Regional Development Assessment Panel Agenda

Meeting Date and Time: Thursday, 30 April 2026; 9.30am
Meeting Number: RDAP/72
Meeting Venue: Shire of Augusta-Margaret River
41 Wallcliffe Road, Margaret River

A live stream will be available at the time of the meeting, via the following link:
RDAP/72 - 30 April 2026 - Shire of Augusta-Margaret River

PART A – INTRODUCTION

1. Opening of Meeting, Welcome and Acknowledgement
2. Apologies
3. Noting of Minutes

PART B – SHIRE OF AUGUSTA-MARGARET RIVER

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Various Lots – Scott River Road, Governor Broome Road and Dennis Road, Scott River – Wind Farm – DAP/25/02933
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART C – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals
2. Meeting Closure

Please note, presentations for each item will be invited prior to the items noted on the agenda and the presentation details will be contained within the related information documentation

DAP Members
Karen Hyde (Presiding Member)
Clayton Higham (Deputy Presiding Member)
Francesca Lefante
Shire President Julia Jean-Rice (Part B – Shire of Augusta-Margaret River)
Cr Greg Boland (Part B – Shire of Augusta-Margaret River)

DAP Secretariat
Ashlee Kelly
Kristen Parker

PART A – INTRODUCTION

1. Opening of Meeting, Welcome and Acknowledgement

2. Apologies

3. Noting of Minutes

PART B – SHIRE OF AUGUSTA-MARGARET RIVER

ITEM 3.1 - VARIOUS LOTS – SCOTT RIVER ROAD, GOVERNOR BROOME ROAD AND DENNIS ROAD, SCOTT RIVER – WIND FARM – DAP/25/02933

Please note that the agenda was formally updated on 22 April 2026 to Version 2 to incorporate the following amendments:

- The list of attachments on page 1 of the Responsible Authority Report (RAR) was revised to include Attachment 8 – Community Petition and Attachment 9 – Applicant response to submissions.
- Attachment 8 was added to the agenda documentation.
- Attachment 9 was added to the agenda documentation.
- Page 24 of the Responsible Authority Report (RAR) has been amended to reference the community petition as located at Attachment 8.
- Page 25 of the Responsible Authority Report (RAR) has been updated to refer to the applicant's response to submissions as located at Attachment 9.

PART B – SHIRE OF AUGUSTA-MARGARET RIVER

1. Declarations of Due Consideration

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Various Lots – Scott River Road, Governor Broome Road and Dennis Road, Scott River – Wind Farm – DAP/25/02933

4. Form 2 DAP Applications

Nil

5. Section 31 SAT Reconsiderations

Nil

Part B – Item 3.1 – Various Lots – Scott River Road, Governor Broome Road and Dennis Road, Scott River – Wind Farm

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Regional Development Assessment Panel
Local Government Area:	Augusta Margaret River Shire
Proponent:	Urbis/SynergyRED
Owner:	Various Landowners – See Attachment 1
Value of Development:	$500 million
Responsible Authority:	Shire of Augusta Margaret River
Authorising Officer:	Nick Logan – Director Sustainable Development & Infrastructure Services
LG Reference:	P225771
DAP File No:	DAP/25/02993
Application Received Date:	22 October 2025
Report Due Date:	20 April 2026
Application Statutory Process Timeframe:	90 Days with an additional 96 days agreed under cl 75(c)
Attachment(s):	1. List of Landowners 2. Development Site Plans 2a. Wind Turbine Envelope Options 2b. Development Concept Plan 3. Development Application Report (including Attachments and technical reports contained as Appendices) 4. Updated Technical reports 4a. Addendum to LVIA 4b. Updated Noise Impact Assessment 4c. Updated Bushfire Risk Management Plan and 4d. Updated Bushfire Management Plan 5. Summary of Submissions 6. Schedule of Submissions 7. Schedule of Referral Responses 8. Community Petition 9. Applicant response to submissions

Responsible Authority Recommendation

It is recommended that the Regional Development Assessment Panel resolves to:

1. **Accept** that the DAP Application reference DAP/25/02993 is appropriate for consideration as a "Wind Farm" land use and compatible with the objectives of the zoning table in accordance with Clause 4.3 of the Augusta Margaret River Shire Local Planning Scheme No. 1;

2. **Approve** DAP Application reference DAP/25/02993 and accompanying plans (Map number 00274 dated 27/2/2026 (Plan 1); Map number 00219, dated 4/09/2025 (Plan 2); plans as contained in the Development Application Report as per Attachment 3 of the Responsible Authority Report with the inclusion of addendum Attachment 4a. and revised plans Attachment 4b, 4c and 4d of the Responsible Authority Report replacing Appendices in Attachment 2 of the RAR of the same title) (subject to modifications) in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and the provisions of the Shire of Augusta Margaret River Local Planning Scheme No. 1, subject to the following conditions:

1. This decision constitutes planning approval only and is valid for a period 5 years from the date of approval. If the subject development is not substantially commenced within the specified period, the approval shall lapse and be of no further effect.

2. The approval is valid for a period of 30 years from the commencement of operations.

3. The development plan is modified to:

    - Relocate Wind Turbine Generators 18 and 19 to the northern side of Governor Broome Road within a designated 'Constraints Based Wind Turbine Envelope' area as depicted on Map number 00274 dated 27/2/2026.
    - Relocate Wind Turbine Generator 1 further south within a designated 'Constraints Based Wind Turbine Envelope' area as depicted on Map number 00274 dated 27/2/2026 to ensure a compliant setback from the approved dwelling or noise sensitive premises at 1610 (Lot 22) Brockman Highway, Courtenay, unless evidence of neighbour agreement is provided.
    - Relocate Wind Turbine Generator 17 to within a designated 'Constraints Based Wind Turbine Envelope' area as depicted on Map number 00274 dated 27/2/2026 to ensure a compliant setback from the approved dwelling or noise sensitive premises at 1165 (Lot 101) Scott River Road, Scott River, unless evidence of a neighbour agreement is provided.

4. The approved development shall be undertaken generally in accordance with the plans and undertakings provided by the Proponent and forming the Application for Development Approval as attached to this report subject to any modifications required as a consequence of any conditions of this approval.

5. This approval is for a maximum of 20 wind turbines with a maximum blade tip height of 250 metres above natural ground level.

6. A minimum blade to ground clearance of 59m above natural ground level shall be achieved.

7. Prior to commencement of works, a micro-siting plan, drawn to scale and provided in a suitable format, shall be submitted for the approval of the Local Government identifying the footprint at ground level, comprising the turbine and its foundation, within which each turbine must be located. The footprint for each

turbine identified in the micro-siting plan, as measured from the centre of the turbine:

a. Must be no more than 100 m in any horizontal direction from the turbine locations as shown on the approved plans; and
b. Must be located within the Constraints Based Wind Turbine Envelope identified on Plan 1 which forms part of this approval; and
c. Must be located 100m from any DBCA managed land, native vegetation, TEC, wetland or covenanted area; and
d. Must not be within 1.1 times blade tip height from non-host lots, reserves located outside the Development Envelope, road reserves, and existing and approved habitable buildings on host lots and non-host lots.

8. Prior to construction commencing, details of all associated infrastructure, access tracks and borrow pits are to be provided to the satisfaction of the Local Government, with works undertaken in accordance with the accepted plan(s). (See advice note 3).

9. The wind turbines and rotors are to be constructed in white or light grey colour in a non-reflective finish.

10. Infrastructure specifically comprising substation and switchyard, operations and maintenance building and workshop, and refuelling locations are to be located at least 100 m from wetland habitat, Threatened Ecological Communities and Department of Biodiversity and Conservation and Attractions managed land.

11. The temporary concrete batching plant shall be located at least 500m from wetland habitat, Threatened Ecological Communities and Department of Biodiversity and Conservation and Attractions managed land.

Technical Reports

12. Once turbine locations and parameters have been finalised, and prior to construction commencing on-site, the Proponent is to submit for approval, to the satisfaction of the Local Government, either:
    a. Updated reports which assess and address the impact of the final turbine locations; or
    b. A technical note from the author of the report or equivalent expert confirming that the change in location of the turbines does not change the outcome or recommendations in the report.

    The reports to which this condition relate are:
        i. Shadow flicker and blade glint;
        ii. Electromagnetic Interference;
        iii. Aviation Impact Assessment; and
        iv. Noise Impact Assessment.

13. An Independent Engineering Certification Report, prepared by a suitably qualified and independent structural engineer, is required to certify:
    a. Prior to construction of turbine foundations: That the wind turbines and their foundations have been designed in accordance with relevant Australian and international standards.

b. Post-construction: That the wind turbines and their foundations have been constructed in accordance with relevant Australian and international standards.

14. Prior to the commencement of works, a Workforce Accommodation Strategy shall be developed in consultation with the Local Government and implemented in accordance with the agreed strategy to the satisfaction of the Shire.

15. Prior to construction commencing, an updated Acid Sulphate Soils and Dewatering Management Plan must be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation.

16. Prior to the commencement of works, a Dieback Management Plan must be prepared to the satisfaction of the Local Government, on advice from the Department of Biodiversity, Conservation and Attractions and implemented thereafter in accordance with the approved plan.

17. Prior to construction commencing, a Water Balance and Water Sourcing Strategy is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation and implemented thereafter in accordance with the approved plan.

18. Prior to construction commencing, a post-development flood model is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation.

19. Prior to construction commencing, a Stormwater Management Plan shall be prepared to the satisfaction of the Local Government and implemented thereafter in accordance with the approved plan.

20. Prior to construction commencing, a site-specific hydrological and geotechnical study is to be prepared to the satisfaction of the Local Government, on advice from Department of Water and Environmental Regulation and Department of Biodiversity Conservation and Attractions.

21. Prior to wind turbine commissioning, an updated Bird and Bat Adaptive Management Plan is to be prepared to the satisfaction of the Local Government, on advice from Department of Water and Environmental Regulation and Department of Biodiversity Conservation and Attractions.

22. Prior to operations commencing, an updated Bushfire Management Plan and Risk Management Plan and submitted to the Local Government for approval, on advice of the Department of Fire and Emergency Services implemented thereafter in accordance with the approved plan.

23. Prior to operations commencing, an Emergency Response Plan shall be developed in consultation with local fire brigades and the Local Government. The Emergency Response Plan shall be implemented at all times during the operational phase to the satisfaction of the Local Government.

24. Prior to operations commencing, an Operational Noise Management and Monitoring Plan shall be approved and implemented to the satisfaction of the

Local Government, upon advice from the Department of Water and Environmental Regulation. The Operational Noise Management and Monitoring Plan shall be made publicly available to the satisfaction of the Shire.

Construction

25. Prior to construction commencing, a Construction Environmental Management Plan shall be submitted to the Local Government for approval. Once approved, the Construction Environmental Management Plan shall be implemented at all times during the construction phase of the Proposal to the satisfaction of the Local Government, upon advice from relevant agencies. (See advice note 4).

26. Prior to construction commencing on-site, a Traffic and Transport Management Plan relating to construction related transport within the Shire of Augusta-Margaret River shall be submitted to the Local Government for approval. The Traffic and Transport Management Plan shall outline the details of any upgrades required by the Proponent and to assess the pavement condition pre and post construction and to rectify and restore the road network and other affected infrastructure following construction, to the satisfaction of the Local Government, in consultation with Main Roads WA. Once approved, the Traffic and Transport Management Plan shall be implemented at all times to the satisfaction of the Local Government for works on local roads, and Main Roads WA for works on State roads.

27. Prior to the commencement of works, the proponent is to enter into a Road Maintenance Agreement with the Local Government, prepared in accordance with relevant WALGA Guidelines, and is to pay to the local government a bond or equivalent acceptable to the Shire sufficient to secure the maintenance and repair obligations contained in the approved Traffic and Transport Management Plan.

28. The Proponent shall ensure the installation of any traffic warning/safety signage in relation to the approved development during the transportation, construction and decommissioning phases is to the satisfaction of the Local Government.

29. Prior to construction commencing, the proponent shall provide details of proposed clearing of native vegetation to the satisfaction of the Local Government.

30. The proponent shall not:
    a. clear more than 1.0 hectare of native vegetation
    b. clear any potential nesting trees for Black Cockatoos.
    c. clear any contiguous native vegetation within 10 metres of the potential nesting trees.
    d. clear more than 0.5 hectares of Moderate to Low quality Western Ringtail Possum habitat, including a maximum of 0.03 hectares of Moderate quality Western Ringtail Possum habitat.
    e. clear any Threatened flora individuals.
    f. clear any Scott River Ironstone TEC

Operational Matters

31. Prior to operations commencing, an Operations Environmental Management Plan shall be submitted to the Local Government for approval. Once approved, the Operations Environmental Management Plan shall be implemented at all times during the operational phase to the satisfaction of the Local Government. The Operations Environmental Management Plan will also include:
    a. Information and contact details of the Operator of the Wind Farm;
    b. A complaints procedure for managing all complaints received, including noise complaints; and
    c. The requirement to maintain a complaints register.

32. Prior to operations commencing, the Proponent shall engage with any affected radiocommunication link operators to identify and implement appropriate mitigation measures.

33. The Proponent is to ensure suitable potable water supply and effluent disposal facilities/infrastructure are designed, installed and maintained for the life of the development in accordance with the Local Government's requirements, upon advice of the Department of Health (if required).

34. Prior to the installation of any in-ground domestic wastewater systems (if required), a Site and Soil Evaluation Report is to be prepared that takes account of the principles of the Government Sewerage Policy (WAPC 2019).

35. Post-construction, the Proponent must provide the Local Government with:
    a. GPS co-ordinates for each constructed wind turbine; and
    b. A plan showing the location of all permanent access tracks.

Decommissioning

36. At least 12 months prior to discontinuation of the relevant approved stage of the development, an updated Decommissioning and Rehabilitation Management Plan is to be prepared and approved to the satisfaction of the Local Government.

37. In conjunction with the decommissioning of the development, the Proponent shall rehabilitate the site in accordance with the updated Decommissioning and Rehabilitation Management Plan.

38. Prior to construction commencing, the proponent shall outline consultation undertaken with host-lot owners including agreement on the scope of works and financial arrangements, and details of consultation with adjoining landowners, the community, local government and relevant government agencies to the satisfaction of the Shire.

39. At least 5 years prior to discontinuation of the relevant approved stage of the development, the Proponent shall outline how funds will be directed into future decommissioning or refurbishment

Advice Notes

1. This is a Development Approval only. The Proponent is advised that it is their responsibility to ensure the proposed development complies with all other applicable legislation, local laws and/or licence/permit requirements that may

relate to the development. This includes the *Biodiversity Conservation Act 2016, Environmental Protection (Noise) Regulations 1997, Environmental Protection Act 1986, Rights in Water and Irrigation Act 1914, Aboriginal Heritage Act 1972, Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and *Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007*, amongst others.

2. For any condition that requires a plan(s) to be submitted to the Local Government, a new and updated plan(s) shall be submitted for each stage of the development, unless otherwise advised by the Local Government.

3. The further detailed plans required by Conditions 7 and 8 must include:
    a. Temporary works required during construction including:
        - Construction compounds;
        - Concrete batching plant; and
        - Materials storage/laydown areas.
        - Borrow pits
    b. Permanent structures and detail, including:
        - Micro-siting of wind turbines, subject to addressing Condition 3;
        - Substation;
        - Operation and maintenance building;
        - Underground cabling map including road crossings; and
        - Service roads and parking.

4. In relation to the Acid Sulphate Soils Dewatering Management Plan, the following information should be included:
    a. Borrow pits shall not intercept groundwater
    b. Dewatering shall not exceed 2mbgl at the edge of the foundations
    c. Dewatering shall not exceed natural seasonal variation by more than 0.1 metres beyond 100 metres from any dewatering location
    d. Dewatering effluent with a pH < 6 and/or total actual acidity (TAA) > 40 mg/L or alkalinity < 30 mg/L must be treated to, at a minimum, the standards specified in the relevant DWER guidelines.
    e. Where infiltration, irrigation or dust suppression is proposed as a dewatering management method, the dewater must:
        i) Be treated prior to use in accordance with item 5(a).
        ii) Be contained within the approved Action Area.
        iii) Be extracted at a rate that does not exceed treatment dosing capacity or compromise the integrity of settlement or containment infrastructure.
        iv) Be disposed of only within the construction footprint and/or on agricultural land.
        v) Where irrigation is proposed, be applied no closer than 50 metres from the Scott River Ironstone TEC and Threatened flora.
        vi) Not result in ponding so as to enable overland flow beyond the immediate area of application, and not enter any wetland habitat, drainage line, the Scott River, the Blackwood River, or any Scott River Ironstone TEC.

vii) Not be discharged, either directly or indirectly, into any wetland habitat, drainage line, the Scott River, the Blackwood River, or any Scott River Ironstone TEC.

f. The dewatering setback requirements are as follows:
    i. Groundwater drawdown must not exceed natural seasonal variation by more than 0.1 metres at any location that is within 100 metres of a dewatering activity.
    ii. If the drawdown limit referred to above is exceeded and this occurs within 50 metres of a wetland habitat, surface water monitoring must be initiated.
    iii. If surface water monitoring shows a reduction in water levels or a deterioration in water quality at a wetland habitat as a result of the action, dewatering activities within 200 metres of the affected wetland must stop.

5. In relation to the Construction Environmental Management Plan, the following information should be included:
    a. A program of works, including timetable for the removal of temporary development after completion of the construction phase.
    b. The location of:
        - Crane hardstand areas;
        - Concrete batching plant, water tanks and any construction compounds and materials storage/laydown areas;
        - Temporary buildings;
        - Temporary access/egress points;
        - Temporary car parking areas; and
        - Cabling.
    c. Address the matters outlined below:
        - Fuel and chemical storage and handling, including spill response;
        - Erosion control and response;
        - Waste management;
        - Dust management;
        - Water management;
        - Waterways protection;
        - Noise and vibration management;
        - Flora and fauna management;
        - Biosecurity management, including weeds and diseases (unless otherwise addressed in the Dieback Management Plan);
        - Land use conflict management, specifically with regard to agricultural activities, as well as the protection of existing fencing around DBCA managed land and mapped TECs
        - Management of mulch/topsoil stockpiles
        - Aboriginal cultural heritage management;
        - Bushfire and emergency response;
        - Requirement for permits/licenses;
        - Rehabilitation of temporary development areas; and
        - Stakeholder and community engagement (including complaints handling processes).

6. With regard to the Operations Environmental Management Plan, the following should be included:
    a. Erosion and sediment control;
    b. Stormwater management;
    c. Dust management;
    d. Water management;
    e. Flora and fauna management;
    f. Biosecurity management, including weeds and diseases (unless otherwise addressed in the Dieback Management Plan);
    a. Aboriginal cultural heritage management;
    b. Waste management; and
    c. Stakeholder and community engagement (including complaints handling processes).
    d. Land use conflict management, specifically with regard to agricultural activities, as well as the protection of existing fencing around DBCA managed land and mapped TECs

7. Any additional wind monitoring mast(s) is to include the following measures as recommended by the Aviation Impact Assessment and by Government agency submissions:
    a. Three marker balls are to be placed on the outside guy wires at the top of the masts;
    b. Guy wire ground attachment points should be in contrasting colours to the surrounding ground/vegetation;
    c. Paint markings should be applied in alternating contrasting bands of colour on the top one-third of the masts, in line with the National Airports Safeguarding Framework Guideline D;
    d. Masts are to be reported to Airservices Australia via the Vertical Obstacle Data Form once mast parameters and locations have been finalised and at least two (2) weeks before construction commencing, to be included on aeronautical maps and charts;
    e. Adjacent landowners are to be notified of obstacles relating to aerial recreation or agricultural activities; and
    f. Suitable ground signage or other warning devices are to be erected at road entrances and key access points around the perimeter of the masts to warn operators of agricultural machinery of the presence of guy wires and other infrastructure associated with the masts.

8. With regard to the Traffic and Transport Management Plan, the following information should be included:
    a. Traffic impact Assessment;
    b. Details of Oversize and Overmass loads;
    c. Swept path analysis;
    d. Haul movements and routes;
    e. Details of any temporary or permanent modifications, works or upgrades required to intersections, roads or site access points;
    f. Pre-construction and post-construction dilapidation surveys; and
    g. Permit /approval requirements, Local Government or Main Roads WA.

9. With regard to the Traffic and Transport Management Plan, Main Roads WA approval and permit requirements may include:
    a. Movements of wind farm components require necessary permits from Main Roads WA's Heavy Vehicle Services (HVS) under the Road

Traffic (Vehicles) Act 2012 complying with the HVS route survey requirements, Oversize Overmass Transport Management Plan (OSOM-TMP); requirements, the Movement of High Risk OSOM Vehicles Policy and the Single Trip OSOM Vehicle Standard Operating Conditions;

b. Proposed works within State road reserves are subject to a separate approval process under the Main Roads Act 1930;
c. All Traffic Control Signal installations, removals, or alterations within Western Australia require approval from Main Roads Network Operations under Regulation 297 of the Road Traffic Code 2000;
d. Main Roads approval for signage and pavement marking modifications is required under the Road Traffic Code 2000; and
e. Any road signs are to comply with Main Roads Policy Application Guidelines for Advertising Signs within and beyond State Roads Reserves under the Main Roads (Control of Advertisements) Regulations 1996.

10. With regard to the Traffic and Transport Management Plan, Local Government approval requirements may include:
    a. Roads to remain open for public use where practicable during road construction/upgrade activities;
    b. Source of and testing results of gravel proposed for use on public roads are to be to the satisfaction of the Local Government; and
    c. Upgrades of the entry points to the Project Site from adjoining public roads.

11. An updated Bushfire Management Plan and Bushfire Risk Management Plan shall be provided together with an Emergency Response Plan to address other potential emergency types such as medical incident response (i.e. ambulance attendance) and storm events shall be developed and provided to the Shire and any forwarded to any agency as required.

12. The development shall be designed and constructed to protect Western Power infrastructure and easements from potential land use conflict. Arrangements should be made to the specifications of Western Power for the provision of necessary electricity easements for the development as and where required. No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power.

13. The Proponent shall immediately advise the Local Government of completion of construction of the development, including completion of any individual stages.

14. The Proponent is strongly encouraged to voluntarily establish and implement a Community Benefits Fund in consultation with the Local Government, consistent with the WA Government endorsed Guideline on Community Benefits for Renewable Energy Projects.

15. The Proponent is advised that:
    a. A clearing permit under the Environmental Protection Act 1986, for the proposed clearing of any native vegetation may be required;
    b. To investigate whether or not approval is required pursuant to the Aboriginal Heritage Act 1972 prior to commencement of any activities or works on site;

c. The transformer associated with each wind turbine shall be located beside each turbine or enclosed within the turbine;
d. All fill placed on the land must be free of disease and weeds;
e. All wind turbine towers are to be fully enclosed (to prevent birds perching or nesting); and
f. There are various Department of Water and Environmental Regulation requirements relating to matters including water licensing, water supply and surface water management including:
    i. A Bed and Banks permit under the Rights in Water and Irrigation Act 1914, will be required for the interference with the bed and bank of any watercourse; and
    ii. A licence to take water under the Rights in Water and Irrigation Act 1914, will be required if it is proposed to take surface water from a watercourse. The proposal is in the Lower Blackwood Surface Water Area and Beenup and Rosa Beenup Groundwater sub-areas.

16. The Proponent is advised that:
    a. Once turbine locations and parameters have been finalised and at least one (1) month before installation of any wind turbines commencing, the Proponent/operator will submit the details of all wind turbines to Airservices Australia via the Vertical Obstacle Data Form;
    b. The updated Aircraft Impact Assessment will include consideration of potential impacts on the Augusta and Margaret River airstrips and proposed mitigation measures (if required) and any additional constraints or requirements identified through further consideration with aviation stakeholders, including aerodrome operators;
    c. On commissioning, the Vertical Obstacle Data Form should be resubmitted to Airservices Australia with the surveyed height and location of each installed turbine and wind monitoring mast; and
    d. On the completion of works, the Vertical Obstacle Data Form should be resubmitted to AirServices Australia and the Department of Fire and Emergency Services with the surveyed height and location of each installed turbine and wind monitoring mast.

17. The Decommissioning and Rehabilitation Management Plan must describe the scope and staging of decommissioning and rehabilitation works, and address the following matters including:
    a. Safety and emergency management;
    b. Environmental management;
    c. Waste management;
    d. A detailed decommissioning schedule or works with timeframes for each stage;
    e. A Traffic Management Plan;
    f. A Bushfire Management Plan;
    g. Sufficient information that clearly outlines any below ground infrastructure to be retained on site and its treatment to allow for continued agricultural use;
    h. Implementation of suitable mechanisms to alert prospective purchasers of retention of any below ground infrastructure which may affect future building locations or development;
    i. Decommissioning and rehabilitation works are required to be completed within 18 months of the turbines ceasing operation to the satisfaction of the Local Government.

j. The Proponent shall rehabilitate the site in accordance with the updated Decommissioning and Rehabilitation Plan which shall be submitted to the Local Government at least 12 months before the wind farm ceases operations.

18. The Accommodation Strategy should include the consideration for accommodation of works including an assessment of options.

19. The Acid Sulphate Soils and Dewatering Management Plan should have regard for the Guideline: *Assessment and management of contaminated sites (DWER 2021*).

20. Works Approval and Licence/Registration under Part V of the Environmental Protection Regulations 1987 may be required in the event the proposed temporary/mobile crushing and screening plant and/or concrete batching plant triggers the prescribed activities outlined within Schedule 1 of the Environmental Protection Regulations 1987. The Proponent is advised to refer to the information and Industry Regulation Guide to Licensing available on the DWER website.

21. The concrete batching plant will need to demonstrate compliance with the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998 irrespective of whether the premises meets the threshold to become a Prescribed Premises as per Schedule 1 of the Environmental Protection Regulations 1987 or not.

22. The following documents provide guidance on the assessment and management of contaminated sites in Western Australia (WA) within the legislative framework provided by:
    a. the *Contaminated Sites Act 2003*; and
    b. the *Contaminated Sites Regulations 2006*; and
    c. the revised national site assessment framework provided in the National Environment Protection (Assessment of Site Contamination) Measure 1999: Guideline: Assessment and management of contaminated sites (www.wa.gov.au).
    d. Further information on Contaminated Sites can be obtained by email (contaminated.sites@dwer.wa.gov.au) or by telephone on 1300 762 982

23. The Proponent is advised:
    a. The Department of Health advises that the treatment and disposal of wastewater generated on site, either temporarily or permanently, is required to comply with the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 and the Government Sewerage Policy 2019 requirements;
    b. A site-specific Site and Soil Evaluation (SSE) should be undertaken by a qualified consultant during the wettest seasonal time of the year (mid-July/August) as per AS/NZS 1547:2012, to ensure the land application area for each wastewater treatment system is appropriately sized and located;
    c. An Application to Construct or Install an Apparatus for the Treatment of Sewage for each onsite wastewater treatment system, temporary or otherwise, will be required to be submitted to the Local Government; and

d. All drinking water provided on site must meet the health-related requirements of the Australian Drinking Water Guidelines 2011.

24. The Proponent should discuss any potential impacts to existing fencing around Department of Biodiversity Conservation and Attractions managed land associated with the Proposal, along with proposed mitigation (e.g. installation of gates), to ensure vehicle and stock access to reserve values continue to be restricted.

25. Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the Proponent has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) or Local Government approval under regulation 17A of the Planning and Development (Development Assessment Panels) Regulations 2011.

26. Should the Proponent be aggrieved by this determination there is a right (pursuant to the Planning and Development Act 2005) to have the decision reviewed by the State Administrative Tribunal. Such application must be lodged within 28 days from the date of determination.

Details: outline of development application

Region Scheme	N/A
Region Scheme - Zone/Reserve	N/A
Local Planning Scheme	Augusta Margaret River Shire Local Planning Scheme No 1.
Local Planning Scheme - Zone/Reserve	General Agriculture
Structure Plan/Precinct Plan	N/A
Structure Plan/Precinct Plan - Land Use Designation	N/A
Use Class and permissibility:	Wind Farm 'A' use
Lot Size:	12 lots totalling 3597ha
Existing Land Use:	Agriculture (grazing)
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☒ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☐ Other
Bushfire Prone Area	Yes
Swan River Trust Area	No

Proposal:

The Project is a large scale wind farm proposed to include up to 20 wind turbine generators with a total capacity of up to 100MW, together with supporting infrastructure. The Project will connect into the South-West Interconnected System (SWIS) via the existing Beenup to Manjimup 132 kV transmission line which passes through the Site.

The Site is located in Scott River, 15km north-east of Augusta. It encompasses 12 freehold lots, part of a Crown Reserve and sections of road reserve with a total area of approximately 3,597 ha. The agricultural use is proposed to continue at the Site and a maximum of 1ha of native vegetation is proposed to be cleared.

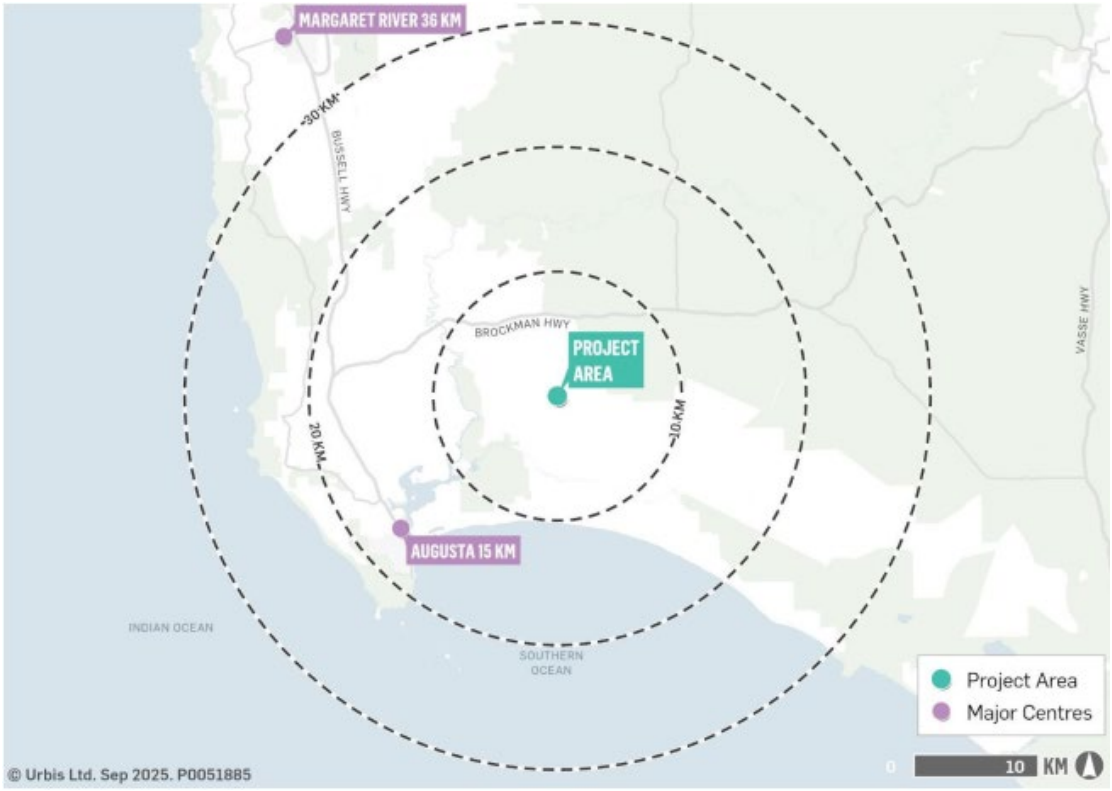


Figure 1: Project Area

The proposed wind turbines have a total maximum tip-height of up to 250 metres. The exact specifications of the wind turbines as well as the specific location of infrastructure, will be confirmed at a later stage after a procurement process and further site investigations. Therefore, the application seeks approval for a development envelope of 3,597 ha as the 'maximum case scenario' in terms of level of impact.

Additional infrastructure for the project located within the Site includes the following:

- Concrete foundations installed up to maximum depth of 5.0m below ground in existing cleared farmland
- Up to two (2) permanent and four (4) temporary wind monitoring (met mast) towers up to 164m tall
- Up to two (2) communications towers up to 100m tall
- One (1) new 132kV electrical substation and switchyard
- One (1) permanent site office, workshop and maintenance building/warehouse with associated lunchroom, amenities and bathrooms including septic systems (Operations and Maintenance building)
- Approximately 30km of gravel capped access road

- A 4.3km transmission line connecting the Wind Farm substation to the existing Beenup to Manjimup 132kV transmission line via a local tee connection
- Approximately 30km of 33kV cables connecting the substation to each WTG, with underground cables preferred unless ground conditions require overhead conductors.
- Temporary laydown and stockpile areas
- Temporary construction compounds
- Temporary concrete batching plants and storage facility
- Water storage tanks and dams
- Borrow pits

The locations of the associated infrastructure have not been documented and have only been included in a concept plan.

The proposal is supported by the following technical studies which have all been based on the 'maximum case scenario' and are included in the Development Application (DA) Report at **Attachment 3**. The attachments listed below are titled as listed in the Planning Report.

- Referral Support Document (Attachment 4 of the DA Report) which includes the following appendices.
    - Surface Water and Hydrogeological Assessment (Appendix A)
    - Preliminary Acid Sulphate Soils and Dewatering Management Plan (Appendix B)
    - Preliminary Decommissioning Plan (Appendix C)
    - Preliminary OSOM Route Study (Appendix D)
    - Desktop Assessment of Subterranean Fauna (Appendix E)
    - Greenhouse Gas Assessment Summary Report (Appendix F)
    - Preliminary Geotech and Baseline Contamination Report (Appendix G)
    - Preliminary Construction Environmental Management Plan (Appendix H)
    - Detailed Flora and Vegetation Survey (Appendix I)
    - Ecological Gap Survey (Appendix J)
    - Basic and Targeted Vertebrate Fauna Survey (Appendix K)
    - Bird and Bat Risk Assessment – Level Two (Appendix L)
    - Desktop Assessment of Short Range Endemic Fauna (Appendix M)
    - Preliminary Bird and Bat Adaptive Management Plan (Appendix N)
    - Shadow Flicker and Blade Glint Assessment (Appendix O)
    - EMI Assessment (Appendix P)
    - Aviation Impact Assessment (Appendix Q)
    - Social Values Assessment (Appendix R)
    - Noise Impact Assessment (Appendix S)
    - Landscape and Visual Impact Assessment (Appendix T)
- Bushfire Management Plan (Attachment 5 of the DA report)
- Bushfire and Risk Management Plan (Attachment 6 of the DA report)
- Transport Impact Statement (Attachment 7 of the DA report)

The Proposal was updated as a response to issues raised through the assessment, with the following attachments forming part of the approved plans:

- Addendum to the Landscape and Visual Impact Assessment (Attachment 4a)
- Updated Noise Impact Assessment (Attachment 4b)
- Updated Bushfire Risk Management Plan (Attachment 4c)

- Updated Bushfire Management Plan (Attachment 4d)

Proposed Land Use	Wind Farm 'A'
Proposed Net Lettable Area	N/A
Proposed No. Storeys	N/A
Proposed No. Dwellings	N/A

Background:

The Site and surrounding area are primarily used for dairy and beef farming, as well as existing blue gum and future pine plantations. It is zoned 'general agriculture' under the Shire's Local Planning Scheme No.1 (LPS1). The Site is mostly cleared with isolated areas of remnant native vegetation including areas designated as Threatened Ecological Communities (TECs) under the *Biodiversity Conservation Act (WA, 2016)*.

The Site and surrounding area is of a broadly uniform flat landform with little topographic variability, ranging from 9m AHD in the southwest to 38m AHD in the northeast. The Site is subject to a high-water table, poor drainage and is prone to flooding or standing water in low lying areas in the winter months. There are varied size lots surrounding the project area, with some lots in the order of 10-20ha to 50-100ha size lots containing dwellings, and other larger 200-500ha agricultural lots. Dwellings are shown in the Figure 2 below.

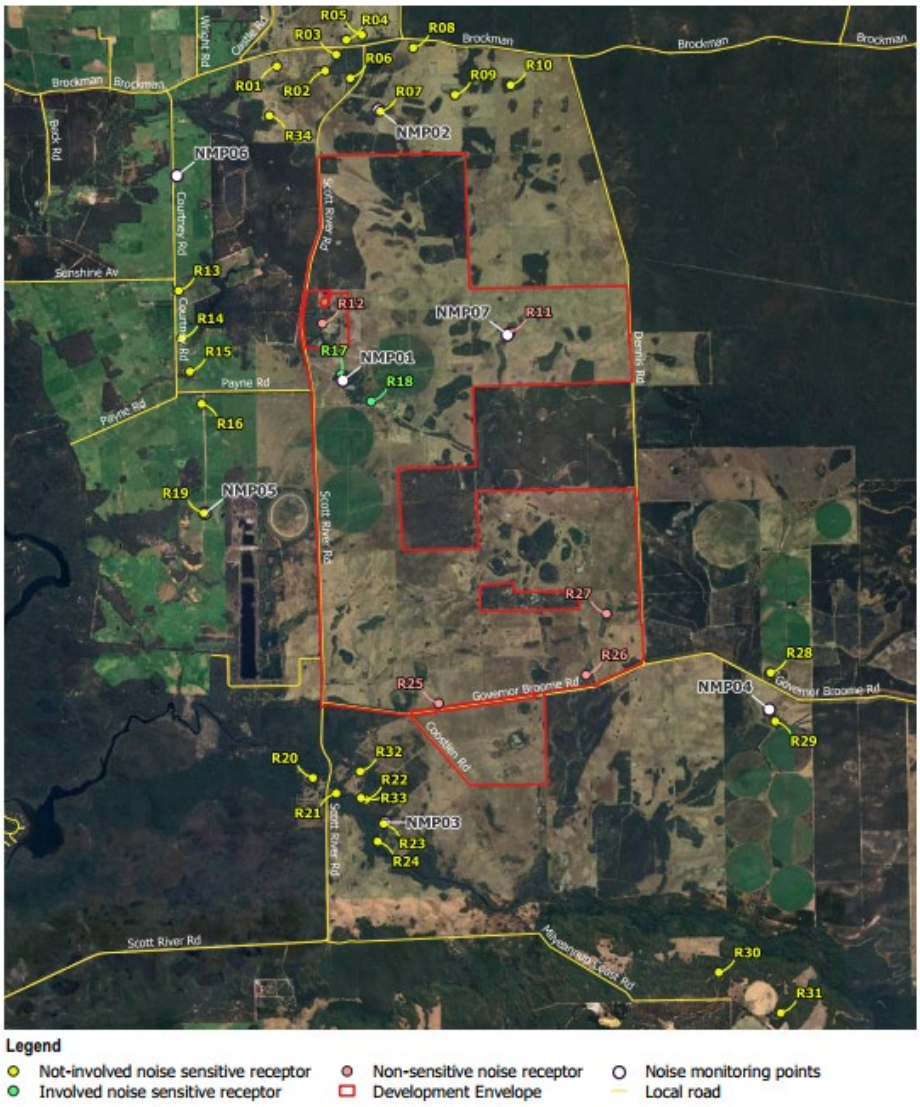


Figure 2: Dwellings near the project site.

There are several state reserves within and surrounding the project area with the Scott River National Park to the west of the Site and the Blackwood River National Park to the north. It is located approximately 5km from the coastline. The project area crosses two state reserves due to access tracks for the development crossing battleaxe access roads to these lots.

The list of landowners can be found at **Attachment 1.**

Figure 3 shows the land assembly for the Site including the initial concept plan submitted as part of the application.

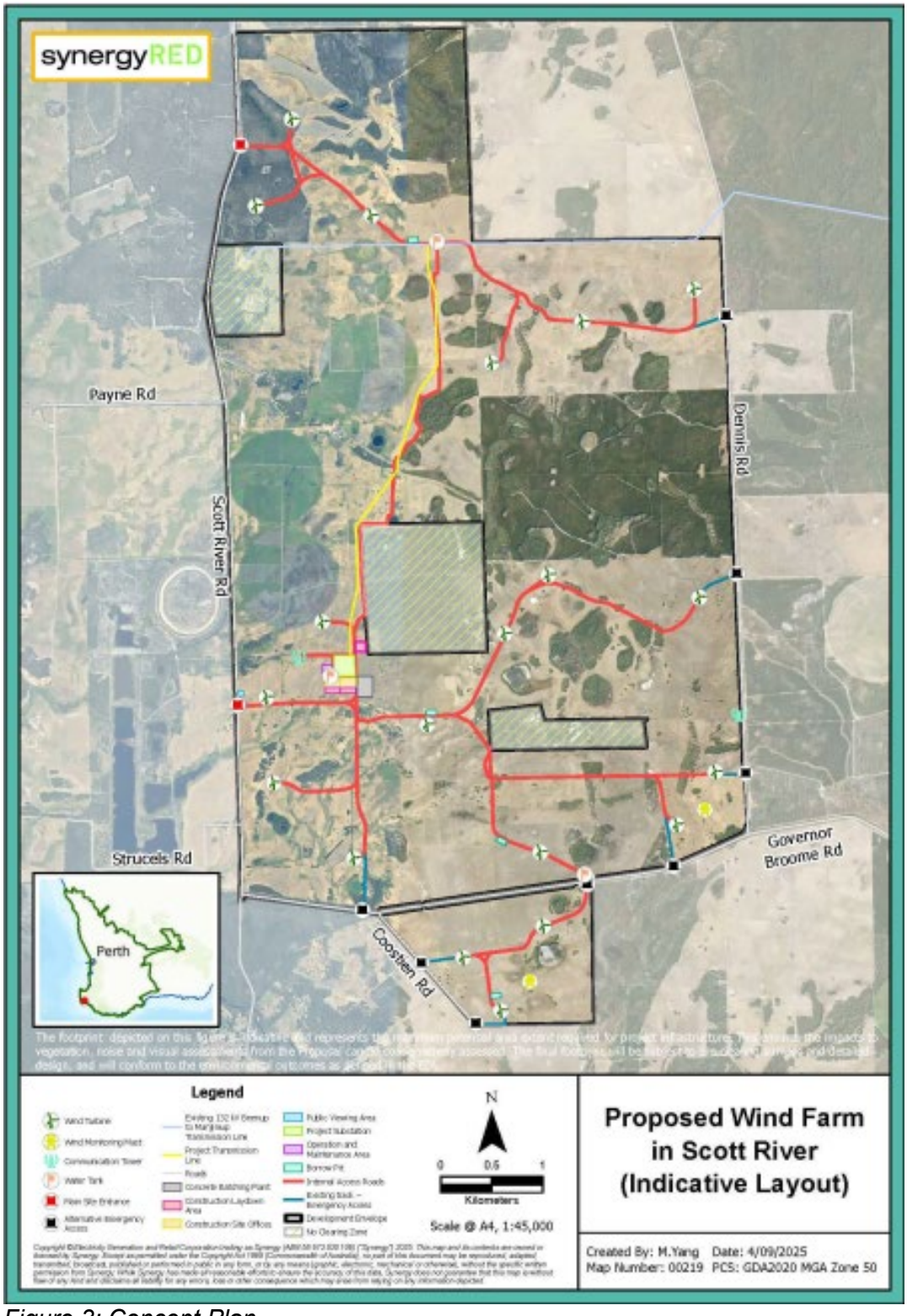


Figure 3: Concept Plan

The Site has been selected by the proponent based on detailed investigations which determined its suitability for a proposed renewable energy project.

- The strong wind resource and diurnal wind profile that compliments the electricity demand profile
- Proximity to the existing 132kV transmission line that traverses the site, being the Western Power Beenup to Manjimup transmission line

- The flat topography of the project area
- The site is largely cleared and only contains small pockets of remnant, good quality vegetation
- Access to the site via the Regional road network from Bunbury Port, with minimal upgrades required

There are no previous Development Assessment Panel (DAP) applications or approvals associated with the Project Site. The Site is located adjacent the rehabilitated 'Beenup' BHP Titanium Mineral Sands extraction site. Extraction ceased at the Beenup Site in the late 1990's with ongoing efforts to monitor and control resultant acid sulphate soil issues continuing to this day.

There are numerous relevant 'sensitive receptors', principally dwellings and approvals for additional receptors that have not been acted on within the Site and its surrounds. The implications are documented within the body of this report where relevant.

Legislation and Policy:

Legislation

- *Planning and Development Act 2005* - Part 11A Development Assessment Panels and Development Control.
- *Planning and Development (Local Planning Schemes) Regulations 2015* – Deemed provisions for advertising, consultation and assessment.
- *Planning and Development (Development Assessment Panels) Regulations 2011*
- *Shire of Augusta Margaret River Local Planning Scheme No.1*
- *Environmental Protection Act 1986* and *Environmental Protection (Noise) Regulations 1997*
- *Rights in Water and Irrigation Act 1914 – water licencing including 5C licence to take groundwater/dewater.*
- *Biodiversity Conservation Act (2016) – authorisation for potential indirect impacts to Threatened Ecological Communities (TEC) and threatened and priority flora and fauna.*
- *Environmental Protection Act 1986 – works approval for prescribed premises.*
- *Aboriginal Heritage Act (1972) s16 and 18 and Regulation 7 and 10.*
- *Environmental Protection and Biodiversity Protection Act (1999, Cth) s75 and 77.*

State Government Policies

- State Planning Strategy 2050
- State Planning Policy 2.0 – Environment and Natural Resources
- State Planning Policy 2.5 – Rural Planning
- State Planning Policy 2.9 – Water
- State Planning Policy 3.7 – Bushfire
- Draft Renewable Energy Planning Code

State government position statements and guidelines

- WAPC Position Statement 2020 – Renewable Energy Facilities
- WAPC Position Statement: Dark Sky and Astrotourism (2022)

- Visual Landscape Planning in WA
- DEED Community Benefits Guideline for Large-scale Renewable Energy Projects in the Southwest Interconnected System

Local Policies

Shire of Augusta Margaret River Local Planning Strategy 2036
Shire of Augusta Margaret River LPP23 – Large-Scale Renewable Energy Facilities

Consultation:

Public Consultation

In accordance with Clause 64 of Schedule 7 of the *Planning and Development (Local Planning Schemes) Regulations 2015*, the application was advertised for a longer period of 28 days (longer than the 14 days required under 64(7) of the deemed provisions) as agreed between the Shire and the proponent.

Advertising was undertaken from 21 November – 22 December 2025 and included the following methods:

- Advertised on YourSay for 28 days
- Letters sent to all residents within 15km radius of site (including Shire of Nannup residents)
- Facebook posts
- Website News Item
- Display at Augusta Shire Office
- Notice in Pelican Post (Augusta local paper)
- Notices and Tender's each week the consultation was open.
- 2OceansFM radio ads for the period of the consultation.

A total of 567 submissions were received - 405 object to the proposal, 155 support and 7 are indifferent.

A further 53 objections were received one month after the consultation closed. These are noted but are not formally included in the schedule of submissions.

40% of submitters are from Augusta. With strong opposition from the closest and most affected residents in the suburbs of Scott River, Nillup, Courtenay, Warner Glen and Alexandra Bridge. See **Attachment 5** for chart showing responses divided by suburb.

Due to the volume and commonality of issues raised, submissions have been summarised and grouped by theme. All submissions have been read and considered in the assessment of the proposal and all planning-relevant issues addressed. A full schedule of submissions is provided at **Attachment 6.**

Comments from those in support included the following:

- Urgent action on climate change through reducing greenhouse gas emissions by transitioning from fossil fuels to renewable energy.
- Support for the broader renewable energy transition as essential to replace ageing coal and gas generation.

- Improved energy security and local power reliability, particularly for Augusta and end-of-grid communities.
- The site is suitable due to strong wind resources, low population density, existing transmission infrastructure and minimal additional clearing.
- Economic and community benefits including local jobs, regional investment, community benefit funding and potential lower electricity prices.
- Compatibility with agriculture, allowing turbines to coexist with farming and support land-use diversification and farm viability.
- Acceptance of visual change as an unavoidable but acceptable trade-off for long-term environmental and energy benefits.

Below is a table of main themes of the objections listed with the most common at the top, and the number of respondents who mentioned this as a concern. A table showing theme groupings can be found at **Attachment 5**. Themes have been grouped together below for rationality.

Issue Raised	**Officer comments**
Lack of certainty and not enough detail in the application (218) - Proposal highly conceptual with no final layout limiting ability to assess impacts. - Uncertainty regarding construction and dewatering and resulting environmental impacts. - Reliance on future studies/management plans that should be assessed at application stage.	The proponent provided an initial concept plan of which the supporting technical studies are based on. Many of the supporting technical reports require greater certainty through management plans to be finalised post approval. SynergyRED have provided an updated plan proposing 500m radius development envelopes for micro siting. The lack of certainty is considered in the planning assessment below.
Landscape and Visual Impact (218) - Disturbance of landscape character of Scott River and views from Augusta. - Visual dominance due to the scale of turbines. - Inadequate visual impact assessment and presentation/representation of real impacts. - Impact on tourism due views from Augusta and resulting economic impacts.	The proposed wind farm will be able to be viewed from Augusta, which faces the direction of the wind farm from a distance of around 15km. The proponent has provided an updated LVIA during the assessment process to try and address community concerns around visual impact. The landscape and visual impact is discussed in detail in the planning assessment of the report. Economic impact is not a valid planning consideration except in restricted circumstances that don't apply to this proposal.

Impacts on waterways and groundwater (160 with 131 mentioning ASS (Acid Sulphate Soil risk)) - ASS risk and its impacts on groundwater, waterways and TEC's - Concern from ASS due to history of the Beenup mine site. - Construction impacts on groundwater levels and surface water flow paths. - Insufficient baseline data, seasonal surveys, groundwater modelling to define risks/impacts to waterways, TECs and wetlands.	The site has a high-water table and a moderate - high acid sulphate soil risk. There have been no site-specific studies carried out within the proposed development envelopes due to the conceptual nature of the proposal, though some testing has occurred on which to base modelling. The remediated Beenup mine, a contaminated site, adjoins the project area. It is not predicted that the proposal will interact with the contaminated site, however it shows the demonstratable risk of ASS in the area. Discussion in detail in the relevant section of the planning assessment below.
Impacts on biodiversity and general environmental impact (147) - Clearing/fragmentation of native vegetation with high biodiversity value. -environmental risks have not been adequately assessed. -benefits from renewable energy do not outweigh risk of permanent environmental harm. - Groundwater dependent vegetation including TEC's being impacted by development including dewatering. - Endangered fauna being impacted by development.	The proponent is proposing to clear up to 1ha of native vegetation, although is not determined exactly where for all areas due to variable location for infrastructure in the application. The Federal DCCEEW decision under the EPBC Act contains specific restrictions on clearing to address Matters of National Significance. This will go towards minimising impact on endangered fauna (western ringtail possum). There is a high risk of disturbance of ASS. See discussion below regarding assessment of risks of ASS below. TECs occur within the Site, further discussion regarding impacts of dewatering and ASS on TECs are discussed in detail below.
Noise (123) - Insufficient setback to dwellings and impacts on amenity of neighbouring lots. - Lack of independent monitoring and reporting of noise.	Setbacks to dwellings is controlled through the Noise Regulations as well as through the Shire's LPP23 which has a setback for visual impact. Proponent has demonstrated project can comply with the Noise Regulations with the

- Health and wellbeing impacts from turbines (56) - Impact from infrasound/low frequency noise (51).	exception of an undeveloped chalet approval on Scott River Road. There is a variation to the policy for visual impact for two separate undeveloped chalet approvals. There are no conclusive studies of health impacts of infrasound. Noise and amenity impacts are discussed in the planning assessment below.
Agriculture (109) - Loss of productive agricultural land and disruption to farming operations. - Impacts on livestock including animal welfare from construction and noise/vibrations from turbines. - Use of groundwater resulting in lower water table and poor water quality (ASS) impacting agricultural use.	Wind farm is a permitted use in the general agricultural zone. The agricultural use of the land is proposed to continue around the development. There are no conclusive studies of health impacts of noise or vibrations to livestock. Further details are required form the proponent as a condition of approval to help minimise impacts of agricultural land and construction impacts on livestock.
Insufficient Consultation (64) - Consultation was inadequate and tokenistic, with affected landholders reporting little or no direct engagement - The proposal lacks transparency and sufficient detail for meaningful input - Community trust and social licence have been undermined with public opposition ignored.	Community consultation outside of the requirements in the planning regulations is not captured in the planning framework. The Shire's LPP23 sets expectations for developers that align with the WALGA and CEC guidelines and it is generally in the interest of the proponent to carry out sufficient consultation. The social values assessment in the application fell short in adequately addressing social impacts. The Shire had raised concern regarding the lack of responsiveness of the proposal to community concerns, this has been somewhat resolved through an updated LVIA to minimise visual impact, however further work could be done in this regard. An assessment of landscape impact is in the discussion below.
Bird and Bats (57) - Inadequate surveys and insufficient data to measure impacts on bird and bats.	Impact on Bird and Bats was assessed by the EPA, with an updated peer reviewed BBAMP provided. DCCEEW referral resulted in additional controls, and there is now a minimum 59m blade height to avoid impact to black cockatoos and migratory birds.

- Habitat fragmentation and construction disturbance, causing displacement. - Collision risk, particularly for raptors, migratory species, bats and coastal birds. - Low-frequency sound, vibration and potential electromagnetic fields may impact behaviour.	The proponent is required to carry out ongoing monitoring and adaptive management with triggers and thresholds listed. Discussed in further detail below.
Bushfire (42) - Turbines would restrict aerial firefighting. - Increase complexity of emergency response to the area such as access and firefighting capability. - Fire ignition risk from turbines.	Proponent has demonstrated that can meet relevant guidelines for mitigating bushfire risk. A further emergency response plan is to be provided and shall be developed in consultation with local fire brigades to manage the complexity of fire response in the area and minimal resources. Further comment in discussion below.
Impact of Decommissioning (41) - Blades cannot be recycled. - Environmental contamination from degradation of materials - No financial guarantee for clean-up.	Decommissioning practices are changeable as the industry and technology evolves. A decommissioning plan shall be provided prior to the end of life of the turbines. Any environmental contamination will need to be addressed thorough the environmental management plan contained in the Operational Management Plan. The Shire would seek evidence of legal arrangement or setting aside of funds to ensure that clean up can be guaranteed.

Aside from the formal consultation, the Shire received a petition in September 2025 containing 1377 signatures objecting to the proposal. The wording of the petition can be found at **Attachment 8**.

Referrals/consultation with Government/Service Agencies

The application was referred to the following government agencies in according with the planning and Development (Local Planning Scheme) regulations 2015:

- Department of Planning, Lands and Heritage (DPLH)
- Department of Water and Environmental Regulation (DWER)
- Department of Primary Industries and Regional Development (DPIRD)
- Department of Biodiversity, Conservation and Attractions (DBCA)
- Department of Health (DOH)

- Department of Fire and Emergency Services (DFES)
- Department of Energy and Economic Diversification (DEED)
- Western Power
- Main Roads WA (MRWA)
- Civil Aviation Safety Authority (CASA)

A summary of the main issues raised by each agency are provided below. More detailed comment on these issues are contained in the following planning assessment section. A full schedule of referral responses is found at **Attachment 7.**

A submission form the applicant regarding issues raised is found at **Attachment 9**.

DPLH Comments made on landscape and visual impact assessment (LVIA) • Further analysis advised including provision of additional viewpoints, photomontages and numbering of turbines. • Recommendations for mitigation of visual impact including relocation of turbines and landscape screening. • Recommended that some turbines are relocated, with the specific altered layout dependent on further analysis and the consideration of further images of views from important locations that were not initially assessed. • Comment that Social Values Assessment Report does not adequately address the social impact of the proposal. Review public submissions to gain more comprehensive overview.	The proponent provided additional information to the LVIA and has responded to the DPLH comments. Included additional analysis and photo montages from key viewpoints and resulted in the relocation of 5 turbines. This is discussed in greater detail in the relevant section of the planning assessment below.
DWER • Water supply/demand yet to be determined, condition for water Sourcing Strategy. • Post-development flood model and stormwater management plan required as condition of approval. • Insufficient information provided to determine if prescribed premises for borrow pits and concrete batching plant. • Condition for Construction Environmental Management Plan (CEMP), to include	Condition for water sourcing strategy. Condition for post development flood model and stormwater management plan.

emergency and contingency response actions e.g. for spill or erosion/sediment. • Potential contamination and ASS - Condition for Acid Sulphate Soil Dewatering Management Plan (ASSDMP) - Beenup Mines considered - Preliminary plan adequate and generally consistent with the DWER ASS guidelines. • Preparation of Bird and Bat adaptive management plan (BBAMP) **Environmental Noise branch** • Compliance with noise regulations can be achieved however assumes no intrusive characteristics • Modulation characteristic likely to be present and should be addressed at DA stage.	Condition for updated CEMP to include these measures. ASSDMP condition applied. Condition for BBAMP. Proponent provided updated NIA to address modulation characteristic. Updated NIA to reflect final turbine layout.
DPIRD Included comments from Southwest Development Commission • Need for accommodation strategy • Aviation impact assessment did not consider MR and Augusta Aerodromes • Enables continuing ongoing agricultural operations, but any disturbance should be mitigated where possible. • Reviewed CEMP - essential to outline biosecurity and erosion measures to maintain agricultural use.	Condition for Accommodation strategy Updated AIA as condition of approval, with further consultation to take place with affected stakeholders. Agricultural management plan including farm management measures applied as condition. Condition for updated CEMP to include biosecurity and erosion measures.
DBCA • Visual amenity impacts from DBCA managed lands. Some clarification required to VIA. • 50m buffer should be applied to all recorded threatened species.	Final position to be on advice of DBCA and DWER Condition. Condition setback.

• Dewatering impacts on TEC's, minimum 100m setback recommended. • Recommend a site-specific hydrological study is undertaken • ASSDMP should be updated in consultation with DBCA to mitigate impacts to TECs. • Note impacts on threatened fauna, including bird and bats. Recommend 100m buffer to remnant vegetation. BBAMP updated in consultation with. • Dust impacts, recommend a 500m buffer from DBCA managed land, TEC and wetland habitat for concrete batching plant. • Recommended updated to Construction Environmental Management Plan	Condition for site specific hydrological study. Condition for ADDSMP Condition 100m buffer to vegetation. Condition 500m buffer to concrete batching plant. Synergy committed to 500m buffer from concrete batching plant
DOH Temporary concrete batching plant considered a potentially contaminated land use. Recommend the proponent provide management details of the proposed batching lant, including contingency measure and actions.	Concrete batching plant may require licensing under DWER as a prescribed premises. There is insufficient information as to whether this will be of a size to be regulated. Management details as a condition of approval.
DFES Assessed proposal against SPP3.7 and the CFA Guidelines. Some minor modifications and clarification recommended.	Proponent has provided updated BMP and BRMP in response to DFES commented. Condition for update required following final layout.
DEED Need for new generation capacity in the SWIS to meet energy demand due to retirement of facilities, growth in peak demand and overall consumption. In advance of upgrade of transmission lines, they are supportive of projects that can connect to the existing network making use of available capacity. Community benefits should be in line with Powering WA guideline.	Noted. Community benefits advice note applied.
Western Power	

Proponent has been progressing development with agency. Further details required prior to commencement of works to finalise connection stages, access etc.	Advice note applied for arrangements to be made with Western Power.
MRWA No issues	Noted.
CASA • Impacts to Busselton Aerodrome • Impacts on 2 uncertified aerodromes within 3 nm • Activity will penetrate current airspace. Details to be sent to ASA of final design prior to construction. • Recommend installation of obstacle lighting	Advice note regarding notification to ASA. Lighting of the WTG at night is not required under the guidelines and has visual management implications. Discussed below.

Other Advice

EPA Western Australia (EPA)

The proponent referred the proposal to the EPA who, on 8 December 2025, issued a decision under 38(g)(1) of the EPAct (WA) to not assess the proposal with public advice given. In the assessment process further information was requested by the EPA regarding the Bird and Bat adaptive management plan, with a peer review carried out and amended plan provided to the satisfaction of the EPA. The EPA considered cumulative impacts of the proposal and that potential environmental impacts can be regulated by other decision-making processes.

A list of decision-making processes to take into account in the development assessment under the Planning and Development Act were provided, including recommendations for conditions as follows:

- The proposal has the potential to impact on the environmental, social and visual amenity values within the local area.
- Due regard can be given to the environmental and social impacts in the assessment of the proposal.
- Recommend a condition of approval for an ASSDMP.
- The DA may assess and regulate impacts relating to noise.
- Implementation of Bird and Bat MP as a condition of approval.
- Other impacts can be mitigated through conditions of the development approval.

Department of Climate Change, Energy, the Environment and Water (DCCEEW)

The proponent referred the proposal to DCCEEW with a decision made on 27 February 2026 that the Proposal is not a controlled action if taken in a particular manner. The particular manners listed are to avoid impacts on threatened species and communities and listed migratory species. It includes measures to be carried out relating to clearing

of vegetation, wind turbine construction, dewatering and ASS. These are discussed in further detail below in the relevant sections.

Planning Assessment:
The proposal has been assessed against all the relevant legislative requirements of the Scheme, State and Local Planning Policies outlined in the Legislation and Policy section of this report. The following matters have been identified as key considerations for the determination of this application:

1. Current policy environment.
2. Land use permissibility
3. Lack of certainty in the Proposal.
4. Landscape and Visual Impact.
5. Impacts on Waterways and Groundwater.
6. Impacts on Biodiversity and TECs
7. Birds and Bats
8. Noise and Amenity
9. Agriculture
10. Bushfire

There are various factors that interrelate between some of these key considerations. In particular, setbacks to dwellings are addressed through both Landscape and Visual Impact and Noise and Amenity.

1. Current policy environment

Critical to determination is an active consideration of the relevance of a convoluted and fractured policy and legislative framework for this decision. Until recently, there has been a notable absence of any supportive policy framework against which to assess large scale wind farms for use by decision makers in Western Australia. The need for policy development of this type would have been evident to the WAPC since at least 2020 when the State Climate Change Policy was released which creates a target of 'net zero' emissions by 2050. The 'Sectoral Emissions Reductions Strategy for Western Australia' released by the State Government in 2023, sets out in greater detail how the energy sector would transition to achieve the net zero target, including a 2022 commitment to retire all state-owned coal fired electricity generation by 2030 and a $3.8billion commitment to low carbon generation including wind. In this context, the subsequent spike in wind farm proposals lodged for planning approval should have been anticipated and planned for.

The WAPC's draft Renewable Energy Code released for public consultation in December 2025 provides some useful additional guidance, which is focused on matters of detail (expressed as 'development standards') rather than a strategic approach to wind farm locations, which would allow local communities to have early input into where such structures are appropriate, considered side by side with practical considerations regarding wind availability, connection to the grid, need for land clearing, population density, local economic drivers and other factors. The State policy environment (or lack thereof) requires developers to take on considerable risk and provides communities with no oversight of whether such proposals are being considered for their area, until a formal proposal is lodged – an approach that sits distinct from other jurisdictions in Australia. As a result, the assessment of large-scale renewable energy projects is limited to a site-by-site process that is inherently

constrained, given the magnitude and complexity of impacts associated with developments of this scale.

In this context, the Proposal is considered in the absence of strategic policy which raises significant challenges in the planning assessment. It also is likely a contributing factor in the level of community objection, where there is a common theme of insufficient consultation and ignored input, which is a clear result of the lack of forward planning to prepare communities for change and set expectations.

The Shire developed Local Planning Policy 23 (LPP23) to guide the assessment of the proposal partially to fill the gap in state government policy. The LPP23 was finally adopted by council in March 2026. Whilst public consultation was being undertaken on the draft LPP23, the State released the draft Renewable Energy Planning Code (Code). The LPP23 was updated post consultation to reflect community submissions and align with the draft Code to be consistent with the State's intent. The draft Code outlines the predominance of the Code over any LPP where there is conflict, however this requires a change in the planning regulations and final adoption of the Code which has not taken place yet. Furthermore, the draft Code provides for an LPP to reflect local specific context.

The WAPC's Position Statement (2020) on Renewable Energy Facilities is currently the main policy at a State level and allows for the development of local planning policies to provide specific development standards. Given that LPP23 is now a final document created with a significant amount of community consultation, it holds that it should be granted significant weight in the assessment. It is noted that previous DAP decisions have given limited weight to LPPs however:

- LPP23 must be given due regard under 67(g) of the deemed provisions. This requires active consideration and if a standard is departed from, there must be a compelling reason to do so.
- LPP23 has been developed with extensive consultation, known to the proponent through the assessment process and provides rational, objective measures for assessment.

Some key points regarding weighting of policies:

- State planning policies/instruments will take precedence over local planning policies where there is any inconsistency.
- Draft policies or planning instruments can still be given weight even though they are not operative. Weight is given to a draft-planning instrument as 'seriously entertained' after advertising is completed – the further towards approval the document is, the more 'seriously entertained' it is considered to be.
- How much weight a planning policy has is determined by factors such as when it was adopted, whether it was foreshadowed at lodgement and procedural fairness (whether the proponent had an opportunity to respond to the new policy if it materially affects the assessment).

LPP23 should have considerable weight compared to that of the draft Code for which consultation finished on the 10 April 2026, although in practice the two are largely complimentary. The draft Code contains provisions that expressly set out the position that once adopted it will be the dominant consideration in large scale renewable energy policy, however this situation has not been arrived at.

For clarity, the hierarchy of planning weight considered under Planning and Development Act (2005) is detailed in the table below.

	Weight	Comment
AMR Shire Local Planning Schemes No.1 and No.2	Statutory weight LPS1 - 'Wind Farm' as an 'A' use in the General Agriculture Zone Draft LPS2 – 'Renewable Energy Facility' as an 'A' use in the Priority Agriculture Zone.	
State Planning Policies ***SPP2.0 Environment and Natural Resources*** ***SPP2.9 Water*** ***SPP2.4 Rural Planning*** ***SPP3.7 Bushfire***	Due regard documents	Have been considered in the relevant discussions below.
WAPC Position statement – Renewable Energy Facilities	Due regard document	Shows government intent yet lacks detail and is not fit for purpose.
AMR Shire LPP23 – Large-scale renewable energy facilities	Due regard. Final document approved by council March 2026. Can be seriously entertained.	Consistent with WAPC Position Statement which allows for LPPs to provide specific development standards.
AMR Shire Local Planning Strategy	Due regard	
State's draft Renewable Energy Planning Code	Draft only, consultation completed 10 April.	Still in initial stages with questions of how 'seriously entertained' it is. Gives indication of contemporary state government intent but known to have several provisions under dispute.
Community benefit Guidelines	No weight in planning framework.	Not able to be added as condition but expectation from Shire and community for provision of benefit.

Other legislation that interacts with assessment:

	Purpose	Comment
Environmental Protection Act (1986) (EP Act)	EPA/DWER oversight - Regulate native vegetation clearing and impacts associated with loss of fauna habitat, environmentally sensitive areas. Impacts on bird and bats (EPA)	EPA review proposal under the EP Act and decided not to assess proposal. Clearing permit required with DWER
Environmental Protection (Noise) Regulations (1997)	Puts limitation on setback of wind turbines form dwellings.	Proponent takes own commercial risk for compliance.
Right in Water and Irrigation Act (1914) (RIWI Act)	DWER oversight Regulate dewatering and impact on water ways, including from ASS.	Provision of ASSDMP required under Act.
Biodiversity Conservation Act (2016) (BC Act)	DBCA oversight Regulate harm to any threatened flora and fauna and threatened ecological communities.	Recommended setbacks to TECs and threatened flora.
Environmental Protection and Biodiversity conservation Act (1999) (DCCEEW)	Protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places	DCCEEW has decided not to assess the proposal if carried out in a particular manner. Controls around protection of threatened species.

2. Land Use Permissibility

Provision	Requirement	Proposal	Assessment
LPS1 – Zoning Table	Wind Farm listed as an 'A' use in the General Agriculture Zone	Wind Farm and associated infrastructure.	Permitted development in the General Agriculture zone.
Schedule 9 – Development Requirements	30m/20m setback from boundary	1.1 times blade length	Complies
Building Height 5.13	No requirement for wind turbines provided that sited not to	250m	See discussion on landscape and visual impact below.

	detract from the visual amenity of the locality		

The relevant aims of the Scheme are to:

- Protect biodiversity and apply the precautionary principle.
- Permit development that maintains the overall rural and natural landscape and visual qualities of the Scheme Area.
- Discourage any land uses and developments which would detract from the principal function of the land for agriculture.

The purpose and objectives of the General Agriculture Zone are:

- To provide for agricultural activities complemented by other ancillary uses which do not detract from the primary use of the land for agricultural purposes
- Incompatible land use proposals should not be permitted
- To preserve the established rural character and amenity of the land, consistent with ongoing agricultural use

The use of the precautionary principle to protect biodiversity is subject to further management plans to mitigate environmental risk, see discussion on waterways and biodiversity below. The proposal is generally consistent with the objectives of the zone, further detailed discussion in the landscape and agriculture sections below.

3. Lack of certainty in the Proposal

Development approval, as an approval to undertake a particular development and/or use, is typically within a spatially defined geographical location. Because of the suite of considerations which form part of any development assessment process, it is necessary to identify with reasonable specificity where such use or development will be located.

The predominant concern arising from public consultation was the conceptual nature of the proposal and the resulting uncertainty regarding construction and dewatering methods, the associated environmental impacts, and the reliance on future management plans as the primary mechanism for impact management.

Language used and details provided throughout the application are unhelpful in this regard. The ‘concept plan’ initially provided for approval (**Attachment 2b**) shows 20 turbines located within a 3597ha development envelope. This plan was subsequently replaced by the plan included as **Attachment 2a** which includes minor turbine relocation and responds, in part, to the draft Code and LPP23 requires for minor variation only to turbine location through ‘micro-siting’. Due to the theoretical nature of the initial proposal, much of the supporting documentation provided is preliminary in nature and does not provide certainty as:

- The location of access tracks and associated infrastructure has not been finalised.
- The specific visual impacts cannot be accurately modelled.
- Ground conditions at specific sites have not been studied to determine if environmental risk can be sufficiently avoided.

The proposal relies heavily on the imposition of conditions to finalise critical aspects of the project. This approach has been attributed to the cost of resolving all outstanding matters upfront without certainty of approval, a situation that is itself reflective of the absence of strategic policy direction at the State level.
Referral agencies, including the federal DCCEEW, the State EPA and DWER, have relied on the imposition of conditions to address further detail. This introduces an additional level of complexity to both the assessment and the DAP decision-making process. Consideration must be given to whether proposed conditions would defer the approval of unresolved matters in a manner that could substantially change the nature of the development, as contemplated by Section 74 of the Deemed Provisions. Whether such unresolved matters would result in a substantial change is context and scale-dependent and must be assessed on a case-by-case basis. It is relevant here that a condition cannot defer for later consideration, a non-incidental aspect of a development. What is considered non-incidental is a matter of fact and degree and includes factors measured as central aspects of a proposal such as significant environmental risk.

In this context, the contents of a management plan can be critical to the decision of whether a development application should be approved or refused. The incorporation of management plans into conditions can raise the issue of whether an otherwise inappropriate development is being approved. In this instance, the Acid Sulphate Soil Dewatering Management Plan (ASSDMP) is critical to the acceptability of the development and is discussed in the relevant section below.

Micro-siting

To some extent, the lack of specificity provided with the application is anticipated by the State's draft Code which recommends that building envelopes of a circular nature and with a radius of 100m be identified allowing for some flexibility of (micro) siting during the project implementation phase. The Shire's LPP23 reflects the same level of micro siting of within a 100m radius development envelope.

The project submitted for approval, however, proposes (through an updated plan responding to issues raised through assessment) envelopes with a 500m radius within 'constraint free areas' (**Attachment 2a**). The constraint free area includes buffers to sensitive receptors, the existing transmission line, roads, heritage sites, landholder exclusion areas (mainly for agriculture), external freehold boundaries, DBCA managed land and native vegetation. The buffer to native vegetation includes all potential habitat trees, wetland areas and covenant areas.

The level of technical constraints that exist at the site are acknowledged, however, the 500m radius envelope allows for substantial variability which has implications for visual impact and site-specific testing. To have such a large variation may compromise the desired landscape outcomes as discussed in relation to landscape and visual impact below.

The 500m radius is a variation to the LPP23 and the draft Code, and the extent of this variability is substantial in its level of possible change. A condition for allowance of siting within 100m radius development envelope is recommended as is depicted on **Attachment 2a** which reduces the degree of uncertainty. This approach provides that the amended plan process under the deemed provisions can be followed for variation, which should be accompanied by the requisite level of detail related to the change at that time.

4. Landscape and Visual Impact

The Proposal includes a Visual Impact Assessment - **Attachment 3** (Appendix T), covering 11 sites which are mapped in the figure below:



Figure 4: Landscape and Visual Assessment Sites

The VIA included a matrix to 'grade' impacts as either negligible, low, moderate or high, taking into account the magnitude of change relative to the sensitivity of the location.

Of the locations assessed, the level of impact was classified as 'high' for the Augusta Hotel, Scott River Road, Albany Terrace Beach Access and Flinders Bay Jetty.

The proponent's VIA included recommendations to consider realignment of the turbines into a regular shape such as a double line or grid pattern and consider the reduction to the height of the turbines to reduce impacts on sensitive locations such as the Augusta Hotel.

As part of the initial request for further information prior to advertising, the proponent was requested to provide the reason for not responding to these VIA recommendations or testing these alternative scenarios, and to provide further details of sight lines from key areas of concern.

Further justification was provided by the proponent on the limitations on the placement of the turbines, but the proposal was not modified prior to advertising.

Throughout the advertising process, Landscape and Visual Impact was raised consistently (38% of submissions), with the following reoccurring concerns raised:

- Disturbance of views to Scott River and from Augusta and loss of landscape character.
- Visual dominance due to scale of turbines.
- Impact on tourism due to views from Augusta and resulting economic impacts.
- Inadequate visual impact assessment and representation of real impacts.

In addition to the above, the following feedback is a summary of the comments provided by the DPLH:

- *Despite the VIA recommendation for a grid layout the irregular layout is considered to be the most suitable, due do the landscape characterises of the proposal area.*
- *It is recommended that the following turbines are relocated:*
    - *the northern two or three turbines relocated further south so that no turbines would be visible from the western shore of the Blackwood River just upstream from Molloy Island (viewpoint 4), and potentially other viewpoints in the vicinity of Molloy Island, assuming that intervening vegetation remains.*
    - *several turbines apparent at the focal point of easterly views from the western shore of Hardy Inlet, near the inlet mouth, adjacent to the steep southerly face of the dune at the mouth of Swan Lake.*
    - *relocation of southern turbines would decrease the perception that turbines are very close to the coast.*

- *In views from town, the wind farm would be less prominent if turbines were in a more compact, clustered layout rather than locating them in an open, roughly linear pattern extending further north and south over a larger area.*
- *The Social Values Assessment Report provided by the proponent does not adequately address the community's perception of landscape character and views. Overall, the social values report likely results in under-estimating the likely social impacts of the proposed wind farm. Public submissions on the wind farm proposal could be reviewed to gain a more comprehensive overview of community perceptions.*

Following the outcomes of the consultation, a second request for information was made to the proponent, which sought the following:

1. Outline how the proposal has responded to community concerns around landscape impacts.
2. Provision of site plan showing actual proposed locations of wind turbines (or micro siting of 100m) with individually numbered turbines.
3. Provision of photomontages for the additional viewpoints suggested by DPLH.
4. Inclusion in VIA of how structures other than wind turbines may have visual impact and how these will be mitigated (if necessary).
5. Outline of any mitigation measures for localised visual impact such as vegetation screening.

In response to the above, additional information was provided by the proponent including commentary against community concerns, refined locations (reduced to 500m in lieu of 100m), additional photo montages, assessment and rating of these additional locations (**Attachment 4a**).

The additional locations assessed with supporting photomontages were:

- Additional location on Scott River Road;
- Centre of Augusta (Ellis Street, Blackwood Avenue)
- Ellis Street Jetty; and
- Albany Terrace.

The proponent also revised the location of the turbines in order to reduce visual clustering of turbines and spread the visual effects across the view more evenly, removing visual 'gaps' within key views. The proponent also advised that they would accept a condition requiring vegetative screening along key travel corridors and within road reserves close to residences that may be impacted visually.

Detailed mapping was also provided indicating the potential turbine locations following the exclusions of other setback requirements, including setbacks to remnant vegetation, environmentally sensitive areas.

As assessment of the proposal and additional information submitted following the RFI is provided below, relative to the following key planning documents.

LPS1
A wind turbine is exempt from the building height requirements of LPS1 provided it is designed and sited to not detract from the visual amenity of the locality. It is accepted that there will be some unavoidable visual impact from the turbines, therefore mitigation through siting and design is integral to the acceptance of the Proposal under the scheme. Opportunities for optimising siting is discussed below.

Draft Renewable Energy Planning Code
Although at an early stage of the process of formalisation, the requirements of the Code have been considered initially as there is less conjecture as to whether these requirements have been met. The requirements have been summarised below:

Policy Requirement	**Comment**
Avoid or minimise impacts on significant landscapes and significant views (through placement, reducing in the number of height of turbines)	Not Applicable.
Minimise visual disruption and prominence where practical opportunities exist.	Complies
Lighting designed to minimise or avoid adverse impacts on views or landscapes unless required for aviation safety requirements.	Complies – see following discussion on lighting for aviation.
Wind turbine blades are finished with a surface treatment of low reflectivity to minimise blade glint.	Complies

In respect to the requirements of the draft code, the following definitions are included of a significant landscape and significant view:

Significant landscape – means a landscape area or feature that holds special importance or value, formally recognised in international, national or state legislation or policy and which warrants consideration in planning and development decisions. May include World Heritage areas, national and state parks.

Significant view – means a public view that holds special importance or value for its visual qualities or economic or cultural significance, formally recognised in international, national or state legislation or policy which warrants consideration in

planning and development decisions. May include views from iconic scenic or tourist routes, trails and lookouts.

It is considered that the Scott River area, or the views from the Augusta township and surrounding coastline, whilst not enshrined in legislation would qualify by all objective measure as a significant view or significant landscape as provided in the code, and for this reason, requirements applicable are to minimise visual disruption and prominence where practicable opportunities exist.

In light of 'minimising visual disruption and prominence where practical opportunities exist', this is a low, essentially permissive threshold, which when considered in relation to the constraints mapping provided proponent meets this standard.

The objective of the relevant section of the draft Code is provided below:

Wind farms are sited and designed with sensitivity to their landscape setting to minimise unnecessary visual disruption and prominence where practical opportunities exist, with the understanding that visual change to the landscape is an inevitable outcome of wind farm development.

The draft Code contemplates visual change to the landscape to facilitate wind farm development, with policy directed to minimise unnecessary impacts. Given that one of the overarching objectives is to "guide the establishment of energy infrastructure to support a sustainable energy supply for Western Australia", it is considered that the scope for intervention, or modification of the proposal is limited based on the requirements of the draft Code.

Notwithstanding that the Proposal can be considered compliant with the draft Code relative to landscape impact, the weighting to these criteria are impacted by the currently unsettled content of the Code.

Assessment against the Shire's LPP23 has been prioritised and included below.

Local Planning Policy 23 – Large Scale Renewable Energy Facilities

A summary of the requirements of LPP23 relative to the proposal are provided below:

Policy Requirement	**Comment**
The landscape and visual impacts of a proposal shall be determined based on the WAPC 'Visual Landscape Planning in Western Australia' manual.	Complies
Where the landscape impact is very high or high, and social impacts are identified as significant through submissions on a proposal, consideration will be given the strategic need for the facility in the context of projected demand and alternative energy potential in the SWIS.	Does not comply, refer to discussion below.
Wind turbines along the Leeuwin Naturaliste Ridge will not be supported.	Not Applicable.
Impacts to significant views or significant landscapes are to be minimised or avoided.	Partial compliance - refer to the discussion below.

Unless subject to a negotiated agreement, large scale wind turbines shall be setback 1575m (based on turbine height) from sensitive premises.	Does not comply, refer to discussion below.
Wind turbines should have uniformity in terms or colour, size, and shape, where appropriate, and should not adversely impact upon nearby properties by reason of shadow flicker or blade glint.	Complies subject to final layout.
Where practical, landscaping should be implemented within the development site, and associated properties and reserves, to mitigate the visual impact of the development from sensitive land uses, and public roads.	Complies subject to condition of approval.
Dark sky principles are to be followed. Development must demonstrate that nighttime visual impacts arising from aviation and operational lighting, are avoided or minimised.	Complies
Shadow flicker shall not exceed a maximum of 30 hours per year and 30 minutes per day at any approved sensitive land use.	Complies

The issues of non-compliance with the policy requirements are discussed further below.

Strategic Need within the South West Interconnected System (SWIS)

As outlined previously, the VIA prepared and submitted with the application identified a high level of impact from numerous locations within Augusta and surrounds, with community concerns raised through consultation.

The 'Sectoral Emissions Reductions Strategy for Western Australia' released by the State Government in 2023, sets out in greater detail how the energy sector would transition to achieve the net zero target, including a 2022 commitment to retire all state-owned coal fired electricity generation by 2030 and a $3.8billion commitment to low carbon generation including wind.

The closure of Collie and Muja coal power station will result in a shortfall of approximately 1173MW in the SWIS. In addition to accounting for the closure of the coal fired power stations, increasing energy consumption through population growth and transition towards 'electrification' will also increase demand. For this reason, the requirements for achieving net zero are difficult to quantify, however this has been estimated to be in the vicinity of 5GW (5000MW).

Currently there are approximately 500MW of renewable energy projects either operational or under construction, with a number of recent approvals for large scale wind farms within the wheatbelt area.

As a point of comparison, in December 2025 a 1000MW capacity windfarm, including 500MW of solar array was approved in the Shire of Canamah. Likewise, it is expected that a 3000MW windfarm will be submitted via the State's Significant Development Assessment Unit in May 2027. The capacity of battery storage is also being increased across the SWIS to improve continuity of power supply which can be variable with renewable sources.

The Scott River Wind Farm has a capacity of 100MW, relatively small in the context of the broader SWIS and projects mentioned above, and could be readily accounted for within the broader network to achieve the strategic objectives of the state government. The key justification around necessity for the Scott River project is as follows:

- Wind Profile – the prevailing winds patterns in the proposal area in aligns with peak energy consumption, providing continuity of supply into the evening when demand is higher and where the wind profile may differ from other areas of the State;
- Transmission Capacity – the project can utilise existing transmission lines adjacent to the Beenup mine site which removes the need any major upgrades which can be environmentally impactful and resource intensive.

In respect to the second point above, the capacity of transmission lines is a constraint on the realisation of the larger scale wind farms within the wheatbelt area. Unlike these larger proposals, delivery of the Scott River wind farm can occur short term due existing transmission infrastructure, whereas larger wind farms in the wheatbelt are dependent on transmission upgrades which are covered in the 2025 South West Interconnected System Transmission Plan.

As mentioned previously, balanced agist the outcomes of community consultation, there was significant concern regarding the visual impact of the proposal, particularly form the Augusta Town site. As outlined in in the updated visual impact documentation, sensitivity to change is high in this location:

"Residents and visitors to the Augusta town centre place value on the scenic, elevated long and wide views across Hardy Inlet and East Augusta from Blackwood Avenue, the main street of Augusta. The view forms part of a valued coastal townscape setting and is experienced frequently by pedestrians, motorists and visitors, often for prolonged periods".

These eastward views from the Augusta Town Centre are deeply connected to the town's sense of place which was evidenced through the outcomes of the 2022 Augusta Character Study, as well as the connection to and experience of the coastal landscape.

It is the view of the Shire that the visual impact of the proposal, classified as high from locations within the townsite and coastal fringe, and the small scale of the system relative to projects being undertaken in other parts of the SWIS, is not outweighed by the strategic need and is inconsistent with clause 2.2 of LPP23.

The degree to which the landscape impact can be reduced through modification to the proposal, and the degree that this achieves a suitable balance is discussed further below.

Significant Views and Landscapes

As outlined above, LPP23 requires that impacts to significant landscapes are to be minimised or avoided.

The definitions are similar to those provided in the code, with differences underlined below:

Significant landscape – means a landscape area or feature that holds special importance or value, may be formally recognised in international, national or state legislation or policy and which warrants consideration in planning and development decisions. May include World Heritage areas, national and state parks and the coastal margin, together with Visual Management Area A and corridors identified in accordance with Appendix 2 of the Shire's Local Planning Strategy.

The definition of a significant view is consistent with that provided in the Code.

The location of Visual Management Area A is provided below (Grey Shaded Area):

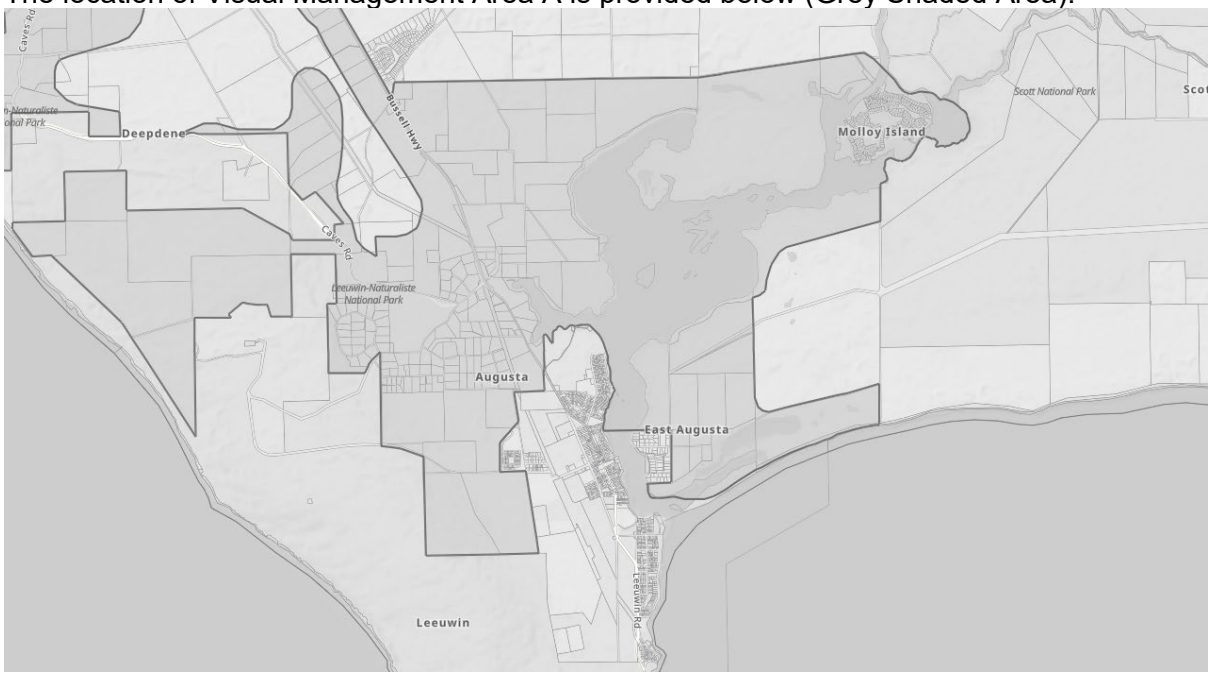


Figure 5: Visual Management Area – Local Planning Strategy.

Whilst the turbines aren't located within Visual Management Area A, they will significantly influence the background to this area as identified in the Visual Impact Assessment, particularly when viewed from the township, Colourpatch and around Albany Terrace.

As mentioned previously, the proponent has made a number of changes to arrangement of the turbines in response to the feedback received during consultation (see figure 6 below):

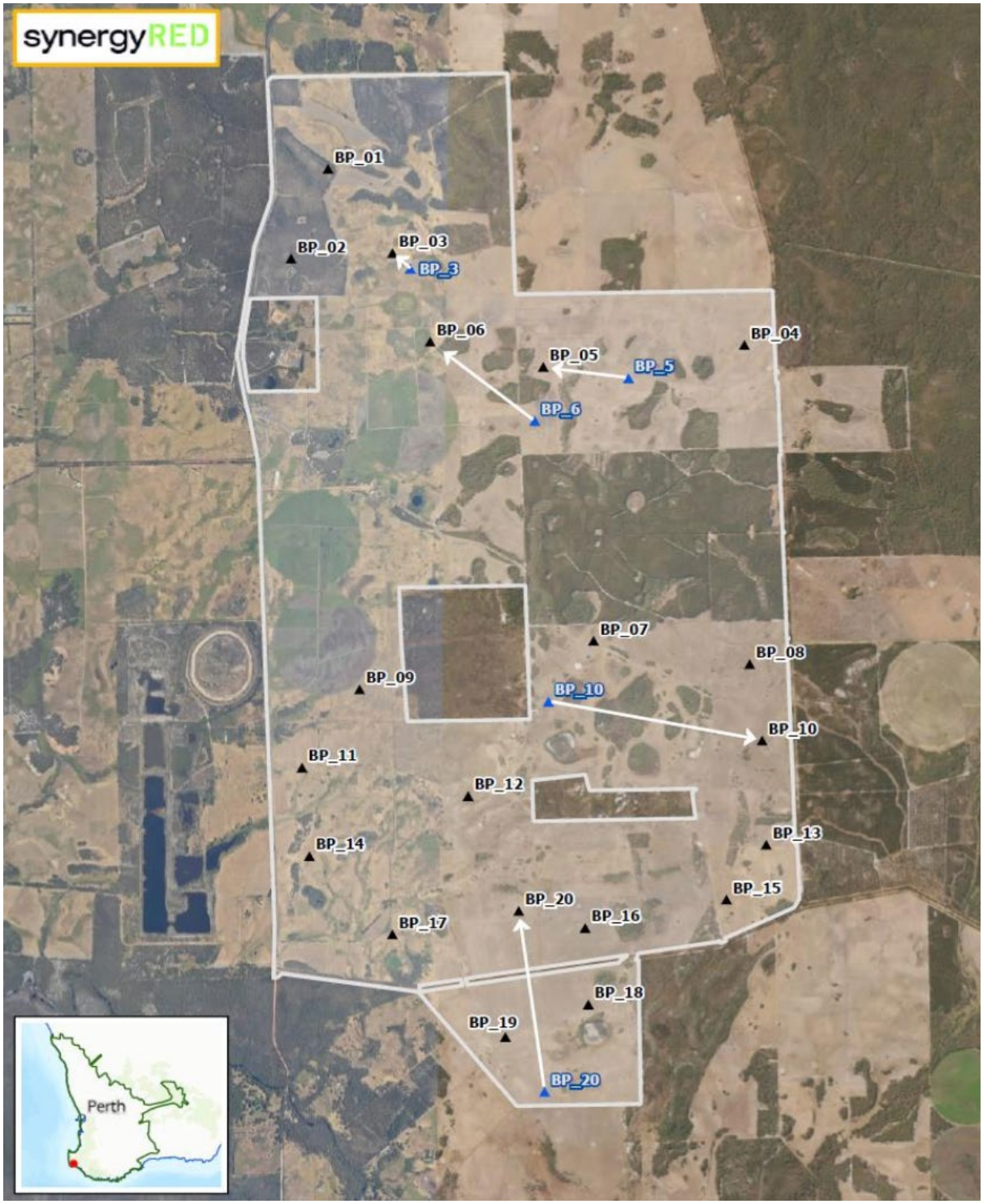


Figure 6: Proposed Turbine Location Modifications

The effect of these changes to the arrangement of the turbine was to achieve the following:

- Relocation of WTG20, increasing the setback between the windfarm and the coastline.
- Relocation of central turbines 3, 5, 6, 10 which pull the most prominent edge further inside the site to improve views from Augusta, Albany Terrace and Scott River Road.

The proponent did not elect to relocate the northern most WTG's with the following justification provided:

- The wind resource in the North is better than most of the other areas and relocating the turbines would have an economic impact to the overall business case for the wind farm
- The three northern turbines are furthest away from most key viewpoints and generally appear smaller and have less impact than the others, they are also not visible from a few locations.
- The northern area of the site, furthest from the rivers contains land with less complex geotechnical conditions and is therefore more viable and cost effective for the project to build on
- The site is already heavily constrained due to complex combination of environmental, technical, and planning constraints that must be balanced when determining appropriate turbine placement,
- Reduced energy production associated with placing turbines closer together if moved amongst the other 17 to the south.

The proponent undertook testing for the relocation of WTG 18 & 19 as well as 20, suggesting that the relocation of these WTG's lead to only minimal change from key viewpoints.

Whilst not all locations were reassessed based on the updated layout, it is important to note that the updated assessment classified the visual impact as 'moderate' from the Centre of Augusta (Ellis Street, Blackwood Avenue) and Albany Terrace.

In respect to the repositioning of all three of the southern WTGs (18,19 &20), the proponent comments are accurate in there is a degree of overlap from the coastal viewing positions which are from the south/southwest. In the context of the view from the Albany Terrace Beach Access, WTGs 13 and 15 will still be visible following relocation of WTGs 18 & 19, albeit the setback from the viewing location will increase by close to 2.52kms. This is similar to the view from Albany Terrace.



Figure 7: Visual Impression from Albany Terrace Beach Access, Augusta.

A photomontage of the modified proposal was not provided from Flinders Bay; however, it appears that there would be a similar outcome with the above.

In the case of Colourpatch, relocation of WTG 18 and 19 would mean that only one WTG (15) would be visible from this location increasing the setback to the closest turbine by over 2.5km from the viewing location.



Figure 8: Visual Impression from Colourpatch

In respect to the view from the Augusta Hotel and main street intersection, advice from DPLH was that the wind farm would be less prominent if turbines were in a more compact, clustered layout rather than locating them in an open, roughly linear pattern extending further north and south over a larger area.



Figure 9: Visual Impression from Augusta Hotel

In this regard, relocation of the northernmost WTGs would be most effective to achieve the feedback from DPLH, however the benefits of this are more difficult determine given the increased setback of these WTGs from the townsite. Overall, it is difficult to conclude that there would be significant perceivable benefit modifying to the layout as viewed from the hotel, however it is clear that relocation of the southern WTGs more centrally would be consistent with DPLH advice.

As outlined above, there is a much higher degree of confidence that relocation of the WTG 18 and 19 will significantly reduce visual impact from Seine Bay/Colourpatch and reduce impacts from the coastal margin through an increased setback to viewing locations.

Subject to a condition requiring the relocation of WTG 18 and 19, it is considered that impacts to significant landscapes can be minimised in accordance with clause 2.4 of LPP23.

Visual Amenity Setback

The LPP23 states that unless subject to a negotiated agreement, large scale wind turbines shall be setback a distance based on a sliding scale of turbine height from a sensitive premises. For a maximum height of 250m, the setback shall be 1575m.

There is a current planning approval for two chalets at 1610 Brockman Highway in the area outlined in red in Figure 10 below. The chalets are setback approximately 1450m from the closest turbine WTG01 as shown in blue. There is no confirmation of any agreement between the proponent and the landowner.



Figure 10: Approved Chalet development at 1610 (Lot 22) Brockman Highway

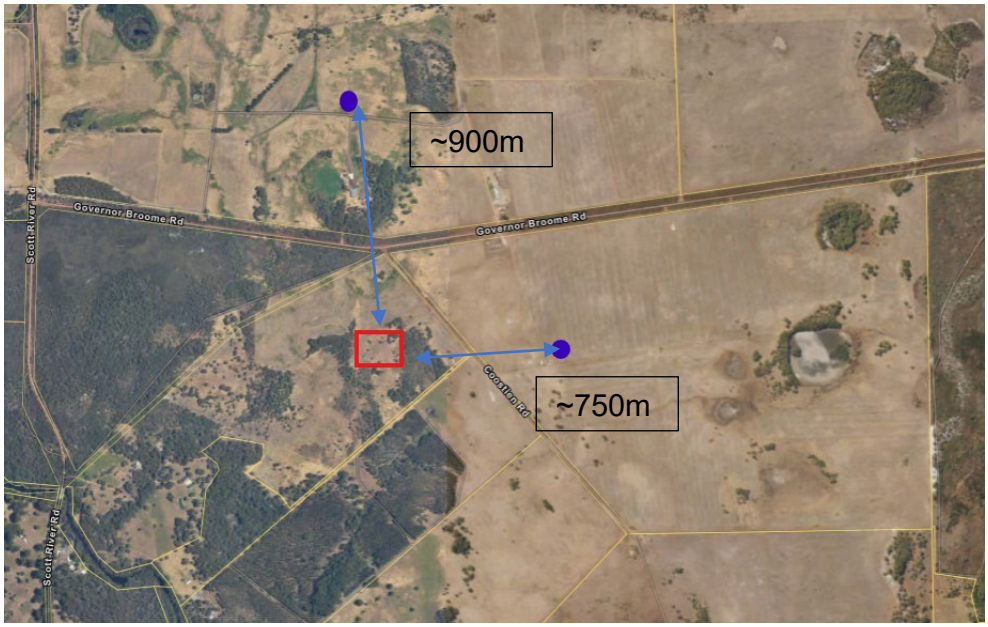


Figure 11: Approved Chalet development at 1165 (Lot 101) Scott River Road

Similarly, there is a planning approval for four chalets at 1165 (Lot 101) Scott River Road which is approximately 750m and 900m from turbine WTG19 and WTG17 respectively (as shown in Figure 11). There is no confirmation of a neighbour agreement. The setback from these chalets also does not comply with the Noise requirements which is discussed in the relevant section below.

To address this variation, a condition has been applied to relocate WTG01 further south, and WTG19 and WTG17 further north to comply with setbacks. The movement of WTG19 also supports the landscape assessment discussed previously.

Aviation/lighting

The Proposal is not to include lighting markers on the wind turbines in order to reduce nighttime visual impact. CASA recommended lighting on turbines, however, there is no legislative requirement for this to be implemented. Ultimately CASA suggest the planning assessment should determine whether this is required, which is unhelpful in arriving at a technical finding.

The proponent has provided an Aviation Impact Assessment (AIA) in the planning report at **Attachment 3** (Attachment 4 – Appendix Q). The risk of collision with wind turbines from aircraft is demonstrably small, and the technical report determines that lighting is not required. The Augusta airstrip is the most used in the area, approximately 15km from the site and is used by the Royal Flying Doctors Service. This was not included in the AIA as not prescribed under the relevant guidelines; however, it is recommended that the proponent continue consultation in this regard and an updated AIA is provided as a condition of approval.

Consistent with WAPC Dark Sky and Astrotourism Position Statement, permanent night-time lighting should only be provided where demonstrably required, with avoidable or excessive lighting discouraged to protect dark-sky values. Given the high visual sensitivity of the site, the distance of 15km from the airstrip and the very low risk of collision, lighting is unlikely to be necessary and complies with LPP23. If the DAP,

as the decision-making authority were to determine that lighting was required, it would bring into question the desired visual management outcomes as outlined above.

As per the CASA recommendation, final coordinates and height data are to be provided to Airservices Australia prior to construction, and a notification of surveyed final heights on completion. Marking of met masts, guy wire sleeves, and top-third paint marking as proposed by the proponent. These are recommended as advice notes.

5. Impacts on Waterways and Groundwater

Concerns around Acid Sulphate Soils (ASS) was raised by a large proportion of submitters, particularly impacts on groundwater, water ways and groundwater dependent ecosystems. The BHP Beenup Mine was commonly raised as an example of the risk of ASS in the area. General construction impacts on groundwater levels and surface water flow paths, and the insufficient baseline data and groundwater modelling to define risks/impacts to waterways, GDEs and wetlands were also raised.

The Proposal includes at **Attachment 3** a Surface Water and Hydrogeological Assessment (SWHA) (Appendix A), Preliminary Geotech and Baseline Contamination Report (Appendix G) and Preliminary Acid Sulphate Soils and Dewatering Management Plan (PASSDMP) (Appendix B). There has been no site specific Geotech or groundwater testing that has occurred at the proposed turbine locations, noting these are yet to be finalised. Testing has been carried out at 20 shallow test pits across the site, individually of up to 2m depth, and 17 ground water bore measurements at 3 different areas of the site, including 3 deep bores as shown in Figure 12 below. Groundwater monitoring took place from April 2024 to January 2025. Groundwater modelling included in the reports has been based off these sites as shown at Figure 12.

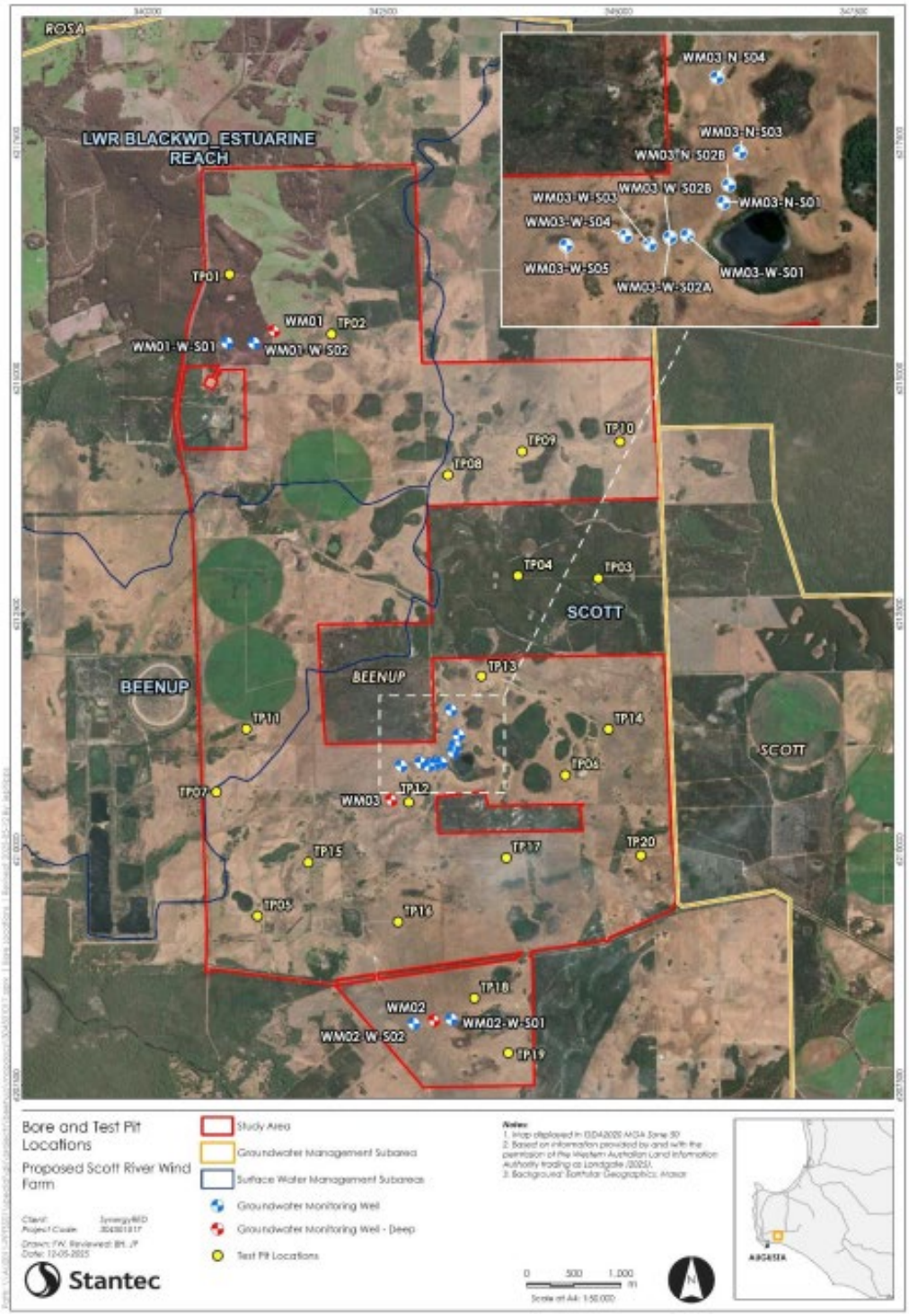


Figure 12: Bore and Test pit locations

Acid Sulphate Soils

The Site is mapped as having a high to moderate risk of ASS occurring within 3m of natural soil surface. Results in the PASSDMP indicate that ASS are present within all soil types in the development envelope except for shallow pale grey/white sands that occur less than 1 metre below ground level (mbgl). The dark grey/brown sands and sandy clay which occur more than 2mbgl are considered the highest risk soils.

The proposal has the potential to expose ASS, due to the excavation and associated dewatering required for the construction of turbine foundations and other supporting below ground infrastructure such as communication tower foundations, met mast foundations and underground cabling, as well as excavation for borrow pits. Flow on effects of soil acidification can include impacts on waterways and groundwater dependent vegetation which is addressed in the section on biodiversity below.

The location of the proposed windfarm is adjacent east and north-east of the site of the former Beenup Mineral Sands Mine, a classified contaminated site. This has been addressed by the proponent through the Geotech and Baseline contamination report. DWER advice states that:

> *As the regional groundwater flow is south to south-west, generally towards the Scott River, legacy contamination at the former Beenup mine site is not expected to impact the location of the proposed wind farm. However, those historical impacts highlight the fact that soil and groundwater conditions in the area present a high risk of acidification, and potential ASS will require management during construction activities.*

An advice note related to contaminated sites which are regulated under the *Contaminated Sites Act 2003* has been applied.

The EPA decision not to assess the proposal advised that risks associated with the potential release of ASS and any resulting impacts on terrestrial environmental quality and inland waters can be appropriately managed through the application of the RIWI Act and PD Act approval processes. The EPA also advised that an authorisation under the *Rights in Water and Irrigation Act 1914* should ensure the maintenance of hydrological regimes and the quality of groundwater and surface water, and the maintenance of land and soil quality to ensure that environmental values are protected. A finalised ASSDMP is required to obtain a dewatering license under the RIWI Act. Accordingly, the EPA recommends that the development approval includes a condition requiring detailed geotechnical investigations and the implementation of an appropriate ASSDMP.

DWER consider that the PASSDMP provides an adequate preliminary assessment of the ASS risks associated with construction of the proposed wind farm, that the disturbance of ASS can be appropriately managed, and that the proposed management of ASS risk is generally consistent with state and national guidelines. Given this finding and the advice of the EPA and DWER on this issue, an alternative finding would be problematic.

The proponent is proposing three alternative foundation designs (documented in the PASSDMP at **Attachment 3)** to minimise the depth of excavation where there are higher ground water levels and minimise the disturbance of ASS. These include:

- A typical below ground foundation (depth of ~5m) will only be used where no dewatering will be required.
- Partially below ground foundations at 0.8-1.2mbgl with ~1m to ~2m dewatering required depending on site conditions.
- Above ground foundations.

Foundation selection will be guided by the commitment from the proponent to ensure groundwater drawdown does not exceed:

- 2.0 m below ground level at the foundation perimeter
- 0.1 m beyond 100 m from any dewatering location
- Natural seasonal variation thresholds, ensuring groundwater dependent ecosystems do not fall below their natural seasonal low

While fully above ground foundations present the lowest ASS risk, they are more resource intensive to construct, requiring a hillock formation and greater structural reinforcement, and may not be feasible in some locations. The below or partially below ground options will be used where groundwater levels are low or the ASS risk can be adequately managed.

Foundation selection is a key mitigation measure to avoid or minimise ASS disturbance. The proponent has indicated that additional groundwater control strategies may also be required. For instance, if revised modelling indicates that a partially above-ground foundation cannot meet the drawdown limits, the use of groundwater exclusion techniques—such as sheet piling—may offer a more feasible solution than adopting a fully above-ground foundation.

SPP 2.0 – Environment and Natural Resources, SPP2.9 – Water, DPLH ASS Planning Guidelines, as well as the Shire's LPP23 have all been considered in the assessment of the proposal.

The Shire considers that ASS pose the most significant environmental risk arising from the Proposal. The Shire relies on the expertise from DWER and the EPA regarding water and ASS management. The advice indicates that the ASS risk can be managed, subject to provision of a detailed ASSDMP, and that the alternative foundation designs proposed by the proponent show there is an opportunity for avoidance and minimisation of ASS disturbance in the final design of the proposal, as is consistent with the relevant state polices and the LPP.

The agencies are satisfied with the approach that the final details of the proposal can be confirmed post approval. Nonetheless, the Shire has concern that the lack of site-specific testing and reliance on modelling based on a relatively confined area of the site provides limited evidence that all of the proposed locations can accommodate a wind turbine while complying with groundwater drawdown limits, all relevant structural and OEM design standards and any other regulatory conditions. There remains a level of uncertainty as to the measures that will be required which could alter the nature of the approval.

The DAP should also note the application of the precautionary principle in the state planning policies and the Shire's LPP23, which calls into question whether a decision should be made with the lack of scientific certainty as to the impacts, when no site-specific testing has been carried out.

A condition for an ASSDMP can be applied to the approval to the extent it is reasonable. That is, the DAP should consider if it is suitable as a condition where the ASS risk is a non-incidental aspect of the proposal, and additionally whether it may lead to a substantial change in the development approval (Section 74 of deemed provisions), as discussed previously.

Considering the above and in the event of a DAP decision to proceed, the Shire has applied the provision of an ASSDMP to the approval as recommended by the EPA. The preliminary plans include commitments by the proponent to avoid and minimise ASS impacts, and it is appropriate that these measures be formalised through the

condition, which includes that borrow pits are not to intercept groundwater, and that groundwater drawdown for wind turbine foundations shall not exceed:

- 2.0m below ground level at the foundation perimeter
- 0.1 m beyond 100 m from any dewatering location
- Natural seasonal variation thresholds

Some of these measures are captured in the DCCEEW particular manner requirements for groundwater drawdown levels. Generally, it should be considered whether the imposition of planning approval conditions that require compliance with conditions required under environmental protection legislation is necessary. Where there is a nexus with the planning framework it may be necessary, as in this case, that the limitations are required to be put on the development to guide specific development locations in the absence of information, i.e. satisfaction of the condition is relevant to the form of development approved. The details of the inclusions on the ASSDMP are outlined in an associated condition.

Additional management measures for treatment of dewater containing ASS are outlined in the DCCEEW referral as follows and are recommended for inclusion in the ASSDMP in the advice note:

a. Dewatering effluent with a pH < 6 and/or total actual acidity (TAA) > 40 mg/L or alkalinity < 30 mg/L must be treated to, at a minimum, the standards specified in the relevant DWER guidelines.

b. Where infiltration, irrigation or dust suppression is proposed as a dewatering management method, the dewater must:
    i) Be treated prior to use in accordance with item 5(a).
    ii) Be contained within the approved Action Area.
    iii) Be extracted at a rate that does not exceed treatment dosing capacity or compromise the integrity of settlement or containment infrastructure.
    iv) Be disposed of only within the construction footprint and/or on agricultural land.
    v) Where irrigation is proposed, be applied no closer than 50 metres from the Scott River Ironstone TEC and Threatened flora.
    vi) Not result in ponding so as to enable overland flow beyond the immediate area of application, and not enter any wetland habitat, drainage line, the Scott River, the Blackwood River, or any Scott River Ironstone TEC.
    vii) Not be discharged, either directly or indirectly, into any wetland habitat, drainage line, the Scott River, the Blackwood River, or any Scott River Ironstone TEC.

The dewatering setback requirements are as follows and are advised to be included in the updated ASSDMP for clarity:

- Groundwater drawdown must not exceed natural seasonal variation by more than 0.1 metres at any location that is within 100 metres of a dewatering activity.
- If the drawdown limit referred to above is exceeded and this occurs within 50 metres of a wetland habitat, surface water monitoring must be initiated.
- If surface water monitoring shows a reduction in water levels or a deterioration in water quality at a wetland habitat as a result of the action, dewatering activities within 200 metres of the affected wetland must stop.

These measures are in place to protect water quality and waterways and have the additional aim of mitigating risk to TECs which is discussed further in the following section.

There is potential for borrow pits to constitute a significant aspect of the proposal, therefore further details of these pits should be provided prior to construction and is recommended as a condition, with commitments for remediation of any borrow pit sites to be laid out in an updated CEMP.

Surface and Groundwater Flows

The proposal has potential to impact surface hydrological regimes and groundwater flows if not managed appropriately. Impacts on groundwater dependent ecosystems are discussed further in the section below. Proposed construction will require lowering the groundwater table, with a maximum dewatering of 33 days per turbine proposed and groundwater monitoring to be carried out during construction.

Impacts on groundwater flows are managed through the limitations on dewatering as discussed above and will be required under the final ASSDMP and the DCCEEW particular manner measures to avoid impacts on wetlands and waterways.

Preliminary pre-development flood modelling has been carried out by the proponent. DWER have advised that it is fit for purpose and that it should be used to inform the overall Surface Water Management Plan for the site. The Surface Water Management plan is recommended as a condition of approval and has been applied along with a Stormwater Management Plan which shall be put in place to mitigate erosion and sediment mobilisation, in addition with a requirement to supply road crossing and drainage designs. An updated post-development flood model shall be prepared as a condition of approval as per DWER advice.

DBCA recommend a site-specific hydrological study is undertaken to identify impacts to Threatened Ecological Communities (TEC's). Surface and groundwater impacts will be key in the decision making around exact turbine location and design and it is expected that these should be provided alongside the EPA recommendation for further detailed geotechnical investigations. These have been recommended as a condition of approval.

The proponent has demonstrated that the proposal can comply with LPP23 and SPP2.9 - Water in that they have identified impacts on surface and groundwater and have demonstrated that they can be managed through the implementation of the CEMP and ASSDMP as per state agency advice. The RIWI Act provides additional controls and has legislative requirements for the maintenance of hydrological regimes and water quality that the proponent must comply with that sit outside the planning process.

6. Impacts on Biodiversity and TECs

Issues raised by submitters include the clearing or fragmentation of native vegetation, impact on ground water dependent ecosystems (including TEC's) and endangered fauna, and the lack of supporting information to adequately determine these impacts.

Native Vegetation

The proponent can confirm some aspects of the clearing required to accommodate the development, but not all areas, again due to the lack of design certainty. The proponent has committed to removing no greater than 1ha of native vegetation overall as part of the development. A condition is recommended for details to be provided to the Shire of the proposed native vegetation clearing following finalisation of the design noting that the clearing is not exempt under Clause 5.20 of LPS1.

Due to the presence of threatened species, the DCCEEW manners for which the project shall comply includes the following:

To avoid impacts to protected matters, the person taking the Action must not:

- clear outside the Action area.
- clear more than 1.0 hectare of native vegetation within the Action area.
- clear any potential nesting trees for Black Cockatoos.
- clear any contiguous native vegetation within 10 metres of the potential nesting trees.
- clear more than 0.5 hectares of Moderate to Low quality Western Ringtail Possum habitat, including a maximum of 0.03 hectares of Moderate quality Western Ringtail Possum habitat.
- clear any Threatened flora individuals.
- clear any Scott River Ironstone TEC.

This reflects the commitments of the proponent and is recommended as a condition. Note discussion above on conditions covered under other environmental legislation.

To comply with LPP23, any unavoidable clearing of vegetation is to be offset with net environmental gain. A condition is recommended for an equal amount of vegetation to be planted of a type that supports the biodiversity of the area.

Threatened Ecological Communities

A detailed flora study was undertaken at the Site in 2025. Four vegetation types in the Site are classified as, or analogous to, Scott River Threatened Ecological Community (TEC). This Scott River Ironstone Association community is listed as critically endangered ecological community under the BC Act 2016 with the TEC a declared ESA under the EP Act 1986. Nationally the community is listed as endangered under the Commonwealth EPBC Act 1999. The Scott River TEC is groundwater dependent and highly sensitive to disturbance from groundwater levels, surface water movement and ASS soils reactions.

Dewatering drawdown in support of constructing the concrete foundations for the project infrastructure will cause a temporary reduction in groundwater levels within the Superficial Aquifer, potentially impacting the hydroperiod and health of ground water dependent ecosystems. Alternative foundation design as mentioned in the previous section aims to reduce the dewatering requirement and thus minimising impact to TEC's.

DBCA have provided recommendations for setbacks from the development to minimise impacts on biodiversity and TEC's. This includes:

- 50m buffer to all recorded threatened species.

- Minimum 100m setback from all proposed buildings, structures and earthworks from TEC's.
- Minimum 100m setback from TEC's for dewatering impacts.
- 100m buffer to remnant vegetation to reduce impacts on fauna.
- 500m buffer from DBCA managed land, TEC and wetland habitat for concrete batching plant to mitigate dust impacts.

The Proponent has made commitments which align with the above setbacks, however, propose ground disturbance to be able to occur up to 50m setback from TECs for access tracks and cabling. The Approved Conservation Advice for Scott River Ironstone Association (DSEWPaC 2013) recommends the application of a minimum 50m buffer for the Scott River Ironstone TEC, *'However, the width of the buffer required may be greater depending on the type of threat, the local hydrology and other factors'*. Further advice has been sought from DBCA in this respect, who have responded that the proposed setback is reasonable subject to final design being carried out in consultation with the agency. This will be included in the updated CEMP and recommended conditions reflect this advice.

LPP23 requires that *proposals shall identify, manage and mitigate impacts on surface and groundwater with sufficient setback from areas of high ecological value including ESAs, groundwater dependent ecosystems and waterways.* TECs are regulated under federal EPBC legislation and therefore are subject to a number of controls outside the planning framework. The Shire notes that not all of the groundwater dependent vegetation is mapped as a TEC despite the presence of rare flora. Safeguards regarding setbacks from all native vegetation and for dewatering limits address this lack of formal mapping. The Shire is satisfied that the TEC's will be sufficiently protected based on DBCA advice due to prescribed setbacks of 100m from any development and with the provision of the relevant conditions.

The above setbacks recommended by DBCA have been incorporated into the condition of approval relating to final locations of turbines and associated infrastructure.

Additionally, it is noted that not all TEC's in the project area are likely to be fenced. Therefore, there is an inclusion in the agricultural management plan that all occurrences of TEC's within the project area shall be fenced to a standard that prevents intrusion from livestock.

7. Bird and Bats

Respondents had concern about inadequate surveys and insufficient data to measure impacts, habitat fragmentation and construction causing displacement of birds, collision risk, and risk to endangered species such as black cockatoos.

The proponent has provided a Bird and Bat Risk Assessment and Preliminary Bird and Bat Adaptive Management Plan (BBAMP) (**Attachment 3 (**Appendix N)) which was also provided in the referral documentation to the EPA. The EPA sought additional information, with the proponent commissioning a peer review of the preliminary BBAMP and providing an amended version to the EPA. Additional trigger and threshold actions and associated monitoring and mitigation measures have been defined to manage ongoing risks in the updated plan. The EPA consider that this adequately addresses their request and consider that the impact was not so significant that formal assessment was required.

A final BBMAP was recommended to be provided as a condition of the planning approval by DWER and the EPA. While threatened species are regulated under the BC Act and EPBC Act, the BBMAP includes species that are not considered under this legislation. As such, the final plan will be likely reviewed by the EPA.

DCCEEW have a particular manner measure for any wind turbine blade to be no less than 59 metres above ground level to avoid and mitigate impacts on Black Cockatoos and migratory species. This is reflected in the relevant condition.

The proponent proposes a minimum 100m buffer to native vegetation including all potential black cockatoo habitat trees, wetland areas and covenant areas. This is solidified through the recommended condition for turbines to be located only within the constrained area which includes this setback. Along with the minimum rotor blade height mentioned above, the proposal is consistent with the LPP23 and the draft Code. The BBAMP allows for ongoing monitoring and responsive management as further data is gathered over the life of the project.

8. Noise and Amenity

Submitters have raised as concerns insufficient setback to dwellings and impacts on the amenity of neighbouring lots, health and wellbeing impacts from turbines including from infrasound/low frequency noise, and the need for independent monitoring and reporting of noise and for mandatory shutdown/curtailment if exceeded.

A Noise Impact Assessment (**Attachment 3** (Appendix S)) was provided with the application with the conceptual turbine layout. It showed compliance with all noise sensitive dwelling on non-host lots, with one dwelling (R32) within 1dB of compliance.

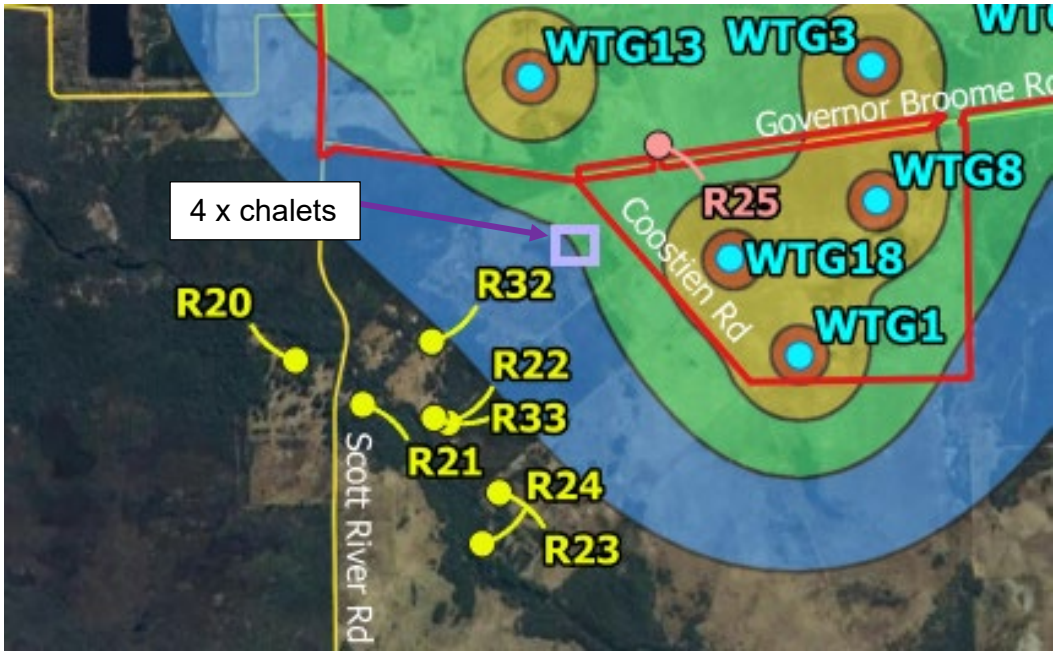


Figure 13: Closest sensitive receivers and location of chalet approval

The DWER Environmental Noise Branch provided feedback that the proposal shows it can comply with the Noise Regulations subject to addressing the 'modulation' characteristic which is most likely to be present. The department recommended a 40

dB(A) criterion to receivers within the project area boundary. The proponent has provided an updated Noise Impact Assessment (**Attachment 4b**) to include discussion on modulation mitigation options both pre-construction and during operations.

DWER have advised that if low frequency/infrasound noise was a significant issue, which it has not been so far and the regulations have dealt with this quite adequately based on research to date, criteria would need to be developed using different parameters. There are several formal government publications that conclude there is no direct evidence of low frequency sound on human health. Therefore, infrasound or low frequency noise is not included in the assessment.

There is a current planning approval for four chalets at 1165 (Lot 101) Scott River Road which are in an area exceeding the Noise Regulations and of which the proponent is aware. It is acknowledged that the proponent carries the risk relating to the development of these chalets as a sensitive premises, were a neighbour agreement not able to be reached. Despite this, it would be reasonable for the Shire to consider the planning implications and recommends the relocation of Turbine 19 and Turbine 17, being closest to the approved sensitive premises. Noting that it is suggested that Turbine 19 be relocated for landscape purposes in any event.

The Shire is satisfied the proponent can comply with the Noise Regulations and the Shire's LPP23 which requires a 35dB compliance for both night and day times, subject to the above issue being resolved and the implementation of conditions as follows.

An updated Noise Impact Assessment to be provided following final turbine layout and shall demonstrate that noise levels will comply with 35dB(A) maximum at all sensitive premises on non-host lots and shall not exceed 40dB(A) at dwellings on host lots to maintain amenity and use at these premises.

An Operational Noise Management and Monitoring Plan shall also be provided as a condition of approval and shall be implemented to manage impacts during the operation phase of the development. Under the Shire's LPP23, this should include noise reports to be made publicly available in a transparent manner and easily accessible to community members which is reflected in the condition wording.

Shadow Flicker

LPP23 requires that shadow flicker shall not exceed a maximum of 30 hours per year and 30 minutes per day at any approved sensitive land use. The Shadow Flicker Assessment provided with the Planning Report (**Attachment 3** (Appendix O)) shows this is exceeded at one premises, a commercial premises and non-sensitive noise receptor. There are a number of dwellings that are marginally outside the shadow flicker impact area and as the layout has not been finalised, a condition had been added to the approval for an updated shadow flicker assessment.

9. Agriculture

Submitters raised concern regarding the loss of productive agricultural land and disruption to farming operations, dewatering resulting in lowering of the water table and poor water quality/ASS impacting agricultural use, as well as impacts on animal welfare from construction and noise/infrasound from turbines

The actual ground disturbance of the Proposal is around 107ha in total including turbine foundations, hardstands, access roads, substation, O&M building and associated infrastructure. This is approximately 3% of the total 3597ha project area. **Attachment 2a** identifies site constraints and indicates an avoidance of the areas used for more intensive agricultural use such as irrigated areas and key farming infrastructure. There is no fragmentation of land proposed at this stage.

DPIRD have raised no concerns regarding the ongoing use of the land for agricultural operations, however outline measures that should be included in the CEMP to mitigate risk of impacts, including biosecurity management measures and erosion management during construction. Noting that impacts on animal welfare from construction is a valid concern where large amounts of machinery accessing properties pose some risk to animal welfare and biosecurity. Like human health, there have been no causal link between low frequency sound/infrasound and impacts on animal health.

It is expected that a wind farm development will result in some loss of agricultural land being most appropriately sited in cleared areas. It has been broadly demonstrated that the agricultural use will be able to continue on the site with a relatively small footprint of the total site area to be set aside for the proposed use.

The proposed wind farm has been considered against State Planning Policy 2.5 – Rural Planning and is consistent with the policy's objectives with the development not anticipated to unreasonably prejudice ongoing rural uses and is compatible with surrounding agricultural uses, subject to proper environmental management.

This section provides opportunity to assess the land use against the Shire's Local Planning Scheme No.1 (LPS1). The proposal is generally consistent with the purpose of the general agricultural zone under the LPS1 which aims to discourage any land uses that detract from the primary use of the land for agricultural purposes. Noting that the 'wind farm' use is intended for the agricultural zones under the scheme. There are no major changes to the incoming LPS2 that warrant discussion or would materially impact this conclusion.

The Shire's LPP23 has a number of provisions relating to the continuation of agricultural use, reflecting the Shire's particular attention to this issue. The amount of 107ha set aside for the proposed use is indicative only at this stage. It is reasonable to ensure that there is consideration of the retention of agricultural land in the final layout of turbines, access roads and associated infrastructure. This includes opportunities for avoiding fragmentation of the site for internal access ways and areas quarantined for development and how this will be managed across multiple landholdings, as well as selecting sites with low agricultural capability (where possible).

The proponent is still yet to provide details of how agricultural activities will be maintained alongside the development including addressing any potential risks to biosecurity, contamination or animal welfare as is required in LPP23. These are listed to be included in the conditions relating to the updated CEMP and the Operational Management Plan as recommended by DPIRD and will help mitigate concerns for the impact of construction access on agricultural operations and animal welfare. The fencing of TECs as mentioned in the previous section will be included in this plan due to the need for protection from livestock.

10. Bushfire

Submitters are concerned turbines would restrict aerial firefighting, increase complexity of the emergency response to the area such as access and firefighting capability and of the fire ignition risk from turbines.

Issues raised in the referral response from DFES have been addressed by the proponent and an updated Bushfire Management Plan (BMP) and Bushfire Risk Management Plan (BRMP) have been provided (**Attachments 4c** and **4d)**. The proponent complies with the DFES recommendation for 300m between turbines to address impacts on aerial firefighting which complies with the draft Code and CFA guidelines.

Fire ignition risk from turbines is low and is addressed in the proponent's BRMP. The proponent has updated the BMP to show that a BAL-29 can be achieved for siting of renewable energy infrastructure which complies with LPP23 and the draft Code.

An updated BMP and updated BRMP are required as a condition of approval to reflect the final turbine layout. A final emergency response plan is recommended as a condition of approval. The Shire's LPP23 requires that this is done in consultation with DFES and local bushfire brigades.

11. Transport

The transport of components from Bunbury Port is feasible with some minor modifications to hardstand at some turnings which do not raise any issue with Main Roads. Main access to the site is to be via Scott River Road, with alternative options presented as shown in Figure 14. There is some minor clearing required for access roads which is part of the total native vegetation clearing of 1ha.

The heavy haulage during construction, maintenance and decommissioning will impact on the roads and increase maintenance requirements for the Shire. This will include Scott River, Governor Broome and Dennis Roads which have vehicle access to the site. It is possible that road upgrades may be required to the unsealed portions of the roads.

An updated Traffic and Transport Management Plan is added as a condition of approval. In line with LPP23, this shall include a technical evaluation of road condition and upgrade requirements in accordance with WALGA technical guidance notes.

Traffic impacts relating to decommissioning are to be addressed through the decommissioning plan.

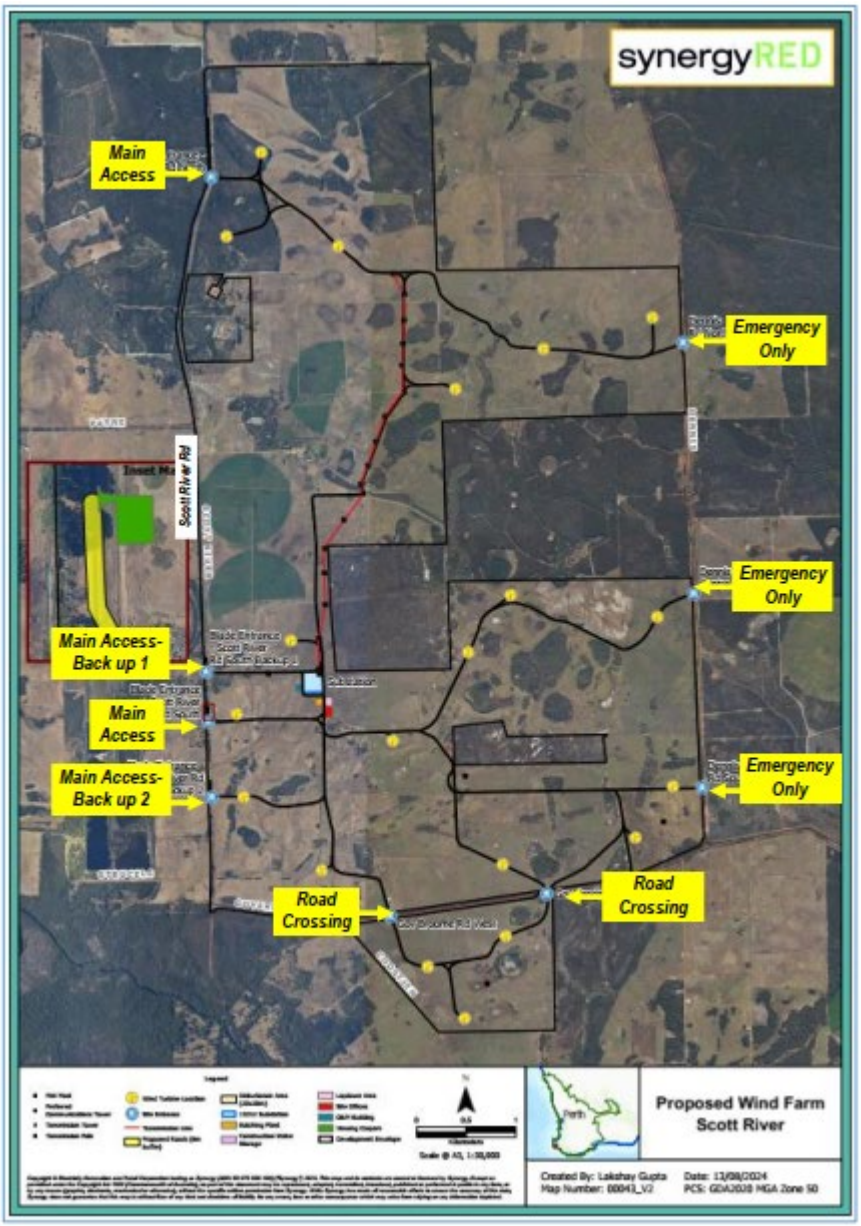


Figure 14 – Road Access

12. Workers Accommodation

The proponent has not been able to provide details as to how workers will be accommodated for the approximate 18 to 24 month construction period.

It should be noted the very high demand for housing in the Shire and the lack of long-term rental accommodation. The accommodation strategy to be provided as a condition of approval should consider this and outline strategies to minimise social impacts as required under the LPP23. Any further on-site accommodation requires an additional approval from the Shire. Alternative impacts on rental accommodation should be appropriately documented and considered as part of the implementation process, with an agreed strategy to mitigate potential impacts.

13. Decommissioning

The proponent provided a preliminary decommissioning plan with the application. At the end of the project life, wind turbines can be repowered to extend the life of the project. This may require lease agreement extensions with landowners. If repowering is not viable, the proponent has committed to removing all above ground infrastructure and rehabilitation of the land to a state agreed with landowners and suitable for the prevailing agricultural land use. Underground foundations may remain subject to arrangements with individual landholders.

The Shire has recommended a condition for a restricted timeframe for the approval of 30 years. This allows the Shire to capture end of life considerations such as future construction impacts and to retest the proposal at the end of useful life should a new, longer duration be proposed at that time.

A condition for an updated decommissioning plan to be submitted to the local government at least 12 months before wind farm operations cease is recommended. Decommissioning and rehabilitation works are required to be completed 18 months within ceasing operations as outlined under the Shire's LPP23. Additionally, the LPP requires that there should be some demonstration of how funds are set aside for decommissioning or provision of evidence of an alternative legal mechanism.

14. Community benefits

The proponent has committed to a community benefit fund of $1000 per MW per year from the first year of construction in line with the DEED Community Benefit Guidelines. It is noted that this cannot be a condition of approval due to it falling outside the planning framework and has been recommended as an advice note. It is understood that the payment of the community benefit fund will be facilitated as a Memorandum of Understanding or legally binding agreement with the SW Regional Development Commission. This has been a point raised by submission and the lack of procedural certainty at this stage reflects the policy framework lagging development pressure.

Conclusion:

The proposal has been assessed against the relevant statutory framework, State and local planning policies, and informed by extensive community consultation and advice from referral agencies. The assessment has identified several key considerations, most notably the lack of certainty arising from the conceptual nature of the application, the potential for significant landscape and visual impacts, and the environmental risks associated with acid sulphate soils and groundwater disturbance within a highly sensitive hydrological setting.

While the proposal aligns with State objectives to support the transition to renewable energy, the absence of a strategic planning framework for large-scale wind energy in Western Australia has resulted in a broad and conceptual application that does not allow for a site-specific assessment. This has contributed to a high level of community concern.

In response to concerns regarding visual impact, the relocation of a number of turbines has been recommended to reduce visual dominance, improve consistency with LPS1 and LPP23, and better balance local impacts against the strategic need for the proposal. These relocations are considered critical to mitigating the most significant

landscape and amenity impacts identified through the assessment and to improving the overall planning balance of the development. In addition, some turbine relocations are required to achieve appropriate setbacks to approved dwellings.

Referral agencies have advised that, subject to stringent conditions and further investigation, environmental risks, particularly those associated with acid sulphate soils, can be managed. On balance, and subject to the recommended turbine relocations and conditions, the Shire considers that the proposal can achieve an acceptable planning outcome within the current framework, albeit with residual risk and acknowledged uncertainty.

Alternative to the RAR Recommendation

The Proposal presents impact, risk and uncertainty. Most importantly are the landscape impacts and potential risk for acid sulphate soils. If the DAP is of the mind to refusal the proposal, the following alternative recommendation could be followed:

That the DAP resolves to:

1. **Accept** that the DAP Application reference DAP/25/02993 is appropriate for consideration as a "Wind Farm" land use and compatible with the objectives of the zoning table in accordance with Clause 4.3 of the Augusta Margaret River Shire Local Planning Scheme No. 1;

2. **Refuse** DAP Application reference DAP/25/02993 and accompanying plans (Map number 00274 dated 27/2/2026 (Plan 1); Map number 00219, dated 4/09/2025 (Plan 2)) in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015* , and the provisions of the Shire of Augusta Margaret River Local Planning Scheme No. 1 for the following reasons:

    a) Unacceptable environmental risk - the proposal is located in a high-risk acid sulphate soil environment. Without site-specific investigation of turbine locations, there is insufficient certainty that irreversible impacts to groundwater, waterways and groundwater-dependent ecosystems can be avoided, contrary to the precautionary principle embedded in State Planning Policy 2.0, State Planning Policy 2.9, Local Planning Policy 23 and Local Planning Scheme No.1.

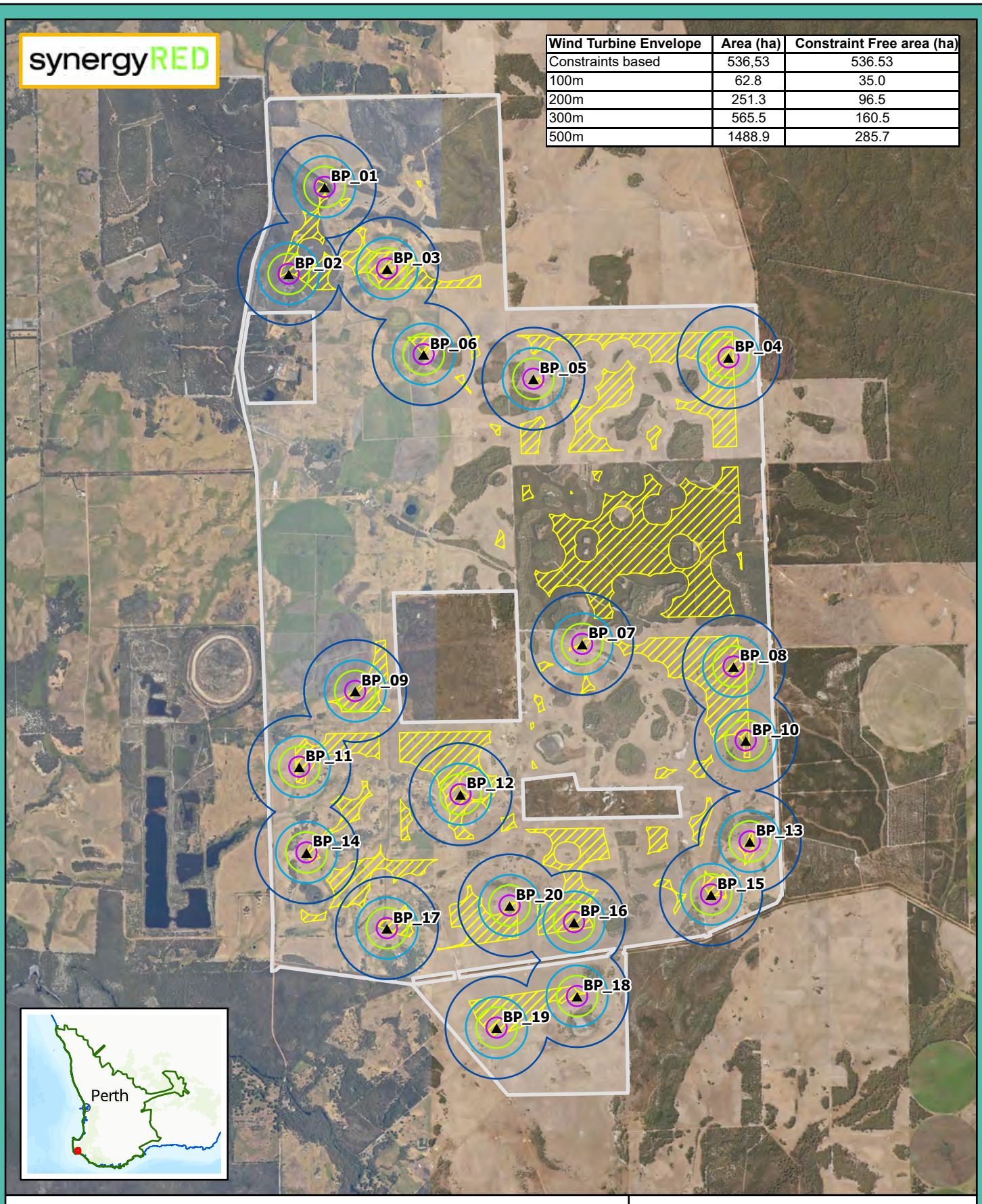
    b) Unacceptable landscape and visual impacts - the proposed turbines would result in high visual impacts on the Augusta townsite, coastal margin and identified sensitive viewpoints. These impacts are not adequately mitigated and would detract from the visual amenity and landscape character of the locality, inconsistent with Section 5.13.3 and the aims and objectives of the Local Planning Scheme, and Local Planning Policy 23.

Attachment 1 – Lot and landowner details

Lot number	Plan/ Diagram	Volume/ Folio	Land tenure type	Registered proprietor
1	69685	1924/610	Freehold	T.J.M. Nominees Pty Ltd
6	33923	2543/911	Freehold	Boley's Pastoral Holdings Pty Ltd
100	38071	2555/699	Freehold	Boley's Pastoral Holdings Pty Ltd
101	38071	2555/700	Freehold	State of Western Australia
4152	207770	2027/165	Freehold	Boley's Pastoral Holdings Pty Ltd
4154	207769	1930/228	Freehold	Ross Kingsley Woodhouse
4260	208478	1824/96	Freehold	Ross Kingsley Woodhouse
4261	208478	1726/538	Freehold	Ross Kingsley Woodhouse
4263	208478	1930/516	Freehold	Boley's Pastoral Holdings Pty Ltd
4265	208480	1581/567	Freehold	The Trust Company (Australia) Ltd
4266	208480	1818/129	Freehold	John Pentland Hick
4269	209300	1981/387	Freehold	Graeme Ernest Payne
4924	217962	LR3089/693	Crown	State of Western Australia *Note: Crown Reserve 42377, managed by the Department of Biodiversity Conservation & Attractions (**DBCA**).*
5200	20935	LR3112/932	Crown	State of Western Australia *Note: Titled Crown land dedicated as road reserve and managed by the Shire AMR*
N/A	N/A	N/A	Crown	State of Western Australia *Note: Untitled Crown land dedicated as road reserve and managed by the Shire AMR:* *-Landgate Land ID 3635213 (Scott River Road)* *-Landgate Land ID 3629782 (Coostien Road)* *-Landgate Land ID 3629783 (Governor Broome Road)*

synergyRED

Wind Turbine Envelope	Area (ha)	Constraint Free area (ha)
Constraints based	536,53	536.53
100m	62.8	35.0
200m	251.3	96.5
300m	565.5	160.5
500m	1488.9	285.7



Legend

- Development Envelope
- Constraints Based Wind Turbine Envelope
- Wind Turbine Location
- 100m Wind Turbine Envelope
- 200m Wind Turbine Envelope
- 300m Wind Turbine Envelope
- 500m Wind Turbine Envelope

N

0 1 2

Kilometers

Scale @ A4, 1:50,000

Wind Turbine Envelope Options

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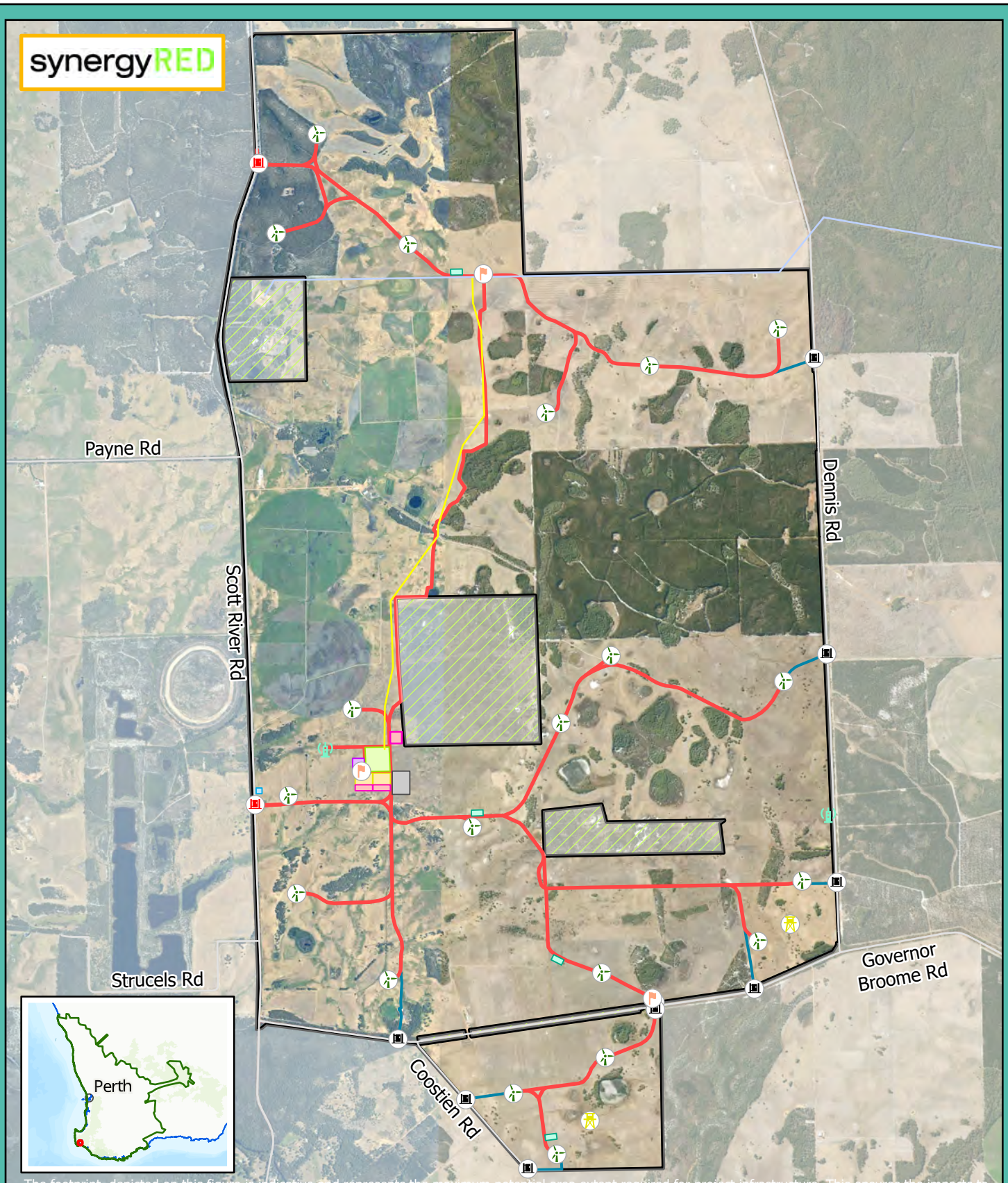
Created By: A.Yu Date: 27/02/2026
Map Number: 00274 PCS: GDA2020 MGA Zone 50



The footprint depicted on this figure is indicative and represents the maximum potential area extent required for project infrastructure. This ensures the impacts to vegetation, noise and visual assessments from the Proposal can be conservatively assessed. The final footprint will be subject to pre-clearing surveys and detailed design, and will conform to the environmental outcomes as defined in the EIA.

Legend

- Wind Turbine
- Wind Monitoring Mast
- Communication Tower
- Water Tank
- Main Site Entrance
- Alternative Emergency Access
- Existing 132 kV Beenup to Manjimup Transmission Line
- Project Transmission Line
- Roads
- Concrete Batching Plant
- Construction Laydown Area
- Construction Site Offices
- Public Viewing Area
- Project Substation
- Operation and Maintenance Area
- Borrow Pit
- Internal Access Roads
- Existing track – Emergency Access
- Development Envelope
- No Clearing Zone

N

0 0.5 1

Kilometers

Scale @ A4, 1:45,000

Proposed Wind Farm in Scott River (Indicative Layout)

Created By: M.Yang Date: 4/09/2025
Map Number: 00219 PCS: GDA2020 MGA Zone 50

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URBIS

Proposed Wind Farm in Scott River

Development Application Report

October 2025
Prepared for: SynergyRED



URBIS STAFF RESPONSIBLE FOR THIS REPORT WERE:

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Report Number	FINAL (3 October 2025)

Acknowledgment of Country

Urbis acknowledges the Whadjuk Noongar People as the Traditional Custodians of Boorloo/Perth.
We recognise that First Nations sovereignty was never ceded and respect First Nations peoples continuing connection to these lands, waterways and ecosystems for over 60,000 years.
We pay our respects to First Nations Elders, past and present.

Urbis is committed to incorporating our respect for First Nations cultures, peoples and storytelling in our work across the Country. We are proud to have partnered with Darug Nation artist, **Hayley Pigram**, and to profile her artwork - **Sacred River Dreaming**.



The river is the symbol of the Dreaming and the journey of life. The circles and lines represent people meeting and connections across time and space. When we are working in different places, we can still be connected and work towards the same goal.

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1 Introduction

Synergy Renewable Energy Developments Pty Ltd (**SynergyRED; 'the Proponent'**) is proposing to develop an onshore Wind Farm up to 100 Megawatt (**MW**) in the Scott River area, approximately 15 km north-east of Augusta, and 15km east of the Karridale townsite, located within the Shire of Augusta-Margaret River (**'Shire AMR'**), in the South West Region of Western Australia (**WA**) (**'the Project'**).

The Project will include the construction and operation of up to 20 wind turbines, and forms part of an initiative by the Proponent to explore, scope and develop a range of renewable energy assets across WA, to meet the WA State Government's 2030 decarbonisation targets.

This Development Application Report (**'this Report'**) has been prepared by Urbis on behalf of the Proponent, to address all relevant planning and technical requirements in support of the Project.

Detail on the Project Site is included in **Section 1.7** of this Report.

Once operational, the Project will generate up to 100MW which could power up to 100,000 average WA homes per year. This would save up to 200,000t of carbon emissions per year, contributing to the State's renewable energy future.

This Report provides a detailed overview of the Project and presents key technical details relevant to the application, including:

Attachments:

Attachment 1: Record of Stakeholder Engagement

Attachment 2: Certificates of Title & Deposited Plans

Attachment 3: Development Plans

Attachment 4: Referral Supporting Document

(*refer individual Appendices outlined in the following section)*

Attachment 5: Bushfire Management Plan

Attachment 6: Bushfire and Risk Management Plan

Attachment 7: Transport Impact Statement

Referral Supporting Document (RSD) Appendices:

Appendix A: Surface Water and Hydrogeological Assessment

Appendix B: Preliminary Acid Sulfate Soils and Dewatering Management Plan

Appendix C: Preliminary Decommissioning Plan

Appendix D: Preliminary OSOM Route Study

Appendix E: Desktop Assessment of Subterranean Fauna

Appendix F: Greenhouse Gas Assessment Summary Report

Appendix G: Preliminary Geotech and Baseline Contamination Report

Appendix H: Preliminary Construction Environmental Management Plan

Appendix I: Detailed Flora and Vegetation Survey

Appendix J: Ecological Gap Survey

Appendix K: Basic and Targeted Vertebrate Fauna Survey

Appendix L: Bird and Bat Risk Assessment – Level Two

Appendix M: Desktop Assessment of Short Range Endemic Fauna

Appendix N: Preliminary Bird and Bat Adaptive Management Plan

Appendix O: Shadow Flicker and Blade Glint Assessment

Appendix P: EMI Assessment

Appendix Q: Aviation Impact Assessment

Appendix R: Social Values Assessment

Appendix S: Noise Impact Assessment

Appendix T: Landscape and Visual Impact Assessment

Given the estimated development value of the Project (exceeding $2 million), this Development Application will be determined by the Regional Joint Development Assessment Panel (**RDAP**) following preparation of a Responsible Authority Report (**RAR**) by the Shire AMR, advice from relevant Government agencies, and the outcomes of community engagement.

1.1 SynergyRED

The Project is being developed by Synergy Renewable Energy Developments Pty Ltd (**SynergyRED**; **'the Proponent')**, a wholly owned subsidiary of Synergy. Its purpose is to *'explore and develop renewable energy solutions for our intelligent energy future'*.

WA is undergoing an energy transformation – the Proponent is developing a portfolio of renewable energy assets such as wind, solar and large-scale battery storage to contribute positively towards the renewable energy sector. The Proponent, and its predecessors, have previously developed some of WA's most notable renewable Projects including:

- Albany Grasmere Wind Farm
- Bremer Bay Wind-Diesel System
- Coral Bay Wind-Diesel System
- Esperance Wind Farm
- Hopetoun Wind-Diesel System
- Kalbarri Wind Farm
- Warradarge Wind Farm
- King Rocks Wind Farm

This Project will be part of the ongoing development of renewable energy assets within the State.

1.2 Regional Context

The Project is located within the South West Region of Western Australia, as shown in **Figure 1** and within the Leeuwin-Naturaliste Sub-region.

The Project Site is located approximately 256km south of the Perth Central Business District (**CBD**), and is located within the Shire AMR, which comprises various towns typically situated along, or set back from, the Leeuwin Naturaliste Ridge landform.

The Shire AMR comprises large agricultural animal pasturing areas, wineries, extensive nature reserves, and various natural features of both individual and landscape significance. The Shire AMR is located in one of 36 recognised biodiversity hot spots globally, known for its unique plant and animal species endemic to the Region.

From a demand and growth perspective, the Leeuwin-Naturaliste Sub-region has experienced strong and ongoing growth demand, which is required to be balanced with the environmental values of the Region.

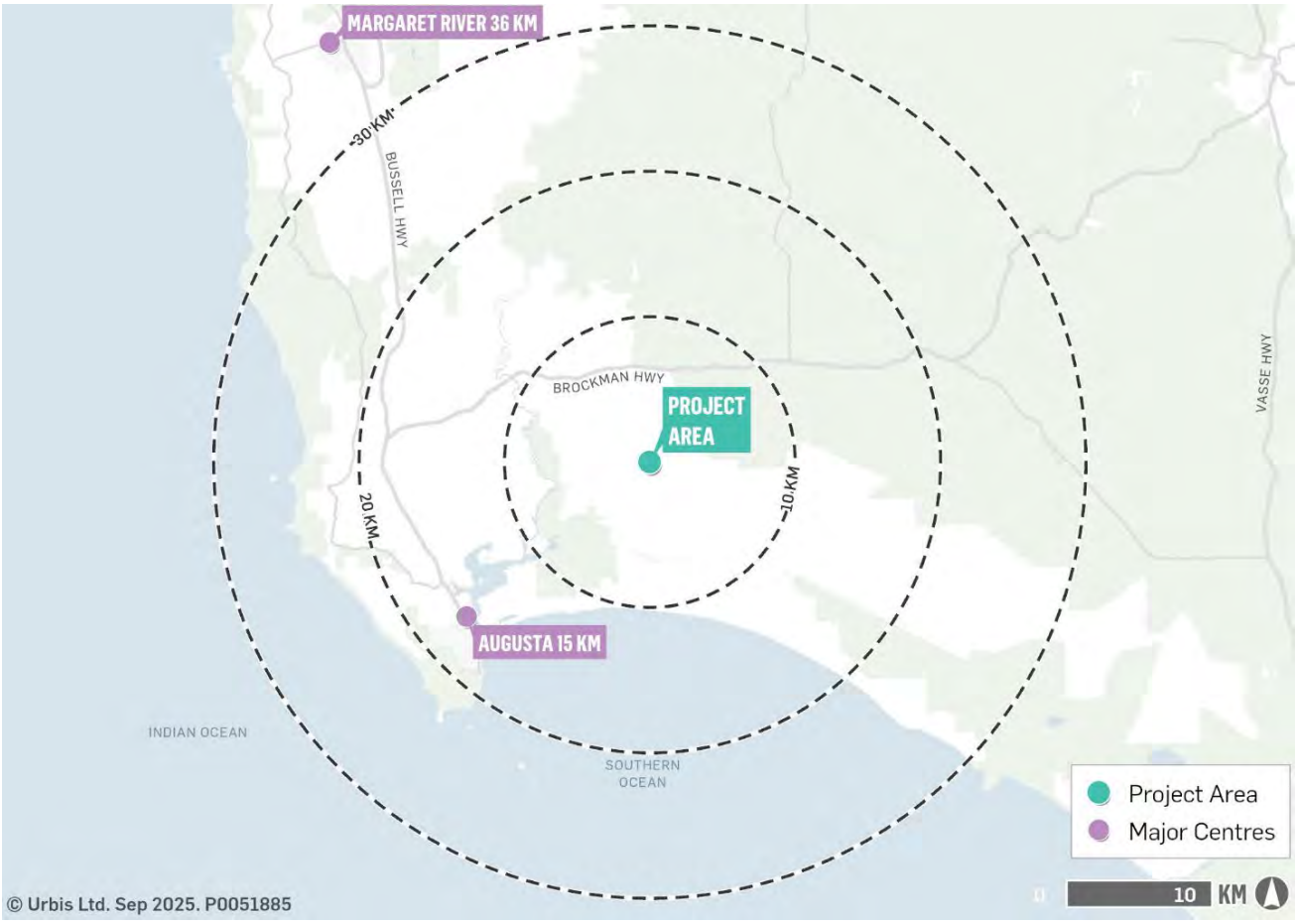


Figure 1 *Regional Context Plan*

1.3 Local Context

The Project Site is located approximately 15km north-east of Augusta, and 16km east of Karridale, and bound by Dennis Road to the east, Scott River Road to the west, and Coostien Road (including land south of Governor Broome Road) to the south. These roads are all local roads controlled by the Shire AMR.

The context immediately surrounding the site comprises State Forest (South Blackwood) to the north-east, Chester and Pagett Nature Reserves to the east, and Scott National Park to the south-west. The Project Site is also largely comprised of, and surrounded by, low intensity general agricultural farmlands.

Whilst the Project Site comprising the Development Envelope is entirely contained within the Shire AMR, the border with the Shire of Nannup is approximately 1.2km east of the Development Envelope.

An Aerial Plan of the Development Envelope is provided at **Figure 2**.

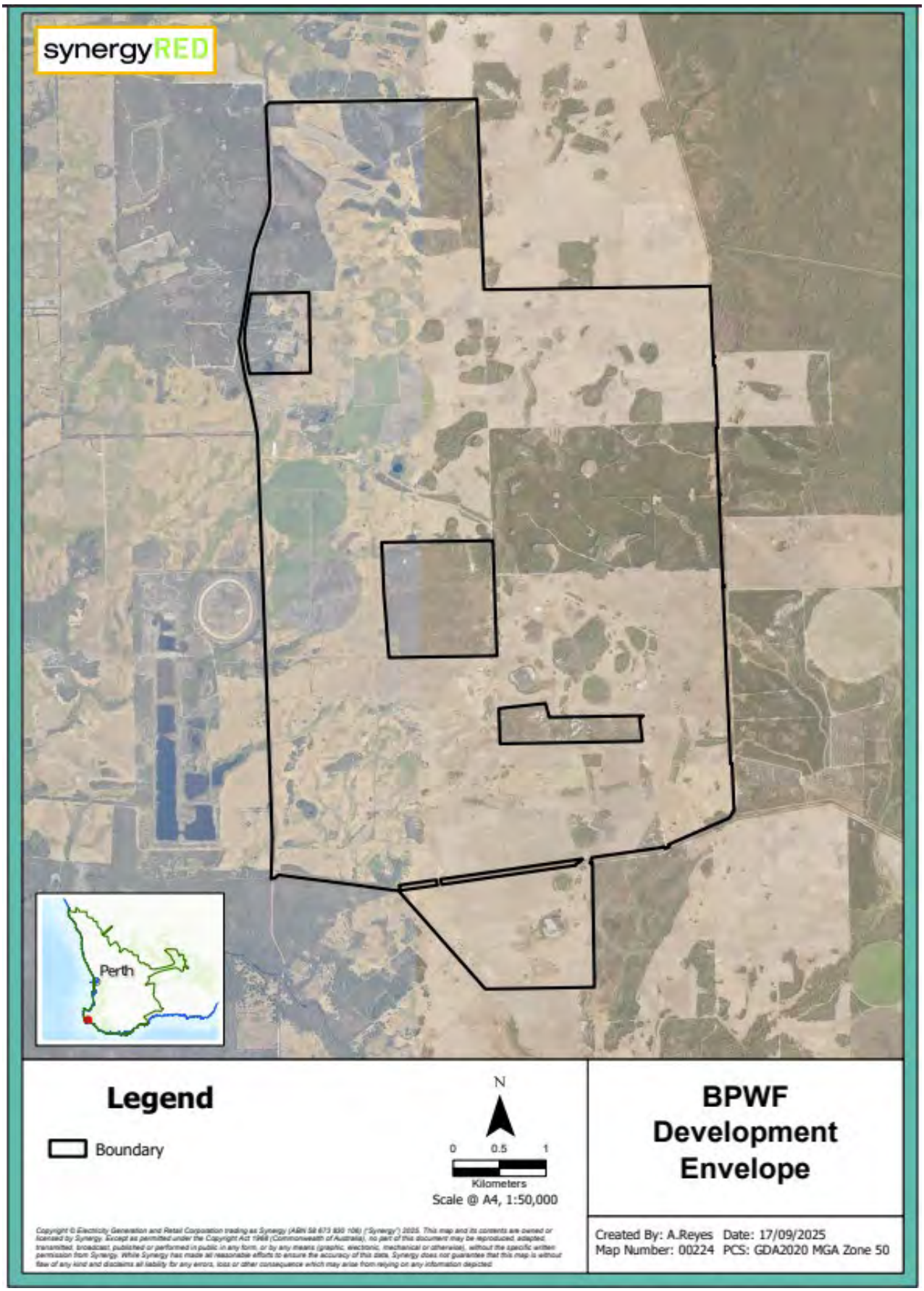


Figure 2 Site Aerial and Development Envelope

1.4 Site Suitability

The Project Site has been selected by the Proponent based on detailed investigations which determined its suitability for a proposed renewable energy project.

In summary, these suitable characteristics include:

- The strong wind resource and diurnal wind profile that compliments the electricity demand profile
- Proximity to the existing 132kV transmission line that traverses the site, being the Western Power Beenup to Manjimup transmission line
- The topography of the project area is within a low relief landscape with elevation gradually increasing from the south-west (approximately 9 m AHD) to the north-east (approximately 38 m AHD)
- Physical and environmental conditions, primarily that the Project Site is largely cleared and only contains small pockets of remnant, good quality vegetation (which will largely be retained by the Project)
- Proximity to existing services in the Towns of Augusta and Margaret River
- Access to the site via the Regional road network from Bunbury Port, with minimal (and only localised) upgrades required
- Consolidated land ownership, with six (6) private landowners included in the Project Site, some with multiple lots, sparsely populated surrounds, and minimal sensitive land uses

The South West Region is widely recognised as one of the country's most favourable locations for wind energy development due to its strong and consistent wind resources (Source: Energy Policy WA).

1.5 Project Summary

The Project is proposed to include up to 20 wind turbine generators (**WTGs**) (total wind capacity of up to 100MW), with supporting infrastructure.

The WTG will be installed on towers up to 164 metres tall with blades up to 90 metres long, delivering a total maximum tip-height of up to 250 metres.

The Project will connect into the South-West Interconnected System (**SWIS**) via the existing Beenup to Manjimup 132 kV transmission line which passes through the Development Envelope (refer **Figure 4** in **Section 2** of this Report).

The exact specifications of the WTGs, including the make, model and size, as well as the specific location of infrastructure, will be confirmed through a procurement process, undertaking further design, and appointing contractors.

On this basis, this Development Application seeks approval for the 'maximum case scenario' in terms of level of impact.

The relevant technical studies that have informed this Project, appended to this report, have all been based on this 'maximum case scenario'.

The Project Site encompasses 12 freehold lots, part of a Crown Reserve and sections of road reserve with a total area of approximately 3,597 ha.

The Project Site and surrounding area is primarily utilised for low intensity agricultural uses (primarily dairy and beef farming, as well as blue gum plantations) and is mostly cleared, however there are areas of remnant native vegetation (which will largely be retained by the Project).

Importantly, agricultural activities will be able to continue around the proposed WTGs and other infrastructure both during and following construction.

The key Project details are summarised in **Table 1**. The Indicative Site Plan at **Figure 4** illustrates the proposed 'Development Envelope' including the indicative location of associated infrastructure.

Table 1 *Key Project Details*

Item	Summary
Location	The Project Site is located in the locality of Scott River, approximately 15km north-east of Augusta, and 16km east of Karridale, in the South West Region of WA. It is bound by Dennis Road to the east, Scott River Road to the west, and Coostien Road (including land south of Governor Broome Road) to the south. The surrounding lands are typically zoned General Agricultural, Parks and Recreation, or Conservation Reserve (Refer **Figure 4** and **Section 4** of this Report).
Site Area	The Development Envelope encompasses 12 freehold lots and part of a Crown reserve, with a total area of approximately 3,597ha, including various road reserves to support transport and access of components to the Site. Within this total Development Envelope, the Indicative Layout comprises a maximum of 107ha comprising WTGs, pads and associated infrastructure, and site access points (within the Shire AMR).
Existing Development	Primarily cleared agricultural land (including tree plantations) with some isolated remnant pockets of native vegetation.
Indicative Development Envelope and Layout	Exact WTG locations and numbers (up to 20 WTGs) to deliver up to 100MW of power will be determined during the Procurement/Contracting Phase (refer **Figure 4).**
WTG Number	Maximum of 20 WTGs
WTG Design	Three bladed, horizontal axis WTGs as illustrated in **Figure 6** and **Figure 7**
WTG Size	▪ Maximum blade length: 90 m ▪ Maximum tower height: 164 m ▪ Maximum overall WTG tip-height: 250 m ▪ Minimum blade ground clearance: 40 m
Power Output	Up to 100MW
Potential WTG Rotation Speed	Typical rotation speed for a modern WTG is approximately 4-12 rotations per minute (dependent upon the wind speed and WTG specifications).
WTG Colour	The WTGs will have non-reflective paint to prevent glint, reduce contrast with background sky and minimise reflection, but remain visible for aircraft. The WTG will be uniform in colour and will not contain any prominent company logo or branding.
Access Roads & Site Entrances	Two (2) main site entrances via Scott River Road on the western boundary of the Development Envelope. A third site entrance will also be installed across Governor Broome Road to facilitate transport of turbine components south of Governor Broome Road. Wherever practical, existing tracks within the Project Site will be used.

Ancillary Features	The Project Includes: ▪ Concrete foundations installed up to maximum depth of 5.0m below ground in existing cleared farmland ▪ Up to two (2) permanent and four (4) temporary wind monitoring (met mast) towers up to 164m tall ▪ Up to two (2) communications towers up to 100m tall ▪ One (1) new 132kV electrical substation and switchyard ▪ One (1) permanent site office, workshop and maintenance building/warehouse with associated lunchroom, amenities and bathrooms including septic systems (Operations and Maintenance building) (**O&M building**) ▪ Approximately 30km of gravel capped access road ▪ Installation and/or upgrade of gates and fences, as required ▪ A 4.3km transmission line connecting the Wind Farm substation to the existing Beenup to Manjimup 132kV transmission line via a local tee connection ▪ Approximately 30km of 33kV cables connecting the substation to each WTG, with underground cables preferred unless ground conditions require overhead conductors ▪ Temporary laydown and stockpile areas ▪ Temporary construction compounds ▪ Temporary concrete batching plants and storage facility ▪ Water storage tanks and dams ▪ Borrow pits
Extent of Clearing	Minor clearing (maximum 1 ha) of native vegetation required.
Project Timeframes	▪ Construction phase – approximately 18-24 months ▪ Operations phase – approximately 30 to 60 years ▪ Decommissioning phase – approximately 24 months
Expected Number of Employees	Up to 150 Employees during peak Construction Phase, and up to five (5) Employees (Operational Staff) following construction and commissioning.

1.6 Stakeholder and Community Engagement

The Scott River area has been the subject of interest for Wind Farm development for several decades, by multiple proponents.

For this Project, the Proponent commenced early discussions and negotiations with key landowners and stakeholders in late 2022.

In the lead up to the lodgement of this Development Application, the Proponent and its Project Team have conducted various engagement activities with relevant stakeholders, including host landowners, local businesses, community groups, local and State government representatives, Aboriginal organisations, industry groups and various government agencies.

Engagement with the wider community has been ongoing since February 2024. This has involved an ongoing presence in the community through a community drop-in office space in Augusta, monthly updates in the local newsletter, letter box drops, targeted social media and radio advertising.

Fifteen drop-in consultation sessions were hosted in various locations throughout the Shire AMR area in March 2024, December 2024, and September 2025. A phone number and email address that is staffed by the Project Community Engagement Office has been widely promoted.

A record of this engagement is provided at **Attachment 1** and in the Social Values Assessment at **Appendix R** of **Attachment 4**).

1.6.1 Social License and Community Benefit Fund

The Proponent is committed to being an active and contributing member of the communities in which it operates its renewable energy infrastructure. If the Project proceeds, it will establish a Community Benefit Fund which aligns with Powering WA's *Draft Guideline on Community Benefits for Renewable Energy Projects* (June 2025) (**Draft Guideline**).

The Draft Guideline provides an overview of community benefits for renewable energy projects across the State and responds to requests from communities and renewable energy developers to establish a framework for community benefits arrangements.

For the first year of construction, the Fund will be $100,000 per year and then adjusted in line with the Consumer Price Index (**CPI**) for future years throughout the life of the asset.

The Fund aims to contribute to social value by prioritising:

- Building resilient, prosperous communities
- Creating or supporting sustainable social and economic outcomes with Aboriginal peoples
- Environmental stewardship
- Long-term community benefits

The Project will work closely with the Shire AMR and local community to create a Community Benefit Fund Implementation Plan to deliver the funds, ensuring the unique needs of the surrounding communities are met.

Eligible funding recipients could include not-for-profits, registered charities, community organisations, local emergency services, educational facilities, and social enterprises.

In certain circumstances, depending on the community's needs and capacity, funds may also be allocated to the Shire AMR or small businesses.

1.7 Project Site

As noted in **Table 1**, the Project Site will be established across 12 freehold lots, part of a Crown Reserve and adjacent public road reserves (Crown Land), with a Development Envelope of 3,597 ha. Of this total Development Envelope, the indicative disturbance footprint is approximately 107ha.

The Project Site is primarily used for agricultural uses (including tree plantations) and is mostly cleared, however there are pockets of good quality vegetation which are proposed to be retained. The Beenup to Manjimup 132kV transmission line currently bisects the site on an east-west axis.

The topography of the Project Site is gently undulating with elevations ranging from 9m to 38m Australian Height Datum (**AHD**).

1.7.1 Lot Details

Table 2 highlights the specific lot details, with cadastral boundaries illustrated at **Figure 3.**

Copies of Certificates of Title and Deposited Plans are provided at **Attachment 2**.

Table 2 *Lot Details*

Lot number	Plan/ Diagram	Volume/ Folio	Land tenure type	Registered proprietor
1	69685	1924/610	Freehold	T.J.M. Nominees Pty Ltd
6	33923	2543/911	Freehold	Boley's Pastoral Holdings Pty Ltd
100	38071	2555/699	Freehold	Boley's Pastoral Holdings Pty Ltd
101	38071	2555/700	Freehold	State of Western Australia
4152	207770	2027/165	Freehold	Boley's Pastoral Holdings Pty Ltd
4154	207769	1930/228	Freehold	Ross Kingsley Woodhouse
4260	208478	1824/96	Freehold	Ross Kingsley Woodhouse
4261	208478	1726/538	Freehold	Ross Kingsley Woodhouse
4263	208478	1930/516	Freehold	Boley's Pastoral Holdings Pty Ltd
4265	208480	1581/567	Freehold	The Trust Company (Australia) Ltd
4266	208480	1818/129	Freehold	John Pentland Hick
4269	209300	1981/387	Freehold	Graeme Ernest Payne
4924	217962	LR3089/693	Crown	State of Western Australia *Note: Crown Reserve 42377, managed by the Department of Biodiversity Conservation & Attractions (**DBCA**).*
5200	20935	LR3112/932	Crown	State of Western Australia *Note: Titled Crown land dedicated as road reserve and managed by the Shire AMR*
N/A	N/A	N/A	Crown	State of Western Australia *Note: Untitled Crown land dedicated as road reserve and managed by the Shire AMR:* *-Landgate Land ID 3635213 (Scott River Road)* *-Landgate Land ID 3629782 (Coostien Road)* *-Landgate Land ID 3629783 (Governor Broome Road)* *-Landgate Land ID 3612400 (Dennis Road)*

*Refer **Attachment 2** (Certificate of Title and Deposited Plans) and **Attachment 3** (Development Plans) for detailed information regarding affected easements.*

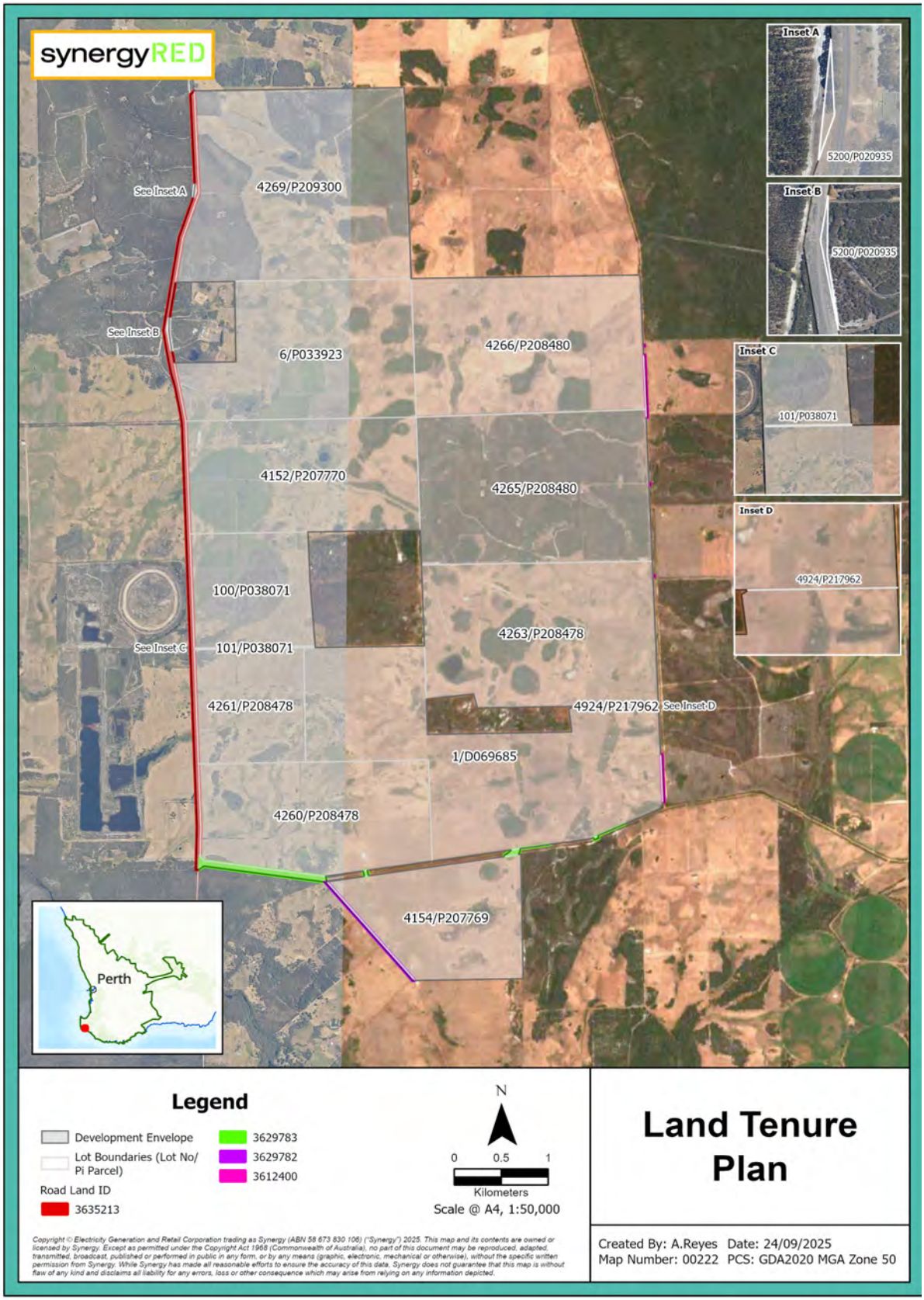


***Figure 3** Land Tenure Plan*

*Note: Easements and public roads are not indicated on **Figure 3**.*

2 Proposed Development

The Proponent proposes to develop the Project Site for the purposes of a Wind Farm. This section provides an overview of the Project, in terms of the proposed WTGs and associated infrastructure, Project Site access and construction details.

2.1 Overview of Project

2.1.1 Development Envelope and Indicative Layout

Figure 4 depicts the proposed Development Envelope, including the Indicative Project Layout of WTGs, associated infrastructure, and site and transport access points (refer **Attachment 3**).

Approval for a 'Development Envelope' is being sought to enable flexibility for the proposed infrastructure location, to be confirmed through the Procurement/Contracting Phase.

The final layout of the Wind Farm will be informed by a comprehensive procurement process where WTG contractors/manufacturers will be selected by the Proponent. This process will confirm the WTG, specifications (make, model etc.) as well as the layout based on more detailed technical studies to ensure compliance with all relevant international and national standards, guidelines and requirements.

Whilst the specific design is yet to be finalised, the Indicative Project Layout shown at **Figure 4** has been developed through an iterative process, informed by extensive technical investigations, including environmental and other technical inputs, landowner and neighbour consultation, and constraints identification.

As identified in **Section 1.5,** this Development Application seeks approval for the 'maximum case scenario' in terms of level of impact.

This approach, which is typical for Wind Farm Development Applications within WA, will then enable any 'lesser' outcome to be acceptable 'as-of-right' given the level of impact would be lower.

Understanding the potential environmental impacts forms an important part of determining the indicative layout and location of the WTGs. As a result, the indicative layout is considered a balance of optimisation from an energy generation perspective, as well as considering the outcomes of all technical studies, particularly environmental impacts.

The Indicative Project Layout demonstrates that a realistic WTG layout can comply with required environmental and other technical outcomes of the relevant frameworks and guidelines.

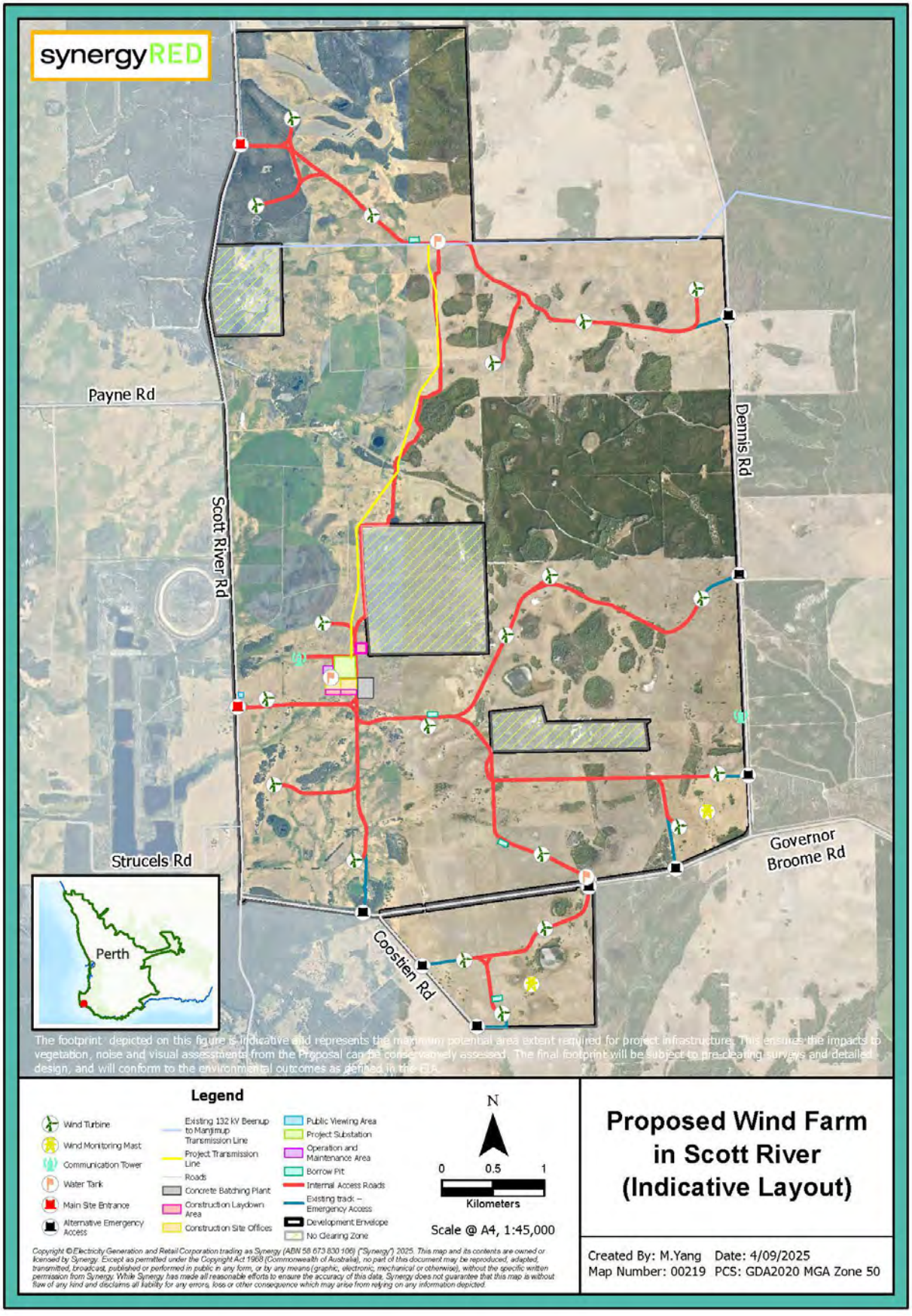


Figure 4 *Indicative Development Envelope and Layout*

2.2 Project Description

2.2.1 WTG Infrastructure

As described in **Section 1.5,** the exact number, specification and model of the WTGs will be determined through the Procurement/Contracting Phase following Development Approval and further detailed site investigations.

The Project has been designed to accommodate up to 20 WTGs to the general parameters illustrated in **Figure 5,** to ensure that assessments of any potential impacts can be adequately considered.

The Wind Farm is anticipated to generate 100MW of power at peak. Power output will, however, vary with wind speeds, weather and grid conditions.

Each WTG will have a transformer located internally or externally near the tower.

Power and communication cables will be installed underground (wherever practical) between the WTGs and connect to the proposed substation, as well as the existing high voltage 132kV overhead powerlines.

The proposed WTG are expected to be connected together in a 'daisy-chain' arrangement via underground cables.

The final number and specification of the WTGs will be selected after a detailed procurement process, and will be broadly based on the following criteria:

- Maximum power and energy output based on wind resource occurring at the Project Site
- Suitability of the WTG to operate for the design life of the Project
- Availability of the WTG components and estimated delivery time to the Project Site
- WTG capable of providing optimum financial outcome over the design life
- Track record of WTG manufacturer and current industry presence in Australia

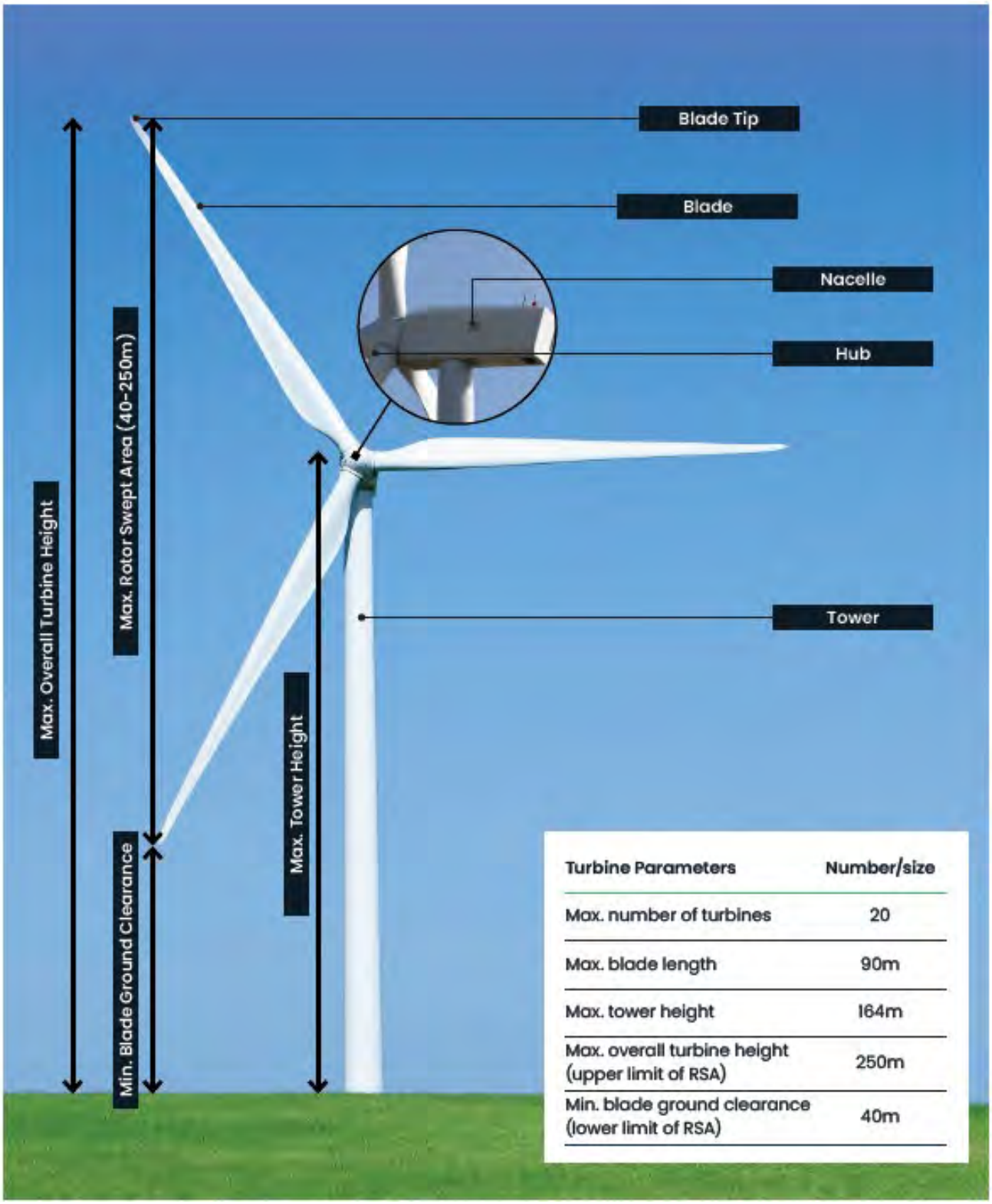


Figure 5 *WTG Specifications*

Note: The final WTG design and layout will be dependent on several factors including additional wind data, market conditions, cost of construction, availability of WTG infrastructure and the capacity of the existing 132kV power line. The cabling between the WTGs will be underground where practical, and follow the roads as much as practical, to minimise clearing, visual impact, and impacts on landowners.

2.2.2 WTG Foundations

The Project Site presents several challenges when it comes to installing turbine foundations, including the presence of significant environmental values, acid sulfate soils (**ASS**), a high-water table, and areas with unstable, loose ground. Because of this, the WTG foundations could vary in size or design across the Development Envelope depending upon the imposed loading, ground conditions, construction methodology and drainage requirements.

To provide a practical and adaptable solution that achieves the necessary mass and stability, while minimising the volume of ASS disturbed, and dewatering volume and depth, three (3) concept turbine foundation designs are proposed for the Project including:

Primary foundation options

- Typical gravitational foundation – above ground, with hillock formation (above ground foundation)
- Typical gravitational foundation – partially above ground, with hillock formation (partial above ground foundation to a depth of 0.8-1.2 metres below ground level (**mbgl**)

Secondary foundation option

- Typical gravitational foundation – below ground foundation

Conceptual wind turbine foundation designs are shown in **Figure 6**.

As an indication, a typical below ground foundation requires approximately 600 - 850m³ of buried reinforced concrete, extending to a depth of up to 5m. The exact foundation design for each WTG location will be confirmed during the Procurement/Contracting Phase, following comprehensive geotechnical and ASS investigations at each proposed location.

The below ground foundation would typically require dewatering to 5.5 mbgl, however, this option will only be used where it is confirmed, prior to construction through detailed site investigation and further modelling, that no dewatering would be required.

Ground improvement may also be required at each WTG foundation, dependent on the results of detailed geotechnical investigations. Ground modification can include soil stabilisation, compaction, the use of geosynthetics or series of concrete piles (refer **Figure 6**). Concrete piles involve concrete being injected down augers to displace, rather than excavate soils, and mitigates any further need for dewatering.

The actual depths of the concrete pillars may vary for each WTG, depending on the geotechnical conditions at the WTG location. Concrete for the foundations will be mixed at concrete batching plants, which will be situated within the Development Envelope.

Non-vegetation zones (**NVZ**) and/or asset protection zones (**APZ**) will be established around the base of turbines to manage the bushfire risk to the Project in accordance with the Bushfire Management Plan (**BMP**). The size of the NVZ and APZ will be dependent on the turbine location and its proximity to different vegetation types.

It is anticipated that any surplus or excavated material be utilised to rehabilitate surrounding areas, or elsewhere on the Project Site for access roads.

Any excavated material will be treated in accordance with an Acid Sulfate Soils and Dewatering Management Plan (**ASSDMP**) and utilised in construction (eg. formation of hillock landforms around WTG foundations, development of internal roads or hardstand) and/or in rehabilitation of temporary construction areas, where appropriate. Any excavated material that is not able to be utilised in construction may be safely disposed of offsite in accordance with the ASSDMP.

A Preliminary ASSDMP has been prepared at **Appendix B** of **Attachment 4**, and further discussion on ASS is provided in **Section 3.10** of this Report.



Figure 6 *WTG Foundation Options*

Note: This is an illustrative concept, it is not to scale and is subject to detailed design.

2.2.3 Wind Monitoring and Communication Towers

Indicative locations for the proposed permanent wind monitoring towers (meteorological masts ('**met masts'**)) are shown within the Development Envelope and Indicative Layout provided at **Figure 4**.

The met masts are required to be located outside of the path of WTG influence to measure unimpeded wind from the prevailing wind directions. The met masts are expected to be permanent and will contain measurement instruments.

In addition, up to four (4) additional but temporary met masts will be constructed during the Construction Phase.

The met masts are required to be a certain distance from nearby WTGs. As such, their locations will be confirmed at the Procurement/Contracting Phase to ensure that accurate measurements can be obtained throughout the life of the Project in accordance with international standards.

To enable the Project to communicate remotely, up to two (2) microwave communication towers are proposed on the Project Site. The communication towers are proposed to be up to 100m in height and are shown on the Indicative Project Layout provided at **Figure 4.**

2.2.4 Operations and Maintenance Building

A permanent Operations and Maintenance building (**O&M building**) is proposed in the centre of the Project Site in close proximity to the substation. The proposed O&M building is likely to include an office, warehouse, kitchen/staff room, amenities, and associated carparking and laydown areas. A layout of a typical O&M building is shown in **Figure 7.**

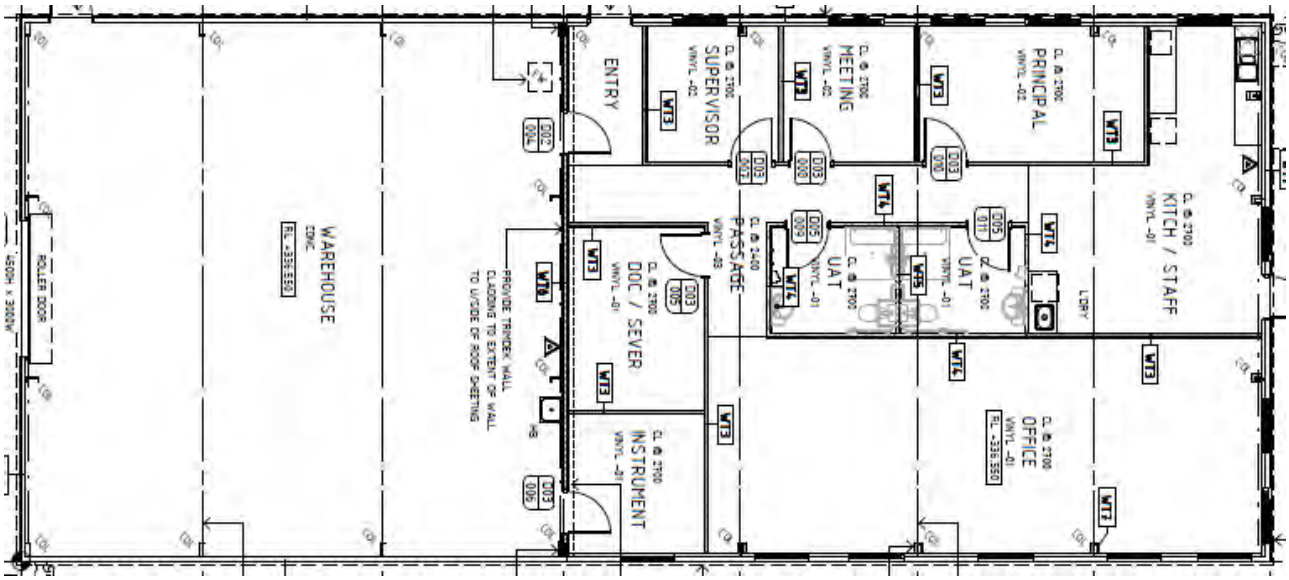


Figure 7 *Indicative O&M building Floor Plan*

As the Project Site does not have access to reticulated sewerage, it is expected that the O&M building will utilise an onsite septic system, which will be installed to comply with relevant Australian standards and Shire AMR approvals (following Development Approval to the Wind Farm).

2.2.5 Substation Infrastructure

A 132 kV substation is required for the Project adjacent to the O&M building, to connect the Project to the SWIS via the existing Beenup to Manjimup 132 kV transmission line. The proposed substation infrastructure will include the following:

- Cabling between the wind turbines and the substation
- Electrical protection infrastructure
- A connecting transmission line via a local tee connection from the substation to the existing Beenup to Manjimup 132 kV transmission line
- Communications equipment, including Supervisory control and data acquisition (**SCADA**)
- Metering
- Transformers
- Static Synchronous Compensators (**STATCOMS**)

An indicative layout of a typical substation is provided in **Figure 8**. The Project will also involve minor upgrades of the existing Beenup substation, with minimal new ground disturbance required (0.02ha).



Figure 8 *Typical Substation Layout*

The cabling between the wind turbines and the substation that connects the Project with the 132 kV transmission line will be underground (where practical) and aim to follow existing roads (where practical) to minimise disturbance. Bird diverters will also be installed during construction along the connecting transmission line.

2.2.6 Site Access

Two (2) main site entrance points are proposed from Scott River Road to ensure safe access to the site and to minimise community disruption during the construction stage, as well as reducing the extent of local roads required for delivery of WTG and other Project components (refer **Attachment 3** and **Figure 4**).

A new site entrance will also be installed across Governor Broome Road to facilitate transport of turbine components south of Governor Broome Road.

As well as the proposed site entrances, emergency services will also be able to utilise other existing farm entrances to access the site.

Access may typically involve widening of the road surface area (additional hardstand), filling and/or redirection of any existing drains (and installing new drainage as required), and the removal of limited vegetation, with similar requirements for the main Project Site access points.

The Preliminary Oversize and/or Over Mass (**OSOM**) Route Study (**Appendix D** of **Attachment 4**) assessed multiple options both from a swept path and sight line assessment perspective, outlining the specific works required to facilitate large truck movements assuming maximum blade length (largest of turbine components), and these entrances were selected as they presented the least impact on environmental values.

Further investigations will be undertaken through the Procurement/Contracting Phase based on the preferred options and size of WTG blade or turbine model deliveries.

2.2.7 Internal Access Roads

The proposed layout of the on-site access roads has been designed to utilise existing roads and tracks wherever practical, and to respond to the existing topography of the land (refer **Figure 4**). The objective was to minimise disturbance to remnant native vegetation, as well as existing agricultural activities within the Project Site.

Access tracks to each of the WTG locations will generally be across open paddocks. The internal site access roads will be private roads and therefore will not impact the general public.

It is expected that there will be approximately 30km of gravel capped roads required, with the following design criteria and mitigation measures applied to the access road layout to mitigate potential impacts:

- Access road footprint will typically be approximately 10m wide to allow for road shoulders, drainage and cabling with some portions proposed to be wider to accommodate turning circles for cranes, trucks and other construction/delivery vehicle requirements. Other portions through sensitive environmental areas will be limited to maximum width of 5-6m to avoid clearing impacts along existing tracks, in accordance with environmental approvals
- Regular turning areas and passing bays will be provided as required
- Roads are not proposed to be sealed and will be constructed from locally sourced aggregate/gravel where available
- Drainage channels will be located on either side of the road as necessary
- Underground power and communications cables will typically be laid alongside internal access roads
- Dust suppression will be managed through a Construction Environmental Management Plan (**CEMP**) to be prepared at the Construction Phase. The Preliminary CEMP is provided in **Appendix H** of **Attachment 4**.

2.2.8 Ongoing Maintenance

The Proponent will be responsible (either directly or via a contractor) for the ongoing maintenance and operation of the WTG, access roads, O&M area, substation and all other associated infrastructure during construction, and throughout operations.

The WTG manufacturers (or suitably qualified contractors) will undertake routine inspections of the proposed infrastructure as part of a regular, ongoing maintenance schedule.

Ongoing maintenance of the access tracks will be required to provide safe access to the proposed infrastructure.

The Proponent will work with Western Power to determine operational boundaries and division of maintenance responsibilities at the substation, connection points and transmission line (an agreement on ownership will be confirmed through the Procurement/Contracting Phase).

2.2.9 Workforce and Accommodation

The Project construction period is estimated to be between 18 – 24 months. The workforce is expected to fluctuate in size throughout this period, with an estimated peak construction workforce of 150 personnel over a period of 3-6 months.

It is anticipated that workers throughout the Construction Phase will be accommodated in local accommodation in surrounding towns and localities, with no construction camp or temporary onsite accommodation proposed at this time.

Once fully constructed and operational, it is anticipated that approximately five (5) full time operations staff will be required throughout the Project's operational life, working typical office hours Monday to Saturday (with on call support after hours), and will reside locally. The employees will be suitably skilled in WTG maintenance activities and be trained appropriately by the O&M contractor.

Project operations which will require on-site personnel include:

- Maintenance of WTGs and associated infrastructure
- Safety management

- Environmental management
- Liaison with landowners

Operations which will likely be managed by off-site personnel include:

- Australian Energy Market Operator (**AEMO**) coordination
- WTG performance monitoring and licensing compliances
- Project reporting
- Remote monitoring

2.2.10 Decommissioning (or Repowering)

Once the operational life of the Project comes to an end, the WTG assets can be repowered by replacing the WTG (or its components), to extend the life of the Project. This may require lease agreement extensions with landowners.

If repowering the WTG assets is not viable, the Proponent commits to removing all above-ground infrastructure, including WTG, substations, and overhead powerlines, and rehabilitating the land to a state agreed upon with the landowners, and to a state suitable for the prevailing agricultural land use. This may include regrading, topsoil replacement, and revegetation.

The Proponent holds full financial liability for the decommissioning of the wind farm. The Proponent is responsible for ensuring that all decommissioning works are adequately funded. This obligation rests solely with the Proponent and does not extend to the landowner or any external stakeholders.

A Preliminary Decommissioning Plan has been prepared and provides details to guide this latter stage of the Project (refer **Appendix C** of **Attachment 4**).

2.2.11 Utilities

On-site effluent disposal will be managed by a septic system and removed by a certified contractor, or an in-ground septic system will be installed.

The O&M building will be fed by power from the Wind Farm when available, or the grid, with a local back-up generator for emergency back-up supply.

Potable water will either be delivered to the Project Site through a suitable supplier or via on-site rainwater treatment.

2.2.12 Design Certification

All proposed infrastructure and assets will be certified, constructed and installed to relevant Australian or International standards and legislation. All components will be capable of withstanding climatic, aerodynamic and electrical induced loads during the operational design life in accordance with applicable standards.

2.3 Construction Process and Impacts

2.3.1 Construction Process

During the Construction Phase the main contractor will develop and act in accordance with Good Renewables Industry Practice by developing and enacting a range of Management Plans outlined in **Section 5** of this report.

There will be certain enabling works required following Development Approval, prior to the commencement of construction including:

- Obtaining remaining environmental approvals including clearing permit

- Establishing a source of water
- Completion of offsite roadworks (for delivery of oversized components eg. WTG tower and blades)
- Detailed site investigations

It is anticipated that the following works will occur during the construction period:

- Construction site establishment (temporary site facilities, laydown areas, equipment and materials)
- Clearing of native vegetation (maximum 1 ha), earthworks, gravel cap paving and drainage for access roads and WTG hardstands
- Excavation for WTG and infrastructure foundations
- Construction of WTG foundations with reinforced concrete
- Temporary construction dewatering during the installation of below ground infrastructure, including turbine foundations, in accordance with the ASSDMP (refer **Section 2.2.2** and **2.3.4**)
- Treatment and reuse or disposal of excavated soils and dewater in accordance with ASSDMP (Preliminary ASSDMP provided in **Appendix B** of **Attachment 4**)
- Installation and/or upgrade of fencing and access gates
- Installation of water tanks and/or temporary water storage dams
- Installation and operation of concrete batching plants
- Installation of electrical substation(s) and switchyards
- Installation of transmission poles or towers and connecting power lines
- Installation of O&M building(s) and workshop(s)
- Installation of met masts
- Installation of communications towers
- Installation of all electrical and communications equipment including underground cables or overhead transmission lines to substation
- Extraction of borrow material (may include crushing and screening by mobile plant)
- Delivery and installation of all WTG transformers, towers, hubs and blades
- Commissioning and testing of WTG and all associated infrastructure
- Progressive rehabilitation and restoration, following construction and, where practical, to facilitate a simultaneous land use operation and continuation of agricultural uses on the Project Site

2.3.2 Anticipated Construction Period

The construction period is anticipated to take approximately 18-24 months and will be confirmed during the Procurement/Contracting Phase. This will be formalised in the CEMP (refer **Appendix H** of **Attachment 4**).

The construction period will be subject to change, due to a range of factors such as weather conditions, infrastructure product availability and construction speeds. Throughout the construction period of the Project, it is envisaged that works could potentially occur up to six (6) days of the week, for up to 11 hours per day, from Monday to Saturday, and generally no work on a Sunday.

It is critical for working hours to remain flexible, as factors such as weather conditions and delivery of materials can have a significant impact on timing of installation. There will likely be out-of-hours work required for some activities such as concrete pours that cannot stop/start or need to commence early when conditions are optimal, and blade/nacelle crane lifts that must be undertaken under safe wind conditions.

The CEMP will be updated to detail appropriate mitigation measures for any out of hours work in accordance with the requirements of the *Environmental Protection (Noise) Regulations 1997* (WA) (‘**Noise Regulations’**).

2.3.3 Environmental Management Controls

The construction contractor(s) will be required to develop environmental management controls for inclusion in their relevant construction management documents (ie. CEMP) to ensure that any potential environmental impacts throughout the Construction Phase of the Project are well managed.

This will also ensure that strategies are implemented to protect and manage flora and fauna, waste, air quality, water quality, noise and cultural heritage. Further, the environmental controls will detail construction techniques and mitigation measures to ensure that that construction impacts are minimised.

2.3.4 Construction Dewatering

Dewatering is expected to be required for the installation of below ground infrastructure including turbine and met mast foundations, as well as other supporting infrastructure. As detailed in **Section 2.2.2**, the WTG and other foundations will be designed to minimise dewatering requirements, while achieving necessary mass and stability.

Dewatering effluent will be managed in accordance with the ASSDMP (refer **Appendix B** of **Attachment 4**), with recharge/infiltration basins maintained so that overflow does not occur, or have any impact, to surrounding land. A detailed ASSDMP will be prepared to specify the management framework, controls and measures to be included, prior to construction.

2.3.5 Equipment and Machinery

Construction works are anticipated to include excavation, rock hammering, drilling, grading, crushing, screening and concrete batching. Works will be undertaken in accordance with the preliminary CEMP (**Appendix H** of **Attachment 4**).

Typical equipment required for construction is detailed as follows:

- **Site mobilisation**: road loaders, graders, trucks, small cranes and generators
- **Access roads and hardstands**: road loaders, bulldozers, excavators, graders, crushers, screeners, scrapers, rollers, dump trucks, semi-trailers, tractors, water carts, hydromulch trucks
- **WTGs**: excavators, rock breakers, concrete trucks, component delivery trucks, crawler heavy lift cranes (small, medium and large), pumps, generators, elevated work platforms
- **Electrical infrastructure works**: trenchers, backhoes, excavators, grader, tractors, winches, laying machines, cranes, concrete trucks, flat-bed trucks
- **Concrete batching plants**

Noise will be generated by the works, excavators, bulldozers, mobile cranes and heavy vehicles. Noise emissions from construction plants, machines or equipment will be in accordance with the construction noise requirements stipulated within the Noise Regulations.

2.3.6 Construction Water Supply

Water supply is a critical component of the Construction Phase of the Project, and will be essential in completing construction activities such as:

- Bulk earthworks
- Dust suppression
- Material conditioning
- Concrete batching
- Drinking water for construction workforce
- Ablution facilities for construction workforce

Water sourcing will be carefully considered throughout the Detailed Design Phase. Construction and potable water will likely be trucked to the Project Site during construction.

Concrete production will require a medium quality water source, which is proposed to be trucked to site. A source for low quality water used for earthworks and dust suppression is to be investigated further in the Procurement/Contracting Phase.

Once the water sourcing strategy has been finalised, engagement with Department of Water and Environmental Regulation (**DWER**), Water Corporation and the Shire AMR prior to the commencement of construction will be undertaken as required.

2.3.7 Construction Transport Route

A preliminary transport route assessment was undertaken to identify whether a feasible route for the transport of large infrastructure via road from the Port of Bunbury to the Project existed (refer **Appendix D** of **Attachment 4**). The assessment considered the discharge berth, transfer to Port storage area, road transport from Port to site, and an assessment of potential site entrances for the maximum turbine blade specifications (ie. 90 m long turbine blades).

The assessment determined that transport of the over-size over-mass (**OSOM**) components (including 90m blades) from the Port of Bunbury is feasible with some minor upgrades required for sections of the road, mostly involving minor widening of the pavement at some turning points and temporary removal of some roadside signage during transport. No clearing of native vegetation is expected to be required along the route outside of the Development Envelope.

The route comprises transport to site from the Port of Bunbury, via Leschenault Drive, Estuary Drive, Koombana Drive, Robertson Drive, Bussell Highway, Sues Road, Brockman Highway, and Scott River Road (refer **Figure 9**).

Aside from the small portions of Leschenault Drive (local Port Road), Estuary Drive (Other Regional Road), Koombana Drive (Other Regional Road), and Scott River Road (local site access road), these are all Primary Regional Roads controlled by Main Roads WA (**MRWA**).

The exact transport route and intersection modifications are subject to the final selection of the WTG.

Once details of the components of the Project and the size of vehicles to be used have been determined, the Proponent will engage with MRWA to obtain an OSOM permit. This will include a detailed OSOM Haulage Route Assessment prior to major deliveries commencing.

An example of a WTG Blade delivery is shown in **Figure 10**.

Site access points are detailed in **Section 2.2.6** and **Appendix D** of **Attachment 4.**

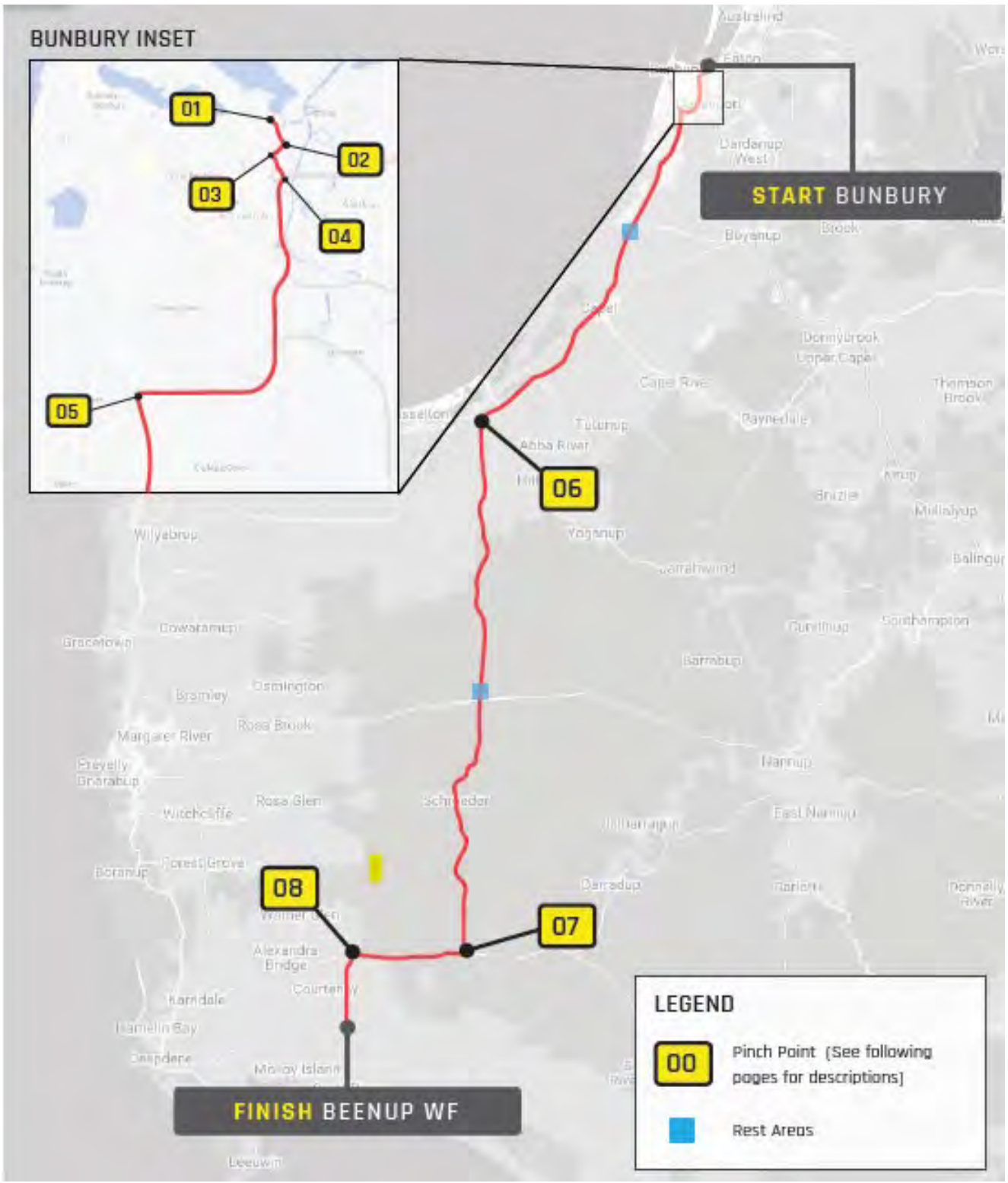


Figure 9 *Proposed Construction Transport Route*



Figure 10 *Example WTG Blade Delivery*

(Image provided by SynergyRED taken at Warradarge Wind Farm – proposed Wind Farm in Scott River WTG specifications will be dependent upon manufacturers requirements and could differ from this image)

2.4 Community Information and Safety

While there is no intent to facilitate and encourage public access to the Project Site, the Proponent acknowledges the potential community and tourist interest in Wind Farm developments in general.

The Proponent has liaised with the Margaret River Busselton Tourist Association (**MRBTA**) and the Shire AMR to determine opportunities for public interaction with the Project.

A public viewing area will be developed along Scott River Road to ensure a safe pull over area where tourists can stop and observe the Wind Farm. The viewing area will include informative sign(s) about wind as a renewable energy source and be capable of accommodating four (4) to six (6) vehicles.

Further, appropriate fencing/signage may be installed at appropriate locations surrounding the Project to notify the public of any safety risks.

3 Technical Considerations

A number of technical assessments and reports have been undertaken to inform the Project and to assess its compliance against the relevant legislative framework. These reports are summarised in this section and appended to this Report.

3.1 Environmental Referral

An Environmental Referral form and supporting documentation has been prepared, and submitted to the WA Environmental Protection Authority (**EPA**) under Part IV of the *Environmental Protection Act 1986.*

The Referral Supporting Document (**RSD**) has been prepared in support of both the Environmental Referral and this Development Application (refer **Attachment 4** and its associated appendices) to provide an overview of the key environmental values and consideration of impacts related to the Project.

The Project will also be referred to the Commonwealth Department of Climate Change Energy the Environment and Water (**DCCEEW**) under the *Environment Protection and Biodiversity Conservation Act 1999*.

The following outcomes have been identified within the RSD (refer **Section 8** and **9** of **Attachment 4**):

3.1.1 Flora and Vegetation

The majority (approximately 81% or 2,902 ha) of the Development Envelope comprises cleared areas, tree plantations and water, and was mapped as completely degraded. Sixteen native vegetation types were recorded in the Development Envelope, with Jarrah woodland vegetation type representing the largest area of intact native vegetation, covering 132.85 ha (approximately 4%) of the Development Envelope.

One (1) Threatened Ecological Community (**TEC**) listed under the EPBC Act and BC Act intersects the Development Envelope, being the Scott River Ironstone Association Community (Scott River Ironstone TEC; listed as Endangered (**EN**) under the EPBC Act and BC Act). A total of 83.58 ha of TEC has been mapped within the Development Envelope. Three (3) flora species listed as Threatened under the EPBC Act and another 12 Priority flora were also recorded in the Survey Area. Three (3) vegetation types were also identified as restricted communities, and several vegetation types were identified as known or potentially groundwater dependent.

The Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been cleared for agricultural use.

The Project is therefore unlikely to cause significant fragmentation to native vegetation within the Development Envelope, and will clear no more than 1 ha of native vegetation, including a maximum of 0.02 ha of vegetation in Very Good or better condition.

The Project will also avoid clearing all known conservation significant flora (including contiguous native vegetation within 50 m of known Threatened and Priority 1 (**P1**) species, and within 20 m of P2, P3 and P4 species) and TEC, as well as locally restricted vegetation types within the Development Envelope. A maximum of 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC will be cleared.

There will be negligible impact to Groundwater Dependent Vegetation (**GDV**) as a result of the minor, localised and temporary construction dewatering, noting drawdown will be managed so as not to exceed the natural seasonal water table low at any GDV, and will be managed in accordance with the ASSDMP (refer **Appendix B** of **Attachment 4**).

Other indirect impacts likely to occur during construction and operation of the Project, being increased dust deposition, the introduction and/or spread of weeds and dieback, alterations to hydrological regimes and accidental bushfires, will be minimised through the implementation of the mitigation measures outlined within the CEMP (refer **Appendix H** of **Attachment 4**), a Dieback Management Plan (as required), Bushfire Management Plan (**BMP**) and Bushfire Risk Management Plan (**BRMP**) (refer **Attachments 5 and 6**).

3.1.2 Fauna

A total of seven (7) conservation significant terrestrial fauna species listed under the EPBC Act, BC Act or as Priority fauna by DBCA, were recorded within the Development Envelope, comprising the following:

- Western Ringtail Possum (*Pseudocheirus occidentalis;* listed as Critically Endangered (**CR**) under the EPBC Act and BC Act)
- Baudin's Cockatoo (*Zanda baudinii*; listed as EN under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris;* listed as EN under the EPBC Act and BC Act)
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; listed as Vulnerable (**VU**) under the EPBC Act and BC Act)
- Wood Sandpiper (*Tringa glareola;* listed as Migratory (**MI**) under the EPBC Act and BC Act)
- Osprey (*Pandion haliaetus;* listed as MI under the EPBC Act and BC Act)
- Western False Pipistrelle (*Falsistrellus mackenziei;* listed as P4 by DBCA).

A total of seven (7) conservation significant fauna species are considered likely to occur within the Development Envelope, based on the currency and proximity of desktop records and the suitability of habitat present, including the three (3) species recorded outside the Development Envelope, being the Peregrine Falcon (*Falco peregrinus*; listed as Other Specially Protected Fauna (**OS**) under the BC Act), Quenda (*Isoodon fusciventer*; listed as P4 by DBCA) and Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae* listed as P3 by DBCA).

Ten (10) broad fauna habitat types were identified within the Development Envelope, including three (3) wetland habitats, two (2) woodlands and five (5) highly modified habitats (ie. cleared, cleared-degraded sumpland, dam, Bluegum and Pine plantations). The majority (approximately 80%) of the Development Envelope comprises highly modified habitats, which cover 2,892.54 ha, and provide limited value for fauna.

A total of 91.30 ha of High quality and 26.84 ha of Moderate quality habitat for Western Ringtail Possum occurs within the Development Envelope and was solely represented by Marri-Jarrah-Peppermint woodland habitat. This High and Moderate value habitat occurs typically in the larger remnants on the extremities of the Development Envelope adjoining or near contiguous vegetation adjacent to the Development Envelope.

Foraging habitat value for each of the three (3) black cockatoo species varied within the Development Envelope ranging from approximately 28-151 ha of High quality, 201-497 ha of Moderate quality and 15-246 ha of Low-quality native foraging habitat. An additional 2,880 ha of low value non-native foraging habitat was identified for Carnaby's Cockatoo associated with cleared habitat, noting this species forages on a small variety of paddock grasses (eg. *Erodium* spp*., Arctotheca calendula*) and melons.

No known breeding or roosting sites for black cockatoos exist within the Development Envelope, and no evidence of breeding or roosting within the Development Envelope was recorded. A total of 580 potential nesting trees for black cockatoos were recorded within the Development Envelope, however none of these were known breeding trees and only four (4) were considered suitable for breeding. The remaining potential nesting trees were considered Potential breeding trees, absent of suitable hollows.

Suitable roosting habitat is present within Marri-Jarrah-Peppermint woodland, as well as Seasonally inundated shrubland wetland and seasonally inundated paperbark woodland (wetland) and Pine plantation (Carnaby's Cockatoo only) habitats.

The Project has been designed to avoid areas of high value fauna habitat by preferentially locating the Development Envelope in a highly disturbed landscape with much of the native vegetation having already been cleared for agricultural use, and so habitat fragmentation will be minimal.

The Project will clear no more than 1 ha of habitat represented by native vegetation, including the following specific habitat values:

- No more than 0.5 ha of Low to Moderate quality Western Ringtail Possum habitat, including maximum of 0.03 ha of Moderate quality habitat
- No more than 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat

The Project will avoid clearing of all wetland habitat (and any contiguous native vegetation within 50m) and all potential breeding trees for black cockatoos (including and any contiguous native vegetation within 10m).

While the risk of turbine strike and/or barotrauma on birds and bats was largely assessed as being Negligible to Low for all species, excepting Forest Red-tailed Black Cockatoo assessed as being at Moderate risk, the implementation of the adaptive management approach as detailed in the preliminary Bird and Bat Adaptive Management Plan (**BBAMP, Appendix L** of **Attachment 4**), will ensure the Project does not have a significant impact on any bird and bat species.

Other impacts likely to occur during construction and operation of the Project, being habitat degradation from increased dust deposition, the introduction and/or spread of weeds and dieback, alterations to hydrological regimes, temporary construction dewatering and accidental bushfires disturbance to fauna movement patterns and behaviour; increased abundance, competition or predation by feral fauna; and loss or injury to fauna individuals from interaction with machinery or equipment and/or entrapment (in excavations, borrow pits, water storage dams and basins) will be minimised through the implementation of the mitigation measures outlined within the CEMP (refer **Appendix H** of **Attachment 4**), a Dieback Management Plan (as required), BMP and BRMP (refer **Attachments 5** and **6**), and an ASSDMP (refer **Appendix B** of **Attachment 4**).

3.2 Archaeological and Ethnographic Heritage Survey

The Development Envelope is located within the South West Boojarah Indigenous Land Use Agreement Area, which includes Aboriginal people from the Wardandi and Bibulmun/Piblemen Noongar language groups, represented by the prescribed body corporate, Karri Karrak Aboriginal Corporation (**KKAC**).

The Proponent has entered into a Noongar Standard Heritage Agreement (**NSHA**) with KKAC on behalf of South West Boojarah People, which outlines the rights and responsibilities of both parties in processes for conducting Aboriginal heritage surveys and assessments.

An Ethnographic and Archaeological Site Avoidance Heritage Survey has been conducted within areas of potential disturbance. The scope of this survey was to identify and confirm the presence of any Aboriginal sites and broader cultural values, assess the potential for any harm to such sites and values as a result of the Project, and provide recommendations to avoid and minimise any impacts (refer **Section 10** of **Attachment 4**).

One (1) registered site, Blackwood River (Registered site ID: 20434), and one (1) Aboriginal cultural heritage lodged place, Scott River (ACH Lodged place ID: 22928), intersect the Development Envelope, however, no new Aboriginal archaeological or ethnographic sites were recorded within the Development Envelope.

The Project has been designed to completely avoid direct impacts to the Blackwood River registered site.

The Project also currently avoids direct impacts to Scott River Aboriginal cultural heritage lodged place.

The Proponent is, however, investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the Scott River (ACH Lodged place ID: 22928) to avoid clearing native vegetation. This option will not be progressed without consultation with KKAC, and any authorisation required under the *Aboriginal Heritage Act* (**AH Act**).

3.3 European Heritage

There are a number of State Heritage places within 30km of the Development Envelope (refer **Section 10** of **Attachment 4**). These include Cape Leeuwin Water Wheel, Cape Leeuwin Lighthouse and Quarters, Memorial HMAS Nizam, Davies Park and Foundry Chimney, Margaret River Hotel, Margaret River Old Hospital Complex, Jalbarragup Bridge (ruin) and Darnell's General Store, Witchcliffe.

No State Registered Heritage places are located directly adjacent to, or intersect with, the Development Envelope.

3.4 Bushfire Management Plan & Bushfire Risk Management Plan

A BMP and accompanying BRMP (**Attachment 5** and **6**) have been prepared to address requirements under State Planning Policy 3.7 (**SPP 3.7**) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024) (**Bushfire Guidelines**). The entire Project Area is designated as bushfire prone based on Department of Fire and Emergency Services (**DFES**) mapping.

Given the renewable energy infrastructure (WTGs and electrical infrastructure) is not considered 'habitable buildings' as defined by the *Planning and Development (Local Planning Schemes) Regulations 2015.* (**Planning Regulations**), compliance with SPP 3.7 and the Bushfire Guidelines is not triggered. The BMP however demonstrates proactive alignment with the intent and principles of these documents, applying a precautionary and best-practice approach to bushfire risk management, consistent with the relevant planning considerations under Clause 67 of the Planning Regulations.

As the proposed O&M building and substation are located within a Bushfire Prone Area and could be considered 'habitable buildings', this triggers the requirement to assess the proposal against SPP 3.7 and the Bushfire Guidelines. The BMP therefore focuses on these proposed permanent buildings, and demonstrates compliance with SPP 3.7. The assessment confirms that through implementation of 9m Asset Protection Zones (**APZ**), compliant vehicular access, and on-site bushfire water supply, all buildings can achieve BAL-29 or lower, reducing the risk of bushfire impact.

Broadly, the BMP and BRMP conclude the following:

- The BMP demonstrates compliance for the proposed permanent buildings against SPP 3.7 and the Bushfire Guidelines
- The BRMP assesses the level of compliance of the proposed renewable infrastructure, against the relevant model requirements of the Victorian Country Fire Authority (**CFA**) Guidelines, to demonstrate the bushfire risk has been appropriately managed. While the CFA guideline does not currently have formal status in WA, it provides the most applicable risk-based framework for non-habitable infrastructure
- The preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire AMR LPP 23 regarding preparation of a fire management plan for renewable energy developments

The key management measures outlined in the BMP and BRMP for this Project includes:

- APZ will be established to ensure sufficient separation is maintained between proposed buildings and substation and surrounding unmanaged vegetation. This will include a 9.0m wide APZ to achieve BAL-29 or lower for:

  - the O&M building envelope
  - the substation envelope (with the envelope to be a non-vegetated zone)
  - each firewater tank
- NVZ and/or APZs will also be established around the base of turbines based on WTG risk classifications (low, transition, high) to manage the bushfire risk to the Project in accordance with the BMP. The size of the NVZ and APZ will be dependent on the turbine location and its proximity to different vegetation types
- BAL assessments using Method 1 from AS 3959:2018 to confirm infrastructure is sited outside of BAL-FZ and within acceptable BAL limits (BAL-29 or lower)
- Vehicular access to be compliant with the CFA Design Guidelines
- Strategic placement of 45kL firewater tanks across the site with compliant hardstand and access
- Integration of fire detection, suppression, and remote shutdown systems within each WTG
- Clear emergency management procedures and Emergency Information Books at site entrances for first responders

3.5 Landscape and Visual Assessment

A Landscape and Visual Impact Assessment (**LVIA**) has been prepared to identify locations from where the Project may be visible; assess the potential impacts of from the identified locations; and identify practical solutions that may assist with mitigating impacts from the identified viewing locations (refer **Appendix T** of **Attachment 4**).

The LVIA has been undertaken to assess compliance with the Western Australian Planning Commission (**WAPC**) Visual Landscape Planning Manual (2007) with reference to the following:

- Best practice guidelines for implementation of wind energy projects in Australia (Auswind 2006)
- WAPC – Position Statement on Renewable Energy Facilities

The LVIA assessment was informed by a desktop review, site inspection (March and August 2024), identified Landscape Character Units (**LCUs**) and values, and a review of similar studies with similar landscape context.

Four (4) LCUs were identified in the Project Area. The significance of impact on each LCU is detailed as follows:

- **LCU 1 – Leeuwin-Naturaliste Coast:** High-Moderate, largely due to the Leeuwin-Naturaliste Ridge being a recognised landscape feature
- **LCU 2 – Scott Coastal Plain:** High-Moderate, due to scenic qualities including the Scott National Park and Gingilup Swamps Nature Reserve
- **LCU 3 – Darling Uplands:** High-Moderate, due to high sensitivity and importance of drainage features, Aboriginal heritage sites, national parks and nature reserves
- **LCU 4 – Blackwood River and Hardy Inlet Riparian Corridor:** Moderate, with the changes confined to specific locations

The LVIA includes an assessment of potential landscape and visual impacts from 12 viewpoint locations as detailed in **Table 3**. These locations were selected based on the LVIA desktop study and community feedback, as well as analysis and fieldwork conduced in March 2024.

Table 3 LVIA Assessment

Viewpoint	Location	Sensitivity to change	Magnitude of change	Significance of impact
VP01	Augusta Hotel	High	High	High
VP02	Augusta Residential	High	Moderate	High-moderate
VP03	Hillview Road Lookout	High	Low	Moderate
VP04	Adjacent to Molloy Island	High	Moderate	High-moderate
VP05	Scott River Road	High	High	High
VP06	Warner Glen Road	High	Low	Moderate
VP07	Brockman Highway	High	Moderate	High-moderate
VP08	Karridale Residential	Moderate	Negligible	Negligible
VP09	Glenarty Road	High	Moderate	High-moderate
VP10	Albany Terrace Beach Access	High	High	High
VP11	Flinders Bay Jetty	High	High	High
VP12	Colourpatch/Seine Bay	High	Moderate	High-moderate

The LVIA recommends that impact of the Project on views from key landscape features should be considered in identifying Wind Farm layout and design, having regard to other design and locational factors, including environmental impacts; and that landscape character values identified in the LVIA should be protected through appropriate siting and design.

The following **Figure 11, Figure 12** and **Figure 13** provide simulations of the Project from various viewpoints identified within the LVIA.

For the full list of Viewpoints, refer to **Appendix T** of **Attachment 4.**



Figure 11 *Simulation of Project from Scott River Road (based on Maximum Project Specifications) Viewpoint 5*



Figure 12 *Simulation of Project from Brockman Highway Residential Road (based on Maximum Project Specifications) Viewpoint 7*



Figure 13 *Simulation of Project from 829 Albany Terrace, Augusta (based on Maximum Project Specifications) Viewpoint 10*

The Proponent has carefully considered the location of turbines and other structures, having regard to a number of spatial factors including protecting environmental values, locating turbines and other infrastructure on cleared agricultural land, and providing adequate setbacks from property boundaries and sensitive receptors.

The mitigation measures that will be implemented include:

- installing cables below ground where practical
- using non-reflective coatings on blades
- maintaining access roads as unsealed tracks wherever practical
- retaining existing vegetation wherever practical (only minimal vegetation removal is anticipated, as identified in **Section 3.5** of this report)
- locating and designing ancillary infrastructure to minimise visual impact
- protecting and rehabilitating any disturbed areas during decommissioning
- ensuring no unacceptable impacts will be caused by noise, light or shadow flicker

The RSD (**Attachment 4**) identifies that perception of visual impact will change and vary depending on the individual viewer's sensitivity to acceptance of change, over different periods of time, and to WTG developments more generally.

Following suggestion by the MRBTA and Shire AMR, the Proponent will install a public viewing area to allow visitors to observe the turbines and provide information about renewable energy. The aim is to encourage similar positive outcomes as those experienced for the Albany Wind Farm, creating new experiences and a positive tourism asset.

It is acknowledged, however, that there will be visual impacts as a result of the Project, and that the outcome will require a balance between the various social, environmental and economic costs and benefits of the Project. The Proponent will continue to investigate opportunities to minimise the visual impact for neighbouring properties adjacent to the Wind Farm, and engage further with stakeholders.

3.6 Noise Impact Assessment

A Noise Impact Assessment (**NIA**) was undertaken for the Project to predict and assess the impact of noise during operations of the WTGs and associated substation at sensitive receptor locations, in accordance with the Noise Regulations and the *Wind Farms Environmental Noise Guidelines*, EPA South Australia (2021) (**SA Guidelines**) (refer **Appendix S** of **Attachment 4**).

The noise modelling results show that the predicted noise levels from the Project received at the adjacent noise sensitive receptors comply with the noise criteria under both the Noise Regulations and the SA Guidelines. For context, the NIA utilised the maximum case WTG sound power levels, assumes wind from all directions at the same time, and is therefore considered to be conservative.

Prior to construction, the Proponent will revise noise modelling for the final WTG layout, height and sound power levels, to ensure compliance at all existing sensitive receptors. The Proponent will also develop and implement an Operational Noise Management Plan (**ONMP**) which will include the requirement for noise monitoring to be undertaken to ensure that levels are not greater than those predicted. If exceedances are recorded, contingency measures will be implemented. It is anticipated this will form a condition of Development Approval.

3.7 Transport Impact Statement

A Transport Impact Statement (**TIS**) has been prepared to examine the impact of the Project on the road network from both a Regional and local perspective (refer **Attachment 7**). The TIS has been prepared on the basis of two (2) main access points into the site on Scott River Road, three (3) emergency access points on Dennis Road (utilising existing farm tracks, which will not be upgraded), and two (2) crossover points over Governor Broome Road.

Overall, the TIS assesses the impacts of traffic, both within the Construction and Operational Phases of the project.

A summary of the key conclusions of the TIS as it relates to the Construction Phase is provided as follows:

- The site will generate the most traffic during the peak construction phase which is estimated for 3-6 months. The total project construction period is anticipated to take 18-24 months
- The Construction Phase will generate traffic movements of various vehicle types (light vehicles, heavy vehicles, mini-buses and OSOM vehicles. These vehicles will be used to transport cranes, wind turbine components and transformer components, travelling under escort and requiring special permits to be assessed and approved by MRWA
- As outlined in **Section 2.3.7** of this Report, an OSOM Route Assessment has been undertaken which concludes that the transport for OSOM for the Project from the Port of Bunbury is feasible with appropriate modifications made to routes (refer **Appendix D** of **Attachment 4**).
- Assuming light vehicle traffic movements mostly occur during the peak hours (when staff are arriving and leaving for the day) and the heavy vehicles are spread out during the day, the peak hour traffic generation is estimated to be an average of 28 vehicle movements per hour, to a maximum of 53 vehicle movements per hour. This is expected to have a low to moderate impact and can be accommodated within the existing capacity of the road network
- Vehicle access to the Project will need to accommodate the turning movements of the proposed construction trucks. Swept Path analysis has been undertaken in AutoTURN using a RAV 4 road train templates for the main access on Scott River Road.

The result of the swept path has concluded that vegetation clearing is required for the main accesses on Scott River Road. This will be addressed through the CEMP anticipated as a condition of development approval

- The assessment considered a worst-case scenario where vehicles would be travelling from the Port of Bunbury to site. It is anticipated that workers will be accommodated within the Region
- Minimum sight distance requirements have been met in both directions at the site access points on Scott River Road and the crossing on Governor Broome Road
- The crash history on the adjacent network is low and does not appear to indicate any major safety issue for the road network, and the Project will not increase the risk of crashes unacceptably. The proposed development will generate a low to moderate volume of additional traffic over a limited period of time and is unlikely to increase the risk of crashes unacceptably
- For the Operational Phase of the Project, the TIS notes that the proposal will generate little to no traffic

Overall, the TIS demonstrates that the Proposal has sufficiently considered all potential transport impacts both during the Construction and Operational Phases of the Project.

Detailed traffic management will be considered prior to commencement of construction, as set out within the CEMP anticipated as a condition of Development Approval.

3.8 Electromagnetic Interference Assessment

An independent assessment of the potential electromagnetic interference (**EMI**) impacts associated with the Project was undertaken (refer **Appendix P** of **Attachment 4**). The assessment utilised a known WTG specification, and the assessment will remain valid for a WTG dimension with a rotor diameter of up to 172m, and an upper tip height of up to 250m or less. The EMI assessment investigated broadcast towers and transmission paths that surround the Project to determine if EMI would be experienced as a result of the Project.

As part of the EMI assessment, stakeholder consultation with key service providers such as Telstra, Western Power, Water Corporation, Department of Fire and Emergency Services (**DFES**), Bureau of Meteorology and Landgate was conducted to assess likelihood and gather feedback. Throughout the consultation process it has been confirmed that impacts are considered unlikely for a majority of the key service providers, with consultation still ongoing with some stakeholders.

A summary of key conclusions from the assessment include:

- Impacts to a majority of radiocommunications services are either not expected or considered unlikely
- There is low potential for impact to Telstra mobile phone signals and radio broadcasting in areas with poor or marginal signal coverage. The Proponent will continue to engage with Telstra to ensure that any impacts are mitigated
- Further assessments required for point-to-multipoint networks, emergency service communications and meteorological radar and will be further assessed through consultation with service operators once the final layout is known
- Interference to signals from satellites which transmit international programs is possible at one (1) dwelling, however, it is unlikely these residents will be receiving signals from these satellites. Interference is also possible to signals intended for Australian audiences, which will be mitigated

The Proponent commits to ensuring that the Project does not result in EMI impacts to services. Where required, mitigation measures will be implemented to prevent disruption. The Proponent will continue to engage with potentially affected radiocommunication operators and landowners throughout the Detailed Design Phase to confirm and address any mitigation needs.

3.9 Shadow Flicker Assessment

An assessment of the expected annual shadow flicker durations from the Project was undertaken (refer **Appendix O** of **Attachment 4**). The assessment used a geometric model informed by maximum turbine specifications, site topography, and sun path data. The theoretical and predicted actual shadow flicker durations at each dwelling was estimated in accordance with the methodology outlined in the *Draft National Wind Farm Development Guidelines.*

A total of 25 dwellings were assessed in detail for shadow flicker impacts. Another nine (9) dwellings were considered unlikely to be impacted by shadow flicker at intensities considered sufficient to cause annoyance, given their distance from the Proposal's turbines, and were therefore excluded from the assessment.

Of the 25 dwellings considered, six (6) are considered 'involved' receptors, with four (4) landowners which have agreed with the Proponent that the dwelling will not be used for residential or accommodation purposes on construction of the Project. These four (4) dwellings were therefore not considered sensitive receptors and were not considered further, leaving 21 receptors considered for assessment.

The assessment found that:

- Two (2) dwellings were predicted to experience theoretical shadow flicker at or above a moderate level of intensity, based on their proximity to wind turbines (ie. within 1,720m, equivalent to 10 times the rotor diameter) - although one (1) of these dwellings (R12) was subsequently determined to be a non-sensitive (commercial) premises

For the remaining dwellings:

- Twelve dwellings were predicted to experience low intensity shadow flicker, due to their distance from the turbines. As such, the duration of moderate or above intensity flicker at these locations is expected to be zero (0).
- Seven (7) dwellings were predicted to experience no shadow flicker, based on their location and orientation relative to the turbines and sun path.

In accordance with the *Draft National Wind Farm Development Guidelines*, more detailed modelling was undertaken to account for real-world conditions, given the theoretical limit of 30 hours per year was exceeded for the two (2) dwellings. This included evaluating actual exposure under realistic operating conditions by applying reductions due to cloud cover and turbine rotor orientation.

This additional modelling confirmed that the actual shadow flicker durations at all dwellings is below the recommended limit of ten (10) hours per year for actual flicker, demonstrating compliance with the Guidelines.

As the turbine blades will be coated with a non-reflective coating, blade glint is not expected to occur and is therefore not considered a risk for the Project.

3.10 Acid Sulfate Soil Assessment

An assessment of the potential impacts associated with the disturbance of ASS and Potential Acid Sulfate Soils (**PASS**) within the Development Envelope has been undertaken (refer **Section 2.2.2** of this Report, **Sections 6** and **7** of **Attachment 4,** and **Appendix B**).

The assessment investigated soil and groundwater conditions within the Development Envelope to determine the extent of PASS, the potential for oxidation during construction activities, and the likely impacts on soil and water quality.

As part of the assessment and consultation with DWER, a review of guidance documents and relevant best-practice management approaches has been undertaken to identify appropriate mitigation measures.

A summary of key conclusions from the assessment include:

- ASS are soils, sediments and peats which occur naturally and contain iron sulfides, typically in the form of pyrite materials. ASS including PASS material remains benign in natural, undisturbed, and anoxic conditions; however, excavation and dewatering during construction activities (borrow pits, turbine foundations, underground cabling) has the potential to expose PASS to oxidation, leading to acidification, mobilisation of metals (particularly iron and aluminium), and a reduction in soil fertility and stability
- ASS risk mapping and site investigations confirmed the presence of PASS across most soil types within the Development Envelope, except for shallow pale grey/white sands that occur less than 1 mbgl, with the highest risk soils identified as dark grey/brown sands and sandy clays occurring at depths greater than 2 mbgl
- Due to the presence of PASS within the Development Envelope, the Proponent commits to the preparation and implementation of an ASSDMP in accordance with relevant guidance to manage the potential risks to terrestrial environmental quality during construction of the Project. A Preliminary ASSDMP has been prepared (refer **Appendix B** of **Attachment 4**) which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP. This will be developed following the completion of detailed site investigations and detailed design, prior to construction of the Project. The ASSDMP is expected to be a condition of Development Approval
- Turbine and other mast/tower foundations will be designed to minimise the excavation of PASS and dewatering requirements, while achieving the necessary mass and stability. Three (3) foundation options are being considered (refer **Figure 6**). The specific foundation option chosen for each WTG/mast/tower location will be determined based on detailed site investigation and further modelling to ensure that any proposed dewatering or excavation would not result in significant impacts to the environment as a result of PASS exposure. Below ground foundations will only be used where it is confirmed that the proposed WTG/mast/tower location would not require dewatering
- Borrow material will be assessed for the presence of PASS prior to disturbance. Borrow pits will be excavated above the groundwater level, and so will not require dewatering, and will be backfilled to a level that prevents groundwater seepage and ponding during high rainfall periods
- Any PASS soils excavated will be treated with aglime in accordance with the Preliminary ASSDMP, with treated soils reused onsite where practical. Treatment will be validated through testing, and soils will be retreated and re-tested as required
- Revised modelling and design criteria will ensure that dewatering depths do not exceed 2 mbgl at the perimeter of foundations and that drawdown does not exceed 0.1 m beyond 100m of dewatering locations. Groundwater triggers will be established within the ASSDMP to ensure extraction does not result in excessive exposure of PASS or impacts to groundwater dependent ecosystems
- Dewater generated during construction will be managed in accordance with the ASSDMP. Treatment will ensure dewater is neutral to alkaline (pH 7–8.5) before reuse or infiltration onsite via strategically placed infiltration trenches or basins. No dewater will be discharged to wetlands or waterways
- Potential impacts to soil quality and groundwater are not expected to be significant, provided the ASSDMP is implemented as proposed

The Proponent will continue to manage potential PASS disturbance risks through the Detailed Design and Construction Phases.

3.11 Aviation Impact Assessment

An Aviation Impact Assessment (**AIA**) (refer **Appendix Q of Attachment 4**) was prepared to assess the potential impacts associated with the Project and provide aviation safety advice in respect of relevant requirements of air safety regulations and procedures to inform and document consultation with key aviation agencies.

From a planning perspective, findings of the assessment conclude that the Project satisfies the provisions of the Shire AMR's Planning Scheme and Strategy (refer **Section 4**).

More broadly in terms of compliance with the *Airports Act 1996* and other relevant statutory legislation, the assessment concludes:

- Whilst the Busselton Margaret River Airport (**YBLN**) (certified aerodrome) obstacle limitation surfaces (**OLS**), flight paths, and descent gradients will not be impacted, updates to the YBLN 'Procedures for Air Navigation Services – Aircraft Operations' (**PAN-OPS**) will be required
- Two uncertified aerodromes within three (3) nautical miles of the Project, including one (1) unknown aerodrome, will likely be affected by operations. These will be mitigated in further consultation with from the aerodrome's operator
- The Project will not impact the grid lowest safe altitude (**LSALT**) or any low-level air route LSALT and located within class G airspace (non-controlled airspace)
- The Project will not have any impact on surveillance or radar facilities
- The Project will be required to reported to Civil Aviation Safety Authority (**CASA**), as soon as reasonably practical, after the intent to construct is established, with construction details such as layout and turbine height provided to Airservices Australia.
- The Project will be required to notify DBCA and DFES of all turbine locations to ensure pilot safety during aerial firefighting. Whilst aerial firefighting is not prohibited in Wind Farms and will be subject to a risk assessment at the time, upon request, the wind turbines can be paused remotely to improve safety
- The finish of the WTGs will provide sufficient contrast with the surrounding environment and maintain an acceptable level of safety, whilst also minimising visual impact to neighbouring assets

The Project complies with aviation safety regulations and procedures, ensuring minimal impact on existing aerodromes and air navigation services, while adhering to the relevant statutory legislation and planning schemes.

3.12 Hydrology & Surface Water Assessment

A Surface Water and Hydrogeological Assessment (refer **Appendix A** of **Attachment 4**) was undertaken to investigate the hydrological and hydrogeological regimes within the Development Envelope, and to assess potential impacts to inland waters associated with the construction and implementation of the Project.

The assessment included the following key components:

- **Surface water** – flood characterisation assessment and modelling to identify inundation areas to inform the future placement of infrastructure and mitigate impacts on surface flow post-construction
- **Hydrogeological assessment** – characterisation of hydrogeology supported by modelling to predict potential changes in groundwater levels and drawdown extent associated with temporary dewatering during construction

- **Preliminary risk assessment** – to provide an understanding of key hydrogeological and hydrological risks associated with the Project and indicate preliminary mitigation measures to prevent impacts to sensitive environmental receptors.

An assessment of the potential impacts to surface water and groundwater associated with the Project, informed by the assessment and with consideration for proposed mitigation including the preliminary ASSDMP has been undertaken (refer **Section 7** of **Attachment 4**).

The Assessment concluded that no significant impacts to surface water or groundwater are expected to result from the Project, with the environmental outcomes identified as:

- Minor, localised and temporary impact to groundwater levels as a result of construction dewatering, with the superficial aquifer expected to recover by the subsequent winter period following construction
- No excessive leakage of the superficial aquifer as a result of excavations penetrating an aquitard
- Minor, short term and localised acidification of groundwater as a result of construction dewatering
- Minor and localised impact to surface and groundwater flows as a result of Project infrastructure
- Minor, localised and temporary impacts to surface water and/or groundwater quality resulting from ASS disturbance and management, erosion and sedimentation, mobilisation of nutrients and/or the accidental loss or spill of hazardous materials
- No interaction with Beenup Mineral Sands acid mine plume
- No impact on surrounding bores

Key impact mitigation measures include:

- Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practical
- WTG and other mast/tower foundations have been designed to minimise or avoid dewatering requirements
- Location and design of borrow pits above groundwater levels to prevent seepage and ponding
- Preparation and implementation of the ASSDMP in line with regulatory guidance (as detailed **Section 3.10** and **Appendix B** of **Attachment 4**) including application of appropriate limits
- Maximum drawdown of 2.0 mbgl at the perimeter of each foundation
- Drawdown will not exceed 0.1 m beyond 100m from any dewatering location
- Drawdown will not exceed natural seasonal variation (ie. will remain above natural seasonal low in watertable) at locations of groundwater dependent ecosystems
- Implementation of a CEMP (**Appendix H** of **Attachment 4**) addressing stormwater, sediment and erosion controls, and contamination prevention

4 Planning Framework

This section outlines the Planning Framework relevant to the Project and assesses the Project against relevant Federal, State, Regional and Local planning, and other frameworks.

Overall, the Project achieves a high level of compliance and alignment with the relevant frameworks.

4.1 Federal Framework

4.1.1 Renewable Energy (Electricity) Act 2000

The *Renewable Energy (Electricity) Act* (2000) (**Renewable Energy Act**) was established to promote and accelerate the development of renewable energy resources and encourage additional electricity generation from renewable energy sources to assist in reducing Australia's greenhouse gas emissions in the electricity sector.

The Mandatory Renewable Energy Target Scheme (**MRET**) is a critical component of the Act and requires electricity wholesalers to source a portion of the electricity sold from renewable energy sources. The Project seeks to provide a new renewable energy source for the SWIS and will make an important contribution towards achieving the targets established under the MRET and the Renewable Energy Act 2000.

4.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act* (1999) (**EPBC Act**) was established to provide a framework for the protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places.

The EPBC Act is administered by DCCEEW and requires referral of an Action that will have, or is likely to have, a significant impact on Matters of National Environmental Significance (**MNES**).

To inform the Project, the RSD containing a Flora and Fauna Assessment summarises key biological values of the Project (**Section 3.1** and Appendices associated with **Attachment 4**).

The following MNES have been recorded within the Development Envelope:

- One (1) TEC listed under the EPBC Act, the Scott River Ironstone Association Community (Scott River Ironstone TEC; listed as EN)
- Three (3) Threatened flora species listed as Threatened under the EPBC Act; *Lambertia orbifolia* subsp. *vespera* (listed as EN), *Grevillea brachystylis* subsp. *australis* (listed as VU) and *Darwinia ferricola* (listed as EN).
- Six (6) Threatened and/or Migratory fauna species including Western Ringtail Possum (*Pseudocheirus occidentalis*; listed as CR), Baudin's Cockatoo (*Zanda baudinii*; listed as EN), Carnaby's Cockatoo (*Zanda latirostris*; listed as EN), Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; listed as VU), Wood Sandpiper (*Tringa glareola*; listed as MI and Osprey (*Pandion haliaetus*; listed as MI). Several other Threatened and Migratory species are considered likely/possibly to occur.

As discussed in **Section 3.1**, the Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having already been cleared for agricultural use.

The Project will avoid clearing TEC, all known Threatened flora (including contiguous native vegetation within 50m), high quality habitat for Western Ringtail Possum, all potential breeding trees for black cockatoos (including and any contiguous native vegetation within 10 m) and all wetland habitats (including contiguous native vegetation within 50m).

The Project will clear no more than 1 ha of native vegetation/habitat, including:

- No more than 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC
- No more than 0.5 ha of Low to Moderate quality Western Ringtail Possum habitat, including maximum of 0.03 ha of Moderate quality habitat
- No more than 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat

While the risk of turbine strike and/or barotrauma on Threatened/Migratory birds was largely assessed as being Negligible to Low for all species, excepting Forest Red-tailed Black Cockatoo assessed as being at Moderate risk, the implementation of the adaptive management approach as detailed in the preliminary BBAMP (**Appendix N** of **Attachment 4)** will ensure that the Project does not have a significant impact on any bird and bat species.

Other impacts likely to occur during construction and operation of the Project will be minimised through the implementation of the mitigation measures outlined within the Project's CEMP (refer **Appendix H** of **Attachment 4**)**,** Dieback Management Plan (as required), BMP and BRMP (**Attachments 5** and **6**) and ASSDMP (**Appendix B** of **Attachment 4**).

Based on the RSD, the Project is not anticipated to have a significant impact on any MNES. As previously noted, the Project will be referred to DCCEEW under the EPBC Act.

4.1.3 Airports Act 1996

The *Airports Act 1996* (**Airports Act**) establishes the regulatory arrangements which apply to the airports designated as core regulated airports, or an airport specified in the Regulations, where the site of the airport is a Commonwealth place formerly owned and operated on behalf of the Commonwealth by the Federal Airports Corporation (**FAC**).

The Department of Infrastructure, Transport, Regional Development and Communications (the Department) regulates issues of ownership and control of the Federal leased airports through restrictions provided under the Airports Act. The effect of the Airports Act and Regulations is to establish limitations on activities which result in infringements into prescribed airspace.

The AIA (**Appendix Q** of **Attachment 4**) considers the potential impacts associated with the Project and provides aviation safety advice in respect of relevant requirements of air safety Regulations and procedures and informs and documents consultation with key aviation agencies.

The assessment concludes that the Project will not create incompatible intrusions; or compromise the safety of existing airports and associated navigation and communication facilities.

4.2 State Planning Framework and Relevant Legislation

4.2.1 State Planning Strategy 2050

The *State Planning Strategy 2050* (**the Strategy**) provides the strategic context for future strategies, plans, policies and decisions related to the sustainable use and development of land throughout the State.

The Strategy identifies renewable energy technologies as a significant area of demand for the future of the State. It places an importance on utilising the renewable energy sources that the State must mitigate and adapt to the effects of climate change.

The Project directly aligns with the intent of the Strategy and will provide the State with a valuable renewable energy producer supplying the SWIS.

4.2.2 State Climate Action and Sustainability Strategy 2024-2027

The State Climate Action and Sustainability Strategy was established to provide background to the concept of sustainability as well as establish illustrative actions for sustainability in WA. It acknowledges the importance of sustainable energy production, developing a pathway to a more sustainable energy system and building in flexibility to account for a rapidly changing global environment and markets.

The Project is directly aligned with the Strategy's initiative of diversifying the State's energy production portfolio by developing more sustainable energy generation across the State.

4.2.3 Energy Transformation Strategy

The WA Government's Energy Transformation Strategy outlines the State's plan to shift focus towards the transition to cleaner and more renewable energy technologies. The energy sector in Western Australia is experiencing a significant transformation, with renewable technologies becoming more cost-effective, and consumers increasingly generating their own electricity through rooftop solar photo-voltaic (**PV**) systems.

This also extends into major energy producers in realising the potential for low emission energy generation methods around the State and their contribution to the SWIS. The Strategy sets out a detailed action plan across four key themes, including modernising energy systems, decarbonising energy supply, optimising energy use and empowering consumers.

The Project is directly aligned with the Strategy's initiative as it provides for a low cost decarbonised sourced energy production, and further diversifies the energy mix for the South West Region.

4.2.4 Leeuwin-Naturaliste Sub-Regional Strategy

The Leeuwin Naturaliste Ridge Sub-Regional Strategy (**LNRSS**) recognises the Region's unique landscape and environmental values, lifestyle and associated amenity. The overall aim the LNRSS is to manage land use planning, and implement the State's strategic priorities, to allow for effective decision making.

Relevant issues and priorities identified in the LNRSS include balancing increased competition and demand for coastal access for recreation, industry, and tourist uses, as well as the loss of rural and natural landscapes, and remnant vegetation.

Although the Project is not included in the LNRSS Policy Area, the Project Site can be viewed from the it - visual impact is therefore an important consideration, addressed in the LVIA contained in **Appendix T** of **Attachment 4** and addressed in **Section 3.5** of this Report.

While there is no specific mention on renewable energy resources in the LNRSS, the SWIS is noted as being important for WA's baseload power generation.

The Project will be compatible with existing farming practices during and following construction and operation. There will be only minimal loss of agricultural land as a result of the project, and minimal impact on remnant vegetation as outlined in **Section 3.1.1** of this Report. Benefits will include the provision of a viewing area to enable the general public to view the Wind Farm and learn about renewable energy projects. These considerations demonstrate the alignment of the Project with LNRSS.

4.2.5 Draft Guideline on Community Benefits for Renewable Energy Projects

The Department of Energy, Mines and Industry Regulation and Safety (**DEMIRS**) released the Draft Guideline on Community Benefits for Renewable Energy Projects ('**Draft Guideline'**) in June 2025. The Draft Guidelines provides an overview of community benefits for renewable energy projects across the State. The guidelines aim to respond to requests from communities and renewable energy developers to provide a resource for determining appropriate community benefits arrangements for renewable energy infrastructure.

The purpose of the guidelines are as follows:

- Provide information to communities about the types of benefit sharing arrangements available for the renewable energy infrastructure they are hosting

- Provide information to Developers about State Government expectations for community benefits arrangements
- Provide a guide on appropriate value of community benefits in different contexts
- Provide suggestions for the governance and administration of community benefits funds
- Provide confidence and clarity for Proponents and investors, by setting out a clear framework for benefit-sharing arrangements across WA

The Project seeks to establish a community benefit fund (refer **Section 1.6.1**) to assist the local community during the transition period from traditional energy sources to renewable energy. This fund will support activities and initiatives that give back to the community each year, providing tangible benefits through financial support of local endeavours, educational programs, and projects. The development of the fund will be crafted collaboratively with community members to ensure it is meaningful and targeted to achieve maximum community benefit.

Preliminary community initiatives include:

- Financial support for local projects and endeavours
- Educational programs to enhance local skills and knowledge
- Community infrastructure projects to improve local amenities

The Proponent will ensure that the fund is structured to meet State Government expectations, and provide a clear, consistent approach to benefit-sharing. This alignment will help foster strong community relationships, support the success of renewable energy projects, and deliver lasting positive impacts for the local community.

4.2.6 State Planning Policies

4.2.6.1 State Planning Policy 2.0 – Environment and Natural Resources

State Planning Policy 2.0 – Environment and Natural Resources (**SPP 2**) defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues within the framework of the State Planning Strategy.

The objectives of the policy are to:

- Integrate environment and natural resource management with broader land use planning and decision-making
- Protect, conserve and enhance the natural environment
- Promote and assist in the wise and sustainable use and management of natural resources

In addition to the objectives of the policy, SPP 2 indicates that planning decision-making should '*support the use of alternative energy generation, including renewable energy, where appropriate*'.

SPP 2 details a wide range of policy measures, including both 'general measures' and 'landscape measures. This includes guidance on strategies, Schemes and decisions which potentially affect locations with visual, Aboriginal and cultural values that should be protected. As part of the consideration of landscape measures, SPP 2 recommends assessment of the landscape, cultural and visual impact for proposed developments where there is the potential to have an impact on surrounding sensitive landscapes.

In accordance with this recommendation, a LVIA has been prepared (refer **Section 3.5** and **Appendix T** of **Attachment 4**) to examine the landscape character of the Project Area and identify the visual impact of the proposed development on the surrounding context. The LVIA identifies locations from where the Project may be visible, assesses the proposed impacts, and recommends initiatives to ameliorate the visual impact.

It is acknowledged that the Project will result in a visual impact, however, the location of WTGs has considered a range of factors including environmental impact, locating infrastructure on cleared agricultural land, and providing adequate setbacks from property boundaries and sensitive receptors. The proposal requires a balance in the consideration of the various social, environmental and economic factors of relevance to the Project.

Further, as discussed in **Section 3.1**, the Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been cleared for agricultural use. The RSD contained in **Attachment 4** demonstrates avoidance of areas of environmental value, and a non-significant impact on the environment through careful site selection and mitigation which will ensure alignment with SPP 2.

4.2.6.2 State Planning Policy 2.5 – Rural Planning

State Planning Policy 2.5 – Rural Planning (**SPP 2.5**) is the basis for planning and decision-making for rural and rural living land across WA. The intent of the policy is to protect and preserve the State's rural land assets due to the importance of their economic, natural resource, food production, environmental and landscape values. Ensuring broad compatibility between land uses is essential to delivering this outcome.

Key objectives of SPP2.5 include:

- **Protect agricultural land resources wherever possible by**:
    - Discouraging land uses unrelated to agriculture from locating on agricultural land
    - Minimising the ad-hoc fragmentation of rural land
    - Improving resource and investment security for agricultural and allied industry production
- **Minimise the potential for land use conflict by**:
    - Providing adequate separation distances between potential conflicting land uses
    - Introducing management requirements that protect existing agricultural land uses
    - Identifying areas that are suitable and capable for intensive agricultural pursuits as agricultural priority areas
    - Avoiding location of new rural settlements in areas that are likely to create conflict with established or proposed agricultural priority areas
- **Carefully manage natural resources by:**
    - Discouraging development and/or subdivision that may result in land or environmental degradation
    - Integrating land, catchment and water resource management requirements with land use planning controls
    - Assisting in the wise use of resources including energy, minerals and basic raw materials
    - Preventing land and environmental degradation during the extraction of minerals and basic raw materials
    - Incorporating land management standards and sequential land use change in the land use planning and development process

The Project Site has been carefully selected to minimise the potential for land use conflict, with adequate separation distance provided between the Project and conflicting/sensitive land uses. As part of the Development Application process, sensitive land uses in proximity to the Project have been identified and an assessment of impacts undertaken (from an environmental, noise, landscape and visual amenity, electromagnetic, shadow flicker and transport perspective).

The Project is consistent with the intent of SPP 2.5 as it is compatible with the existing rural and agricultural land uses on site. It is designed in a manner which protects the rural integrity of the land with little disturbance (approximately 3% within the Development Envelope) and will facilitate agricultural operations during the life of the Project.

The location of the site and indicative layout has had regard for many factors in order to minimise disturbance to the immediate and surrounding rural area and to ensure adequate separation distances are provided to conflicting land uses.

4.2.6.3 State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy 3.7 – Planning in Bushfire Prone Areas (**SPP 3.7**) directs how land use should address bushfire risk management in Western Australia. It applies to all land which has been designated as bushfire prone by the Fire and Emergency Services (**FES**) Commissioner (refer also **Section 3.4** of this Report).

Under SPP 3.7, Bushfire Attack Level (**BAL**) assessment is required for habitable buildings and specified buildings on lots greater than 1,100 m2 for buildings which are residential in nature (Classes 1, 2, 3 and 10a). Bushfire planning protection criteria should be considered for other buildings and structures.

The entire Development Envelope is designated as Bushfire Prone on DFES mapping of Bush Fire Prone Areas, with the proposed building and substation envelopes surrounded by unmanaged grassland and remnant vegetation. The BMP and BMRP are included at **Attachments 5** and **6**.

Since the Bushfire Prone Area is located across the entire Development Envelope, it was not possible to locate the proposed WTGs and associated access tracks, underground cables, and Western Power network connections (poles and overhead conductors) outside the Bushfire Prone area.

Post-development, all proposed bushfire prone assets within the Project, as currently shown, will be subject to BAL ratings of ≤BAL29 or lower. The BMP proposes measures to mitigate bushfire risk including APZs, firefighting water supply, fire detection and suppression, and fire breaks.

4.2.6.4 State Planning Policy 6.1 – Leeuwin-Naturaliste Ridge

The objective of the Policy is to establish a strategic planning framework for the Leeuwin-Naturaliste Ridge area until 2050, providing a clear vision, guidance, and assurance for land use. Currently, SPP 6.1 is under review by DPLH and will be significantly informed by the LNRSS (refer **Section 4.2.4**).

The strategic framework of SPP 6.1 covers all land and water areas, defined by the coastal waters and lands near Cape Naturaliste and Cape Leeuwin, extending inland to the Bussell Highway. This includes the eastern edges of towns along the Highway.

Although SPP 6.1 does not include the Project Site, it has the potential to influence the visual quality of the broader landscape as seen from key travel corridors and areas of natural landscape significance. The Project is not proposing any development within the Leeuwin-Naturaliste Ridge itself.

The Project has considered the potential impact for visual impact along key transport and tourism routes, and it is acknowledged that will be an area of key public concern.

Visual impact has been addressed in **Section 3.5** and within **Appendix T** of **Attachment 4.**

4.2.7 Environmental Protection Act 1986 (State)

The *Environmental Protection Act 1986* (**EP Act**) was established to protect and improve environmental quality, control and reduce pollution as well as to conserve, preserve, protect, enhance and manage the environment.

The EPA uses environmental principles, factors and associated objectives as the basis for assessing whether a Project's impact on the environment is acceptable. The environmental principles, factors and objectives underpin the Environmental Impact Assessment (**EIA**) process.

As noted previously in this report, an Environmental Referral has been submitted to the EPA under section 38 of the EP Act. The RSD has been prepared in support of both Environmental Referral and this Development Application (refer to **Section 3.1** and **Attachment 4** and its Appendices) to provide an overview of key environmental values and consideration of impacts related to the Project.

As discussed in **Section 3.1,** the Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been cleared for agricultural use.

The Project will avoid clearing TEC, all known Threatened flora (including contiguous native vegetation within 50m), locally restricted vegetation types, wetland habitats, high quality habitat for Western Ringtail Possum and all potential breeding trees for black cockatoos (including and any contiguous native vegetation within 10m).

The Project will clear no more than 1 ha of native vegetation/habitat, including:

- No more than 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC
- No more than 0.5 ha of Low to Moderate quality Western Ringtail Possum habitat, including maximum of 0.03 ha of Moderate quality habitat
- No more than 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat

While the risk of turbine strike and/or barotrauma on conservation significant birds was largely assessed as being Negligible to Low for all species, excepting Forest Red-tailed Black Cockatoo assessed as being at Moderate risk, the implementation of the adaptive management approach as detailed in the preliminary BBAMP (refer **Appendix L** of **Attachment 4**), will ensure that the Project does not have a significant impact on any bird and bat species.

Other impacts likely to occur during construction and operation of the Project, will be minimised through the implementation of the mitigation measures outlined within the CEMP (**Appendix H** of **Attachment 4**), Dieback Management Plan (as required), BMP and BRMP (**Attachments 5** and **6**) and AASDMP (**Appendix B** of **Attachment 4**).

4.2.8 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (**BC Act**) was introduced to provide for conservation and protection of biodiversity in Western Australia. The Project is not located within any listed conservation area.

As discussed in **Section 3.1**, the Project has been designed to largely avoid areas of remnant vegetation/habitat by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having already been cleared for agricultural use and will clear no more than 1 ha of native vegetation/habitat.

Flora, vegetation, fauna and habitat values present within the Development Envelope, along with summary of the Projects impacts and mitigation is provided in **Section 3.1** and detailed in the RSD (**Attachment 4**).

Requirements for Section 40 and 45 Authorisation under the BC Act and appropriate mitigations will be discussed with DBCA in the context of potential indirect impacts to the TEC, Threatened and Priority flora and fauna, and potential bird collisions with turbines and vehicle movements.

4.2.9 Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agricultural Management Act 2007* (**BAM Act**) was introduced to provide for the management of the risk of animal, plant pests and diseases entering, emerging, establishing or spreading throughout Western Australia.

None of the recorded weed species within the Development Envelope are listed as a Declared Pest or Weed of National Significance (**WoNS**) under the BAM Act.

The Project does not intend to import any organisms from outside of WA. Major infrastructure imported internationally will be subject to standard quarantine requirements. Any construction materials that may be sourced from outside the Project, such as gravel, will be managed to ensure no weeds or diseases will be introduced, which will be managed through the preliminary CEMP.

4.2.10 Environmental Protection (Noise) Regulations 1997

As discussed in **Section 3.6**, the NIA was undertaken to predict and assess the impact of noise during operations of the WTGs and associated substation at sensitive receptor locations in accordance with applicable regulatory requirements set out in both the Noise Regulations and the SA Guidelines (refer **Appendix S** of **Attachment 4** and **Section 3.6**)

DWER was consulted throughout the noise assessment process and advised the Proponent on appropriate methodology and noise criteria, notably that compliance should be demonstrated with the Regulations rather than the SA Guidelines.

The noise modelling results show that the predicted noise levels from the Project received at all noise sensitive receptors complies with the Regulations.

Noise modelling will be revised prior to construction in consideration of the final WTG layout, height and sound power levels and an ONMP developed and implemented.

4.2.11 Environmental Protection Authority (South Australia) – Wind Farms – Environmental Noise Guidelines, 2009

As discussed in **Section 3.6 and Section 4.2.10,** a NIA was undertaken for the Project to predict and assess the impact of noise during operations of the WTGs and associated substation at sensitive receptor locations in accordance with applicable regulatory requirements set out in both the Noise Regulations and SA Guidelines (refer **Appendix S** of **Attachment 4**)**.**

While DWER advised that compliance should be demonstrated with the Regulations rather than the SA Guidelines, Synergy opted to assess the Project against the SA Guidelines, as well as the Noise Regulations, in consideration of the *WA Planning Commission Position Statement – Renewable Energy Facilities* (**Section 4.2.12**), and as established in the Proponent's commitments during early community engagement.

The noise modelling results show that the predicted noise levels from the Project received at all noise sensitive receptors comply with the SA Guideline criteria (as well as the Noise Regulations).

4.2.11 WAPC Position Statement – Renewable Energy Facilities

This Position Statement was prepared by the WA Planning Commission (**WAPC**) in March 2020 to support the consistent consideration and provision of renewable energy facilities in WA. It identifies assessment measures to facilitate appropriate development of renewable energy facilities, seeking to ensure these facilities are in areas that minimise potential impacts upon the environment, natural landscape and urban areas, while maximising energy production returns and operational efficiency.

Table 4 addresses these considerations in the context of the Project. Overall, all relevant matters have been considered and addressed as part of this Development Application.

Table 4 *Position Statement Assessment – Renewable Energy Facilities*

Item	Summary	Assessment
Community Consultation	Early consultation with the community and	A high level of community and stakeholder engagement has been undertaken to inform this application, including engagement with the Shire AMR, relevant Government

	stakeholders is encouraged.	agencies, landowners and the broader community (Refer **Attachment 1** and **Appendix R** of **Attachment 4**).
Environmental Impact	An environmental survey should be conducted.	Several flora and vegetation, terrestrial fauna and bird and bat utilisation surveys have been undertaken in accordance with EPA and DCCEEW guidelines and advice as detailed in the RSD (**Attachment 4**). These studies informed this application, and the indicative location of WTG and other infrastructure. A summary of the RSD findings is included in this report (**Section 3.1**). The Project has been referred to the EPA under the EP Act and will also be referred to DCCEEW under the EPBC Act.
Landscape and Visual Impact	A Landscape and Visual Impact Assessment may be required which reviews the landscape significance of the site and area, likely impacts on views, the Wind Farm layout and proposed measures to minimise visual impact.	A LVIA has been prepared to support the DA (refer **Section 3.5** and **Appendix T** of **Attachment 4**). The Assessment undertakes a comprehensive analysis of key identified view locations and suggests a number of mitigation measures that may be considered as part of the detailed design and construction process. Whilst it is acknowledged there will be a visual impact in some areas, the Project has already been located in cleared agricultural land to mitigate impact on areas of high landscape value. The Project will require a balance between the various social, environmental and economic considerations.
Noise Impact	Proposals within 1,500m of existing or new noise sensitive premises will require an acoustic study.	A NIA (**Appendix S** of **Attachment 4**) has been undertaken and concludes the Project will comply with the SA Guidelines and WA Noise Regulations, as detailed in **Section 3.6**.
Public and Aviation Safety	Appropriate measures should be undertaken to manage public access near a renewable energy facility	The Project does not encourage or facilitate public access into the Site and is not in close proximity to any identified tourism locations (other than nearby nature reserves). A public viewing area will be installed along Scott River Road to ensure a safe pull over area where tourists can stop and observe the Wind Farm. In order to provide the community (including tourists) with information regarding the Project, the Proponent will liaise with the Shire AMR to facilitate appropriate educational/ informative signage at appropriate locations.
	Wind turbines in areas subject to cyclones need to be designed and constructed to enable	The Project is not located within an area subject to cyclones.

	safe stowage if high winds are forecast.	
	Proponents of wind turbine Proposals should refer to the National Airports Safeguarding Framework (NASF) Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installation (Wind Farms) / Wind Monitoring Towers. Any potential aviation safety risks identified require consultation with Civil Aviation Safety Authority (CASA), Air Services Australia and/or the Commonwealth Department of Defence.	The AIA (**Appendix Q** of **Attachment 4**) concludes that the project will not create incompatible intrusions or compromise the safety of existing certified airports and associated navigation and communication facilities. Nearby unknown aerodromes will be consulted to further understand the impacts of the Wind Farm on aerodrome operations. The Project will not impact the LSALT or any low-level air route LSALT and located within class G airspace (non-controlled airspace). No impact to radar or surveillance facilities were identified. WTG will have non-reflective paint and be a contrasting colour to maintain an acceptable level of safety. Wind monitoring towers will be marked in accordance with NASF Guideline D.
	Wind turbines in Bushfire Prone Areas should be designed and maintained so they are not a bushfire risk to surrounding bushland.	As noted by the Australasian Fire and Emergency Services Authorities Council, the likelihood of turbine fires is considered to be low given appropriate protection measures are applied. While the whole Project Site is declared a 'Bushfire Prone Area' a BAL assessment and associated BMP and BRMP (**Attachments 5** and **6**) determined that the risk can be reduced through the implementation of APZs and NVZs to BAL-29 or lower. The wind turbines will also be designed with fire detection and suppression systems to further reduce any risk.
Heritage	Assessment of relevant Aboriginal heritage, natural or historical heritage significance which may impact on site suitability.	As discussed in **Section 3.2**, an Archaeological and Ethnographic Heritage Survey has been conducted, and whilst there is an existing Registered Site and an Aboriginal Cultural Heritage lodged Place within the Development Envelope, no new sites were recorded during the survey. The Project avoids both the Registered site and the Aboriginal cultural heritage lodged place, however, the Proponent is investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the Aboriginal Cultural Heritage lodged place in order to avoid clearing native vegetation. This option will not be progressed without consultation with KKAC, and any authorisation required under the AH Act.

Construction Impact	Key matters that should be addressed during the construction phase are: A site construction management plan that identifies standards and procedures for the construction of the development Site disturbance should be minimised during construction Vehicle and machinery access and movement.	Preliminary details of the construction process, staging and impacts is discussed within this report. A preliminary CEMP is provided in **Appendix H** of **Attachment 4.** Site disturbance is limited to WTG, locations where additional infrastructure is proposed and access tracks (existing tracks and roads will be used wherever practical to minimise Site disturbance and interference with agricultural activities). It is anticipated specific construction details will be required as part of an updated CEMP, anticipated as a condition of Development Approval. The TIS is contained within **Attachment 7,** addressing vehicle movement and access to the Project Site with suitable compliance.

4.2.12 Visual Landscape Planning in Western Australia

The *Visual Landscape Planning in Western Australia - A Manual for Evaluation, Assessment, Siting and Design* (the **VLP Manual**) is the primary guiding document which details a consistent approach to the consideration of visual landscape matters within the planning process. The VLP Manual aligns with Planning Bulletin No.67 in that the primary aim is to minimise potential negative impacts wherever possible, by establishing and identifying visual criteria and management objectives.

The LVIA identifies there will be visual impact as a result of this proposal, however, the Project outcome will require a balance between the various social, environmental and economic costs and benefits of the project (refer **Section 3.5** and **Appendix T** of **Attachment 4**).

The LVIA has identified High-moderate visual impact across a majority of identified viewpoints.

The Project responds to the objectives identified within the VLP Manual by:

- Locating the wind turbines in already cleared and modified areas
- Installing cables below ground wherever practical
- Using non-reflective coatings on blades
- Maintaining access roads as unsealed tracks wherever practical
- Retaining existing vegetation wherever possible (only minimal vegetation removal is anticipated as identified in **Section 3.5** of this report)

4.2.13 Southwest Regional Planning and Infrastructure Framework

The South West Regional Planning and Infrastructure Framework (the **SWRPI Framework**) is a high-level document that was established to provide an overview of regional planning issues, and to provide further basis for ongoing planning and development within the South West Region:

"For a region that generates high standards of social amenity, diverse economic activities and high-quality food, supported by effective and efficient infrastructure and at the same time preserving and enhancing the natural environment".

The SWRPI Framework identifies the need for physical infrastructure to ensure sufficient water, power, transport, wastewater and telecommunication services to support forecast population growth throughout The South West, and to attract new economic activity for the development of the Region, whilst also ensuring adequate conservation of natural areas. This broadly aligns with the needs identified in the LNRSS.

Further, the SWRPI Framework specifically recognises the historic and strategic importance of the Region in delivering 90% of the baseload of WA's energy generation with coal since 2015. It further recognises the importance of transition and diversification of energy generation methods that reduce greenhouse gas emissions. It specifically identifies the need for energy infrastructure to be appropriately located and buffered.

The Project closely aligns with the Strategy's initiative of diversifying the region's energy production and the need to reduce greenhouse gas emissions. The Project delivers effective infrastructure that will provide a sustainable and renewable energy source for the SWIS that is capable of providing up to 100,000 homes with electricity each year.

The Project will contribute positively to the South West's economy and infrastructure security by locating new and innovative technology that diversifies the land use composition within the locality. It is anticipated that a workforce of up to 150 people in peak construction periods will increase spending within the Region.

The Project provides a unique opportunity for a simultaneous land use operation, with the Wind Farm, rural and agricultural activities co-existing.

4.3 Local Planning Framework

4.3.1 Shire of Augusta-Margaret River Local Planning Scheme No.1

The Shire AMR's Local Planning Scheme No.1 (LPS 1) provides the statutory planning framework guiding land use and development control within the Shire AMR.

An assessment of the key aims of LPS1 that are relevant to the Project is provided in **Table 5.**

Table 5 *Local Planning Scheme No.1 Assessment*

Scheme Aim	Assessment	Compliance
Biodiversity and Environmental Values To the extent possible under the Scheme, to ensure, that biodiversity values are protected and, where possible, enhanced and to arrest any further biodiversity decline by ensuring that future land use and development do not cause biodiversity loss or diminish its environmental values for present and future generations and, where there is uncertainty, to apply the precautionary principle.	As detailed in **Section 4.2.7** and **Attachment 4**, the Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been already cleared for agricultural use. Vegetation clearing will be limited to less than 1 ha, including: • No more than 0.02 ha of native vegetation in Very Good or better condition. • No more than 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC • No more than 0.5 ha of Low to Moderate quality Western Ringtail Possum habitat, including maximum of 0.03 ha of Moderate quality habitat • No more than 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat The Project will avoid clearing TEC, all known Threatened flora (including contiguous native vegetation within 50m), locally restricted vegetation types, wetland habitats (including contiguous native vegetation within 50m), high quality habitat for Western Ringtail Possum and all potential breeding trees for black cockatoos	

	(including and any contiguous native vegetation within 10m). Other impacts will be managed through implementation of a BBAMP, CEMP, ASSDMP, BMP and BRMP and Dieback Management Plans (where required).	
Landscape and Visual Qualities To permit development that maintains the overall rural and natural landscape and visual qualities of the Scheme Area and its visual environs.	The LVIA has identified High-moderate visual impact across a majority of identified viewpoints (refer **Appendix T** of **Attachment 4**). To assist in mitigating impacts, the following will be implemented: ▪ Locating the wind turbines in already cleared and modified areas ▪ installing cables below ground wherever practical ▪ using non-reflective coatings on blades ▪ maintaining access roads as unsealed tracks wherever practical ▪ retaining existing vegetation wherever possible (only minimal vegetation removal is anticipated as identified in **Section 3.5** of this report) The LVIA identifies there will be visual impact as a result of this proposal, however, the Project outcome will require a balance between the various social, environmental and economic costs and benefits of the project.	
Lifestyle and Community Identity *To provide for the expansion of established settlements, the development and consolidation of tourism, and the preservation of prime agricultural land for a range of broad acre and intensive production purposes all within a broad objective of promoting a strong sense of community identity and sense of place*	This report demonstrates that a Wind Farm can operate in the General Agriculture zone without adversely impacting agricultural uses, maintaining the functional identity of the local area.	
Conservation and Heritage To provide, where appropriate, for the preservation and protection, conservation and enhancement of areas, places and objects of cultural and natural heritage significance.	As detailed in Section 4.2.7, one (1) registered Aboriginal site, Blackwood River (Registered site ID: 20434), and one lodged Aboriginal place, Scott River (Lodged Heritage Place ID: 22928), intersect the Development Envelope. The Proponent will enter into a Noongar Standard Heritage Agreement with the KKAC through the SWALSC. The Project has been designed to avoid the Blackwood River registered site and Scott River lodged heritage place. The Proponent is, however,	

	investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the Scott River, to avoid clearing native vegetation. This option will not be progressed without consultation with KKAC, and any authorisation required under the AH Act.	
Agriculture and Rural Land Use To ensure the protection of Priority and General Agricultural Land as identified within the Scheme by discouraging any land uses and developments which would detract from the principal function of the land for productive agricultural purposes and ad hoc fragmentation of rural land which could lead to the establishment of non-rural uses and developments; and	The Project is compatible with existing agricultural uses. The Project has a disturbance footprint of approximately 3% within the Development Envelope, ensuring that existing agricultural land uses can continue and are compatible with the Wind Farm. The indicative layout has been prepared in consultation with landowners to ensure avoidance of key agriculture infrastructure. The development will not result in further land fragmentation. The Project directly aligns with the overarching themes, visions and objectives of the relevant State and Regional Planning Strategies by making a meaningful contribution towards the renewable energy sector and sustainable energy production. The Project will provide the locality with development that will sustainably produce energy for the entire SWIS.	
Agriculture and Rural Land Use To provide for the sustainable use of rural land for diverse agricultural production, which encourages and promotes best practice agriculture and sustainable land use change, and which accommodates ancillary and complementary rural activities.	The Project will not functionally impact agricultural uses on General Agricultural zoned land. Wind Farms are considered a complementary use to various agricultural uses, as evidenced by the Project's approximate 3% disturbance footprint within the Development Envelope.	
Tourism To provide for and foster a diverse tourist industry (which builds on the global market demand for nature based, wilderness, environmentally friendly and indigenous based learning experiences) with particular support for unique local niche products and services, which complements the natural, cultural, social and man-made environment, strengthens the local sense of place	The supply and harnessing of renewable energy are consistent with the Shire's *Eco Destination Certification* and supports the 'climate action' initiative. Following interest expressed by the Shire and MRBTA, a public viewing area will be developed along Scott River Road to ensure a safe pull over area where tourists can stop and observe the wind farm. The viewing area will include informative signage about wind as a renewable energy source.	

and promotes sustainable economic support for the Shire.		
Shire Economy To provide for an overall pattern of land use and development which will diversify and improve the Shire's economic base with an emphasis on value-adding to the Shire's agricultural production; and	The Project will diversify the Shire AMR's economic base. The Project is 'value neutral' to the Shire AMR's agricultural production.	
Shire Economy To promote and facilitate the development of the region as a centre for education, agriculture, tourism and small innovative business.	The Project will increase the overall supply of energy available within the SWIS, thereby indirectly supporting all sectors.	
Residential Development and Strategic Land Supply To provide for a variety of housing settlement options and lifestyle choices within the Shire and to provide for the expansion and consolidation of all settlements within the Scheme Area, but with emphasis on the expansion of smaller settlements to remove the pressure for development that has occurred on the principal towns.	As noted, the current residential land supply in the Sub-region is expected to be adequate until 2050, with no significant growth increase expected in Augusta. The location of the Project is not in a location identified for residential development, and therefore will have no impact on land supply or townsite expansion.	
Sustainable Land Use and Development To ensure that new land use and development are consistent with the principles of sustainability, and to approve only those development Proposals that are also consistent with those principles.	The Shire AMR's Local Planning Policy framework incorporates an overarching sustainability policy around the areas of: ▪ Natural environments ▪ Welcoming and inclusive communities ▪ Sustainable Development ▪ Vibrant and diverse economies Sub-policies and frameworks have been considered where feasible and relevant.	
Community Services and Infrastructure Provision To provide affordable and sustainable, physical infrastructure and human social services commensurate with the needs of the local and broader community.	The Project will not have adverse impacts on the Shire's ability to deliver social services and community/physical infrastructure.	

Public Works To provide an overall planning framework whereby Proposals for land uses and developments, which are public works undertaken by State and local government or other authorised agencies, may be assessed against the provisions of the Scheme.	NA – the Project is not considered to be a Public Work.	
Transport To promote reduction in the use of fossil fuels and improvement in human health by transport strategies that, where possible, reduce reliance on motor vehicles, employ best practice parking strategies, encourage pedestrian and cycling activities, integrate public transport, encourage mixed use development and minimise the impact of trucks (and other large vehicles) on the Shire's present and future infrastructure; and the Scheme Area's local amenity.	Aside from the vehicles associated with the construction and maintenance of the Project at a community level, the Project will not induce further fossil fuel usage or further motor vehicle reliance. It is directly aimed at limiting the impact of fossils fuels on the region.	

4.3.1.1 Zoning

The Development Envelope is located within the 'General Agriculture' zone under LPS 1 as shown **Figure 14**.

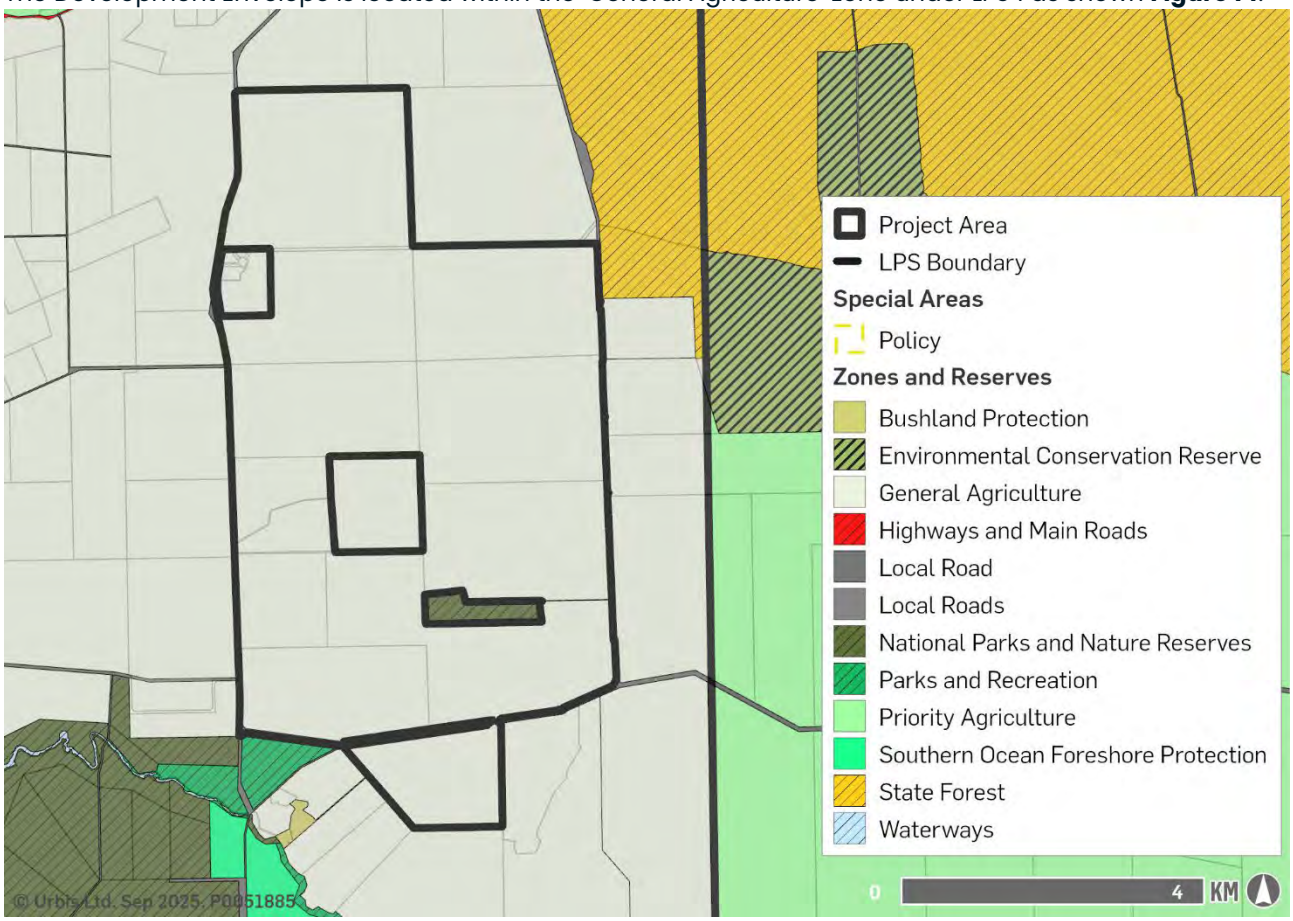
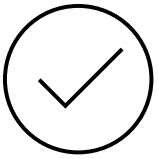


Figure 14 *Local Planning Scheme No.1 Map*

An assessment against the Purpose of the General Agriculture zone is provided at **Table 6**:

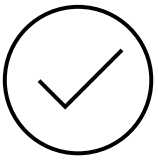
Table 6 *Compliance with Purpose of the Scheme*

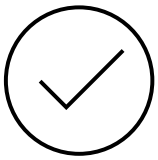
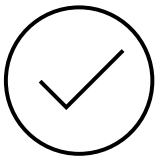
Purpose	Assessment	Compliance
To provide for a more general classification of rural land, other than that identified as being of State or Regional agricultural significance as set out in Local Planning Strategy, used, or capable of being used for a range of agricultural activities complemented by other ancillary uses which do not detract from the primary use of the land for agricultural purposes	The Project will allow for the primary use of the land for agricultural uses to continue during and following construction. The Project will not impact on the use or viability of rural land uses.	✓
To provide that subdivision and development activities that generate alternative and incompatible land use proposals should not be permitted	The Project will co-exist with existing agriculture use, allowing the rural character and ongoing use of the area to remain. No subdivision is proposed as part of this Project.	✓

Notwithstanding the zoning of land, to provide for the retention and protection of portions of land within that Zone that are not cleared and that are valuable to the high landscape values and ecological systems of the Scheme area	As detailed in **Section 3.1, Section 4.2.7** and **Attachment 4**, the Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been cleared for agricultural use. Vegetation clearing will be limited to less than 1 ha, including: • No more than 0.02 ha of native vegetation in Very Good or better condition. • No more than 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC • No more than 0.5 ha of Low to Moderate quality Western Ringtail Possum habitat, including maximum of 0.03 ha of Moderate quality habitat • No more than 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat The Project will avoid clearing TEC, all known Threatened flora (including contiguous native vegetation within 50 m), locally restricted vegetation types, wetland habitats (including contiguous native vegetation within 50 m), high quality habitat for Western Ringtail Possum and all potential breeding trees for black cockatoos (including and any contiguous native vegetation within 10 m).	

An assessment against the Objectives of the General Agriculture zone is provided in **Table 7**.

Table 7 *General Agriculture Zone Objective Assessment*

Objectives	Assessment	Compliance
To provide for the broad range of potential extensive agricultural activities, and, where appropriate, some intensive agricultural and horticultural uses of land notwithstanding that some of the activities might also be appropriate to the Priority Agriculture Zone;	As noted, the Project is compatible with existing agricultural uses and has the benefit of providing landowners with a secondary income stream. Agricultural uses can continue during construction, and this will continue post Project completion. The indicative layout has a footprint of approximately 3% within the Development Envelope (including areas of temporary construction disturbance) ensuring that existing agricultural land uses can continue and are compatible with the Wind Farm. Furthermore, the indicative layout has been prepared in consultation with landowners to ensure avoidance of key agriculture infrastructure. The Project will make a positive contribution to the renewable energy sector and can be facilitated while minimising impacts on the existing general agricultural uses.	
To preserve the established rural character and amenity of the land within the Zone consistent with the ongoing use and development of that land for productive agricultural purposes	The LVIA has been prepared to inform the Project and a number of mitigation measures will be implemented as detailed in Section 3.5. The Project will co-exist with existing agriculture use, and therefore the rural character and ongoing use of the Project Area will not significantly change.	

To oppose subdivision Proposals which would adversely affect the utility of agricultural land for productive purposes through specific subdivision criteria to ensure long term agricultural sustainability and appropriate lot sizes as set out at clause 4.15.5; and	No subdivision or further land fragmentation is proposed.	
To allow for the provision of sustainable low-impact tourist development such as chalet development but only where an established and continued agricultural, horticultural, viticultural or other similar rural production, or significant tracts of native vegetation that can be protected on the land holding and where such uses will be incidental and complementary to that established use or protection of the significant native vegetation	The Proponent will construct a public viewing area adjacent to the Project on the suggestion of the MRBTA. The Project Area will continue to be used for productive rural purposes.	

4.3.1.2 Land Use and Permissibility

LPS1 defines a 'Wind Farm' (or wind-energy facility) land use as:

'Premises used to generate electricity by wind force and includes any turbine, building or other structure used in, or in conjunction with, the generation of electricity by wind force but does not include private turbines used principally to supply electricity on a domestic property or rural use of the land or anemometers'.

A Wind Farm is an 'A' use in the General Agriculture Zone. This means that *'the use is not permitted unless the local government has exercised its discretion by granting development approval after giving special notice in accordance with clause 64 of the Deemed Provisions'.*

The Project is required to be advertised in accordance with the Deemed Provisions.

4.3.1.3 Development Requirements

Development within the General Agriculture Zone

Clause 4.16 of LPS 1 sets out development requirements for land in the General Agriculture Zone. The provisions are generally irrelevant to a Wind Farm proposal, other than the requirement for a 100m setback to be applied from the edge of any permanent stream or water course, or 30m from any natural water course that flows intermittently; and the ability for revegetation to occur where other land is proposed to be cleared as part of a proposed General Agricultural land use.

While there are no permanent watercourses there are various intermittent water courses within the Development Envelope, most of which have already been cleared of native vegetation, and in some cases altered by, existing agricultural practices and many of which are intersected by existing farm infrastructure (ie. tracks).

The Project is unable to maintain 30m setback from all intermittent watercourses, but will utilise existing tracks as much as practical and will ensure drainage controls (eg. drains and culverts) are appropriately located, designed, constructed and maintained to maintain surface water flow regime.

The Project has also been designed to completely avoid direct impacts to the Blackwood River registered site. The Project currently avoids direct impacts to Scott River Aboriginal cultural heritage lodged place.

The Proponent is, however, investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the Scott River (ACH Lodged place ID: 22928) to avoid clearing native vegetation. This option will not be progressed without consultation with KKAC, and any authorisation required under the Act.

Setbacks

Schedule 9 of LPS 1 sets out development standards within the General Agriculture zone being:

- Front setback: 30m
- Rear setback: 20m
- Side setback: 20m

WTGs will be situated a minimum of 1.1 times the blade length (ie. 90m + 20m) from the turbine centre point to all the external Development Envelope boundaries, well in excess of the minimum 20m or 30m LPS 1 requirement. Proposed setbacks are therefore consistent within LPS 1 requirements.

WTGs are setback a minimum 1500m from all existing dwellings.

All other infrastructure will meet the LPS 1 required setbacks.

Building Height

Clause 5.13 does not specify a maximum height for the development of the nature proposed, however, clause 5.13.2 allows taller structures where the nature of the proposed '*structure is such that, to be functional, it must be built to a higher level*'.

Clause 5.13.3 excludes structures, including a wind turbine, from height controls, provided the structure is sited and/or treated so as not to detract from the visual amenity of the locality.

As detailed in **Section 3.5** and **Appendix T** of **Attachment 4**, a LVIA has been prepared to inform the Project. It is acknowledged that there will be visual impact as a result of the proposal, and that the Project outcome will require a balance between the various social, environmental and economic costs and benefits of the Project.

4.3.2 Local Strategic Considerations

4.3.2.1 Shire of Augusta Margaret River Local Planning Strategy 2036

The Local Planning Strategy 2036 (**LPS2036**) sets out the Shire AMR's vision over a 10-to-15 year period. The objective of the Strategy in relation to Utilities and Community Assets is to:

"Provide community infrastructure and services that meet the needs of a growing community and which embody the sustainable use of water, energy and financial resources."

A key response area of the Strategy is to 'Transition to Renewable Energy' which is guided by the following Strategic Response, supported by items to be actioned within the Shire AMR's Planning Framework:

1. *'Support appropriately located renewable energy facilities to progress towards increased percentage of Shire power supplies coming from local renewable supplies.*
    i. *Introduce a 'Renewable Energy Facility' use class into the scheme as well as criteria that recognises the different impacts between different types (eg. wind, solar, etc)*
    ii. *Update Local Planning Policy 23 to clarify approval requirements, with specific criteria guiding placement of larger scale systems; and*
    iii. *Ensure that applicable planning related outcomes from the Shire's Local Energy Action Plan (**LEAP**) (superseded by Climate Action Plan), are reflected and reinforced in the Shire's Planning Framework'*

The Project is closely aligned with the strategic initiatives outlined in LPS2036. The Project will connect to the SWIS and contribute to increasing the Shire AMR's proportion of energy coming from renewable resources.

It is understood that provisions relating to 'Renewable Energy Facility' and Policy changes are being addressed by the Shire AMR through Draft Local Planning Scheme No.2 (**LPS 2**), and other Policy approaches detailed in this Report.

4.3.2.2 Draft Shire of Augusta-Margaret River Local Planning Scheme No. 2

Draft LPS 2 has been advertised, and direction given by the Hon Minister for Planning to the Shire AMR regarding modifications required to be made to the Scheme prior to gazettal.

In the context of the advertised version of the Scheme, LPS2 proposes to rezone the subject land from 'General Agriculture' to 'Rural'. This change will largely preserve the current status and intent of the 'General Agriculture' zone, while streamlining the number of zones within the Scheme. Additionally, LPS2 aims to introduce the standard land use definition of 'Renewable Energy Facility', remaining an 'A' use, requiring public advertising.

A range of other environmental and landscape provisions are also proposed to be introduced. Whilst the Project is located in an area identified as having environmental assets (primarily wetland systems), the Project has been designed to avoid and otherwise minimise impacts on remnant native vegetation and wetland habitats, including committing to clear no more than 1 ha of native vegetation and avoid clearing of all wetland habitat (including any contiguous native vegetation within 50m). The Project is supported by extensive environmental investigations (refer **Section 3.1** and **Attachment 4**).

The Landscape Protection Map does not note the Development Envelope as being a 'visually sensitive area'.

The scope of modifications to the new Scheme are not yet known.

4.3.2.3 Shire of Augusta-Margaret River Climate Action Plan 2020-2030 Part 1

The Climate Action Plan 2020-2030 Part 1 (**CAP1**) sets out the Shire AMR's and community's vision for climate mitigation measures for the next ten (10) years until 2030. The aim of CAP1 is to reduce both industry and community carbon emissions.

The Project supports the Shire AMR's need to transition to green energy sources and further contribute to development of sustainable local industries.

4.3.3 Local Planning Policy Assessment

The following section provides an assessment against the relevant Local Planning Policies (**LPP**) which are applicable to the Project.

4.3.3.1 Local Planning Policy 23 – Renewable Energy Systems

Local Planning Policy No.23 **(LPP 23)** sets out the Shire AMR's aspirations for the design, scale, and location of renewable energy systems, including Wind Farms. Whilst the Shire AMR is willing to facilitate this type of development, there is a need to ensure that these are designed to mitigate against visual and acoustic amenity impacts to immediate and surrounding properties.

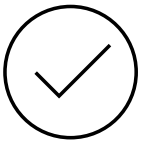
As the Project is proposed to connect into the SWIS, it is considered a 'Large Renewable System' which is able to be approved if it meets LPP 23 objectives and measures as highlighted in **Tables 8** and **9.**

Table 8 8 *Local Planning Policy No.23 Objectives Assessment*

Objective	Comment	Check
To facilitate the introduction of renewable energy technologies on a broad scale and address planning related matters associated with their development.	The Proponent is committed to developing a number of Wind Farms in the SWIS, and is committed to addressing relevant planning matters.	
Provide for the protection of the quality of the streetscape, surrounding landscape, and amenity (particularly visual and acoustic amenity) of nearby properties and surrounding areas in the establishment of renewable energy systems.	A NIA and LVIA have been conducted to assess the visual and noise impact on the surrounding landscape and existing dwellings.	
Provide guidance for the development of renewable energy systems on land controlled under Local Planning Scheme No. 1.	Both LPS 1 and the draft LPS 2 have been considered in the design of the Project and in the Development Application.	

Table 9 9 *Local Planning Policy No.23 - Measures relevant to Large Renewable Energy Systems Assessment*

Measure	Comment	Check
Renewable energy systems should be designed in a manner that does not result in adverse impacts upon flora and fauna, environmentally sensitive areas, or landscape character and amenity.	The Project has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having already been cleared for agricultural use. Vegetation clearing will be limited to less than 1 ha, and other impacts will be managed through the development and implementation of various Management Plans, as detailed in Section 4.2.7 and the RSD (**Attachment 4**). Notably, the Project will avoid clearing TEC, all known Threatened flora (including contiguous native vegetation within 50 m), locally restricted vegetation types, wetland habitats (including contiguous native vegetation within 50 m), high quality habitat for Western Ringtail Possum and all potential breeding trees for black cockatoos (including and any contiguous native vegetation within 10 m).	

	The LVIA identifies there will be visual impact as a result of this proposal, however, the Project outcome will require a balance between the various social, environmental and economic costs and benefits of the Project (**Appendix T** of **Attachment 4**).	
Renewable energy systems should be positioned so as not to detract from the building itself or impose on the existing streetscape, adjacent properties or the surrounding area.	The Project is appropriately set back from any significant streetscape, adjacent properties and high amenity locations as depicted in **Figure 4.** The LVIA assessed visual impacts to adjacent properties (**Appendix T** of **Attachment 4**).	
Electrical components and wires associated with wind energy systems should not be visible from public roads or vantage points.	33kV cabling will be located underground wherever practical. Above ground components are expected to be minimal and generally be shielded from public roads and vantage points through retention of vegetation.	
Height restrictions in the LPS1 may be varied where large wind energy systems are proposed to allow for these systems to function properly. The height and location of these systems will be determined through preparation of a detailed visual impact assessment, consultation with community and key stakeholders and compliance with relevant planning documents. Due regard will be given to LPS1, the purpose of the zone and the provision of this policy when considering any such height variation.	The Proponent has committed to following due planning process and providing effective engagement with the local community. WTGs will be situated a minimum of 1.1 times the blade length (ie. 90m + 20m) from the turbine centre point to all the external Development Envelope boundaries, well in excess of the minimum 30m LPS 1 Scheme requirement. All other infrastructure meets the minimum LPS 1 requirement. Heights are typically assessed in accordance with clause 5.5. For operational reasons the height of the WTG is required to exceed that set out in the Scheme, as outlined in **Section 4.3.1.3** of this report.	

4.3.3.2 Renewable Energy Policy Issues and Options Paper (2025)

The Shire AMR's Renewable Energy Policy Issues and Options Paper (2025), developed to support the potential creation of a Renewable Energy Local Planning Policy, acknowledges the broader transition to renewable energy, the development of the State Code, and the current State and local planning frameworks

Key considerations are outlined in **Table 10**.

Table 10 10 *Issues and Options Paper Analysis*

Consideration	Details	Comment
Environmental Impact	▪ Current framework requires an EIA. ▪ Option for the Shire AMR to advocate for more prescriptive requirements, such as compensating for vegetation loss or rehabilitating clearings.	Environmental Impacts of the Project have been addressed in the RSD (refer **Attachment 4**) and are summarised in **Section 3.1.**
Landscape and Visual Impact	▪ Large developments are not allowed along the Leeuwin Naturaliste Ridge ▪ LVIA to align with DPLH Visual Landscape Planning in WA. ▪ Turbine setbacks: 1.5km from dwellings and 3x height of turbine from boundaries. ▪ Recognises use of vegetated buffers and other mitigation measures.	The Project Site is located outside the Leeuwin Naturaliste Ridge SPP. A LVIA has been undertaken in accordance with DPLH requirements. Turbines will be set back 1.5km from existing dwellings. Landscape and Visual Impacts and proposed WTG setbacks are addressed in the RSD and LVIA (**Appendix T** of **Attachment 4**).
Noise Impact	▪ Refers to WA Guidelines, with an option to create a new noise requirement	The NIA has been undertaken and confirms compliance at all existing dwellings in accordance with the Noise Regulations and the SA Guidelines for the operation of the WTGs (**Appendix S** of **Attachment 4**). Noise levels at sensitive receivers will meet compliance requirements.
Heritage	▪ Acknowledges the current *Aboriginal Heritage Act 1972 (ACH Act)* requirements for engagement, with an option to create additional requirements to address heritage impact	Aboriginal heritage engagement has taken place and will continue, to ensure that impacts to known Aboriginal cultural values are considered and addressed. The Project currently avoids the registered site and lodged heritage place. The Proponent is, however, investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the Scott River to avoid clearing native vegetation. This option will not be progressed without consultation with KKAC, and any authorisation required under the AH Act.
Land Use Compatibility	▪ Recognises that large renewable energy projects can complement existing agricultural uses, such as grazing.	The Project is compatible with existing agricultural use, with the disturbance footprint being

	▪	Notes the potential for a minimum 2km setback to residential areas and ensuring project design supports continued agricultural use.	approximately 3% of the Development Envelope during construction, and 1-2% during operations. The Project is located greater than 2km from Residential zoned land.
Construction and Decommissioning	▪	Requires a CEMP and a Decommissioning Plan	A Preliminary CEMP has been prepared at (**Appendix H** of **Attachment 4**) and is expected to form part of a condition of Development Approval. Further details of the CEMP are provided in **Table 11** and discussed in **Section 2.2** of this report. An overview of Project decommissioning is provided i**n Section 2.2.9** and in **Appendix C** of **Attachment 4**.
Community Benefits and Engagement	▪	Refers to the Draft Guideline on Community Benefits Consultation Paper and supports pre-consultation with the community before lodging a Development Application.	An overview of the Community Benefit Fund for the Project is addressed at **Section 1.6.1.** A comprehensive record of Stakeholder Engagement has been provided at **Attachment 1.**

5 Implementation

As identified in this Report, a range of Management Plans and studies will be prepared following determination of the Development Application, through the Detailed Design, Construction, Operations and Decommissioning Phases.

The Management Plans will identify risks and/or significant environmental values, actions and mitigation, performance targets, monitoring processes, conditions of approval and commitments.

Each Management Plan requires the appointment of a position that is responsible for its management and implementation throughout, and following, construction.

The considerations for each Management Plan and Study are identified for each Project Phase, as detailed in **Table 11**:

Table 11 *Management Plans*

Project Phase	Proposed Management Plan(s), Specifications and Studies	Considerations	Responsible agency (consultation required)	Plan Provision
Detailed Design /Procurement/ Contracting Phases	**Detailed Site Plan/Specifications**	▪ Confirmation of final layout based on technical findings, detailed design and tender process ▪ WTG make, model and size ▪ Met masts/comms tower locations	Local government	Prior to construction
	Technical Studies	▪ Dieback investigation ▪ Detailed Geotech and ASS (including revised drawdown modelling) ▪ Updated technical studies as required, due to any material impacts or departures to technical background studies ie. based on final layout (eg. revised noise impact, EMI, Shadow Flicker, OSOM and aviation impact assessment); WTG specifications and outcomes from ongoing stakeholder engagement	Local government	Prior to construction
Construction Phase	**Construction Environmental Management Plan** (refer **Appendix H** of **Attachment 4**).	▪ Erosion and sediment control ▪ Stormwater management ▪ Dust management ▪ Noise and vibration	Local Government State referral agencies (where required)	Prior to construction

		▪ Fauna management ▪ Dieback management (if required) ▪ Waste management ▪ Fire and Emergency Response ▪ Aboriginal heritage management ▪ Updated technical studies ▪ Construction timing ▪ Final layout ▪ Engagement with landowners to determine practical solutions to reduce farming impacts (eg. optimising construction logistics to minimise disruption to an operating dairy)		
	Traffic and Transport Management Plan	▪ Traffic Management ▪ OSOM Haulage Route	MRWA Local government	Prior to construction
Operations Phase	**Operations Environmental Management Plan**	▪ General environmental management during operations, such as dust, stormwater and waste	Local government	Prior to operations
	Bushfire Management and Bushfire Risk Management Plans (BMP and BMP provided at **Attachments 5** and **6**)	▪ Bushfire management ▪ Bushfire Risk Management ▪ Final layout, selected WTG make, model and size	Local Government DWER DFES	Prior to operations
	Operational Noise Management and Monitoring Plan	▪ Reflecting final selection of WTGs and other infrastructure, final WTG locations, and consideration of nearby sensitive receptors	DWER (where required) Local government	Prior to operations
	Bird & Bat Adaptive Management Plan (BBAMP) (Preliminary BBAMP provided as **Appendix L** of **Attachment 4**)	▪ Final WTG specifications (including RSA) and WTG locations	Local government DWER / DCCEEW	Prior to operations

Decommissioning	**Decommissioning Plan** (Preliminary Decommissioning Plan provided as **Appendix C** of **Attachment 4**)	▪ Decommissioning Plan to incorporate changes in good industry practices and technology, legislation and statutory requirements as well as discussions with landowner eg. retention of assets	Local Government State referral agencies (where required)	Prior to decommissioning

6 Conclusion

The Project is an important renewable energy development which will make a significant contribution to the State's decarbonisation.

The Project Site has been selected based on investigations undertaken over a number of years, and was selected due to its potential wind generation profile, an existing transmission line, access to infrastructure, and available cleared land.

The Project has been comprehensively considered at a technical level, and this Report demonstrates its general compliance with relevant technical and planning legislation and frameworks.

Good industry practices have guided the Project's design since its inception, with a focus on delivering a high-quality Wind Farm capable of generating up to 100 MW of wind power for the State. The exact specifications of the WTGs, and locations for infrastructure, will be confirmed once the Proponent obtains further technical data, undertakes detailed design, and appoints contractors.

On this basis, this Development Application seeks approval for the 'maximum case scenario' in terms of level of impact.

The relevant technical studies that have informed this Project, appended to this report, have all been based on this 'maximum case scenario'.

Importantly, agricultural activities will be able to continue around the proposed WTGs and other infrastructure, both during and following construction.

From a Planning perspective, the Project demonstrates a high level of compliance and alignment with Federal, State, Regional, Local and other frameworks that are relevant in considering Wind Farm Projects.

RDAP is encouraged to approve this Development Application, subject to suitable conditions, including those identified within this Report.

Disclaimer

This report is dated 3 October 2025 and incorporates information and events up to that date only and excludes any information arising, or event occurring, after that date which may affect the validity of Urbis Pty Ltd **(Urbis)** opinion in this report. Urbis prepared this report on the instructions, and for the benefit only, of SynergyRED **(Instructing Party)** for the purpose of Development Application **(Purpose)** and not for any other purpose or use. To the extent permitted by applicable law, Urbis expressly disclaims all liability, whether direct or indirect, to the Instructing Party which relies or purports to rely on this report for any purpose other than the Purpose, and to any other person which relies or purports to rely on this report for any purpose whatsoever (including the Purpose).

In preparing this report, Urbis was required to make judgements which may be affected by unforeseen future events, the likelihood and effects of which are not capable of precise assessment.

All surveys, forecasts, projections and recommendations contained in or associated with this report are made in good faith and on the basis of information supplied to Urbis at the date of this report, and upon which Urbis relied. Achievement of the projections and budgets set out in this report will depend, among other things, on the actions of others over which Urbis has no control.

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This report has been prepared with due care and diligence by Urbis and the statements and opinions given by Urbis in this report are given in good faith and in the reasonable belief that they are correct and not misleading, subject to the limitations above.

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Attachment 1

Record of Stakeholder Engagement

Record Of Stakeholder Engagement

Stakeholder	Engagement Format	Dates
Landowners	Engagement with landowners began in September 2022 through meetings, phone and email. Since late-2022 / early 2023 regular engagement with the six (6) involved landowners has been undertaken regarding wind monitoring, Wind Farm concept design planning, land lease discussions, as well as site surveys and studies.	2022 - ongoing and as needed to negotiate and finalise agreements, provide updates and arrange access for onsite feasibility studies.
Neighbours	Engagement with adjacent neighbours that had the potential to host WTGs commenced in February 2023 via phone and email. Face to face engagement began in May 2023. Engagements with neighbours that did not have the potential to host WTGs commenced in August 2023. Initial conversations were to introduce the Project and next steps. Two (2) neighbours took part in the Social Values Assessment. Neighbour agreements have been discussed with neighbours, where appropriate.	February 2023 - ongoing
Local community	The wider community were introduced to the Project in February 2024 through a letter box drop, newspaper advertisements, posters, and social media advertising. These were followed by drop-in community consultation sessions in various locations through the Shire AMR. Eleven additional drop-in consultation sessions were held in December 2024 and September 2025. These sessions saw approximately 372 attendees. An online Project page and engagement tool was launched to enable two-way online communication which has had 2,866 page visits since its launch. Monthly updates about the Project have been published in the Pelican Post, and ad hoc notices in the Augusta-Margaret River Times and the Margaret River Mail.	February 2024 - ongoing

		Regular email updates are sent to the Project email subscribers. A community drop in space was set up in February 2025, has been opened for the community to drop-in for 17 days during this time, and had 41 visitors. The office space will remain open in the months that follow Development Application submission. Regular radio advertisements have promoted the Project and upcoming community consultation. Fifty-nine meetings have been held with local community members and groups.	
Shire of Augusta Margaret River		Engagement with the Shire AMR began in February 2023. The first meeting was held the next month to introduce the Project. Numerous phone calls, emails and meetings have been held with the Shire AMR CEO, Planning Officers, Sustainability Officers, emergency services, communications team and Councillors to provide Project updates, seek input on community engagement, and offer energy education.	February 2023 - ongoing

Stakeholder	**Date**	**Issues/Topics Raise**	**Applicant Response**
Regulators/Government Departments			
Western Power	2022 - ongoing Fortnightly meetings since February 2025.	Grid connection and capacity. Upgrades to Beenup Substation. Building a new substation.	Ongoing discussion and regarding the connection process. Suitable capacity of the existing transmission is around 100MW.
CASA and Airservices Australia	2023 – ongoing	Introduce Project and discuss impacts of Project on nearby aircraft operations.	CASA no objections. ASA requested that the Project completes a Vertical Obstacle Notification Form so it can record the tall structures.
Global Airspace Solutions	2025	Introduce Project and discuss impacts of Project on nearby aircraft operations.	There is no impact on aircraft operations, but there is an impact on the IFP plates which can be changed at a cost.

Department of Fire and Emergency Services	2024 – ongoing	Introducing Project, seek clarity on bushfire assessment and application of CFA guidelines.	Consider separation distances to vegetation, access points, firewater, liaison with local fire brigades, recommended emergency night-time lighting.
Water Corporation	2024 – ongoing	Potential Electromagnetic Interference with equipment as well as water availability for construction works.	Margaret River has sufficient water to meet construction requirements, whereas water availability in the Augusta area is limited.
Department of Water and Environmental Regulation	2023 - ongoing	Discussion of hydrology and hydrogeology baseline studies, licencing bore requirements, noise modelling, dewatering, ASS, referral guidance.	Offered to supply existing data, recommended a review of the Hardy Inlet water quality plan, recognised that management of dewatering to minimise drawdown will be key, but acknowledged likely low risk given temporary nature of activity, noise modelling shows compliance.
Department of Biodiversity, Conservation and Attractions	2025	Land access for Lot 4924 and discussion about 101. Aerial bush firefighting.	The Proponent may progress with discussed site access requirements, and ensure that final turbine coordinates are provided for aerial operations.
Regional Service Providers			
Telstra	2025	Potential Electromagnetic Interference	No response was received from Telstra.
NBN Co	2025	Potential Electromagnetic Interference	No concerns raised.
Optus	2025	Potential Electromagnetic Interference	No concerns raised.
Bureau of Meteorology	2025	Potential Electromagnetic Interference	-
Royal Flying Doctor Service	2024	Impacts of Project on nearby aircraft operations	No response was received from the RFDS.

Department of Defence	2024	Impacts of Project on nearby aircraft operations	Requested that the Project completes a Vertical Obstacle Notification Form to Air Services Australia.

Attachment 2

Certificates of Title & Deposited Plans

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1581	**567**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4265 ON DEPOSITED PLAN 208480

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

THE TRUST COMPANY (AUSTRALIA) LTD OF LEVEL 15, 20 BOND STREET, SYDNEY, NEW SOUTH WALES
(T L715347) REGISTERED 23/8/2011

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. M545831 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 10/2/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1581-567 (4265/DP208480)
PREVIOUS TITLE:	1581-567
PROPERTY STREET ADDRESS:	598 DENNIS RD, SCOTT RIVER.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

LANDGATE COPY OF ORIGINAL NOT TO SCALE 02/09/2025 11:14 AM Request number: 68700006

Landgate
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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1726	**538**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4261 ON DEPOSITED PLAN 208478

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ROSS KINGSLEY WOODHOUSE OF 1713 WARNER GLEN ROAD WARNER GLEN WA 6288
(T I260381) REGISTERED 10/10/2002

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE.
2. O806264 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 16/7/2021.
3. Q129291 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 6/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1726-538 (4261/DP208478)
PREVIOUS TITLE:	1605-792
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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Landgate
www.landgate.wa.gov.au

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1818	**129**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4266 ON DEPOSITED PLAN 208480

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

JOHN PENTLAND HICK OF COWARAMUP

(XE A000001A) REGISTERED 1/1/0001

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. G222391 EASEMENT TO ELECTRICITY CORPORATION. SEE SKETCH ON VOL 1818 FOL 129. REGISTERED 5/7/1996.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1818-129 (4266/DP208480)
PREVIOUS TITLE:	1818-129
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1824	**96**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4260 ON DEPOSITED PLAN 208478

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ROSS KINGSLEY WOODHOUSE OF 1713 WARNER GLEN ROAD WARNER GLEN WA 6288
(T D814254) REGISTERED 10/1/1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. O806264 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 16/7/2021.
2. Q129291 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 6/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1824-96 (4260/DP208478)
PREVIOUS TITLE:	1663-839
PROPERTY STREET ADDRESS:	119 GOVERNOR BROOME RD, SCOTT RIVER.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1924	**610**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 1 ON DIAGRAM 69685

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

T.J.M. NOMINEES PTY LTD OF CARE OF ROOM 114/768 CANNING HIGHWAY, APPLECROSS
(A E812518) REGISTERED 19/2/1992

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE. VOL 1924 FOL 610.
2. Q129284 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 6/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1924-610 (1/D69685)
PREVIOUS TITLE:	1726-537
PROPERTY STREET ADDRESS:	399 GOVERNOR BROOME RD, SCOTT RIVER.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1930	**228**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4154 ON DEPOSITED PLAN 207769

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ROSS KINGSLEY WOODHOUSE OF 1713 WARNER GLEN ROAD WARNER GLEN WA 6288
(T K361625) REGISTERED 2/10/2007

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E893206 CAVEAT BY CABLE SANDS PTY LTD LODGED 28/5/1992.
2. O806264 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 16/7/2021.
3. Q129291 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 6/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1930-228 (4154/DP207769)
PREVIOUS TITLE:	1591-758
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1930	**516**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4263 ON DEPOSITED PLAN 208478

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

BOLEY'S PASTORAL HOLDINGS PTY LTD OF UHY HAINES NORTON PRT SUITE 3/46-48 ALBERT STREET BUSSELTON WA 6280

(T O006326) REGISTERED 12/10/2018

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE.
2. O006327 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 12/10/2018.
3. Q264702 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 23/12/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1930-516 (4263/DP208478)
PREVIOUS TITLE:	1658-663
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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Landgate
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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1981	**387**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4269 ON DEPOSITED PLAN 209300

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

GRAEME ERNEST PAYNE OF 361 PAYNE ROAD, SCOTT RIVER

(T F376761) REGISTERED 25/11/1993

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE.
2. H572376 MEMORIAL. SOIL AND LAND CONSERVATION ACT 1945. AS TO PORTION ONLY. REGISTERED 12/10/2000.
3. I568237 PROFIT A' PRENDRE. CERTAIN RIGHTS AND INTERESTS TO HANSOL AUSTRALIA PTY LTD OF SUITE 15, 64 CANNING HIGHWAY, VICTORIA PARK FOR A PERIOD OF 22 YEARS FROM AND INCLUDING 1.2.2003. AS TO PORTION ONLY. REGISTERED 25/7/2003.
   - K598662 TRANSFER OF PROFIT A' PRENDRE TO GREAT SOUTHERN TIMBER HOLDINGS PTY LTD OF 16 PARLIAMENT PLACE, WEST PERTH REGISTERED 16/5/2008.
   - L951746 CHANGE OF NAME. GRANTEE NOW BUNBURY FIBRE PLANTATIONS PTY LTD OF POST OFFICE BOX 1286, BUNBURY REGISTERED 1/6/2012.
   - O517645 TRANSFER OF PROFIT A' PRENDRE TO PEPPERMINT ESTATE PTY LIMITED OF LEVEL 23 141 WALKER STREET NORTH SYDNEY NSW 2060 REGISTERED 7/10/2020.
4. Q152860 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 26/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1981-387 (4269/DP209300)

END OF PAGE 1 - CONTINUED OVER

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REGISTER NUMBER: 4269/DP209300 VOLUME/FOLIO: 1981-387 PAGE 2

PREVIOUS TITLE:	1390-488
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2027	**165**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4152 ON DEPOSITED PLAN 207770

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

BOLEY'S PASTORAL HOLDINGS PTY LTD OF UHY HAINES NORTON PRT SUITE 3/46-48 ALBERT STREET BUSSELTON WA 6280

(T O006326) REGISTERED 12/10/2018

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. H297999 MEMORIAL. SOIL AND LAND CONSERVATION ACT 1945. AS TO PORTION ONLY. REGISTERED 2/12/1999.
2. O006327 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 12/10/2018.
3. Q152858 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 26/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	2027-165 (4152/DP207770)
PREVIOUS TITLE:	1492-786
PROPERTY STREET ADDRESS:	599 SCOTT RIVER RD, SCOTT RIVER.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2543	**911**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 6 ON DEPOSITED PLAN 33923

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

BOLEY'S PASTORAL HOLDINGS PTY LTD OF UHY HAINES NORTON PRT SUITE 3/46-48 ALBERT STREET BUSSELTON WA 6280

(T O006326) REGISTERED 12/10/2018

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. G247423 EASEMENT TO ELECTRICITY CORPORATION. SEE DEPOSITED PLAN 33923. REGISTERED 6/8/1996.
2. H297999 MEMORIAL. SOIL AND LAND CONSERVATION ACT 1945. AS TO PORTION ONLY. REGISTERED 2/12/1999.
3. N010189 CAVEAT BY TELSTRA CORPORATION LTD AS TO PORTION ONLY LODGED 26/5/2015.
4. O006327 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 12/10/2018.
5. Q152858 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 26/9/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP33923
PREVIOUS TITLE:	2082-108, 2082-109
PROPERTY STREET ADDRESS:	527 SCOTT RIVER RD, COURTENAY.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2555	**699**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 100 ON DEPOSITED PLAN 38071

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

BOLEY'S PASTORAL HOLDINGS PTY LTD OF UHY HAINES NORTON PRT SUITE 3/46-48 ALBERT STREET BUSSELTON WA 6280

(T O006326) REGISTERED 12/10/2018

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EASEMENT BURDEN - SEE DEPOSITED PLAN 38071
2. O006327 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 12/10/2018.
3. Q264701 CAVEAT BY SYNERGY RENEWABLE ENERGY DEVELOPMENTS PTY LTD LODGED 23/12/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP38071
PREVIOUS TITLE:	1584-579
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER

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Landgate
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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2555	**700**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 101 ON DEPOSITED PLAN 38071

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

STATE OF WESTERN AUSTRALIA

(T I978349) REGISTERED 6/8/2004

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EASEMENT BENEFIT - SEE DEPOSITED PLAN 38071

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP38071
PREVIOUS TITLE:	1584-579
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER
RESPONSIBLE AGENCY:	DEPARTMENT OF BIODIVERSITY, CONSERVATION AND ATTRACTIONS (SCLM)

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
LR3089	**693**

RECORD OF QUALIFIED CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 4924 ON DEPOSITED PLAN 217962

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: NATIONAL PARKS AND NATURE CONSERVATION AUTHORITY
(XE F096779) REGISTERED 27/1/1993

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. F096779 RESERVE 42377 FOR THE PURPOSE OF CONSERVATION OF FLORA AND FAUNA REGISTERED 27/1/1993.
   F096779 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. PURSUANT TO SECTION 7 OF CALM ACT 1984. REGISTERED 27/1/1993.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
(3) The interests etc. shown hereon may have a different priority than shown.

----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	LR3089-693 (4924/DP217962)
PREVIOUS TITLE:	LR3089-693
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER
RESPONSIBLE AGENCY:	DEPARTMENT OF BIODIVERSITY, CONSERVATION AND

END OF PAGE 1 - CONTINUED OVER

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ATTRACTIONS (SCLM)

NOTE 1:	A000001A	CORRESPONDENCE FILE 2087/1991.
NOTE 2:		SUBJECT TO SURVEY - NOT FOR ALIENATION PURPOSES
NOTE 3:		LAND PARCEL IDENTIFIER OF SUSSEX LOCATION 4924 ON SUPERSEDED PAPER CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 4924 ON DEPOSITED PLAN 217962 ON 28-AUG-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.
NOTE 4:		THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE OF TITLE.

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WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
LR3112	**932**

RECORD OF CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 5200 ON PLAN 20935

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: ROAD

PRIMARY INTEREST HOLDER: STATE OF WESTERN AUSTRALIA

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. G999769 TAKING ORDER. THE DESIGNATED PURPOSE OF THE CONSTRUCTION OF THE BEENUP MINERAL SANDS HAULAGE ROUTE (SABINA, SANSON AND SCOTT RIVER ROAD SECTIONS). REGISTERED 12/1/1999.
2. I457920 DEDICATED ROAD REGISTERED 24/4/2003.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	LR3112-932 (5200/P20935)
PREVIOUS TITLE:	1608-136, 2061-218, 2102-976
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF AUGUSTA MARGARET RIVER
RESPONSIBLE AGENCY:	MAIN ROADS WESTERN AUSTRALIA (ROAD)

NOTE 1: A000001A CORRESPONDENCE FILE 1955/1998.

END OF PAGE 1 - CONTINUED OVER

LANDGATE COPY OF ORIGINAL NOT TO SCALE 02/09/2025 11:15 AM Request number: 68700006

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NOTE 2: LAND PARCEL IDENTIFIER OF SUSSEX LOCATION 5200 ON SUPERSEDED PAPER CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 5200 ON FREEHOLD TITLE PLAN 20935 ON 03-SEP-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.

NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE OF TITLE.

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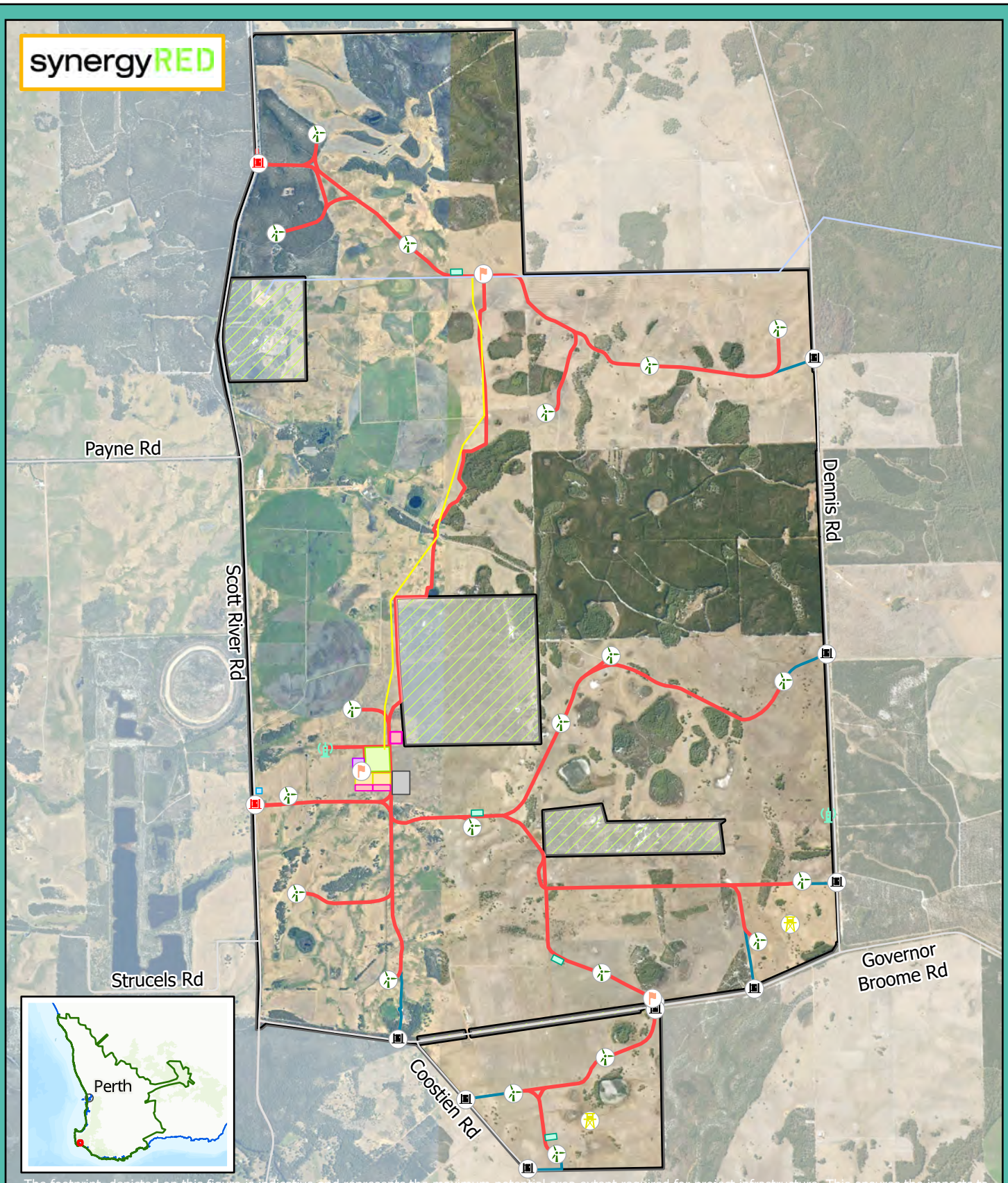
Attachment 3

Development Plans



The footprint depicted on this figure is indicative and represents the maximum potential area extent required for project infrastructure. This ensures the impacts to vegetation, noise and visual assessments from the Proposal can be conservatively assessed. The final footprint will be subject to pre-clearing surveys and detailed design, and will conform to the environmental outcomes as defined in the EIA.

Legend

- Wind Turbine
- Wind Monitoring Mast
- Communication Tower
- Water Tank
- Main Site Entrance
- Alternative Emergency Access
- Existing 132 kV Beenup to Manjimup Transmission Line
- Project Transmission Line
- Roads
- Concrete Batching Plant
- Construction Laydown Area
- Construction Site Offices
- Public Viewing Area
- Project Substation
- Operation and Maintenance Area
- Borrow Pit
- Internal Access Roads
- Existing track – Emergency Access
- Development Envelope
- No Clearing Zone

N

0 0.5 1

Kilometers

Scale @ A4, 1:45,000

Proposed Wind Farm in Scott River (Indicative Layout)

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Created By: M.Yang Date: 4/09/2025
Map Number: 00219 PCS: GDA2020 MGA Zone 50

Attachment 4

Referral Supporting Document (RSD)

REDACTED ON REQUEST OF EPA



Wind Farm in Scott River

Section 38 Referral Supporting Document

Synergy Renewable Energy Developments Pty Ltd

September 2025

ecological AUSTRALIA
A TETRA TECH COMPANY

Document Tracking

Project Name: Wind Farm in Scott River

Project Number: 24PER7886

Version	Prepared by	Reviewed by	Approved by	Status	Date
A	L.Sinclair/D.Snell	A.Bowley, J.Mitchell	SynergyRED	Draft for submission with EPA Referral	25/09/2025

This report should be cited as 'Eco Logical Australia 2024, Wind Farm in Scott River, Prepared for Synergy Renewable Energy Developments Pty Ltd.'

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Abbreviations

Abbreviation	Description
%S	% sulphur
µS/cm	microSiemens per centimetre
AASS	Actual Acid Sulfate Soils
AEP	Annual Exceedance Probability
AH Act	*Aboriginal Heritage Act 1972*
AMRCCE	Augusta-Magaret River Clean Community Energy
APZ	Asset Protection Zones
ASS	Acid Sulfate Soils
ASSDMP	Acid Sulfate Soils and Dewatering Management Plan
BAM Act	Biosecurity and Agriculture Management Act 2007
BBAMP	Bird and Bat Adaptive Management Plan
BBRA	Bird and Bat Risk Assessment
BBUS	Bird and Bat Utilisation Survey
BC Act	Biodiversity Conservation Act 2016
BHP	BHP Group Ltd
BMP	Bushfire Management Plan
BNP	Beenup
BoM	Bureau of Meteorology
BRMP	Bushfire Risk Management Plan
°C	Degree Celsius
Ca	Calcium
CALM	Department of Conservation and Land Management
CASA	Air Services Australia and Civil Aviation Safety Authority
CB	Citizen's Band
CEMP	Construction Environmental Management Plan
CFA	Country Fire Authority
Cl	Chlorine
CR	Critically Endangered
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
db	decibel
db(A)	decibel A
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DER	Department of Environmental Regulation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DFES	Department of Fire and Emergency Services
DGV	Default Guideline Value
DoE	Department of the Environment
DoEE	Department of the Environment and Energy
DoH	Department of Health

Abbreviation	Description
Dongas	Modular transportable offices
DoW	Department of Water
DPaW	Department of Parks and Wildlife
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of the Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
EAAF	East Asian – Australasian Flyway
EIA	Environmental Impact Assessment
EIL	Ecological Investigation Levels
EMI	Electromagnetic Interference
EN	Endangered
EPA	Environmental Protection Authority
EP Act	Environmental Protection Act 1986
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERGA	Environmental Research Group Augusta
ESA	Environmentally Sensitive Area
ESL	Ecological Screening Levels
GDE	Groundwater Dependent Ecosystem
GDV	Groundwater Dependent Vegetation
GHG	Greenhouse Gas
GoWA	Government of Western Australia
ha	hectare
HCO_3	Bicarbonate
HILs	Health Investigation Levels
HSL	HSL Screening Levels
IBRA	Interim Biogeographic Regionalisation for Australia
JAF02	Southern Jarrah Forest subregion
K	Potassium
KKAC	Karri Karrak Aboriginal Corporation
kL	kilolitres
km	kilometre
km^2	square kilometre
KNT	Potassium, Nitrogen and Trace Elements
kV	kilovolt
LCDC	Lower Blackwood Land Conservation District Committee
LCU	Landscape Character Unit
LG Act	Local Government Act 1995
LIA	Local Impact Area
LTV	Long-term Trigger Value
m	metre
m^3	cubic meter
m^3/s	cubic meter per second
m/km	metres per kilometre

Abbreviation	Description
m AHD	metres with respect to the Australian Height Datum
mbgl	metres below ground level
Mg	Magnesium
mg/L	milligrams per litre
MI	Migratory
MJP	Manjimup
MLA	Member of the Legislative Assembly
mm	millimetre
MNES	Matters of National Environmental Significance
MP	Member of Parliament
MW	Megawatt
Na	Sodium
NBN	National Broadband Network
NEPM	National Environment Protection Measure
NHMRC	The Australian National Health Medical Research Council
NTU	Nephelometric Turbidity Unit
NVZ	Non-vegetation Zones
NSHA	Noongar Standard Heritage Agreement
NVCP	Native Vegetation Clearing Permit
O&M Area	Operations and Maintenance Area
P	Priority
PASS	Potential Acid Sulfate Soils
PD Act	Planning and Development Act 2005
PFAS	Per- and Polyfluoroalkyl Substances
pH_{FOX}	pH Field Oxidation
PMST	Protected Matters Search Tool
PPE	Personal Protective Equipment
PTD	PTG Consulting Pty Ltd
Q&A	Question and Answer
RDAP	Regional Development Assessment Panel
RiWI Act	Rights in Water and Irrigation Act 1914
RSA	Rotor Swept Area
RSD	Referral Supporting Document
SA	South Australia
SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheet
SO_4	Sulfate
SPOCAS	Suspension Peroxide Oxidation Combined Acidity and Sulfate
SPPs	State Planning Policies
SRE	Short Range Endemic
STATCOMS	Static Synchronous Compensators
SWALSC	South West Aboriginal Land and Sea Council
SWIS	South West Interconnected System
SynergyRED, the Proponent	Synergy Renewable Energy Developments Pty Ltd

Abbreviation	Description
t	tonne
tCO2-e	tonnes of Carbon Dioxide equivalent
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TKN	Total Kjeldahl Nitrogen
UBC	Urban Bushland Council
VA	Vegetation Association
VU	Vulnerable
WA	Western Australia
WAM	Western Australian Museum
WAR01	Warren bioregion and subregion
WoNS	Weeds of National Significance
WSWA	Wildflower Society of Western Australia
WTG	Wind Turbine Generator

Executive Summary

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is proposing to develop an onshore wind farm generating up to 100 Megawatts (MW) in the Scott River region, approximately 15 km north-east of Augusta, in the South West of Western Australia (WA) (the Proposal). The Proposal will include the construction and operation of up to 20 wind turbines and is part of an initiative by SynergyRED to explore, scope and develop a range of renewable energy assets across WA, to meet the State Government's 2030 decarbonisation targets.

A general description of the Proposal and its physical, construction and operational elements are provided in Table ES-1 and Table ES-2.

Table ES-1: General Proposal Content Description

General Proposal Content Description	
Proposal Title	Wind Farm in Scott River
Proponent Name	Synergy Renewable Energy Developments Pty Ltd (SynergyRED)
Short Description	This proposal is for the development of an onshore wind farm in the Scott River region, approximately 15 km north-east of the town of Augusta, in the South West of Western Australia. The Proposal will involve the construction and operation of up to 20 wind turbines, generating up to 100 MW, with associated infrastructure including meteorological masts and communication towers, operation and maintenance building, substation and transmission infrastructure and other supporting infrastructure. It is located across numerous freehold properties primarily cleared for agricultural purposes and Blue Gum plantation. The wind farm substation will connect the Proposal to the South West Interconnected System (SWIS) via the existing 132 kV Beenup to Manjimup transmission line.

Table ES-2: Proposal Elements

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Physical elements		
Wind turbines including associated foundations and hardstands	Figure 2-1	107 ha of disturbance, including clearing of no more than 1 ha of remnant native vegetation, within a 3,597 ha Development Envelope.
Meteorological masts and communication towers		
Substation and transmission infrastructure		
Operations and maintenance area		
Site entrances, internal access roads and public viewing area		
Other supporting infrastructure and utilities (e.g. concrete batching plants, borrow pits, site office, water storage and construction laydown areas)		
Construction elements		
Construction water supply	Within the Development Envelope (Figure 2-1)	Water tanks and/or storage dams will be installed to support construction and operational water requirements. Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction.
Concrete batching plants	Within the Development Envelope (Figure 2-1)	Concrete for the foundations will be mixed at concrete batching plants. Concrete batching material may be sourced offsite.
Dewatering for construction of underground infrastructure including turbine, meteorological mast and communication tower foundations	Within the Development Envelope (Figure 2-1)	Groundwater drawdown will not exceed 2 mbgl, measured from the natural land surface at the perimeter of each foundation.
Operational elements		
Wind energy production	Within the Development Envelope (Figure 2-1)	A maximum of 20 turbines, with a maximum total energy production of 100 MW.
Proposal elements with greenhouse gas emissions^		
Construction elements:		
Scope 1	3,799 tCO_2-e	
Scope 2	149 tCO_2-e	
Scope 3	99,958 tCO_2-e	
Operation elements:		
Scope 1	156 tCO_2-e per year	
Scope 2	134 tCO_2-e per year	
Scope 3	40 tCO_2-e per year	
Rehabilitation		
The Proposal utilises existing cleared areas (i.e. agricultural and tree plantation land devoid of native vegetation) wherever possible. Minor areas of native vegetation necessary for construction and operation of the Proposal will be cleared.		

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Following construction, and where practicable, the Proponent will conduct progressive rehabilitation in areas no longer required, to meet the original land use or to an agreed post closure land use with the landowners. The rehabilitation of sites used for temporary infrastructure can inform the broader post-decommissioning rehabilitation strategy by identifying the most effective rehabilitation techniques.		
Commissioning		
The Proposal's commissioning stage has no additional effects on the environment.		
Decommissioning		
Once the initial operational life of the Proposal comes to an end, the wind farm can be repowered by replacing the wind turbines, or wind turbine components to extend Proposal life. If repowering the wind farm is not viable, the Proponent will decommission and rehabilitate the Proposal site to an agreed post-closure land use with landowners. This will involve the dismantling and removal of all turbines and above ground infrastructure, unless otherwise agreed with the relevant landowners, noting it's likely that the landowner may want to retain some infrastructure (e.g. access roads). Below ground infrastructure will also be removed if environmentally acceptable and agreed upon with landowners, in accordance with the Decommissioning Plan. The removal and disposal of materials and components will be conducted in a manner that minimises impacts to the environment and the infrastructure itself, to allow for the reuse of components, if viable.		
Other elements which affect extent of effects on the environment		
Proposal time	Maximum project life	64 years*
	Construction phase	18 to 24 months
	Operations phase	30 to 60 years
	Decommissioning and rehabilitation phase	24 months

^The greenhouse gas assessment is considered to be conservative due to the application of the mitigation hierarchy, which has changed since the Proposal design (e.g. reduced clearing)

*This accounts for potential repower after 30 years of operation.

The purpose of this Referral Supporting Document (RSD) is to provide additional supporting information to that provided in the associated referral application form to guide the Environmental Protection Authority's (EPA's) determination of the validity of the referral and on its decision whether to assess the Proposal. The RSD describes the existing environmental values present within and immediately surrounding the Proposal and assesses the environmental impacts that have the potential to occur from its implementation.

In preparing this document, the following guidance has been considered:

- *Instructions on how to prepare an Environmental Review Document* (EPA 2024)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2024)
- *Instructions and template: How to identify the content of a proposal* (EPA 2024)
- *Instructions: Referral of a proposal under section 38 of the Environmental Protection Act 1986* (EPA 2024).

Comprehensive and ongoing stakeholder engagement has formed an important part of the Proposal planning process. The Proponent commenced engagement with key stakeholders in September 2022, and engagement is ongoing. Key stakeholder groups include Federal and State government agencies, local government, Traditional Owners, landowners and neighbours, local community and non-government organisations.

Based on an assessment of potential impacts associated with the Proposal, the key environmental factors considered relevant to the Proposal are:

- Terrestrial Environmental Quality

- Inland Waters
- Flora and Vegetation
- Terrestrial Fauna
- Social Surroundings.

A summary of potential impacts, key proposed mitigation strategies and proposed environmental outcomes for each of the relevant environmental factors is provided in Table ES-3.

No residual impacts to individual factors are considered significant and the Proponent considers that the Proposal meets the EPA's environmental factor objectives.

Table ES-3: Summary of Potential Impacts, Proposed Mitigation and Proposed Environmental Outcomes

Environmental Factors	
Factor 1: Terrestrial Environmental Quality	
Potential Impacts	• Soil acidification and/or toxicity due to disturbance of Potential Acid Sulfate Soils (PASS) during construction • Soil erosion due to ground disturbing activities • Soil contamination from accidental loss or spill of hydrocarbons and other hazardous materials
Key Mitigation	Potential impacts to Terrestrial Environmental Quality have primarily been avoided or minimised through the design of the Proposal during the planning phase, including through the following: • Clearing of remnant native vegetation within the Development Envelope will be limited to a maximum of 1 ha. • Turbine/mast/tower foundations will be designed to limit the excavation of PASS and dewatering requirements. Three foundation options are being considered, with the specific foundation option for each location to be determined based on detailed site investigation and revised modelling • Borrow pits will be excavated above the groundwater level and will be assessed for the presence of PASS prior to disturbance. • Any dewatering required for construction will not exceed 2 mbgl at the perimeter of each foundation and will be managed to ensure drawdown does not exceed 0.1 m beyond 100 m from any dewatering location. The following management plans will be implemented to minimise the impacts to Terrestrial Environmental Quality: • An Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) will be prepared and implemented to manage the potential risks associated with the exposure of PASS from excavation and dewatering during construction. The ASSDMP will be informed by the Preliminary ASSDMP. • A Construction Environmental Management Plan (CEMP) will be implemented during construction to manage impacts associated with soil erosion and contamination.
Residual Impacts and Environmental Outcomes	No significant residual impacts to Terrestrial Environmental Quality associated with the Proposal are anticipated due to the following: • Impacts to soil quality as a result of the disturbance of PASS and/or erosion will be minor and short-term, to the Development Envelope. • Impacts to soil quality as a result of any accidental loss or spill of hazardous materials will be minor and remediated and limited to the Development Envelope. • Impacts will be managed through the implementation of management plans throughout construction and operation of the of the Proposal, including a CEMP and a detailed ASSDMP to be informed by the Preliminary ASSDMP. The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Terrestrial Environmental Quality environmental factor *"to maintain the quality of land and soils so that environmental values are protected"*.

Environmental Factors	
Factor 2: Inland Waters	
Potential Impacts	• Dewatering leading to temporary reduction in groundwater levels and reduced interaction with surface water • Penetration of an aquitard causing excessive leakage from the Superficial Aquifer • Changes to surface hydrological regimes due to Proposal infrastructure • Changes to groundwater flow due to Proposal infrastructure • Acidification and/or toxicity of surface water and/or groundwater during construction due to: - Disturbance and/or inappropriate handling of PASS - Inappropriate management of dewater. • Reduced water quality due to erosion, sedimentation or mobilisation of nutrients • Contamination of surface water and/or groundwater from accidental loss or spills of hydrocarbons and other hazardous materials • Draw-in of the adjacent Beenup Mineral Sands acid mine plume during construction dewatering • Groundwater drawdown associated with construction dewatering reducing water security for surrounding bore users.
Key Mitigation	Potential impacts to Inland Waters have primarily been avoided or minimised through the design of the Proposal during the planning phase, including through the following: • Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable. • Turbine/mast/tower foundations have been designed to limit dewatering requirements. Three foundation options are being considered, with the specific foundation option for each location to be determined based on detailed site investigation and revised modelling. • Borrow pits will be located and designed to ensure that no dewatering is required. • Any dewatering required for construction will not exceed 2 mbgl at the perimeter of each foundation and will be managed to ensure drawdown does not exceed 0.1 m beyond 100 m from any dewatering location and does not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at Groundwater Dependent Ecosystems (GDEs). • Strategic disposal of dewater to, and location of, infiltration basins/trenches around the point of extraction to minimise the cone of depression. • Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion. • Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. • Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable. • Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion • Infrastructure which may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, concrete batching area, refuelling locations) will be located at least 100 m from wetland habitats. The following management plans will be implemented to minimise the impacts to Inland Waters: • An ASSDMP will be prepared and implemented to manage the potential risks associated with the exposure of PASS from excavation and dewatering during construction. The ASSDMP will be informed by the Preliminary ASSDMP. • A CEMP will be implemented during construction to manage impacts associated with changes to hydrological regimes, erosion and contamination.

Environmental Factors	
Residual Impacts and Environmental Outcomes	No significant residual impacts to Inland Waters associated with the Proposal are anticipated due to the following: • Minor, localised (i.e. largely within the watertables natural seasonal variation and managed to within 100 m of each dewatering location), and temporary impact to groundwater levels as a result of construction dewatering, with the Superficial Aquifer expected to recover by the subsequent winter period following construction • No excessive leakage of the Superficial Aquifer as a result of excavations penetrating an aquitard • Minor, short-term and localised acidification of groundwater as a result of construction dewatering • Minor and localised impact to surface and ground water flows as a result of Proposal infrastructure • Minor, localised and temporary impacts to surface water and/or groundwater quality resulting from Acid Sulfate Soils (ASS) disturbance and management, erosion and sedimentation, mobilisation of nutrients, and/or the accidental loss or spill of hazardous materials • No interaction with the Beenup Mineral Sands acid mine plume • No impact on surrounding bore users. • Impacts will be managed through the implementation of management plans, including a CEMP and a detailed ASSDMP prepared in consideration of Preliminary ASSDMP. The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Inland Waters environmental factor *"to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected"*.
Factor 3: Flora and Vegetation	
Potential Impacts	• Loss and increased fragmentation of native vegetation due to clearing • Loss of conservation significant flora and/or vegetation communities species due to clearing • Degradation of vegetation from increased dust deposition, introduction and/or spread of weeds and/or dieback, altered hydrological regimes and increased risk of bushfires • Groundwater drawdown associated with construction dewatering potentially reducing the hydroperiod and health of Groundwater Dependent Vegetation (GDV).
Key Mitigation	Potential impacts to flora and vegetation have primarily been avoided or minimised through the design of the Proposal during the planning phase, including the avoidance of the following: • Native vegetation within conservation covenant areas • Native vegetation growing in association with wetland habitats, including any contiguous native vegetation within 50 m • Scott River Ironstone Threatened Ecological Community (TEC), and all Threatened and Priority flora individuals • Contiguous native vegetation within 50 m of the Scott River Ironstone TEC and within 50 m of known records of Threatened and P1 species and within 20 m of P2, P3 and P4 species, with the exception of one site. The following management plans will be implemented to minimise the impacts to flora and vegetation: • A CEMP will be implemented during construction to manage impacts associated with clearing, fragmentation, dust deposition, weeds and changes to hydrological regimes • A Dieback Management Plan will be developed and to minimise the risks related to the introduction and/or spread of dieback, where required, and informed by a Phytophthora dieback survey completed prior to construction. • Groundwater drawdown impacts to GDV will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP. • A Bushfire Management Plan (BMP; Linfire 2025a) and Bushfire Risk Management Plan (BRMP; Linfire 2025b) will be implemented during construction and operation of the Proposal).

Environmental Factors	
Residual Impacts and Environmental Outcomes	No significant residual impacts to flora and vegetation associated with the Proposal are anticipated due to the following: • The Proposal will result in the clearing of up to 1.00 ha of native vegetation, including a maximum of 0.02 ha of vegetation in Very Good or better condition • Clearing is restricted to small areas required for the construction of internal access roads, particularly to facilitate ingress of turbine components, upgrades to the existing Beenup Mine to Manjimup 132 kV transmission line, and where an alternative layout was not possible due to the avoidance of other significant receptors. Approximately 0.36 ha of native vegetation clearing is considered unavoidable. The remainder of the 1.00 ha clearing will allow for flexibility in project design. • The avoidance of conservation significant flora (including contiguous native vegetation within 50 m of known Threatened and P1 species and within 20 m of P2, P3 and P4 species), TEC, native vegetation within conservation and covenant areas and locally restricted vegetation types that occur within the Development Envelope during clearing • Clearing of a maximum of 0.01 ha of contiguous native vegetation within the Scott River Ironstone TEC 50 m buffer • The Proposal has been designed to preferentially locate infrastructure within cleared agricultural land and is thus unlikely to cause significant fragmentation to native vegetation within the Development Envelope • There will be negligible impact to GDV as a result of the minor, localised and temporary construction dewatering, noting drawdown will be managed so as not to exceed the natural seasonal natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at any GDV • Impacts to vegetation due to altered hydrological regimes will be minimal • The indirect impacts likely to occur during construction and operation of the Proposal, namely increased dust deposition, the introduction and/or spread of weeds and dieback, dewatering impacts to GDEs, alterations to hydrological regimes and accidental bushfires will be minimised through the implementation of the mitigation measures outlined within the Proposal's CEMP, a Dieback Management Plan (as required), an ASSDMP, a BMP (Linfire 2025a) and BRMP (Linfire 2025b). The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Flora and Vegetation factor to "*protect flora and vegetation so that biological diversity and ecological integrity are maintained*".
Factor 4: Terrestrial Fauna	
Potential Impacts	• Loss and increased fragmentation of vertebrate fauna habitat • Loss or injury to fauna individuals through turbine strike, barotrauma or collision with transmission infrastructure, interactions with vehicle/machinery, and/or entrapment in excavations, dams, basins and borrow pits during construction. • Disturbance to fauna movement patterns and behaviour from wind turbine movement, light, noise and/or vibration • Increased competition or predation by feral fauna • Groundwater drawdown associated with construction dewatering potentially reducing the hydroperiod and health of GDEs (wetland habitats and aquatic fauna habitat) • Degradation of fauna habitat as a result of increased dust deposition, Introduction and/or spread of weeds and/or dieback, increased risk of bushfires and altered hydrological regimes.

Environmental Factors	
Key Mitigation	Potential impacts to Terrestrial Fauna have primarily been avoided or minimised through the design of the Proposal during the planning phase, including through the following: • Avoidance of wetland habitats and contiguous native vegetation within 50 m • Avoidance of suitable or potential breeding trees for black cockatoos and contiguous native vegetation within 10 m • No placement of wind turbines in proximity (minimum of 100 m from the centre point of the turbine) to remnant native vegetation/habitat to prevent blade overhang • Fragmentation will be minimised by limiting the clearing width for all internal access roads to 5-6 m where they pass through a Western Ringtail Possum habitat patch. The following management plans will be implemented to minimise the impacts to Terrestrial Fauna: • A CEMP will be implemented during construction to manage impacts associated with the loss of fauna habitat, fragmentation, loss or injury to fauna, disturbance to fauna movement patterns and behaviour, increased competition or predation by feral fauna and the degradation of fauna habitat from dust, weeds and changes to hydrological regimes • A Bird and Bat Adaptive Management Plan (BBAMP) has been prepared to monitor and manage potential environmental impacts to bird and bat species arising from the operation of the Proposal including loss or injury through turbine strike and barotrauma, disturbance to movement patterns and behaviour and increased competition or predation by feral fauna • A Dieback Management Plan will be developed and implemented to minimise the risks related to the introduction and/or spread of dieback, where required • Groundwater drawdown impacts to GDEs (wetlands and aquatic fauna habitat) will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP • A BMP (Linfire 2025a) and BRMP; (Linfire 2025b) will be implemented during construction and operation of the Proposal.

Environmental Factors	
Residual Impacts and Environmental Outcomes	No significant residual impacts to Terrestrial Fauna associated with the Proposal are anticipated due to the following: • The Proposal will clear no more than 1.00 ha of habitat represented by native vegetation, including the following species-specific habitat values: - A maximum of 0.5 ha of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat - A maximum of 1.00 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat. • The Proposal will avoid clearing: - All wetland habitat and any contiguous native vegetation within 50 m. - All potential and suitable breeding trees for black cockatoos and any contiguous native vegetation within 10 m. - All High quality Western Ringtail Possum habitat. • The Proposal will clear approximately 100.72 ha of non-native Low quality foraging habitat (e.g. cleared paddocks/pasture) for Carnaby's Black Cockatoo. • The potential for fauna habitat fragmentation is minimal given the highly modified nature of the Development Envelope, the utilisation of existing cleared areas and tracks, and the commitment to limit the width of clearing for all internal access roads to 5-6 m, where they pass through a Western Ringtail Possum habitat patch. • The risk of loss or injury to fauna individuals and degradation of fauna habitat as a result of construction related activities is considered to be minor and will be minimised through the implementation of the Proposal's CEMP, a Dieback Management Plan (where required), an ASSDMP, a BMP (Linfire 2025a) and BRMP (Linfire 2025b). • While the risk of turbine strike and/or barotrauma on birds and bats was largely assessed as being Negligible to Low for all species, excepting Forest Red-tailed Black Cockatoo assessed as being at Moderate risk, the implementation of adaptive management approach as detailed in the preliminary BBAMP, will ensure that the Proposal does not have a significant impact on any bird and bat species. • Substantial disturbance to fauna movement patterns and behaviour from wind turbine movement, light, noise and/or vibration is not anticipated and will be minimised through the implementation of the CEMP and BBAMP. • There will be negligible impacts to wetland GDEs, and aquatic fauna that may inhabit them, as a result of the minor, localised and temporary construction dewatering, noting drawdown will be managed in accordance with an ASSDMP (Appendix B) so as not to exceed the natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at any GDE location. • Impacts to fauna habitat due to altered hydrological regimes will be minimal. The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Terrestrial Fauna factor to *"protect terrestrial fauna so that biological diversity and ecological integrity are maintained"*.
Factor 5: Social Surroundings	
Potential Impacts	• Impacts to Aboriginal heritage sites or cultural values through: - Ground disturbance associated with the construction of the Proposal which may cause the loss of or damage to Aboriginal heritage sites or cultural values - Changes to surface water flows, groundwater levels and water quality which may impact the Blackwood River / Goorbilyup Buerle or Scott River. • Impacts to landscape and visual amenity due to the placement of wind turbines and other proposal infrastructure • Altered socio-economic outcomes for the local community including impacts to tourism and employment, agricultural land use and impacts on infrastructure, services and roads. • Reduce local amenity as a result of light, noise and dust emissions and shadow flicker.

Environmental Factors	
Key Mitigation	Potential impacts to Social Surroundings have primarily been avoided or minimised through the design of the Proposal during the planning phase, including through the following: • Design of the Proposal to completely avoid direct impacts to the Blackwood River / Goorbilyup Buerle registered heritage site. • Any impact to tributaries of the Scott River lodged heritage place within the Development Envelope would require consultation with Karri Karrak Aboriginal Corporation (KKAC) and relevant authorisation under the *Aboriginal Heritage Act 1972* (AH Act). • No clearing of any native vegetation within 50 m of any lodged heritage place or registered heritage site. • Wind turbine blades will be coated in a non-reflective paint to avoid blade glint. • Wind turbines will be uniform in colour, design and size to minimise visual impacts. • Landowners and adjacent neighbours will be engaged to discuss screening and landscaping to mitigate any visual impacts. • Alternative turbine/tower/mast foundations will be utilised to avoid and otherwise minimise PASS disturbance and dewatering impacts on land use. • Detailed design will consider adjustment of turbine locations or the relocation, reconstruction or modification of communication infrastructure to ensure no Electromagnetic Interference (EMI) as a result of the Proposal. • Nighttime construction activities will be avoided where practicable to minimise light and noise emissions. • Lighting will be minimised to that necessary for safe construction and operation of the Proposal. • Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by Air Services Australia and Civil Aviation Safety Authority (CASA)/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions. • The Indicative Disturbance Footprint has been designed to ensure compliance with noise regulations at all existing dwellings. • Dust management measures will be implemented in accordance with the CEMP. The following management plans will be implemented to minimise the impacts to Social Surroundings: • An ASSDMP will be prepared and implemented to manage the potential risks to land use associated with the exposure of PASS from excavation and dewatering during construction. The ASSDMP will be informed by the Preliminary ASSDMP. • A CEMP will be implemented during construction to manage impacts associated with dust and indirect impacts to the Blackwood River / Goorbilyup Buerle and Scott River. • A Traffic Management Plan will be implemented during construction of the Proposal to minimise traffic safety impacts and disruptions to local road users. • A BMP and BRMP will be implemented during construction and operation of the Proposal to minimise bushfire risk to surrounding land users. • An operational noise management plan will be developed and implemented for the wind farm and will include noise monitoring.

Environmental Factors	
Residual Impacts and Environmental Outcomes	No significant residual impacts to Social Surroundings associated with the Proposal are anticipated due to the following: • No direct impacts to the Blackwood River / Goorbilyup Buerle and no direct impact to the Scott River without the relevant consultation with KKAC and any necessary authorisations under the AH Act • Indirect Impacts to small tributaries of Blackwood River / Goorbilyup Buerle and Scott River because of altered surface hydrological regimes or water quality will be minor, temporary and localised • Moderate to high impact to Landscape Character Unit (LCU) and the visual amenity at 11 of the 12 sensitive receptors as a result of visible wind turbines • Creation of a tourism asset and opportunity for active community participation in the Proposal and the creation of local employment opportunities • No significant impact to productivity of agricultural land as a result of the Proposal • No significant impact from EMI • Minor and temporary impact of increased traffic to the local community and industries during construction • Minor increase in risk of accidental bushfires, however minor decrease in risk of lightning caused bushfire. • Minor increase in light emissions • Noise emissions will be compliant with the WA Noise Regulations at all non-involved noise sensitive receptors • Low impact of shadow flicker, compliant with Draft National Wind Farm Guidelines (EPHC 2010) • Minor, short term increase in dust emissions during construction. • Impacts will be managed through the implementation of management plans throughout construction and operation, including a CEMP, ASSDMP, Traffic Management Plan, Operational Noise Management Plan, BMP and BRMP. The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Social Surroundings environmental factor "*to protect social surroundings from significant harm*".

Environmental impacts from the Proposal have also been considered cumulatively and holistically and, where appropriate, synergies between management and mitigation measures are considered from a holistic perspective. When considered from a holistic perspective, the combined effects on the terrestrial environment as a whole are no greater than the effects on individual factors, and residual impacts of the overall Proposal are not considered significant.

The Proponent considers the avoidance and mitigation proposed in this RSD as well as the ability of other statutory decision-making processes to mitigate potential impacts to the environment are sufficient to meet both the principles contained in the *Environmental Protection Act 1986* (EP Act) and the EPA's environmental objectives.

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Appendix L Bird and Bat Risk Assessment for a Proposed Wind Farm in Scott River – Level Two investigation

Appendix M Desktop Assessment of Short Range Endemic Fauna for a Proposed Wind Farm in Scott River – Western Australia

Appendix N Proposed Wind Farm in Scott River Preliminary Bird and Bat Adaptive Management Plan

Appendix O Beenup Wind Farm Shadow Flicker and Blade Glint Assessment

Appendix P Beenup Wind Farm EMI Assessment

Appendix Q Aviation Impact Assessment: Beenup Wind Farm

Appendix R SynergyRED Scott River Wind Farm Feasibility: Social Values Assessment

Appendix S Proposed Wind Farm at Scott River: Noise Impact Assessment

Appendix T Proposed Wind Farm - Scott River: Landscape and Visual Impact Assessment

1. Introduction

1.1. Overview

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is proposing to develop an onshore wind farm generating up to 100 Megawatts (MW) in the Scott River region, approximately 15 km north-east of Augusta, in the South West of Western Australia (WA) (the Proposal) (Figure 1-1). The Proposal will include the construction and operation of up to 20 wind turbines and is part of an initiative by SynergyRED to explore, scope and develop a range of renewable energy assets across WA, to meet the State Government's 2030 decarbonisation targets.

1.2. Purpose and Scope

The purpose of this Referral Supporting Document (RSD) is to provide additional supporting information to that provided in the associated referral application form to guide the Environmental Protection Authority's (EPA's) determination of the validity of the referral and on its decision whether to assess the Proposal. The RSD describes the existing environmental values present within and immediately surrounding the Proposal and assesses the environmental impacts that have the potential to occur from its implementation.

In preparing this document, the following guidance has been considered:

- *Instructions on how to prepare an Environmental Review Document* (EPA 2024)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2024)
- *Instructions and template: How to identify the content of a proposal* (EPA 2024)
- *Instructions: Referral of a proposal under section 38 of the Environmental Protection Act 1986* (EPA 2024).

1.3. Proponent Details

SynergyRED is the Proponent for this Proposal. The Proponent's details are presented in Table 1-1.

Table 1-1: Proponent Details

Proponent Details	
Proponent	Synergy Renewable Energy Developments Pty Ltd (SynergyRED)
ABN	58 673 830 106
Address	Level 23 152-158 St Georges Terrace Perth, WA 6000
Primary Contact	Natassja Bell Senior Advisor – Environment and Heritage 08 6282 7000 synergyapprovals@synergy.net.au
Secondary Contact	Fabienne Hill Faskel Lead Environment Advisor Projects & Approvals 08 6282 7000 synergyapprovals@synergy.net.au

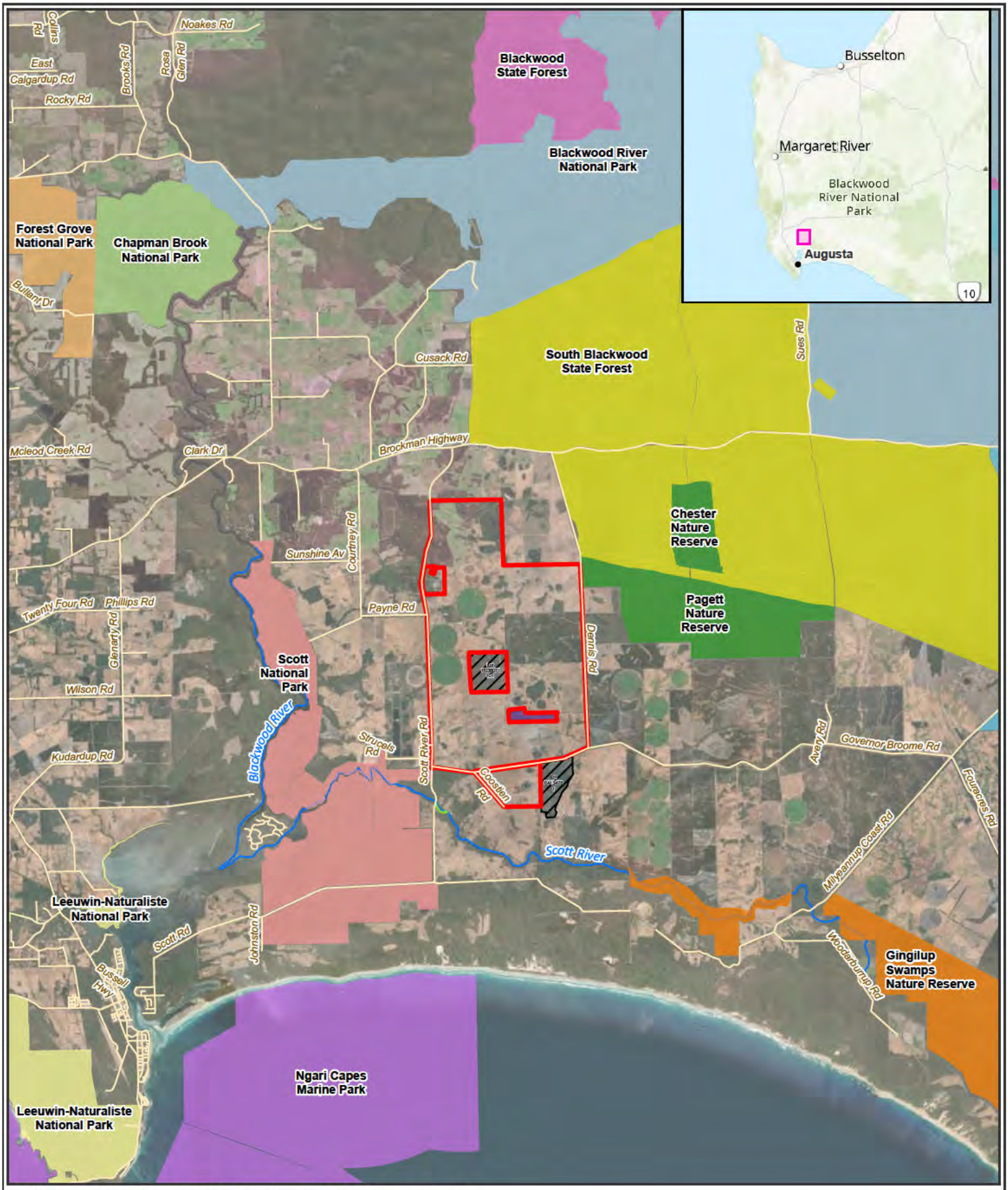

Figure 1-1: Regional Context of the Proposal

- Development Envelope
- DBCA Lands of Interest (Crown Freehold Land)
- Roads
- Watercourses

DBCA managed lands

- Blackwood State Forest
- Milyeannup State Forest
- Ngari Capes Marine Park
- South Blackwood State Forest
- Blackwood River National Park
- Chapman Brook National Park
- Chester Nature Reserve
- Forest Grove National Park
- Gingilup Swamps Nature Reserve
- Leeuwin-Naturaliste National Park
- Pagett Nature Reserve
- Scott National Park
- Wiltshire-Butler National Park
- Unnamed WA15185 Nature Reserve
- Unnamed WA42377 Nature Reserve
- Unnamed WA42942 Nature Reserve

0 1.5 3 6
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/11/2025

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1.4. Key Proposal Terminology

The Proposal: Includes the construction and operation of up to 20 wind turbines and associated infrastructure and activities with the Development Envelope.

Development Envelope: Refers to the area where all Proposal activities will occur. This includes land parcels where consent has been granted for the development of the Proposal and is approximately 3,597 ha.

Indicative Disturbance Footprint: Refers to the maximum area of land that will be disturbed for the Proposal within the Development Envelope. It is based on the largest possible layout and has been used to calculate the maximum area of native vegetation clearing (1 ha). The impact assessment within this document is based on the entire Indicative Disturbance Footprint being disturbed (approximately 107 ha).

The above areas are illustrated in Figure 1-2.

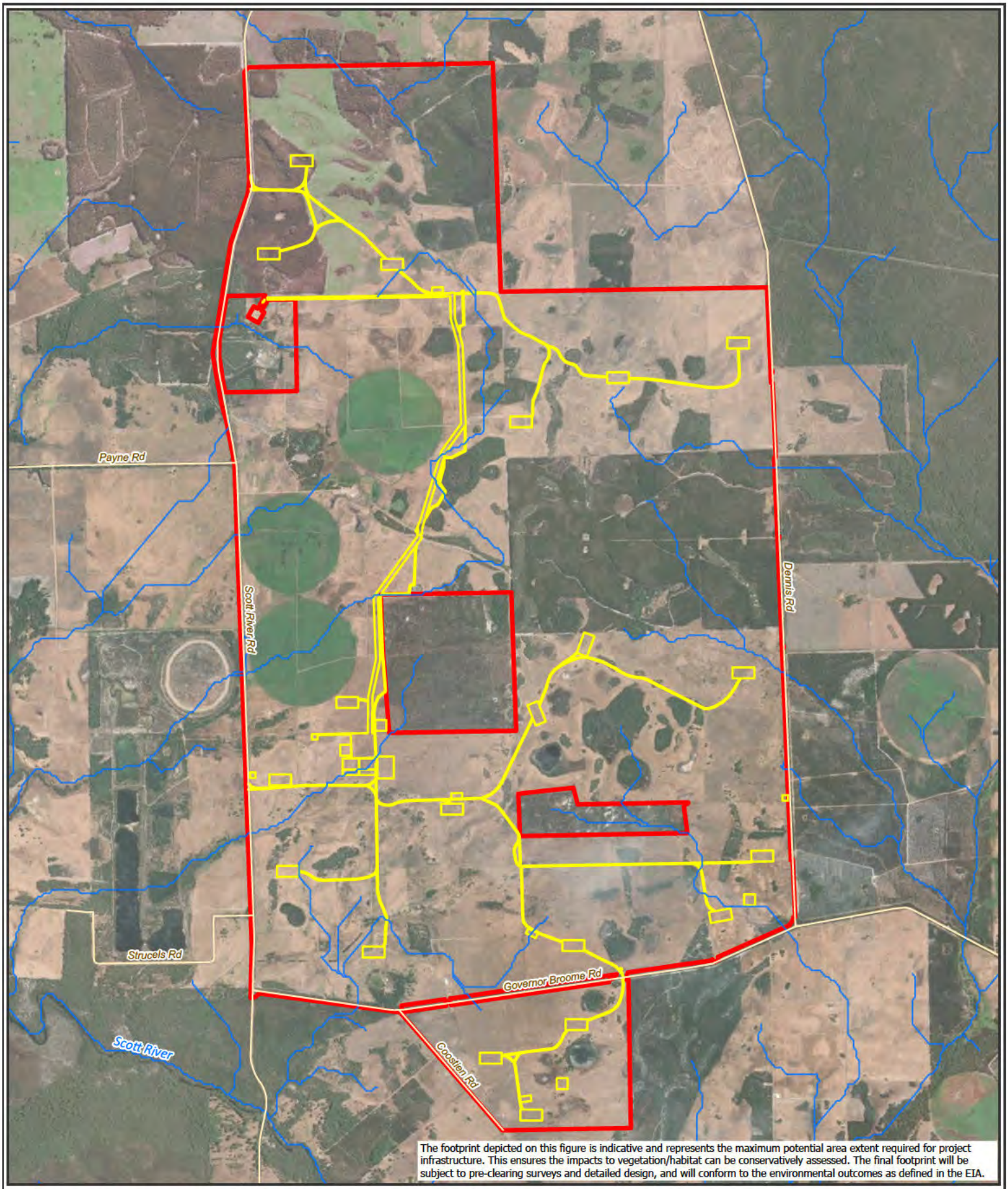

Figure 1-2: Development Envelope and Indicative Disturbance Footprint

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

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Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date:
9/10/2025

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2. Proposal

2.1. Proposal Content

Table 2-1 presents a general description of the Proposal, whilst Table 2-2 defines the Proposal's key elements.

Table 2-1: General Proposal Content Description

General Proposal Content Description	
Proposal Title	Wind Farm in Scott River
Proponent Name	Synergy Renewable Energy Developments Pty Ltd (SynergyRED)
Short Description	This proposal is for the development of an onshore wind farm in the Scott River region, approximately 15 km north-east of the town of Augusta, in the South West of Western Australia. The Proposal will involve the construction and operation of up to 20 wind turbines, generating up to 100 MW, with associated infrastructure including meteorological masts and communication towers, operation and maintenance building, substation and transmission infrastructure and other supporting infrastructure. It is located across numerous freehold properties primarily cleared for agricultural purposes and Blue Gum plantation. The wind farm substation will connect the Proposal to the South West Interconnected System (SWIS) via the existing 132 kV Beenup to Manjimup transmission line.

Table 2-2: Proposal Elements

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Physical elements		
Wind turbines including associated foundations and hardstands	Figure 2-1	107 ha of disturbance, including clearing of no more than 1 ha of remnant native vegetation, within a 3,597 ha Development Envelope.
Meteorological masts and communication towers		
Substation and transmission infrastructure		
Operations and maintenance area		
Site entrances, internal access roads and public viewing area		
Other supporting infrastructure and utilities (e.g. concrete batching plants, borrow pits, site office, water storage and construction laydown areas)		
Construction elements		
Construction water supply	Within the Development Envelope (Figure 2-1)	Water tanks and/or storage dams will be installed to support construction and operational water requirements. Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction.
Concrete batching plants	Within the Development Envelope (Figure 2-1)	Concrete for the foundations will be mixed at concrete batching plants. Concrete batching material may be sourced offsite.
Dewatering for construction of underground infrastructure including turbine, meteorological mast and communication tower foundations	Within the Development Envelope (Figure 2-1)	Groundwater drawdown will not exceed 2 mbgl, measured from the natural land surface at the perimeter of each foundation.
Operational elements		
Wind energy production	Within the Development Envelope (Figure 2-1)	A maximum of 20 turbines, with a maximum total energy production of 100 MW.
Proposal elements with greenhouse gas emissions^		
Construction elements:		
Scope 1	3,799 tCO_2-e	
Scope 2	149 tCO_2-e	
Scope 3	99,958 tCO_2-e	
Operation elements:		
Scope 1	156 tCO_2-e per year	
Scope 2	134 tCO_2-e per year	
Scope 3	40 tCO_2-e per year	

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Rehabilitation		
The Proposal utilises existing cleared areas (i.e. agricultural and tree plantation land devoid of native vegetation) wherever possible. Minor areas of native vegetation necessary for construction and operation of the Proposal will be cleared. Following construction, and where practicable, the Proponent will conduct progressive rehabilitation in areas no longer required, to meet the original land use or to an agreed post closure land use with the landowners. The rehabilitation of sites used for temporary infrastructure can inform the broader post-decommissioning rehabilitation strategy by identifying the most effective rehabilitation techniques.		
Commissioning		
The Proposal's commissioning stage has no additional effects on the environment.		
Decommissioning		
Once the initial operational life of the Proposal comes to an end, the wind farm can be repowered by replacing the wind turbines, or wind turbine components to extend Proposal life. If repowering the wind farm is not viable, the Proponent will decommission and rehabilitate the Proposal site to an agreed post-closure land use with landowners. This will involve the dismantling and removal of all turbines and above ground infrastructure, unless otherwise agreed with the relevant landowners, noting it's likely that the landowner may want to retain some infrastructure (e.g. access roads). Below ground infrastructure will also be removed if environmentally acceptable and agreed upon with landowners, in accordance with the Decommissioning Plan. The removal and disposal of materials and components will be conducted in a manner that minimises impacts to the environment and the infrastructure itself, to allow for the reuse of components, if viable.		
Other elements which affect extent of effects on the environment		
Proposal time	Maximum project life	64 years^*
	Construction phase	18 to 24 months
	Operations phase	30 to 60 years
	Decommissioning and rehabilitation phase	24 months

^The greenhouse gas assessment is considered to be conservative due to the application of the mitigation hierarchy, which has changed since the Proposal design (e.g. reduced clearing)

*This accounts for potential repower after 30 years of operation.

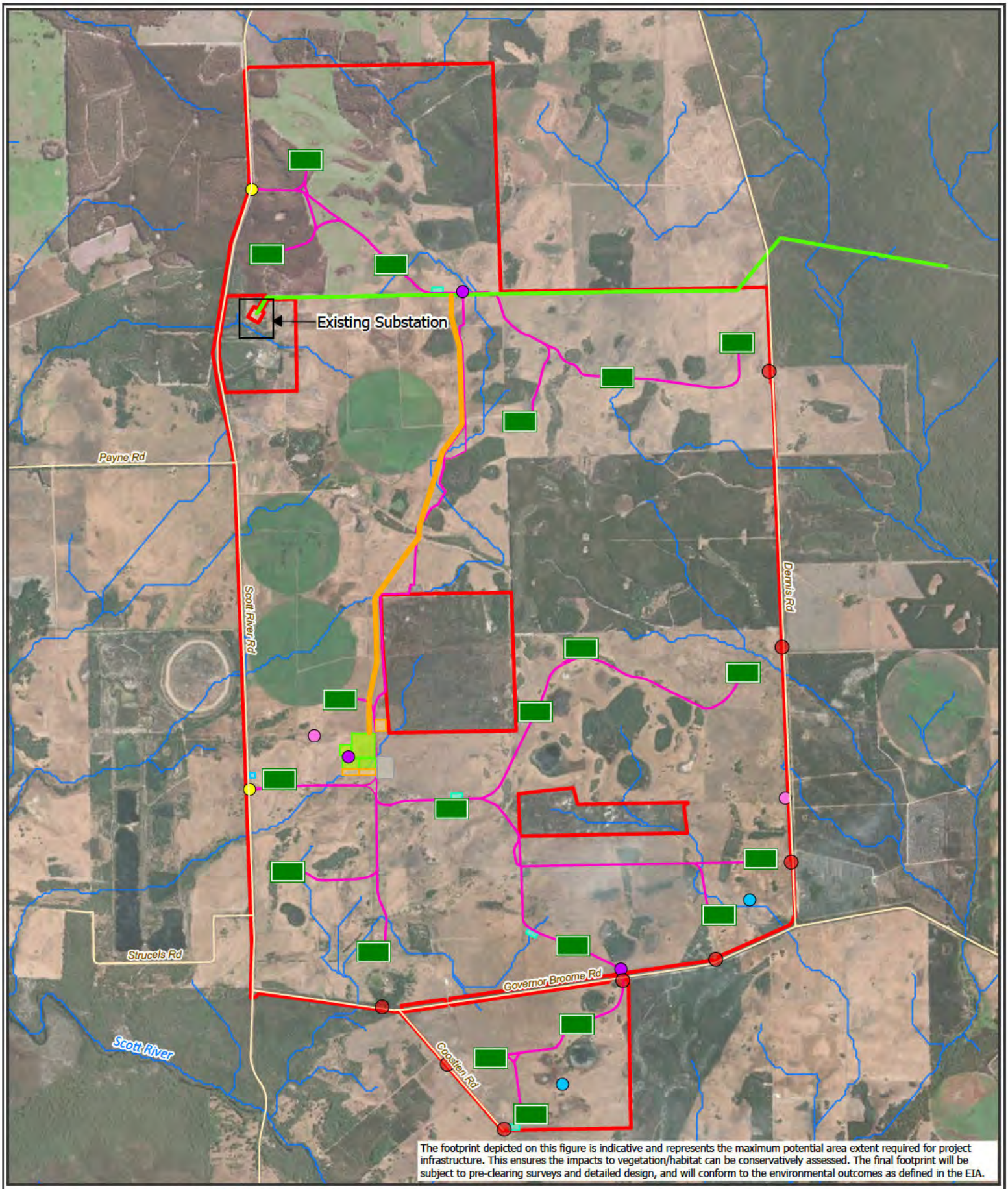

Figure 2-1: Proposal Physical Elements

- Existing Farm Entrance/Emergency Access
- Existing 132 kV Beenup to Manjimup
- Roads
- Rivers and Tributaries
- Development Envelope

Proposal Physical Elements

- Wind Turbine
- Communication Tower
- Main Site Entrance
- Water Tank
- Meteorological Mast
- Transmission Line
- Borrow Pit
- Public Viewing Area
- Internal Access Road
- Concrete Batching Plants
- Construction Laydown Areas
- O&M Area, Project Substation, Construction Site Offices

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Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/10/2025

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2.2. Proposal Element Description

2.2.1. Wind Turbines

The Proposal will have a maximum of 20 wind turbines, generating up to 100 MW. The Proposal commits to the following turbine parameters as depicted in Figure 2-2:

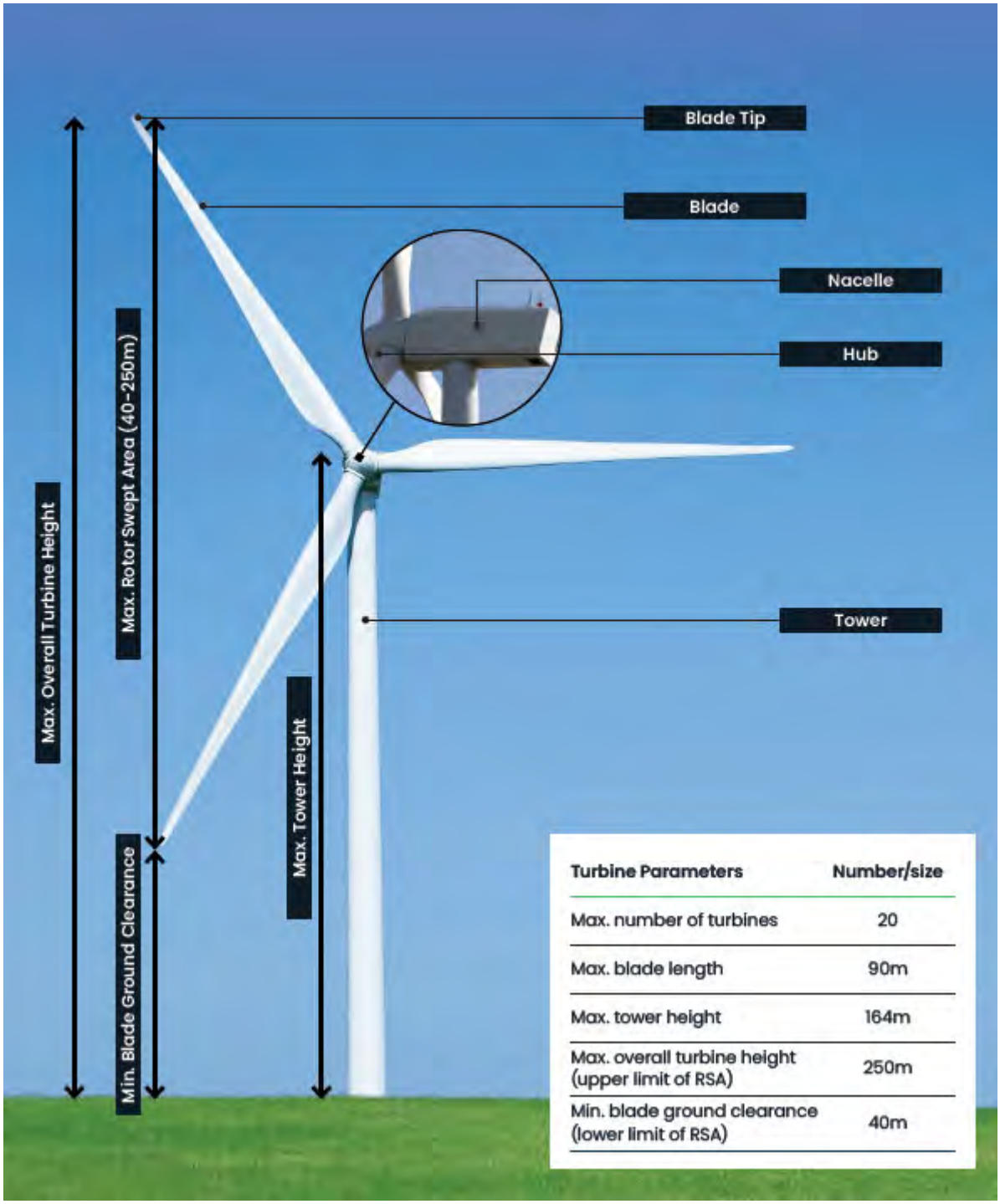
- Maximum blade length: 90 m
- Maximum tower height: 164 m
- Maximum overall turbine height: 250 m
- Minimum blade ground clearance: 40 m.

The parameters are considered to be an upper/lower limit and are intended to provide flexibility for any innovation in turbine design between now and the time of detailed design and construction.

The rotor swept area (RSA) refers to the physical area swept by the rotating blades during operation. For the purposes of this environmental impact assessment, a 'worst case' RSA of 40 m above ground level to 250 m above ground level was considered to account for varied turbine models (Figure 2-2).

The final number, design and placement of turbine infrastructure will be dependent on several factors including market conditions, cost of construction, infrastructure availability and the confirmed capacity of the existing 132 kV transmission line.

The indicative locations for each wind turbine are shown in Figure 2-1. These locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment and land users.



Turbine Parameters	Number/size
Max. number of turbines	20
Max. blade length	90m
Max. tower height	164m
Max. overall turbine height (upper limit of RSA)	250m
Min. blade ground clearance (lower limit of RSA)	40m

Figure 2-2: Maximum Turbine Parameters

2.2.1.1. Turbine Foundations

The proposed wind farm site presents several challenges when it comes to installing turbine foundations, including the presence of significant environmental values, acid sulfate soils (ASS), a high-watertable, and areas with unstable, loose ground. Because of this, the turbine foundations will vary in size across the Development Envelope depending upon the imposed loading, ground conditions, construction methodology and drainage requirements.

To provide a practical and adaptable solution that achieves the necessary mass and stability, while minimising the volume of ASS disturbed, and dewatering volume and depth, three turbine foundations designs are proposed for the Proposal including:

- Primary foundation options
  - Typical gravitational foundation – above ground, with hillock formation (above ground foundation)
  - Typical gravitational foundation – partially above ground, with hillock formation. (partial above ground foundation)
- Secondary foundation option
  - Typical gravitational foundation – below ground (below ground foundation).

Specific design details of each foundation options are provided in Table 2-3 and Figure 2-3. The below ground foundation, typically requires dewatering of 5.5 metres below ground level (mbgl), however, will only be used where it is confirmed, prior to construction through detailed site investigation and revised modelling, that no dewatering would be required (see Section 6 and Section 7).

Table 2-3: Turbine foundation options

Turbine Foundation Design	Approximate Foundation Dimension (m)	Maximum Depth Below Ground Level (mbgl)	Approximate Volume Reinforced Concrete (m^3)	Approximate Volume Soil Excavated (m^3)	Maximum Depth of Dewatering Required at the perimeter of each foundation(mbgl)
Primary foundation options					
Typical gravitational foundation – above ground, with hillock formation	30x30	0	985	163	0
Typical gravitational foundation – partially above ground, with hillock formation	30x30	1.2	985	950	2
Secondary foundation option					
Typical gravitational foundation – below ground	25x25	5	600 – 850	3500	0*

* Typically requires dewatering to a depth of 5.5m

Ground improvement may also be required at each turbine foundation, dependent on the results of detailed geotechnical investigations. Ground modification can include soil stabilisation, compaction, the use of geosynthetics or series of concrete piles (as depicted in Figure 2-3). Concrete piles involve concrete being injected down augers to displace, rather than excavate soils and mitigates any further need for dewatering. They are anticipated to extend to a maximum of 15 mbgl, based on preliminary

geotechnical results. Concrete for the foundations will be mixed at concrete batching plants, which will be situated within the Development Envelope.



Figure 2-3: Indicative Cross-Section of Turbine Foundation Options

Any excavated material will be treated in accordance with an Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) and utilised in construction (e.g. formation of hillock landforms around turbine foundations, development of internal roads or hardstand) and/or in rehabilitation of temporary construction areas, where appropriate. Any excavated material that is not able to be utilised in construction will be safely disposed of offsite in accordance with the ASSDMP.

Non-vegetation zones (NVZ) and/or asset protection zones (APZ) will also be established around the base of turbines to manage the bushfire risk to the Proposal in accordance with the Bushfire Management Plan (BMP; Linfire 2025a). The size of the NVZ and APZ will be dependent on the turbine location and its proximity to different vegetation types (Linfire 2025a).

The dewatering required for the construction of turbine foundations is discussed further in Section 2.2.7.

2.2.1.2. Hardstand

Each turbine requires a hardstand area adjacent to the actual turbine foundation area. These provide stable and suitable areas for the turbine components to be stored and lifted into position by the required cranes. These hardstand areas will remain in-situ for the lifetime of the wind farm to allow for maintenance and repairs.

2.2.2. Meteorological Masts and Communication Towers

Two permanent meteorological masts (met masts) will be erected to measure wind speed and direction. The met masts will be up to 164 m tall, depending on the height of the selected wind turbine, and will be a suitable distance from the nearest turbines to ensure that accurate and unimpeded wind measurements can be obtained throughout the life of the Proposal, in accordance with international standards. In addition, up to four temporary meteorological masts will be erected during construction to calibrate permanent wind monitoring towers from proposed turbine locations. Visual bird diverters will be installed on guy wires of permanent met masts.

Two microwave communications towers may also be required each up to 100 m tall.

Met masts and communication towers will utilise similar foundation solutions to turbines, as detailed in Section 2.2.1.1.

2.2.3. Substation and Transmission Infrastructure

A 132 kV substation is required for the Proposal adjacent to the Operations and Maintenance Area to connect the Proposal to the SWIS via the existing Beenup to Manjimup 132 kV transmission line. An indicative layout of a typical substation is provided in Figure 2-4. This Proposal will also involve upgrade of the existing Beenup substation, with minimal new ground disturbance required (0.02 ha).

The Proposal substation infrastructure will include the following:

- Cabling between the wind turbines and the substation
- Electrical protection infrastructure
- A transmission line connecting wind farm substation to the existing Beenup to Manjimup 132 kV (MJP-BNP 81) transmission line via a local tee connection
- Communication infrastructure such as supervisory control and data acquisition (SCADA)
- Metering
- Transformers
- Static Synchronous Compensators (STATCOMS)

The cabling between the wind turbines and the substation that connects the Proposal with the 132 kV transmission line will be underground and follow existing and proposed internal access roads where

possible to minimise disturbance. Visual bird diverters will also be installed during construction along the new connecting transmission line.



Figure 2-4: Typical Substation

2.2.4. Operations and Maintenance Area

The proposed Operations and Maintenance Area (O&M Area) will be located near the Proposal substation and is expected to include the following:

- Office
- Warehouse
- Workshop
- Kitchen/staff room
- Amenities
- Carpark and laydown.

Given the area within the Development Envelope is not connected to the sewerage network, the O&M Area is anticipated to utilise an onsite septic system, which will be installed in compliance with relevant Australian standards and requirements of the Shire of Augusta Margaret River and Department of Health.

2.2.5. Site Entrances, Internal Access Roads and Public Viewing Area

There will be two main access points to the Proposal situated along Scott River Road (Figure 2-1). These have been located to:

- Achieve safe access
- Utilise existing disturbance to minimise clearing impacts
- Ensure minimal community disruption by reducing the number of local roads required for transport of turbine components.

A new site entrance will also be installed across Governor Broome Road to facilitate transport of turbine components south of Governor Broome Road. This location was selected to minimise clearing and to avoid impacts to the Scott River Ironstone Threatened Ecological Community (TEC), conservation significant flora and lodged Aboriginal Heritage sites (Section 8.6.1 and 10.5.1).

As well as the proposed site entrances emergency services will also be able to utilise other existing farm entrances to access the site as required (Figure 2-1).

Internal access roads will generally have a construction footprint of 10 m and will be designed to utilise existing tracks and other cleared areas as much as practicable, with the aim of minimising disturbance to native vegetation and agricultural activities. The construction footprint for internal access roads in sensitive areas will be limited to maximum width of 5-6 m to avoid clearing impacts along existing tracks as necessary, supported by the provision of passing bays.

Roads will be unsealed and gravel-capped with locally sourced material where available and will be designed and constructed to minimise impacts to natural surface water flows.

A public viewing area will also be developed along Scott River Road to ensure a safe pull over area where tourists can stop and observe the wind farm. The viewing area will include informative signage about wind as a renewable energy source and be capable of accommodating four to six vehicles.

2.2.6. Supporting Plant and Equipment

Supporting plant and equipment to facilitate Proposal construction will include, but not limited to:

- Concrete batching plants
- Construction site offices
- Construction laydown areas
- Generator(s) for emergency and construction power supply
- Borrow pits, for local sourcing of gravel, including mobile crushing and screening plant if required
- Water storage infrastructure for construction and operational water requirements. Note: no water abstraction is proposed as part of this Proposal. This will include water tanks (retained through operations and available to emergency services) and temporary water storage dams.

Laydown areas will be required for the site office and concrete batching plants which will only be required during construction. The site offices will be modular transportable offices (dongas). A typical concrete batching plant is shown in Figure 2-5.



Figure 2-5: Typical Concrete Batching Plant

2.2.7. Construction Dewatering

Dewatering is likely to be required for the installation of below ground infrastructure, including turbine and met mast foundations as well as other supporting infrastructure (e.g. communication tower foundations and underground cabling). As detailed in Section 2.2.1.1, the turbine and other foundations will be designed to limit dewatering requirements, while achieving necessary mass and stability.

Based on a conservative drawdown model for the partial below ground foundation, dewatering is expected to occur over approximately 33 days at each foundation, allowing five days of initial pumping to attain target drawdown, followed by 28-day steady-state pumping to maintain the target drawdown during the concrete curing period (Stantec 2025b, Section 7, Appendix A).

Dewatering effluent will be managed in accordance with the ASSDMP, including lime dosing to neutralise potentially acidic water and then directed to a limestone lined settlement basin to settle prior to; infiltration or reuse in irrigation, concrete batching or dust suppression, subject to achievement of quality parameters (Section 6 and 7, Appendix B).

Dewatering recharge/infiltration basins will be maintained such that overflow does not occur to surrounding land and positioned to reduce the cone of depression by being as close as possible to the location under abstraction.

Due to the dewatering requirement and the presence of potential ASS (PASS) within the Development Envelope (see Section 6) an ASSDMP will be developed to manage the potential impacts to surface water and groundwater during construction. As the infrastructure design and layout has not yet been finalised, a Preliminary ASSDMP has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP, which will be developed prior to construction of the Proposal (PTG 2025; Appendix B). The detailed ASSDMP will also be prepared based on detailed site investigations as well as revised drawdown modelling where required once final turbine locations are determined.

Further details on the potential dewatering requirements and impacts associated with the construction of the Proposal is provided in Section 7.

2.2.8. Maintenance and Operation

Ongoing maintenance and operation of the turbines and associated hardstands, access roads, O&M area, substation, and all other associated infrastructure will be required following construction throughout the life of the Proposal. The chosen turbine manufacturer will be responsible for maintaining the turbines for a defined period following commissioning. Once the manufacturer's obligation expires, a suitably qualified contractor will visit the site and undertake regular inspection and maintenance activities. Ongoing maintenance of internal access tracks and drainage infrastructure will be undertaken to ensure safe access to all components requiring maintenance throughout the year.

2.2.9. Workforce and Accommodation

The Proposal construction period is estimated to be between 18 – 24 months. The workforce is expected to vary in size throughout this period, with an estimated peak construction workforce of 150 personnel. It is anticipated that workers throughout the construction period will be accommodated in local accommodation in surrounding towns and localities, with no construction camp or temporary onsite accommodation proposed. Once operational, it is anticipated that approximately five full time operations staff will be required and will reside locally throughout its 30 – 60 year operational life.

2.2.10. Decommissioning

The Proposal has an operational life of 30 years; however, can be repowered by replacing the wind turbines and/or components to extend Proposal life another 30 years. If repowering the wind farm is not viable, the Proposal site will be decommissioned and returned to its original condition, or to an agreed post-closure land use with landowners, in accordance with the Draft Decommissioning Plan (Appendix C).

2.3. Proposal Exclusion - Transport Route

A preliminary transport route assessment was undertaken (Ares 2024; Appendix D) to identify whether a feasible route for the transport of large infrastructure via road from the Port of Bunbury to the Proposal exists. The study considered the discharge berth, transfer to port storage area, road transport from port to site, and an assessment of potential site entrances for the maximum turbine blade specifications (i.e. 90 m long turbine blades). The assessment determined that some minor upgrades may be required for sections of the road, mostly involving minor widening of the pavement at some turning points and temporary removal of some roadside signage during transport; however, no clearing of native vegetation would be required along the route outside of the Development Envelope. Based on the above the transport route is not considered a component of the Proposal.

2.4. Proposal Alternatives and Proposal Justification

2.4.1. Proposal Need

The Climate Change Act 2022 set Australia's greenhouse gas emissions reduction targets of a 43% reduction from 2005 levels by 2030 and net zero by 2050. In WA, the Government has committed to a whole-of-government 2030 greenhouse gas emissions reduction target of 80% below 2020 levels.

To fulfil this commitment the State Government has embarked on a significant transition to greater use of renewable energy. Renewable energy is produced using natural resources that are constantly replenished and never run out. As part of this transition, State-owned coal power stations are to be phased out and retired by 2030 and replaced by renewable options.

SynergyRED is assisting the State Government with this transition by investigating and developing future renewable energy assets with the potential to connect to the SWIS, which covers the area from Kalbarri in the north, east to Kalgoorlie and south to Albany. In developing wind farms and other forms of renewable energy, SynergyRED is committed to supporting this target, whilst maintaining affordable and reliable electricity supply for customers across the SWIS. The Proposal will also create local employment and economic opportunities and support the regional development and diversification of the local area.

This Proposal is consistent with the Australian and State Government's commitments to limit greenhouse gas emissions and achieve renewable energy targets.

2.4.2. Proposal Alternatives

In 2010 Verve Energy, which merged with Synergy in 2014, obtained development approval from the Shire of Nannup, a Clearing Permit (CPS 3401/1) under the *Environmental Protection Act 1986* (EP Act) and Federal environmental approval (EPBC 2009/4911) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) for Milyeannup Wind Farm, which comprised 30 wind turbines generating 55 MW of electricity, and was located on relatively pristine coastal dune habitat on the south coast, approximately 20 km east of Augusta. The key environmental impact of this proposal was the clearing of up to 42 ha of native vegetation, approximately 98% of which is habitat for the Western Ringtail Possum, which was listed as Vulnerable at the time of assessment (now listed as Critically Endangered), and foraging habitat for both the Baudin's Black Cockatoo and Carnaby's Black Cockatoo (Biota 2009b).

In progressing feasibility assessments for wind farm development in the South West, it was determined that while the Milyeannup Wind Farm had excellent wind, it was less practical to develop due to the distance to transmission lines and the high environmental impact and associated offsets required. Synergy decided to investigate alternative sites before proceeding any further with this development and specifically sought out cleared agricultural land close to transmission lines.

The current Proposal, is located approximately 8 km northwest of the Milyeannup Wind Farm site, and provides an alternative renewable energy development, with significantly lower impact to the environment (i.e. a maximum of 1 ha of native vegetation clearing), being located predominantly on cleared farmland and closer to the existing Beenup substation and transmission line, as well as providing for greater separation distance from Gingilup Swamps Nature Reserve, a nationally important wetland. The Development Envelope is 3.3 km from the nature reserve compared to the Milyeannup Wind Farm site which is approximately 500 m away.

In selecting an appropriate wind farm site, a number of key factors are considered:

- Wind speeds are required to be high and consistent to enable the wind farm to generate the most electricity from wind energy as possible. The wind resource, where the Proposal is located, is strong, with the highest wind speeds in the afternoon and through the nighttime. This aligns with times when there is higher energy demand on the SWIS and complements daytime solar generation. The site also offers diversity of wind resource compared to other existing wind farms north and east of Perth.
- Low vegetation cover is preferred. The Proposal is located within a highly disturbed landscape with much of the native vegetation having been cleared for agricultural use. Consequently, the Proposal has been designed to largely avoid areas of remnant vegetation (clearing no more than 1 ha of native vegetation, including no more than 0.5 ha of Western Ringtail Possum habitat and 1 ha of black cockatoo habitat represented by native vegetation) by preferentially locating the Development Envelope and Indicative Disturbance Footprint within existing cleared areas, with most of the vegetation classified as Completely Degraded.
- A location with sparse housing is preferred. The Proposal is in an area that has some of the largest predominantly cleared landholdings in the South West.
- Reasonable road access is required. Access to the Development Envelope can be achieved through the existing road network.
- Suitable network connections are required in the vicinity. The Proposal is in an area that has access to an existing and underutilised substation and transmission line, associated with the old Beenup Mine. By choosing this location the disturbance footprint can be reduced limiting the impact on the environment.

In addition to the above, climate change is a key threat for many Australian ecosystems and species, particularly the listed fauna species considered as part of this assessment (DPaW 2017; DSEWPaC 2013). Alterations in rainfall patterns, temperature extremes, and increased frequency and intensity of bushfires may accelerate the decline of these species. Renewable energy projects such as this Proposal are critical in addressing these challenges by directly reducing greenhouse gas emissions from energy production.

2.4.3. Design and Evolution of the Proposal

Evaluation and optimisation of the Development Envelope was completed through iterative reviews of environmental, heritage, social, economic and engineering aspects, as well as land access negotiations, which have all been informed by technical studies, and stakeholder and community engagement. Key design changes implemented include:

- Reduction of the Development Envelope from approximately 5,600 ha to 3,597 ha. These changes had the benefit of removing areas of conservation estate (50.2 ha), Department of Biodiversity, Conservation and Attractions (DBCA) lands of interest (284.6 ha), vegetation classified as TECs and conservation significant flora, and increased separation distance of the Proposal from the Scott River and South Blackwood State Forest
- Reduction in the number of wind turbines from a maximum of 30 to maximum of 20 (reducing energy generation from 150 MW to 100 MW), reducing visual impact, noise emissions and the overall footprint and associated clearing impacts
- Increase in the minimum blade ground clearance from 25 m to 40 m to mitigate risk of bird strike

- Relocation of infrastructure to avoid TEC, conservation significant flora, wetlands and associated vegetation, heritage sites, potential habitat trees for black cockatoos, locally restricted vegetation types, and clearing within restrictive covenant areas
- Relocation of infrastructure to minimise native vegetation clearing (i.e. maximum of 1 ha), particularly minimising clearing within vegetation that is in very good to excellent condition
- Relocation of turbines to ensure compliance with the WA *Environmental Protection (Noise) Regulations 1997* at all existing non-involved sensitive receptors
- Selection of site entrance locations for transport of turbine components that avoided and otherwise minimised requirement for clearing of native vegetation and avoided sensitive values (e.g. TEC)
- Removal of the requirement for a water supply pipeline that would have had to traverse the Blackwood River and 5 km of Scott National Park
- Investigation and commitment to the use of alternative foundation design that minimises the depth of excavation and thus the volume of ASS to be excavated and dewatering required
- Addition of a public viewing area to ensure a safe pull over area for people to view the wind farm and learn about wind energy, supporting increased tourism in the area
- Additional water storage to support bushfire emergency response in and around the Development Envelope.

2.5. Local and Regional Context

The Proposal is in the Scott River region of WA, within the Warren bioregion, approximately 250 km south of Perth. The Proposal is located within the Shire of Augusta Margaret River and the South West Boojarah Indigenous Land Use Agreement (ILUA) Area. Karri Karrak Aboriginal Corporation (KKAC) is the regional corporation for the South West Boojarah region that was established under the ILUA.

The land surrounding the Proposal is zoned as general agricultural, with the Proposal intersecting eleven privately owned agricultural properties, used primarily for dairy and beef farming as well as Blue Gum plantation. A total of 2,476.41 ha within the Development Envelope has been cleared of vegetation, primarily for these agricultural operations.

The Proposal is located adjacent to the historic BHP Beenup mineral sands mine, closed since 1999.

The Proposal occurs in proximity to several DBCA managed lands (Figure 1-1) including (approximate distances from the Development Envelope shown in brackets):

- Forest Grove National Park (11 km)
- Blackwood River National Park (5 km)
- Leeuwin Naturaliste National Park (14 km)
- Scott National Park (adjacent)
- Chapman Brook National Park (10 km)
- South Blackwood State Forest (300 m)
- Milyeannup State Forest (12 km)
- Blackwood State Forest (11 km)
- Pagett Nature Reserve (30 m)
- Chester Nature Reserve (14 km)
- Gingilup Swamp Nature Reserve (3.3 km)
- Un-named Nature Reserve (WA42377) (excised from the Development Envelope)
- Un-named Nature Reserve (WA42942; 1 km)
- Ngari Capes Marine Park (5 km)
- Lot P038071 101 (DBCA Land of interest, excised from the Development Envelope)
- Lot P413478 1 (DBCA Land of interest, excised from the Development Envelope).

The closest regional centre is the town of Augusta, approximately 15 km south-west of the Development Envelope. The main economic industries within the Shire of Augusta Margaret River are the natural environment, tourism, viticulture and agriculture, with the Shire relying heavily on the integrity of its natural ecosystems to drive its economy (Shire of Augusta Margaret River 2024).

The Scott River is located approximately 1 km south of, and the Blackwood River is located approximately 4 km west of, the Development Envelope, respectively (Figure 2-1; Stantec 2025b). The Scott River is a tributary of the Blackwood River with their confluence approximately 5.4 km south-west of the Development Envelope. From that convergence, the Blackwood River flows through the Hardy Inlet, before discharging into the Indian Ocean.

2.5.1. Climate

The Warren bioregion is characterised by a moderate Mediterranean climate, with annual rainfall ranging between 600 to 1500 mm (Lyons et al. 2000).

Climate data was taken from the Bureau of Meteorology (BoM) Cape Leeuwin weather station (station number 9518, rainfall and temperature data 1897 – 2025), located approximately 17 km south-west of the Development Envelope (BoM 2025a). Based on this data, the region receives an annual average rainfall of 948.6 mm, with most of the rainfall occurring during the winter months of June, July and August (BoM 2025a; Figure 2-6). Mean maximum air temperatures range from 16.5°C in July and August to 23.4°C in February, and mean minimum air temperatures range from 11.3°C in August to 17.3°C in February. Recent rainfall is generally lower than the long-term average for the area. A total of 19.4 mm was recorded from December 2024 to February 2025, which is significantly less than the long-term average for the same period (51.8 mm).

Mean morning and evening wind speeds are generally similar throughout the entire year (Figure 2-7; BoM 2025a). The highest long term average wind speeds were recorded during winter; however, strong winds are recorded throughout the entire year (Figure 2-7).

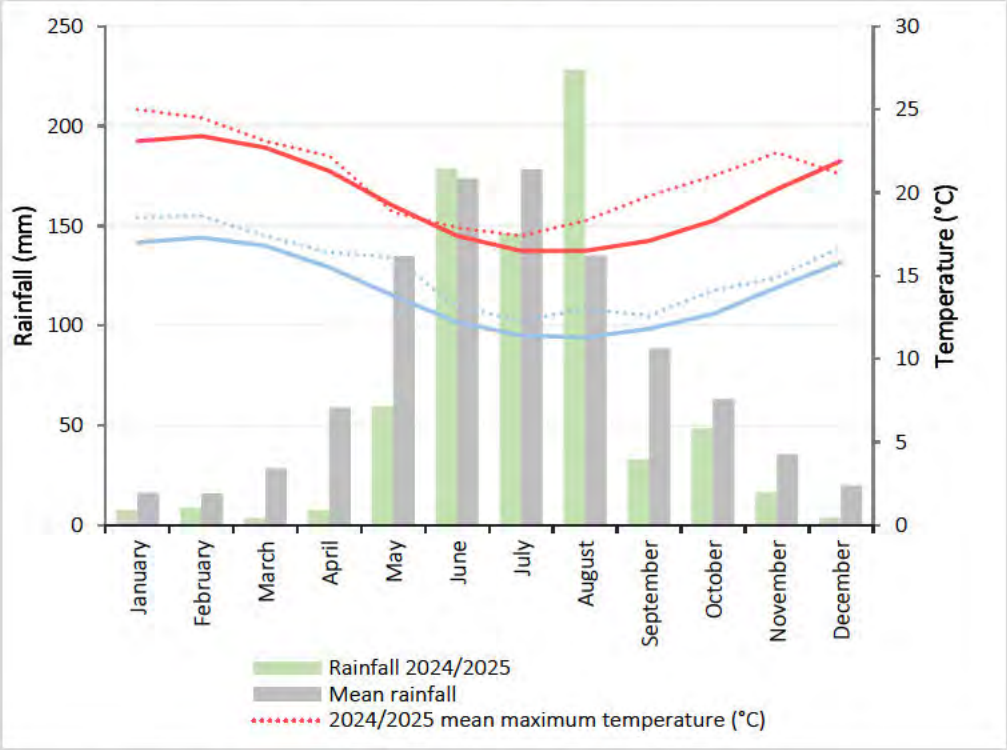


Figure 2-6: Rainfall and Temperature Data for the Development Envelope

*Short term (2024 – 2025) and long term (1897 – 2025) average rainfall and temperature data from Cape Leeuwin weather station (station number 9518). Rainfall and temperature data 2024/2025 is from March 2024 to February 2025.

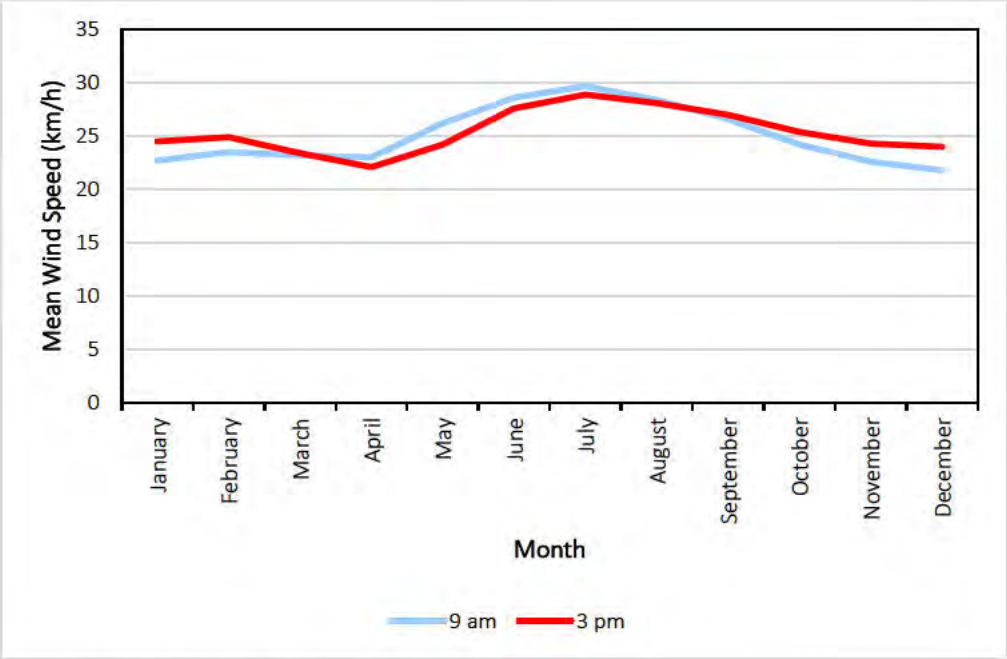


Figure 2-7: Mean 9 am and 3 pm Wind Speeds

*Long term (1907-2010) average wind speed data from Cape Leeuwin weather station (station number 9518).

3. Legislative Context

3.1. Environmental Protection Act 1986

The EP Act is the primary environmental legislation governing environmental protection and impact assessment within WA.

Part IV of the EP Act provides for the referral and assessment of proposals that may, or will, have a significant impact on the environment. The impact assessment process under the act is administered by the EPA, with assistance from the Department of Water and Environmental Regulation (DWER).

This document and the associated referral application form have been developed to meet the legislative requirements outlined in s 38 of the EP Act for the 'referral of proposals' to the EPA.

3.2. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework for the protection of Matters of National Environmental Significance (MNES). As such it requires all actions that will or may have a significant impact on a protected matter to be referred to the Minister for the Environment. The EPBC Act is administrated by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

As part of the Proposal planning process, SynergyRED has considered its requirements, and propose to refer the Proposal, under the EPBC Act. Should the Proposal be determined to be a controlled action and require assessment under the EPBC Act, SynergyRED will pursue that approval separately to the EP Act and other State approvals.

3.3. Other Environmental Approvals and Regulations

The other environmental approvals and regulations relevant to the Proposal are outlined in Table 3-1. This table also presents how these other environmental approvals and regulations will mitigate the potential impacts associated with the Proposal to ensure that the Proposal will be implemented in such a way to be in accordance with the EPA's objectives.

Table 3-1: Decision-making Authorities and Processes

Decision-making Authority	Legislation or Agreement Regulating the Activity	Approval Mechanism	Ability to Mitigate Environmental Impact
Department of Biodiversity, Conservation and Attractions (DBCA)	*Biodiversity Conservation Act 2016* (BC Act)	• Section 45 authorisation. • Section 40 authorisation.	Yes, this process can mitigate environmental impacts Requirements for Section 40 and 45 Authorisation and appropriate mitigations will be discussed with DBCA in the context of potential indirect impacts to the TEC, Threatened and Priority flora and fauna, and potential bird collisions with turbines and vehicle movements. By adhering to the overarching objectives of the Act, the outcomes of the Section 40 and 45 licencing are likely to align with the EPA's Environmental Factor Objectives for Flora and Vegetation and Terrestrial Fauna.
DWER	EP Act Part V Environmental Protection (Clearing of Native Vegetation) Regulations 2004	• Native Vegetation Clearing Permit.	Yes, this decision-making process can mitigate environmental impacts Part V of the EP Act regulates the clearing of native vegetation. Any native vegetation clearing that is not exempt under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 will be the subject of an NVCP application prior to construction. The NVCP process is governed by the guiding principles for the clearing of native vegetation, as stipulated in Schedule 5(1) of the EP Act. Through this, DWER assesses significant flora and vegetation, wetlands, areas of high biological diversity, significant fauna habitat and conservation areas. A NVCP application will be lodged with DWER, and conditions related to management and mitigation of environmental impacts will be applied. By applying these conditions, the outcomes of the NVCP are likely to align with the EPA Environmental Factor Objectives for Flora and Vegetation, Terrestrial Fauna, Terrestrial Environmental Quality and Inland Waters.
	Rights in Water and Irrigation Act 1914 (RiWI Act)	• 26D licence to construct a well. • 5C licence to take groundwater. • Bed and banks permit.	Yes, this decision-making process can mitigate environmental impacts All provisions, including the issuing of s 5C, s 26D licences and bed and bank permits, are guided by the overarching objectives of the RiWI Act (s 4). The most relevant of these to the Proposal and the EPA's objective for Inland Waters is objective a(ii) which is: *"To provide for the management of water resources, and (ii) in particular for the protection of their ecosystems and the environment in which water resources are situated, including the regulation of activities detrimental to them."* Temporary dewatering will be required during the construction phase of the Proposal to support excavations and installation of below ground infrastructure (e.g. concrete foundations and electrical cables). And road construction may interfere with bed and banks. By adhering to the overarching objectives of the RiWI Act, the outcomes of the 5C and 26D licences, and bed and bank permits, are likely to align with the EPA's Inland Water factor objective.

Decision-making Authority	Legislation or Agreement Regulating the Activity	Approval Mechanism	Ability to Mitigate Environmental Impact
	EP Act Part V Environmental Protection Regulations 1987	• Works Approval. • Operating Licence. • Registration for prescribed activities.	Yes, this decision-making process can mitigate environmental impacts A temporary/mobile crushing and screening plant may be required during construction. A Works Approval and Operating Licence/Registration will be required if the proposed temporary/mobile crushing and screening plant triggers the prescribed activities outlined within Schedule 1 of the Environmental Protection Regulation. The mechanisms for Works Approvals and Operating Licences/Registrations are guided by the overarching objective of the EP Act to 'Protect the environment of the State'. By adhering to this overarching objective and its guiding principles, the outcomes of the Works Approvals and Operating Licences are likely to align with the EPA's Inland Waters, Terrestrial Environmental Quality and Social Surroundings factor objectives.
Department of Planning, Lands and Heritage (DPLH)	*Aboriginal Heritage Act 1972* (AH Act)	• Section 16 authorisation to enter, excavate, examine, or remove anything on an Aboriginal site. • Section 18 consent for impact on an Aboriginal site. • Regulation 10 authorisation for minor activities and impacts. • Regulation 7 authorisation to bring plant and equipment to an Aboriginal Site.	Yes, this decision-making process can mitigate environmental impacts One registered Aboriginal site (Blackwood River [Registered site ID: 20434]) and one lodged Aboriginal place (Scott River [Lodged place ID: 22928]) intersect the Development Envelope, as identified through a search of the DPLH Aboriginal Cultural Heritage Information System database. The AH Act provides for the registration, management and control of Aboriginal heritage by the Minister for Aboriginal Affairs and the DPLH. The AH Act protects and manages Aboriginal heritage by requiring approvals for activities that may impact on heritage sites or cause harm. Where implementation of AH Act processes is likely to result in the avoidance or minimisation of harm to Aboriginal cultural heritage sites, these processes are likely to align with the EPA's objectives for the Social Surroundings factor and the Inland Waters factor, given both Aboriginal cultural heritage sites relevant to the Proposal are surface water features.
Department of Health	*Health Act 1911* Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974	• Application to Construct or Install an Apparatus for the Treatment of Sewage.	Yes, this decision-making process can mitigate environmental impacts As the operations and maintenance building will not be connected to the sewerage network an onsite septic system will be required. An application must be lodged to install the proposed wastewater treatment system. Details of the system will be assessed by the Local Shire and/or Department of Health, depending on the amount of wastewater to be handled by the apparatus each day. By adhering to the licence, the outcomes are likely to align with the EPA's objectives for Inland Waters and Terrestrial Environmental Quality.

Decision-making Authority	Legislation or Agreement Regulating the Activity	Approval Mechanism	Ability to Mitigate Environmental Impact
Regional Development Assessment Panel (RDAP), Shire of Augusta Margaret River	*Planning and Development Act 2005* (PD Act) Planning and Development (Development Assessment Panels) Regulations 2011 Planning and Development (Local Planning Schemes) Regulations 2015 Shire of Augusta – Margaret River Local Planning Scheme No. 1	• Development Application.	Yes, this decision-making process can mitigate environmental impacts The Development Application (DA) process considers aspects related to Social Surroundings and other environmental factors such as Flora and Vegetation, Terrestrial Fauna, Inland Waters and Terrestrial Environmental Quality. Conditions applied to the Development Approval will include requirements to avoid, mitigate and manage environmental impacts. Planning decisions must have due regard for statutory State Planning Policies (SPPs) pursuant to the PD Act, as well as local planning schemes (the *Shire of Augusta-Margaret River Local Planning Scheme No.1).* A DA will be lodged with the Shire of Augusta Margaret River and assessed through the RDAP. Conditions related to management and mitigation of environmental impacts will be applied, ensuring the outcomes of the Proposal align with all the relevant key factor EPA objectives.

3.4. Land Tenure

The Development Envelope is situated almost entirely on Freehold land within the Shire of Augusta-Margaret River, with some extents on public land comprised of reserves managed by state and local government. These lots are currently zoned “General Agriculture” and “Local Roads” within the Shire of Augusta-Margaret River Local Planning Scheme No.1 (DPLH 2024).

The Proponent has access to freehold land through agreements with the landowners and consent from crown reserve land managers to submit this application. The appropriate approvals will be sought for access to reserves managed by state and local government once approval is obtained.

4. Stakeholder Engagement

4.1. Stakeholder Identification

Comprehensive and ongoing stakeholder engagement has formed an important part of the Proposal planning process. The Proponent commenced engagement with key stakeholders in September 2022 and engagement is ongoing. A stakeholder identification process was delivered at the outset of the feasibility assessment, and the identified stakeholders and their level of interest have been summarised in the Table 4-1.

Table 4-1: Key Stakeholders for the Proposal

Stakeholder Group	Stakeholder	Area of Interest
Federal Government	Air Services Australia and Civil Aviation Safety Authority (CASA)	• Proposal details. • Planning approval.
	BoM	• Meteorological radar.
	DCCEEW	• Impact upon MNES. • EPBC Act referral.
	Geoscience Australia	• Trigonometrical stations.
State Government	Premier of WA	• Alignment with Net Zero 2030 target.
	Minister for Energy	
	Member for the South West	
	Member for Warren-Blackwood	
	DBCA	• Biodiversity aspects. • Land use.
	DWER	• Environmental impact assessment. • Referral under EP Act. • Groundwater licensing.
	DPLH	• Planning approval. • Heritage.
	Department of Fire and Emergency Services (DFES)	• Bushfire risk management.
	Main Roads WA	• Road usage.
	Port of Bunbury	• Potential use of port for future delivery of turbines.
	Water Corporation	• Availability and capacity of water for construction activities. • Understanding seasonal constraints for water supply.
	WA Police	• Land use. • Electromagnetic interference.
	Western Power	• Connection to existing infrastructure.
Local Government	Shire of Augusta-Margaret River	• Planning approval. • Social impact and considerations such as set-back distances, employment and accommodation. • Bushfire risk management. • Community Benefit Fund.
	South West Development Commission	• Proposal details. • Employment opportunities. • Local road usage and maintenance
	City of Busselton	• Aviation and airspace.
Traditional Owners	KKAC	• Aboriginal cultural heritage engagement and protection. • Employment opportunities.
	South West Aboriginal Land and Sea Council (SWALSC)*	
Landowners and Neighbours	Various including private and industry such as BHP	• Social values assessment, including noise. • Land use. • Management of PASS and dewatering. • Landowner and neighbour benefits.

Stakeholder Group	Stakeholder	Area of Interest
Local community	Community members	• Community Benefit Fund. • Proposal details. • Potential impacts. • Social values assessment. • Employment opportunities.
Non-Government Organisations	Telstra/Optus/NBN	• Impacts to service provision.
	Wildflower Society of WA	• Environmental impact assessment.
	Augusta Margaret River Clean Community Energy	• Proposal details. • Community Benefit Fund. • Employment opportunities. • Social values assessment, including noise. • Land use. • Environmental impact assessment.
	Augusta Chamber of Commerce & Industry	
	Augusta Community Resource Centre	
	Molloy Island Homeowners Association	
	Augusta Community Development Association	
	Augusta Historical Society	
	Augusta Wildlife Care WA Inc	
	Beenup Consultation Group	
	Cape to Cape Bird Group (linked to Birdlife Australia)	
	Country Women's Association (Augusta)	
	East Augusta Housing/Residents Association	
	Environmental Research Group Augusta (ERGA)	
	Friends of Augusta Land and Coast Care Group	
	Leeuwin Lions	
	Lower Blackwood Land Conservation District Committee (Scott River local farmers)	
	Lower South West Growers Group (formally the Scott River Growers Group Margaret River Region)	
	Margaret River Busselton Tourism Association	
	Urban Bushland Council (UBC)	

*Initial engagement only, all continuing engagement is through KKAC

4.2. Stakeholder Engagement Process

Community engagement has formed an important aspect of the feasibility assessment process. SynergyRED engaged with the community through a variety of methods to reach a wider audience and provide information in an accessible and timely manner. SynergyRED's key community engagement activities are detailed in this Section, and all engagement activities undertaken are summarised in Table 4-2.

4.2.1. Community Drop-In Sessions

SynergyRED has held 14 community drop-in sessions in the Augusta-Margaret River area in March 2024, December 2024 and September 2025, including at Alexander Bridge, East Augusta, Augusta and Margaret River. The purpose of the engagement was to introduce the Proposal, present findings of completed studies, gather community feedback and dispel misconceptions. Representatives from SynergyRED's Environment, Engineering, Community Engagement, Construction, Land Access and Senior Leadership teams were present and available to answer community questions.

The key concerns raised by the community during the drop-in sessions are detailed in Section 10. Images of the community drop-in sessions are provided in Figure 4-1.



Figure 4-1: Images of Community Drop-in Sessions

4.2.2. Augusta Office

To enable community members to drop-in at a time convenient for them, SynergyRED opened an office in Augusta in February 2025. The office is open monthly and available for community members to visit and speak to a SynergyRED team member about the Proposal.

The key concerns raised by the community at the Augusta office are detailed in Section 10.

Table 4-2: Stakeholder Engagement Methods Employed

Method	Targeted Stakeholder	Description
Community drop-in sessions	Local community	14 community drop-in sessions held to provide information on the feasibility assessment, seek feedback and offer the opportunity to ask questions.
SynergyRED office in Augusta	Local community	SynergyRED office in Augusta has been open monthly from February 2025 to provide the opportunity for community members to drop-in, provide feedback or ask questions.
Briefings / meetings / interviews	Landowners and neighbours Local organisations Local government State government DCCEEW	Meetings held with interested stakeholders to share Proposal information, seek feedback and answer questions.
Proposal website	All	Proposal website established to provide updates on feasibility assessment and provide an opportunity for interested stakeholders to ask questions through the Question and Answer feature. Website updated with key Proposal information, including newspaper articles and advertising of upcoming engagement sessions.
Email updates	Interested stakeholders	Regular Proposal updates emailed to stakeholders who signed up for updates via the website or during a community drop-in session.
Information booklets	Local community	Two information booklets published which included Proposal information, results of feasibility studies, answers to frequently asked questions and contact details for Proposal team.
Library display	Local community	Information display created at Augusta Library to share Proposal information, provide information booklets and seek community feedback through questions.
Newspaper articles	Local community	Monthly newspaper articles published in the local newspaper, from August 2024 onwards, to share Proposal information, provide answers to frequently asked questions, and seek feedback.
Survey	Local community	Survey delivered as part of Social Values Assessment to understand what is important to the community, and what benefits and impacts the proposed wind farm could have on surrounding communities.
Social media posts	Local community	Social media posts published to promote upcoming community drop-in sessions.
Letters	Neighbours / local community	Letters sent to all local community members to promote upcoming community drop-in sessions. Letters sent to all neighbours within 5 km radius of the proposed Development Envelope to provide information and seek feedback.
'Stayz' messenger	Local holiday homeowners	Messages sent through the Stayz app to all holiday homeowners with a view of the wind farm to provide information and seek feedback.
Local radio	Local community	Regular radio promotion of SynergyRED office and drop-in sessions in Augusta.
Drop-in engagement	Local businesses	Ad-hoc drop-ins to local businesses to provide information and the opportunity to provide feedback to SynergyRED.

4.3. Stakeholder Engagement Outcomes

Stakeholder engagement outcomes have been summarised in Table 4-3 and the key concerns raised are detailed in Section 10.3.1.

Table 4-3: Stakeholder Consultation

Stakeholder	Date(s)	Topic Discussed	Response/ Outcome
State and Federal Government & Agencies			
CASA	August 2023	• SynergyRED discussed the Proposal. • CASA recommended night-time aviation lighting, but did not consider it a requirement.	• No objection based on recommendation in Aviation Project Report. • SynergyRED is working through considerations regarding aviation lighting, with regard for other impacts this may have.
DCCEEW	August 2025	• SynergyRED introduced the Proposal. • SynergyRED discussed the Matters of National Environmental Significance (MNES) with the potential to be impacted, including summarising key study findings, mitigations and predicted outcomes. • Discussion on the following uncertainties/concerns relating to bird strike: - Adequate detail of survey methodology, including survey effort, timing, site selection, including any limitations/uncertainties relating to the collection of flight height data - Sufficient justification for consequence of impacts - Sufficient local and regional context relating to MNES, including their use/movement through habitats within and around the Proposal - Provision and consideration for local/regional population where available - Give consideration to any known migratory paths - Consider all MNES and justify why those considered unlikely to occur are not assessed.	• DCCEEW appreciated SynergyRED's comprehensive presentation, the conservation nature of the impact assessment and work undertaken to avoid direct impacts and to address risks associated with ASS/dewatering. • Approach to impact assessment and referral was discussed and agreed.
DFES	April 2024 to November 2024	• SynergyRED provided an overview of the Proposal. • SynergyRED sought clarification on bushfire assessment and application of Country Fire Authority (CFA) guidelines, as well as how to interpret SPP 3.7 and the CFA guidelines for windfarms. • Discussion on clearing requirements, road requirements, firewater tank requirements and separation distances. • Discussion on conceptual layout, firewater, access tracks and aerial firefighting. • SynergyRED presented conceptual layout and sought feedback.	• SynergyRED to draft plans showing firewater, access points and separation to vegetation, then send draft to DFES for comment prior to DA. • SynergyRED to engage DFES Regional Operations, and local fire brigades regarding local considerations. • SynergyRED to revise conceptual layout, clearly show proposed and alternative options for site entrances, show tracks and firewater tank locations. • SynergyRED to incorporate feedback provided by DFES into the Bushfire Management Plan and Risk Assessment. • SynergyRED to contact DBCA and the Shire of Augusta Margaret River to set up a meeting at / near the proposed wind farm to consult with them on the wind farm and proposed conceptual site plan. • SynergyRED to engage with DFES and DBCA regarding aerial firefighting. • SynergyRED to seek details from turbine suppliers regarding their fire management systems, whether they have fire suppression, and if there would be any warranty issues if we used a third-party fire suppression system. • SynergyRED to provide information and spatial data on the wind farm and wind turbine locations to support aerial firefighting prior to construction.
DWER (Green Energy Team)	February 2024 to July 2025	• Introduction to DWER Green Energy Team. • SynergyRED provided an introduction to the Proposal, studies completed and planned, and the community engagement strategy. • Discussion and confirmation of hydrology scope of work. • Discussion on noise assessment requirements and results. • Discussion on ASS and associated preliminary management plan. • Discussion on management plan requirements at referral. • Discussion on potential requirement for two years of bird and bat monitoring data to support Environmental Impact Assessment (EIA). • Discussion on proposed transport route and its exclusion from the Proposal given no clearing anticipated outside the Development Envelope.	• Approach to impact assessment and referral was discussed and agreed and managed with DWER input throughout. • A second year of bird and bat monitoring was undertaken to address DWER's request.
DWER (Water Branch)	March 2024	• Discussion and confirmation of hydrology/hydrogeology scope of work. • DWER gave advice on licensing requirements for bores and restrictions on production bores. • DWER recognised that management of dewatering to minimise drawdown will be key but acknowledged likely low risk given temporary nature of activity. • DWER offered to supply existing monitoring bore and surface water data from the area.	• Approach to hydrology/hydrogeology scope confirmed. • DWER subsequently supplied background information. • SynergyRED progressed with RiWI Act 26D application for the installation of groundwater monitoring bores. • SynergyRED had developed the Proposal to minimise dewatering requirements (e.g., through use of alternative foundations).
DWER (Noise Branch)	March 2024 to March 2025	• DWER provided contemporary noise guidance for wind farms, which evolved with the Proposal. • DWER confirmed compliance should be measured against the WA *Environmental Protection (Noise) Regulations 1997.* • SynergyRED presented initial noise modelling results for the Proposal and discussed noise criteria. • DWER informally reviewed noise assessment ahead of referral.	• SynergyRED provided noise assessment to DWER for informal review. • SynergyRED undertook Noise Assessment to align with the WA *Environmental Protection (Noise) Regulations 1997* (DWER expectation), as well as the South Australian (SA) Wind Farms Environmental Noise Guidelines (SA EPA 2021) (to align with the Position Statement: Renewable energy facilities (WAPC 2020) and to fulfill commitment made during community consultation). • SynergyRED demonstrated compliance with WA *Environmental Protection (Noise) Regulations 1997.*

Stakeholder	Date(s)	Topic Discussed	Response/ Outcome
Jackie Jarvis MP Electoral Office (Minister for Agriculture and Food, Forestry and Small Business)	March 2024	• SynergyRED presented studies completed and planned, the community engagement strategy and answered questions. • Future engagement opportunities.	• SynergyRED provided further information regarding community consultation dates and locations. • SynergyRED to continue to update on progress of the Proposal.
(previous) Member for Warren-Blackwood (Ms. J Kelsbie MLA)	February 2024 to November 2024	• SynergyRED presented studies completed and planned, the community engagement strategy and answered questions.	• Pleased with community engagement approach. • Generally supportive of the Proposal.
South West Development Commission	December 2024	• Briefing on Phase One Feasibility results.	• No concerns raised. • Appreciative of the in-depth briefing.
Local Government			
Shire of Augusta Margaret River	February 2023 to ongoing	• Several meetings have been conducted to provide updates on the Proposal, including overview of community engagement plan, consulting on aviation lighting, metrological mast and the approval pathway. • SynergyRED provided Energy Education presentations to the Council and Officers on energy and renewables. • SynergyRED presented to Shire before community engagement sessions with preliminary results of studies. • Site visit to discuss bushfire risk and management.	• SynergyRED will continue to engage with the Shire and provide ongoing updates on the Proposal, including Community Benefit Fund.
Traditional Owners			
South West Aboriginal Land and Sea Council (SWALSC) on behalf of Karri Karrak Aboriginal Corporation (KKAC)	March 2023 to January 2024	• SynergyRED's earlier engagements on the Proposal were SWALSC as at the time KKAC was in the process of being established. • Introduction of Proposal pipeline across the South West, seek guidance on how best to engage and establish relationship. • Seek progress on Noongar Standard Heritage Agreement (NSHA) for Scott River. • SWALSC advised regional corporations still getting established. • Access agreements ought to be sufficient for NSHA • Noongar naming of assets- Elders (Noongar People) are eager to have input into naming of asset.	• Provided Statutory Declaration and map for NSHA. • Executed a Noongar Standard Heritage Agreement with KKAC. • Commenced arrangement of Aboriginal Heritage survey (completed with KKAC below).
KKAC	January 2024 to August 2024	• Meeting with KKAC to discuss heritage processes associated with the Proposal. • Elders who participated in the survey requested that they have a say in the naming of the Proposal.	• Completion in January 2024 of Aboriginal Heritage survey in accordance with the NSHA with Elders nominated by the KKAC. • Draft Aboriginal Heritage Survey Report provided to KKAC. • SynergyRED has committed to providing opportunities for Proposal naming, with input from KKAC.
KKAC	May 2025 to September 2025	• Engagement with KKAC on Aboriginal cultural heritage.	• Arrangements made for KKAC to review draft heritage report and provide its comments to SynergyRED.
Landowners and Neighbours			
Various Landowners and Neighbours	September 2022 to October 2025	• Across a number of meetings, phone calls and emails, the following items were discussed: - Provided overview of the Proposal - Explored interest in hosting wind turbine(s) or consenting to early feasibility studies - Advance discussions for option to lease and ongoing development activities - Some landowners interested in participating in Social Values Assessment survey or interviews - Noise of wind turbines, visual impact, and property prices - Request permission to access properties for the purpose of surveys: - Noise monitoring survey, including installation of noise loggers - Visual Impact Assessment – photos to be taken from some properties - Biological Surveys (flora and fauna) - Aboriginal heritage surveys - Monitoring wells - Fire assessment - Geotechnical assessment. - Discussions on met mast location, height, size, timing and access for installation - Discussion on location of wind turbines, roads and fencing infrastructure - Discussions on bore exploration locations.	• Multiple landowners have executed an option to lease, with a sufficient number required to support development of the Proposal. • Access granted to certain properties for feasibility studies. • SynergyRED commitment to ongoing engagement regarding the Development Approval Application Process.

Stakeholder	Date(s)	Topic Discussed	Response/ Outcome
Community			
Alexandra Bridge Volunteer Bushfire Brigade	March 2025	• SynergyRED contacted the Alexandra Bridge Bushfire Brigade and left a message to provide overview of Proposal and seek feedback.	N/A
East Augusta Volunteer Bushfire Brigade	March 2025	• SynergyRED contacted the East Augusta Volunteer Bushfire Brigade to: - Provide an overview of Proposal - Seek feedback and questions from Brigade members.	• No concerns or questions at this stage.
Holiday homeowners	March 2025	• SynergyRED contacted holiday homeowners who would have a view of the proposed wind farm, discussing the following information: - Overview of Proposal and potential to see the turbines from the holiday home - Offer to meet with SynergyRED to discuss the Proposal - Queries regarding lighting requirements on turbines - Concerned about the change of view.	• SynergyRED undertook a Landscape and Visual Impact Assessment and socialised these outcomes with the community. These also inform the impact assessment. • SynergyRED continues to work through the proposed requirement for lighting installation on turbines.
Karridale Volunteer Bushfire Brigade	March 2025	• SynergyRED contacted the Karridale Volunteer Bushfire Brigade and left a message to provide overview of Proposal and seek feedback.	N/A
Kudardup Volunteer Bushfire Brigade	March 2025	• SynergyRED contacted the Kudardup Volunteer Bushfire Brigade to: - Provide an overview of Proposal - Seek feedback and questions from Brigade members.	• No concerns or questions at this stage.
Local community	February 2024 to ongoing	• SynergyRED held community engagement sessions to: - Provide an overview of Proposal - Seek feedback and questions from community members.	• The local community raised the following concerns about the Proposal: - Visual impacts - Noise impacts - Infrasound generation - Impacts to property prices - Impacts to birds - Impacts to tourism - Management of ASS - Recyclability of wind turbines SynergyRED's response to these concerns are addressed in Table 10-2.
Molloy Island Volunteer Bushfire Brigade	March 2025	• SynergyRED contacted the Molloy Island Bushfire Brigade to: - Provide an overview of Proposal - Seek feedback and questions from Brigade members.	• No concerns or questions at this stage.
Local Community and Industry Groups			
Augusta Community Development Association	March 2024 to November 2024	• Progress updates on the Proposal. • Invitation to community drop-in sessions. • Generally supportive of the feasibility study and suggested community concern likely to be around the site suitability/selection and impacts on migratory birds.	• SynergyRED commitment to community engagement as studies and impact assessment are completed.
Augusta - Margaret River Clean Community Energy (AMRCCE)	November 2022 to ongoing	• Discussion of work by AMRCCE to date on assessing feasibility of 10 MW wind farm in Scott River and opportunity to collaborate. • Confirmation of partnership for Proposal. • Ongoing feasibility study updates to AMRCCE members.	• Development of a participant agreement into the ongoing feasibility assessment now led by SynergyRED has now been established. • AMRCCE continue to provide advice and support the Proposal.
BHP - Beenup Rehab Project	February 2024 to February 2025	• Meetings and phone calls discussing: - Overview of the Proposal - Opportunities to record bird utilisation within the Beenup rehabilitation area - History of Beenup mine, presence of PASS and lessons learned for PASS management - All tenure confirmed as currently BHP freehold - Site being managed for long-term conservation - BHP provided map of bore locations, Annual Environmental Report, and Surface and Groundwater Baseline Summaries.	• A comprehensive ASS investigation was undertaken for the Proposal, with SynergyRED drawing on BHP experience in ASS Management Measures. • SynergyRED provided link to website for further information and contact details should any member of the BCG have any queries regarding the Proposal.
Lower Blackwood Land Conservation District Committee (LCDC)	March 2024 to May 2024	• Introduction to the Proposal and ongoing engagement regarding Proposal milestones and grant opportunities.	• Three members agreed to be interviewed as part of the Social Values Assessment.

Stakeholder	Date(s)	Topic Discussed	Response/ Outcome
Lower South West Growers Group	March 2024	• Introduction to the Proposal. • Offer to host briefing to group.	N/A
Molloy Island Homeowners Association	April 2024, June 2024 and September 2024	• Phone calls with representatives of the Homeowners Association. Key items discussed included: - SynergyRED provided an overview of the Proposal and the social values assessment and community survey being conducted seeking their interest in participating - Proximity of wind turbines to Molloy Island - Noise levels - Visual impact - Impacts to bats.	• Interviews were conducted with members of Molloy Island Homeowners Association for Social Values Assessment.
UBC Wildflower Society of Western Australia (WSWA)	March 2024 – February 2025	• Discussion of WSWA and UBC purpose, views on renewable energy projects and discussion on WSWA renewable energy position statement. • SynergyRED provided an overview of the Proposal and studies being conducted as part of the feasibility study • WSWA and UBC appreciated the early engagement. • WSWA are supportive of renewable energy projects as long as they are located in the right place (i.e. avoid clearing and located close to where the power is required). • WSWA would like to see biological studies done correctly (multi-season, right time of year, etc. although noted that second season may not be required if clearing is avoided). • UBC and WSWA queried opportunities for rehabilitation, sire improvement and recyclability of infrastructure at end of life.	• Biological surveys follow EPA and DCCEEW guidelines and no change to the scope was required. • SynergyRED issued SIA questionnaire to WSWA and UBC. • SynergyRED to consider adding UBC to the procurement list for rehabilitation works. • SynergyRED to provide an update on completion of studies. • SynergyRED to notify WSWA once applications are submitted.

5. Objectives and Principles of the EP Act

The Proposal is believed to meet the EPA's principles, factors and objectives (EPA 2023b), having given them due consideration in its design and mitigation decisions, to avoid and otherwise reduce residual environmental impacts. This in turn demonstrates that the Proposal will meet the overarching object of the EP Act to 'Protect the environment of the State'.

5.1. Principles

The object of the EP Act is to 'Protect the environment of the State', having regard for the five environmental protection principles, listed under s 4A of the EP Act. Consideration against each of these principles is provided in (Table 5-1).

Table 5-1: Principles of the Environmental Protection Act 1986

Principle	Considerations
1. The Precautionary Principle Where there are threats of serious or irreversible damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by: • Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment • An assessment of the risk-weighted consequences of various options.	The Proposal has been developed through a detailed process of review to ensure that any impacts to the environment, where possible, have been avoided or otherwise have been minimised as far as practicable. To ensure that mitigation decisions are suitably informed of the local environmental values and the potential impacts of the Proposal, SynergyRED has undertaken extensive environmental studies and surveys within the Development Envelope and the surrounding local area. The comprehensive understanding of these values and potential impacts are reflected in the information presented within this document.
2. The Principle of Intergenerational Equity The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	The Proposal has been designed to address the principle of intergenerational equity by complying with the EPA's objectives for each environmental factor. This has been achieved through the implementation of mitigation measures to avoid and reduce the significance of any residual environmental impacts. A maximum of 1 ha of native vegetation will be cleared to support the Proposal. The Proposal also only uses a small proportion of agricultural land and will enable the remainder of the Development Envelope to continue to be used for productive purposes. The Proposal will contribute to economic growth and employment in the South West region, and the increased supply of clean energy will contribute to the affordability of electricity throughout the State. The Proposal contributes to the State Government's aspiration of net zero emissions by 2050 (GoWA 2020) and 2030 interim greenhouse gas emissions reduction target, through the procurement of renewable energy. The assessment contained within this document demonstrates that the Proposal can be implemented to avoid significant impacts to the health, diversity and productivity of the environment for the benefit of future generations.

Principle	Considerations
3. The Principle of the Conservation of Biological Diversity and Ecological Integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Comprehensive baseline environmental studies and surveys have been undertaken to understand the existing biological diversity within the Development Envelope and the local area. This has included flora, vegetation, fauna, wetland, geotechnical and hydrological assessments. The results of these studies and surveys have been used to inform a robust assessment of the potential impacts that the Proposal may have on the biological diversity and ecological integrity within these areas. The clearing of native vegetation and fauna habitat, particularly that of conservation significance has been avoided as far as practicable or minimised in all other circumstances. The Proponent commits to clearing no more than 1 ha of native vegetation, and will avoid impacts to all TECs, conservation significant flora, wetlands, including groundwater dependent values, and black cockatoo potential nesting trees. The minimum RSA has also been increased from 25 m to 40 m to mitigate the risk of strike to low flying bird species such as black cockatoos. To ensure all unavoidable impacts are minimised as far as practicable mitigation measures will be implemented throughout the construction, operation, and decommissioning phases of the Proposal. These mitigation measures are discussed in detail throughout this document.
4. Principles Relating to Improved Valuation, Pricing and Incentive Mechanisms Environmental factors should be included in the valuation of assets and services. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	The costs of environmental constraints through avoidance and management have been considered in the planning and design of the Proposal. The location of the Proposal has been selected to maximise energy production whilst minimising impacts on the surrounding environment. The Proponent will be responsible for funding the cost of the environmental avoidance and management measures and ongoing monitoring, decommissioning and rehabilitation activities.
5. The Principle of Waste Minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	The Proponent is committed to minimising waste as far as practicable during construction, operation, and decommissioning by adopting the hierarchy of waste controls: avoid, reduce, reuse, recycle and safe disposal. In accordance with the decommissioning plan (Appendix C), infrastructure materials and components such as steel, conductors, switches and transformers will be reused, sold as scrap, recycled or repurposed, where possible. The Proponent has observed recent success in the decommissioning of the Ten Mile Lagoon and Nine Mile Beach wind farms in Esperance, where 465 t (97% by weight) of the windfarm was recycled or reused.

5.2. Environmental Factors

Environmental factors are those parts of the environment that may be impacted by an aspect of a Proposal. The EPA has 14 environmental factors, organised into five themes: sea, land, water, air, and people. The 14 environmental factors and how they relate to the Proposal are presented in Table 5-2.

Based on an assessment of potential impacts associated with the Proposal, the key environmental factors considered relevant to the Proposal are:

- Terrestrial Environmental Quality (Section 6)
- Inland Waters (Section 7)
- Flora and Vegetation (Section 8)
- Terrestrial Fauna (Section 9)
- Social Surroundings (Section 10).

Table 5-2: Environmental Factors

Theme	Factor	Objective	Consideration
Sea	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	**This factor is not considered relevant to the Proposal.** The Proposal is located approximately 4 km inshore with no anticipated environmental impact pathways or potential for interaction with benthic communities or habitats.
	Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	**This factor is not considered relevant to the Proposal.** The Proposal is located approximately 4 km inshore with no anticipated environmental impact pathways or potential for interaction with coastal processes.
	Marine Environmental Quality	To maintain the quality of water, sediment, and biota so that environmental values are protected.	**This factor is not considered relevant to the Proposal.** The Proposal is located approximately 4 km inshore with no anticipated environmental impact pathways or potential for interaction with the marine environment.
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	**This factor is not considered relevant to the Proposal.** The Proposal is located approximately 4 km inshore with no anticipated environmental impact pathways or potential for significant interaction with marine fauna.
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	**This factor is considered relevant to the Proposal.** SynergyRED has made a concerted effort to avoid areas of native vegetation wherever possible during the planning and design phase of the Proposal, and as such no more than 1 ha of native vegetation will be cleared as part of the Proposal, with the majority of the Development Envelope being previously cleared agricultural land.
	Landforms	To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.	**This factor is not considered relevant to the Proposal.** No distinctive landforms occur within the Development Envelope.
	Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	**This factor is not considered relevant to the Proposal.** A desktop assessment determined that subterranean fauna are unlikely to be present within the Development Envelope, given the lack of suitable habitat (Invertebrate Solutions 2024b;

Theme	Factor	Objective	Consideration
			Appendix E). Furthermore, the Proposal presents limited potential for impact, associated with construction dewatering and management of PASS (see Section 6 and 7).
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	**This factor is considered relevant to the Proposal.** The Proposal may result in localised impacts to land and soils, particularly associated with the excavation of PASS for the construction of turbine foundation. An ASSDMP will be developed and implemented, of which a Preliminary version has been prepared (PTG 2025; Appendix B).
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	**This factor is considered relevant to the Proposal.** SynergyRED has made a concerted effort to avoid areas of native vegetation wherever possible during the planning and design phase of the Proposal and as such minimal fauna habitat will be cleared as a result of the Proposal, with the majority of the Development Envelope being previously cleared agricultural land. However, up to 1 ha of native vegetation/habitat may be cleared as part of the Proposal and there is also risk of avifauna collision with wind turbines when operational. A preliminary Bird and Bat Adaptive Management Plan (BBAMP) has been developed and will be implemented to manage potential impacts associated with avifauna collision (ELA 2025a Appendix N).
Water	Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	**This factor is considered relevant to the Proposal.** The site contains several predominantly ephemeral wetlands and high water table. SynergyRED has made a concerted effort to avoid all wetlands, will implement an ASSDMP, of which a Preliminary version has been prepared (PTG 2025; Appendix B) and operate in accordance with RiWI Act licence and permits, as well as ensure appropriate drainage management to ensure hydrological regimes and water quality are maintained and wetlands and other potentially groundwater dependent values are protected.
Air	Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	**This factor is not considered relevant to the Proposal.** While the Proposal is likely to generate temporary dust emissions during construction, these emissions can be readily mitigated through standard dust suppression mechanisms and are not anticipated to have significant impact on any environmental values.
	Greenhouse Gas (GHG) Emissions	To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.	**This factor is not considered relevant to the Proposal.** The Proposal will produce emissions associated with wind turbine materials production, transportation, and turbine construction. However, the predicted GHG emissions from the Proposal are well below the EPA's significance threshold of 100,000 tCO2-e emissions released per year, for each Scope 1 and Scope 2 sources (Appendix F). It is noted that the Greenhouse Gas Assessment is considered to be conservative due to the application of the mitigation hierarchy, which has changed since the Proposal design (e.g. reduced clearing).

Theme	Factor	Objective	Consideration
			Inherently, the Proposal will result in a net benefit in comparison to fossil fuel alternatives for energy production in WA.
People	Social Surroundings	To protect social surroundings from significant harm.	**This factor is considered relevant to the Proposal.** While the Proposal will be compliant with noise regulations, is not anticipated to cause shadow flicker impacts on any sensitive dwellings and can be developed to mitigate any electromagnetic interference, the Proposal will be visible from sensitive receptors in the local community. SynergyRED has undertaken extensive community and stakeholder consultation and several community concerns from the Proposal have been raised in relation to this factor. Two Aboriginal cultural heritage sites also intersect the Development Envelope.
	Human Health	To protect human health from significant harm.	**This factor is not considered relevant to the Proposal.** Considerations as they relate to the EP Act are concerned with emission of radiation to the environment. Other considerations are detailed in the Social Surroundings assessment. The Australian National Health Medical Research Council (NHMRC 2015) concludes there is no consistent evidence that wind farms cause adverse health effects in humans. The evidence that does exist suggests that the level of extremely low-frequency electromagnetic radiation close to wind farms is less than average levels measured inside and outside of suburban homes (NHMRC 2015). As such the Proposal does not present an exposure risk to harmful radiation.

6. Terrestrial Environmental Quality

6.1. EPA Environmental Factor Objective

The EPA's objective for the Terrestrial Environmental Quality environmental factor is to "*maintain the quality of land and soils so that environmental values are protected*" (EPA 2016b).

For the purposes of EIA, the EPA defines the terrestrial environment as "the chemical, physical and aesthetic characteristics of soils" (EPA 2016b).

6.2. Relevant Policy and Guidance

Relevant policy and guidance documents for Terrestrial Environmental Quality and how they have been considered for this Proposal are summarised in Table 6-1.

Table 6-1: Policy and Guidance for Terrestrial Environmental Quality

Policy / Guidance	Consideration
Environmental Factor Guideline: Terrestrial Environmental Quality (EPA 2016b)	The information provided in this section addresses the 'considerations for environmental impact assessment' outlined within the guideline.
Contaminated Sites Act 2003	This Act has been considered in the determination of the need for assessment and management of potential existing contamination relevant to the Proposal.
Assessment and Management of Contaminated Sites (DWER 2021)	This document has been considered in the determination of the need for assessment and management of potential existing contamination relevant to the Proposal.
Guideline: Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2015a)	These documents have been considered in the determination of the need for assessment and management of potential ASS relevant to the Proposal.
Guideline: Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER 2015b)	

6.3. Receiving Environment

6.3.1. Studies and Survey Effort

Publicly available datasets and a Preliminary Geotechnical and Baseline Contamination Assessment (Stantec 2024; Appendix G) have been utilised to inform an understanding of the soil landscape, composition and geology within the Development Envelope.

The Preliminary Geotechnical and Baseline Contamination Assessment was undertaken for the Development Envelope and comprised testing via geotechnical boreholes and test pits between February and March 2024 (Stantec 2024). The assessment provided preliminary information on the geology of the site, including soil profile, contamination and presence of ASS.

6.3.2. Topography

The Development Envelope is within a low relief landscape with elevation gradually increasing from the south-west (approximately 9 m AHD) to the north-east (approximately 38 m AHD) (Stantec 2024). There is an average regional slope from north to south of approximately 2.5 m/km and less than 1 m/km from

east to west, and a poorly defined drainage divide that runs approximately through the centre of the Development Envelope, segregating the Blackwood and Scott River headwater catchments. The Blackwood River is located approximately 4 km from the Development Envelope western boundary, at an elevation of approximately 0 m AHD, with the landscape gently increasing in elevation from the river to approximately 20 m AHD at that boundary.

6.3.3. Geology

The Geological Survey of Western Australia (1967 as cited in PTG 2025) mapping undertaken at a 1:250,000 scale for Busselton and Augusta indicates that the Development Envelope is primarily underlain by Quaternary alluvium, comprising quartz-rich sand dunes and Cainozoic laterite. Nearby mapping for Karridale-Tooker undertaken at a 1:50,000 scale indicates that the Leederville Formation, comprising interbedded sedimentary rock and associated units derived via weathering, may be underlying the dune deposits and laterite (ferricrete) across the Development Envelope (Geological Survey of Western Australia 2002 as cited in PTG 2025). Of the three formations that comprise the Lower Cretaceous Warnbro Group, the Leederville Formation is the only one to occur beneath the Scott Coastal Plain (Chan 2011 as cited in PTG 2025). The Warnbro Group is a series of distinct lithological units comprising the Strucel Beds and Beenup Beds, which likely form the Leederville Formation (BHP 1998, 2015 as cited in PTG 2025).

Within the Development Envelope, the main geological stratigraphic units are the Quaternary alluvium, lake and swamp deposits, the Early Cretaceous Leederville Formation and Triassic Lesueur Sandstone (Stantec 2024). Geology within the Development Envelope comprises siliceous dune sands deposited unconformably on the Leederville Formation. Within the dune sands, localised diagenetic features comprise organic stained siliceous sands, bleached siliceous sands and shallow sands, overlying ferricrete (PTG 2025).

The hydrogeology of the Development Envelope is detailed in Section 7.

6.3.4. Soil-Landscape Zones and Systems

The Development Envelope occurs across two soil-landscape zones defined by regional soil mapping (DPIRD 2020), namely:

- Donnybrook Sunkland Zone
- Scott Coastal Zone.

Each soil-landscape zone is divided further into soil-landscape systems. The soils within the Development Envelope fall mostly within the Scott River Plain Land System, with a small northern portion of the Development Envelope intersecting the Nillup Plain System (Table 6-2; Figure 6-1). Both systems are described as “Poorly drained coastal plains in the southern Donnybrook Sunkland” (DPIRD 2022).

Table 6-2: Soil-Landscape Systems within the Development Envelope

Soil-Landscape System	Description	Area within Development Envelope	
		ha	%
Nillup Plain System	Poorly drained plain, in the southern Donnybrook Sunkland. Sandy gravel, non-saline wet soil, grey deep sandy duplex, loamy gravel and pale deep sands. Jarrah-marri-paperbark woodland.	15.66	0.44
Scott River Plain System	Poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and jarrah-marri-paperbark woodland.	3,581.19	99.56

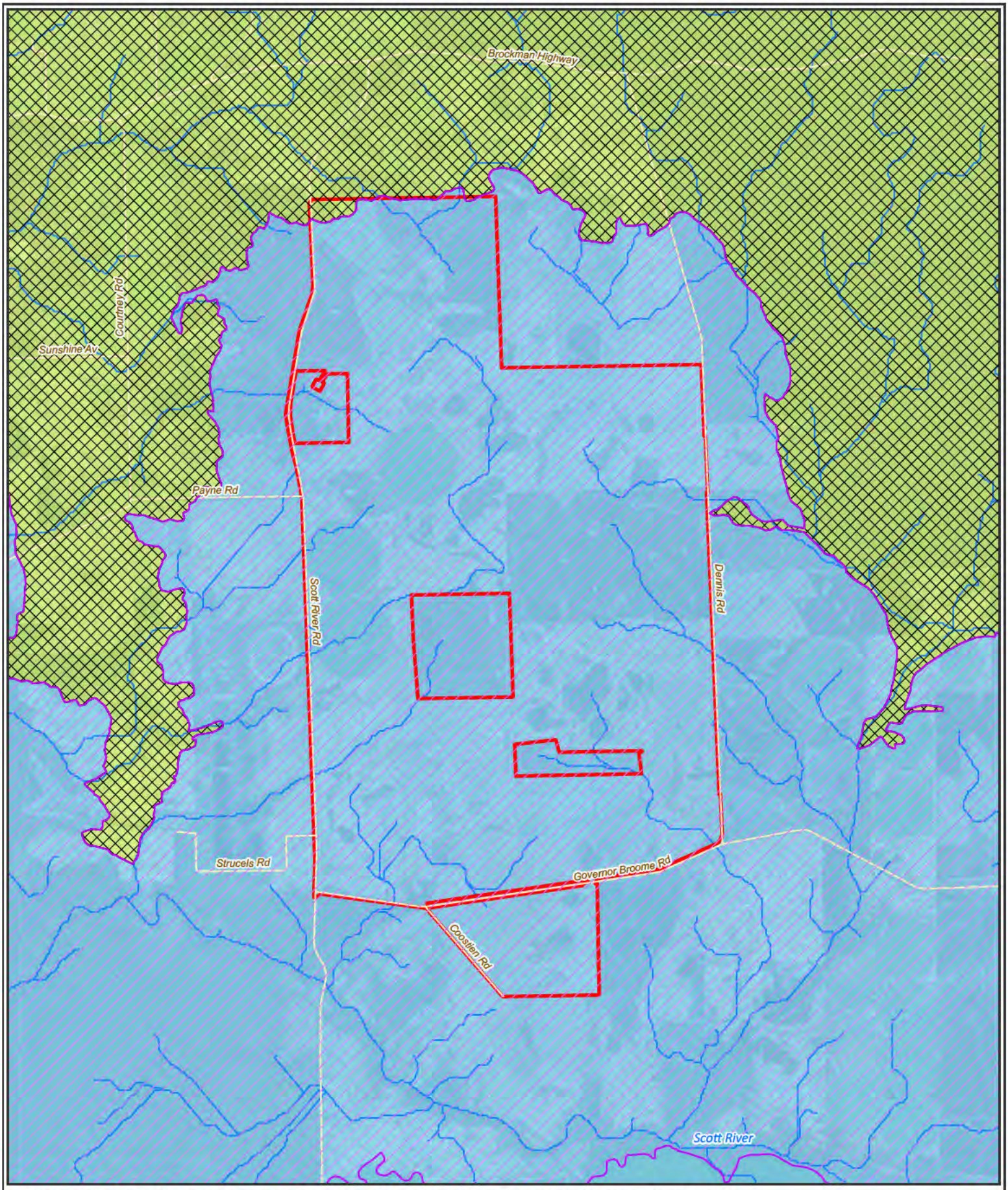


Figure 6-1: Soil-Landscape Mapping Across the Development Envelope

Development Envelope
Roads
Rivers and Tributaries

Soil Landscape Mapping Units (DPIRD 2022)
Nillup Plain System
Scott River Plain System

Soil Landscape Mapping Zones (DPIRD 2020)
Donnybrook Sunkland Zone
Scott Coastal Zone

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date:
9/15/2025

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6.3.5. Soil Profile

The shallow soil profile (<3 m) within the Development Envelope was generally found to comprise a thin layer of topsoil and dune sand overlying ferricrete, or alternating bands of clayey and sandy soils with pockets of organic and peaty material (Stantec 2024). These units are generally underlain by clayey and sandy soils to a depth of approximately 25 m. Outcrops of ferricrete also occur throughout the Development Envelope (Stantec 2024). The Development Envelope can be segregated, based on different soil profile properties, into northern, southern and central portions (Table 6-3).

Table 6-3: Soil Profile Across the Development Envelope

Area of Development Envelope	Soil Profile Description
North	A thin layer of dune sands (< 1.6 m) immediately overlying saturated grey and dark grey, interbedded/alternating bands of clayey and sandy soils and frequent pockets of organic and peaty material.
South	A thin layer of dune sands (< 1.0 m) overlying iron-cemented sands (ferricrete). The encountered ferricrete was a 1.7 m thick, massive rock unit directly overlying weakly cemented organic rich sands. Residual sands and clays likely derived from the Leederville Formation were present underlying this unit.
Centre	Similar to the southern area of the Development Envelope, though ferricrete was present only 0.35 m below surface, underlying topsoil and dune sands and encountered as a 2 m thick, massive rock unit. Weakly cemented organic rich sands were present directly beneath ferricrete, extending to 6.2 m before intersecting clayey and sandy soils likely residuals of the Leederville Formation.

Source: Stantec 2024; PTG 2025

6.3.6. Acid Sulfate Soils

ASS are soils, sediments and peats which occur naturally and contain iron sulfides, typically in the form of pyrite materials (DER 2015a). This soil material remains benign when in a natural, anoxic state. However, ASS that are exposed to oxidation through disturbance (e.g. from dewatering, drainage works and earthmoving activities) have the potential to cause significant environmental effects, including contamination of waterways, groundwater and impacts to soil quality.

ASS includes PASS and actual acid sulfate soils (AASS). PASS are soils or sediments which contain iron sulfides that have not been oxidised, while AASS are soils or sediments containing iron sulfides which have undergone some oxidation (DER 2015a).

ASS Risk Mapping identifies the top 3 m of soils within the Development Envelope as having high to moderate risk of ASS occurring (DWER 2017; Figure 6-2). The geotechnical and baseline contamination assessment undertaken for the Proposal included a preliminary ASS investigation of the Development Envelope, including field screening and laboratory testing (Stantec 2024). Results of a pH field oxidation (pH_{FOX}) assessment indicated the possible presence of PASS within all samples; however, no AASS was identified. The results of the suspension peroxide oxidation combined acidity and sulfate (SPOCAS) assessment indicated that 50 of the 70 samples tested exceeded the National Acid Sulfate Soils Guidance's net acidity action criteria (0.03%S), triggering the requirement for an ASS management plan to be developed and implemented (Stantec 2024; Sullivan et al. 2018).

The results indicate that PASS is present within all soil types of the Development Envelope except for shallow pale grey/white sands that occur less than 1 mbgl (PTG 2025). The dark grey/brown sands and sandy clay which occur more than 2 mbgl are considered the highest risk soils within the Development Envelope due to the presence of elevated concentrations of inorganic sulfur.

6.3.7. Contaminated Sites

The DWER Contaminated Sites Database (DWER 2025 as cited in PTG 2025) has mapped two contaminated sites adjacent to the western boundary of the Development Envelope (site 886 and 4254), both of which are associated with the historic mining of heavy mineral sands at the BHP Beenup Mineral Sands Mine (Figure 6-2). These sites have been classified as “remediated for restricted use” due to the elevated levels of acidity, sulfate and aluminium present in the groundwater.

Works at the historic mine included the excavation of heavy mineral sands via dredging and subsequent wet mineral separation and concentration, which resulted in the disturbance of PASS material (PTG 2025). Remedial works were completed from 2000 to 2001, including treatment with lime sand. Metal and acidity-impacted groundwater has been identified at the mine, caused by the disturbance of ASS. Groundwater modelling and risk assessments have indicated that this impacted groundwater does not pose an unacceptable risk to human health or to the environment, including the Scott River and Blackwood River as downstream receptors (PTG 2025). The groundwater levels within the Development Envelope are higher than, and up gradient of, the adjacent historic mine, with no suspected interaction with the acid mine plume (Stantec 2025b).

6.3.8. Contaminants of Potential Concern

The geotechnical and baseline contamination assessed the presence of asbestos, nutrients and contaminants of potential concern within the Development Envelope (Stantec 2024). Contaminant presence was analysed against the following adopted assessment criteria, where relevant, to assess potential ecological and human health risks:

- CRC Care 2011 Soil HSL Intrusive Maintenance Worker (shallow trench)
- CRC Care 2011 Soil HSL Direct Contact (Intrusive Maintenance Worker)
- NEPM 2013 HSL Screening levels (HSL) for vapour intrusion Commercial/Industrial
- NEPM 2013 Health Investigation Levels (HILs) Commercial/Industrial
- NEPM 2013 Ecological Screening levels (ESL) Commercial/Industrial
- NEPM 2013 Ecological Investigation Levels (EIL) Commercial/Industrial.

Asbestos was not identified in the soil within the Development Envelope (Stantec 2024).

All other contaminants of potential concern were recorded below the laboratory limit of reporting or adopted assessment criteria, where relevant, including; Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene, Total Recoverable Hydrocarbons, metals (arsenic, beryllium, boron, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium and zinc), Organochlorine, Organophosphate, pesticides, and Per- and polyfluoroalkyl substances (PFAS) (Stantec 2024).

Concentrations of nutrients, including potassium, nitrogen and total kjeldahl nitrogen (TKN), nitrate, nitrite, nitrogen and phosphorus were recorded above the laboratory limit of reporting; noting that there are no assessment criteria for nutrients in soil (Stantec 2024).

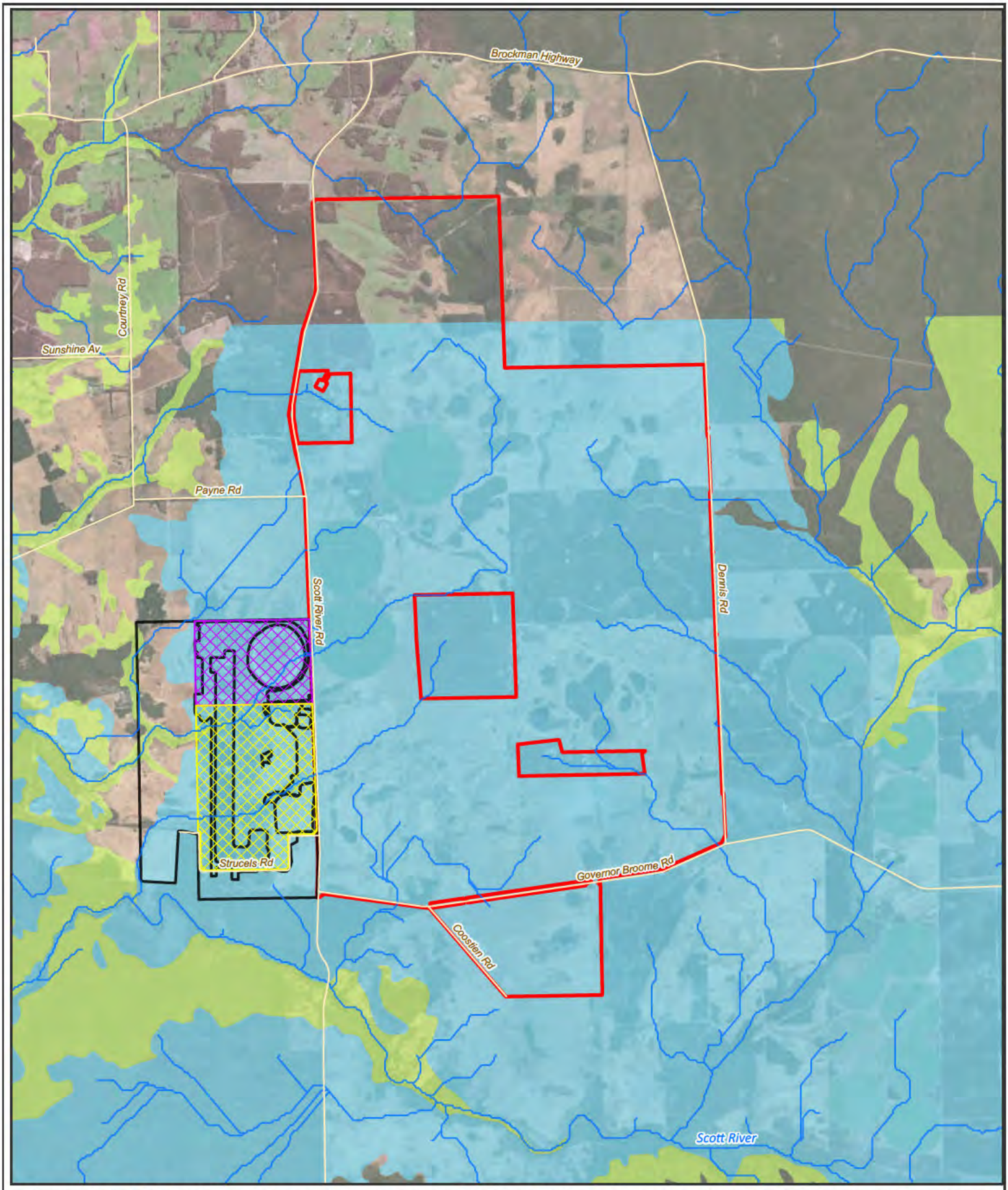

Figure 6-2: ASS Risk Mapping and Contaminated Sites within and Surrounding the Development Envelope

- Roads
- Rivers and Tributaries
- Development Envelope
- Beenup Mine

Acid Sulfate Soil Risk Mapping (DWER 2017)

- High to moderate risk of ASS occurring within 3m of natural soil surface
- Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface

Contaminated Sites (DWER 2025c)

- Site 886: Remediated for Restricted Use
- Site 4254: Remediated for Restricted Use

0 0.5 1 2
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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6.4. Potential Environmental Impacts

The potential direct and indirect impacts of the Proposal on terrestrial environmental quality prior to mitigation being applied have been identified as:

- Soil acidification and/or toxicity due to disturbance of PASS during construction
- Soil erosion due to ground disturbing activities
- Soil contamination from accidental loss or spills of hydrocarbons and other hazardous materials.

Related potential impacts to groundwater and surface water are assessed in Inland Waters (Section 7).

6.5. Mitigation

The Proponent has applied the mitigation hierarchy during the design of the Proposal to reduce the potential impacts to the quality of the terrestrial environment within and surrounding the Development Envelope as far as practicable.

Specific mitigation and management measures proposed to be implemented by the Proponent have been detailed in Table 6-4. Key management measures are discussed below.

Due to the presence of PASS within the Development Envelope, the Proponent commits to the preparation and implementation of an ASSDMP in accordance with relevant guidance to manage the potential risks to terrestrial environmental quality during construction of the Proposal. A Preliminary ASSDMP has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP to be developed following the completion of detailed site investigations and detailed design prior to construction of the Proposal (PTG 2025; Appendix B). The ASSDMP is expected to be a condition of DA approval.

Turbine and other mast/tower foundations will be designed to limit the excavation of PASS and dewatering requirements, while achieving the necessary mass and stability. Three foundation options are being considered (Section 2.2.1; Figure 2-3). The specific foundation option chosen for each turbine/mast/tower location will be determined based on detailed site investigation and revised modelling to ensure that any proposed dewatering or excavation would not result in significant impacts to terrestrial environmental quality as a result of PASS exposure. Below ground foundations will only be used where it is confirmed that the proposed turbine/mast/tower location would not require dewatering.

Borrow material will be assessed for the presence of PASS prior to disturbance. Borrow pits will be excavated above the groundwater level, and so will not require dewatering, and will be backfilled to a level that prevents groundwater seepage and ponding during high rainfall periods.

Any dewatering required will not exceed 2 mbgl at the perimeter of each foundation and will be managed to ensure drawdown does not exceed 0.1 m beyond 100 m from any dewatering location. Management of potentially acidic dewatering effluent is addressed in Section 7, in accordance with the Preliminary ASSDMP (Appendix B).

A Construction Environmental Management Plan (CEMP; SynergyRED 2025; Appendix H) has been prepared to manage potential environmental impacts during the construction phase. The CEMP details the management measures used to minimise potential impacts to the quality of the terrestrial environment during construction of the Proposal, including key management targets and actions, contingency actions, monitoring and reporting requirements.

Table 6-4: Proposed Terrestrial Environmental Quality Mitigation Measures

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Soil acidification and/or toxicity due to disturbance of PASS during construction	N/A	• Disturbance of PASS will be avoided wherever practicable. • Turbine/mast/tower foundations have been designed to limit the excavation of PASS and exposure of in-situ PASS as a result of dewatering (as detailed in Section 2.2.1.1 and illustrated in Figure 2-3). • Drawdown will be limited to a maximum of 2 mbgl at the perimeter of each foundation and will not exceed 0.1 m beyond 100 m from any dewatering location, to ensure exposure of in-situ PASS is minimised. • Borrow pits will be excavated above the groundwater level, and so will not require dewatering, and will be backfilled to a level that prevents groundwater seepage and ponding during higher rainfall periods. • Borrow material will be assessed for the presence of PASS prior to disturbance. • A detailed geotechnical and ASS investigation will be undertaken prior to construction. This will include additional soil sampling and analysis to at least 1 m below the base of any proposed excavations to ascertain the extent of PASS. • A detailed ASSDMP will be prepared and implemented following completion of detailed site investigations and revised modelling, to be informed by the Preliminary ASSDMP (Appendix B). The ASSDMP will include the following key management measures: - Soils requiring management will be treated with aglime upon excavation and reinterred, reused on-site and or taken off site for disposal, with limestone pads constructed where needed to manage treated soil stockpiles. - All stockpiled material will be stored an adequate distance away from waterways and wetlands to minimise the potential for leachate/runoff entering waterbodies. - ASS material that cannot be reused (i.e. geotechnically unsuitable and cannot be used as non-structural fill) will be disposed of offsite at a licensed facility. - In areas requiring soil management and treatment, soils at the base of excavations will be covered with a thin layer of aglime as a precautionary measure to provide buffering capacity against minor releases of acidity. - Treated soil will be assessed to validate the adequacy of the lime treatment. Where soils do not meet the validation criteria, soils will be retreated and retested until the criteria are met. - Appropriate groundwater level triggers will be developed to manage the depth of groundwater extraction, limiting the dewatering exposure of PASS (Section 7).	N/A	Potential for minor impacts to soil quality within the Development Envelope as a result of PASS disturbance during construction. The assessment and significance of this residual impact is detailed in Section 6.6.1.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Soil erosion due to ground disturbing activities	N/A	• Clearing of remnant native vegetation within the Development Envelope will be limited to a maximum of 1 ha. • The Indicative Disturbance Footprint has been designed to utilise existing cleared areas and tracks as much as practicable. • The CEMP (Appendix H) will include the following key management measures for erosion: - Runoff from infrastructure (such as the substation, O&M and concrete batching areas) will be captured and directed to an on-site retention basin for settlement and infiltration and/or controlled discharge through a stormwater overflow designed to manage sediment removal and reduce stormwater velocity. - Drainage control structures (e.g. drains and culverts) will be appropriately located, designed and constructed to maintain surface water flow regimes and minimise erosion. - Topsoil stockpiles will be constructed by paddock-dumping to a maximum height of 2 m. - Topsoil stockpiles will be sited to avoid areas likely to experience substantial surface water flows, where practicable. - Windrows of sufficient height will be installed around topsoil stockpiles to prevent surface water erosion. - Topsoil stockpiles and exposed soils are to be regularly inspected and maintained. - All access tracks will be stabilised and watered to minimise the generation of airborne dust and soil during construction. - Erosion protection will be installed in line with relevant guidelines.	• Land temporarily disturbed during construction (e.g. for laydown areas and concrete batching plant) will be rehabilitated to the original land use or to a post closure land use agreed with the landowners.	Potential for minor impacts to soil quality as a result of wind and surface water erosion, limited to the Development Envelope. The assessment and significance of this residual impact is detailed in Section 6.6.2.
Soil contamination from accidental loss or spills of hydrocarbons and other hazardous materials	N/A	• Potentially contaminating substances such as solid and liquid wastes and bulk hydrocarbons will be stored and handled as per the requirements of the *Dangerous Goods Safety Act 2004*. • The CEMP (Appendix H) will include the following key management relevant to hydrocarbons and hazardous materials: - All liquid chemicals will be bunded. Bunds will be impermeable, have a capacity of 110% of the largest container stored or 25% the total volume stored and be covered/protected from rainfall and stormwater ingress. - Bunds will be inspected regularly and kept free of residue, litter and stormwater. - All chemical and fuel containing facilities will be regularly inspected for leaks and spills. - Storage containers will be labelled as per the relevant Safety Data Sheet (SDS). - Appropriate spill equipment is to be available during the transportation and handling of hazardous materials. - Potentially contaminated water will be treated on site before being discharged into stormwater drainage or contained and removed as contaminated waste.	N/A	Potential for accidental loss or spill of hazardous materials resulting in soil contamination, to be remediated and limited to the Development Envelope. The assessment and significance of this residual impact is detailed in Section 6.6.3.

6.6. Assessment and Significance of Residual Impacts

6.6.1. Soil Acidification and/or Toxicity due to Disturbance of PASS during Construction

PASS material remains benign when in a natural, undisturbed and anoxic state. Construction of the Proposal, including excavation and dewatering, has the potential to expose PASS to oxidation, which has the potential to result in impacts to soil quality through acidification, mobilisation of metals and reduction in soil fertility and stability.

The Proposal has the potential to expose PASS, due to the excavation for borrow pits, as well as excavation and associated dewatering required for the construction of turbine foundations and other supporting below ground infrastructure (e.g. communication tower foundations, met mast foundations and underground cabling). Material from borrow pits will be excavated above groundwater (i.e. will not require dewatering) and will be managed in accordance with the ASSDMP. Borrow pits will also be backfilled to the maximum seasonal groundwater level prior to any seasonal fluctuations to ensure no groundwater seepage and ponding occurs.

Three potential foundation designs have been included as part of the Proposal (Section 2.2.1.1), with the two primary foundations options (above ground and partially above ground foundations) minimising the amount of PASS proposed to be excavated. The maximum depth of the primary foundation options is 1.2 mbgl, noting that the dark grey/brown sands and sandy clay which occur more than 2 mbgl are considered the highest risk soils within the Development Envelope (Section 6.3.6). Any PASS soils excavated during construction will be treated with aglime where required, in accordance with the Preliminary ASSDMP, and reused on site where possible. Treated soil will be assessed to validate the adequacy of the lime treatment and retreated and tested where required. The final foundation for each location will be specific to the local soil and groundwater conditions as defined by detailed geotechnical and ASS investigations and revised modelling completed prior to construction (Section 2.2.1.1) and will also ensure that the depth of dewatering does not exceed 2 mbgl at the perimeter of each foundation, and that drawdown does not exceed 0.1 m beyond 100 m from any dewatering location, to ensure any potential exposure of in-situ PASS is localised. In accordance with the Preliminary ASSDMP (Appendix B), appropriate groundwater level triggers will be developed to manage the depth of groundwater extraction within the Development Envelope, thereby limiting the dewatering exposure of PASS.

The Proponent considers that potential impacts of PASS disturbance during construction can be appropriately managed through the implementation of an ASSDMP which will be prepared and implemented in accordance with the Preliminary ASSDMP (Appendix B). On this basis, construction of the Proposal is not expected to result in significant impacts to soil quality as a result of PASS disturbance.

6.6.2. Soil Erosion due to Ground Disturbing Activities

Soil erosion may result in the deterioration of soil condition by removing topsoil and soil structure. This has the potential to impact the health of overlying vegetation, effecting ecosystem function. The clearing of native vegetation and excavation of soils for construction of the Proposal has the potential to increase erosion through exposure of soils to wind and water.

The occurrence of soil erosion within the Development Envelope during construction is unavoidable. Erosion will be limited to ground disturbance areas within the Indicative Disturbance Footprint, of which the majority (94.92%) is within existing cleared areas. The Proposal has been designed to minimise clearing of native vegetation as much as possible, with a maximum clearing extent of 1 ha.

A CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for erosion. Key management measures include the appropriate siting, design and maintenance of

drainage controls and topsoil stockpiles to prevent surface water erosion. All access tracks will be stabilised and watered to minimise the generation of airborne dust and soil.

Through the implementation of mitigation measures within the CEMP, it is expected that any soil erosion as a result of the Proposal will be limited and localised to the disturbed areas during construction. On this basis, the Proposal is not expected to result in significant impacts to soil quality or associated environmental values as a result of erosion.

6.6.3. Soil Contamination from Accidental Loss or Spills of Hydrocarbons and Other Hazardous Materials

Hydrocarbons and other chemicals will be used and stored within the Development Envelope during construction and operation of the Proposal (e.g. fuels, lubricants, cement, admixtures and other chemicals required for concrete batching). There is potential for accidental spills to occur, which may result in contamination of soil and subsequent impacts to environmental values, such as vegetation, fauna habitat, surface water and groundwater systems.

All potentially hazardous substances will be stored and handled in accordance with the *Dangerous Goods Safety Act 2004.* A CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for soil contamination. All liquid chemicals will be bunded and covered/protected from rainfall and stormwater ingress and bunds will be regularly inspected and maintained. Spill response equipment will be readily available and accessible at the site of hazardous materials storage and use to ensure a prompt response to any accidental spills.

Given the provision for appropriate containment and clean-up in the unlikely event of a large spill, the accidental loss or spill of hydrocarbons or other hazardous materials are not expected to result in significant residual impacts to soil quality.

6.7. Environmental Outcomes

No significant impacts to terrestrial environmental quality are expected as a result of the Proposal. In consideration of the proposed avoidance and mitigation measures, the environmental outcomes of the Proposal for the Terrestrial Environmental Quality environmental factor are:

- Impacts to soil quality as a result of the disturbance of PASS will be minor and short-term, and limited to the Development Envelope
- Impacts to soil quality as a result of erosion will be minor and short-term, and limited to the Development Envelope
- Impacts to soil quality as a result of any accidental loss or spill of hazardous materials will be minor and remediated, and limited to the Development Envelope.

Impacts will be managed through the implementation of management plans throughout construction and operation of the Proposal, including a CEMP (Appendix H), and a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B) prior to construction.

The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Terrestrial Environmental Quality environmental factor "*to maintain the quality of land and soils so that environmental values are protected*".

7. Inland Waters

7.1. EPA Environmental Factor Objective

The EPA's objective for the Inland Waters factor is to *"maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected"* (EPA 2018).

For the purposes of EIA, the EPA defines Inland Waters as "the occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality)" (EPA 2018).

7.2. Relevant Policy and Guidance

Relevant policy and guidance documents for Inland Waters and how they have been considered for the Proposal are summarised in Table 7-1.

Table 7-1: Policy and Guidance for Inland Waters

Policy / Guidance	Consideration
Environmental Factor Guideline: Inland Waters (EPA 2018).	The information provided in this section of the document has been tailored to address the 'considerations for environmental impact assessment' outlined within this guideline.
Rights in Water and Irrigation Act 1914 (RiWI Act)	This Act has been used to inform the description of values of the receiving environment.
Water Quality Guidelines (ANZECC and ARMCANZ 2000)	This document has been used to define potential beneficial uses and ecosystem health of existing inland waters.
Guideline: Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2015a)	These documents have been used to guide the identification, assessment and management of water with regard to the presence of PASS.
Guideline: Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER 2015b)	
Operational Policy No. 5.12 – Hydrogeological Reporting Associated with a Groundwater Well Licence (DoW 2009)	This document has been used to guide the assessment of hydrogeological values.

7.3. Receiving Environment

7.3.1. Studies

A Surface Water and Hydrogeological Assessment (Stantec 2025b; Appendix A) was undertaken to investigate the hydrological and hydrogeological regimes within the Development Envelope and to assess potential impacts to inland waters associated with the construction and implementation of the Proposal. The assessment included the following key components:

- Surface water – flood characterisation assessment and modelling to identify inundation areas to inform the future placement of infrastructure and mitigate impacts on surface flow post-construction
- Hydrogeological assessment – characterisation of hydrogeology supported by modelling to predict potential changes in groundwater levels and drawdown extent associated with temporary dewatering during construction
- Preliminary risk assessment – to provide an understanding of key hydrogeological and hydrological risks associated with the Proposal and indicate preliminary mitigation measures to prevent impacts to sensitive environmental receptors.

The assessment was informed by additional hydrological and hydrogeological studies within the region, providing greater context of local processes and sensitive receptors within and surrounding the Development Envelope. Additional studies include a Groundwater and Surface Water Monitoring Program (Stantec 2025a), undertaken over 12 months, to understand the seasonal variability of the groundwater and surface water systems within the Development Envelope, as well as the Preliminary Geotechnical and Baseline Contamination Assessment which assessed the presence of PASS within the Development Envelope (Stantec 2024; Section 6.3.1).

7.3.2. Climate

The Development Envelope is subject to the Mediterranean climate of the Warren bioregion, characterised by hot summers and mild, wet winters (Section 2.5.1). Based on data from the Scott River weather station (station ID: 509199), considered the most representative of climate condition within the Development Envelope, the average annual rainfall is 953.2 mm (Stantec 2025b). The annual average pan evaporation within the Development Envelope has been estimated to be 1,452 mm, indicating a deficit between annual average rainfall and pan evaporation (Stantec 2025b).

7.3.3. Geology and Soils

Within the Development Envelope, the main geological stratigraphic units are the Quaternary alluvium, lake and swamp deposits, the Early Cretaceous Leederville Formation and Triassic Lesueur Sandstone (Stantec 2024). Geology comprises siliceous dune sands deposited unconformably on the Leederville Formation. Within the dune sands, localised diagenetic features comprise organic stained siliceous sands, bleached siliceous sands and shallow sands, overlying ferricrete (‘coffee rock’) (PTG 2025).

The generalised soil profile within the Development Envelope was found to comprise a thin layer of topsoil and dune sand overlying ferricrete, or alternating bands of clayey and sandy soils with pockets of organic and peaty material (Stantec 2024). These units are generally underlain by clayey and sandy soils to a depth of approximately 25 m. Outcrops of ferricrete also occur throughout the Development Envelope (Stantec 2024).

ASS Risk Mapping identifies the soils within the Development Envelope as being of moderate to high risk of ASS occurring within 3 m of the soil surface (DWER 2017). Results of a pH field oxidation assessment (pH_{FOX}) indicated the possible presence of PASS within all samples; however, no AASS were identified. This field, and further laboratory, analysis indicate that PASS is present in all soil types of the Development Envelope that occur more than 1 mbgl (PTG 2025). The dark grey/brown sands and sandy clay which occur more than 2 mbgl are considered the highest risk soils within the Development Envelope due to the presence of elevated concentrations of inorganic sulfur.

Further detail on the geology, soils and PASS within the Development Envelope is described in Section 6 (Terrestrial Environmental Quality).

7.3.4. Surface Water

7.3.4.1. Surface Water Catchments and Waterways

The Development Envelope intersects the Blackwood River catchment and Scott River catchment and several ephemeral waterways, with approximately 14.0 km^2 (39%) of the Development Envelope draining into the Blackwood River and 22.0 km^2 (61%) draining into the Scott River (Figure 7-1; Stantec 2025b). A poorly defined ridgeline occurs through the middle of the Development Envelope, which segregates the eleven Blackwood River and Scott River sub catchments which discharge from the Development Envelope (Figure 7-1; Stantec 2025b).

The minor ephemeral waterways within the Development Envelope typically flow from north-east to south-west towards the Blackwood River, which is located approximately 4 km west of the Development Envelope, and south-east towards the Scott River, approximately 1 km to the south (Figure 7-1).

The Scott River acts as a tributary to the Blackwood River and the confluence of the rivers is located approximately 5.4 km south-west of the Development Envelope. From the convergence onwards, the Blackwood River flows through the Hardy Inlet, before discharging into the Indian Ocean.

During summer, the Blackwood River is recharged by groundwater from the Yarragadee and Leederville Aquifers which contribute 30% to 100% of the rivers water supply. Concurrently, the tributaries of the Blackwood River contract or become dry (Beatty et al. 2009 as cited in Stantec 2025b).

7.3.4.1. Drainage and Flow

There is existing drainage infrastructure within the Development Envelope to facilitate plantation and agricultural activities. This drainage has not been established to coordinate with roads and natural drainage lines, which has resulted in catchment modification and several areas of localised ponding (Stantec 2025b).

There is no available flood extent data or downstream tailwater condition information for Scott River (Stantec 2025b). Surface water modelling indicated that the frequent flow regimes (such as the 50% Annual Exceedance Probability [AEP]) demonstrate a minor inundation extent and a small number of defined flow paths which discharge from the Development Envelope (Stantec 2025b). During frequent flow events, the average flow depth is less than 100 mm across the Development Envelope with defined flow paths conveying depths of approximately 100 mm.

During frequent (50% AEP) and rare flow regimes (1% AEP), peak flow rates vary from 0.5 m^3/s to approximately 20 m^3/s, respectively, with that maximum discharge rate occurring south to the Scott River (Stantec 2025b; Figure 7-2). The modelled maximum velocity of flows during these rare events over the majority of the Development Envelope is less than 0.5 m/s, with localised sections of some waterways near the western and southern boundaries experiencing flows above 0.5 m/s. A few even

more localised sections subject to flow velocities above 2 m/s are too small to be visible at the mapping scale shown (Figure 7-2). The maximum ponding depth during a 50% AEP is approximately 1.2 m, occurring at the south-west of the Development Envelope. In both frequent (approximately 50% AEP) and rare events (1% and 2% AEP), inundated areas with depths greater than 0.5 m typically occur upstream of roads that act as hydraulic barriers, with some ponding occurring in areas of wetlands and perched ponds (Stantec 2025b). Inundation is widespread during rare flow regimes (1% and 2% AEP), with a maximum ponding depth of approximately 2.8 m occurring towards the north of the Development Envelope (Figure 7-3).

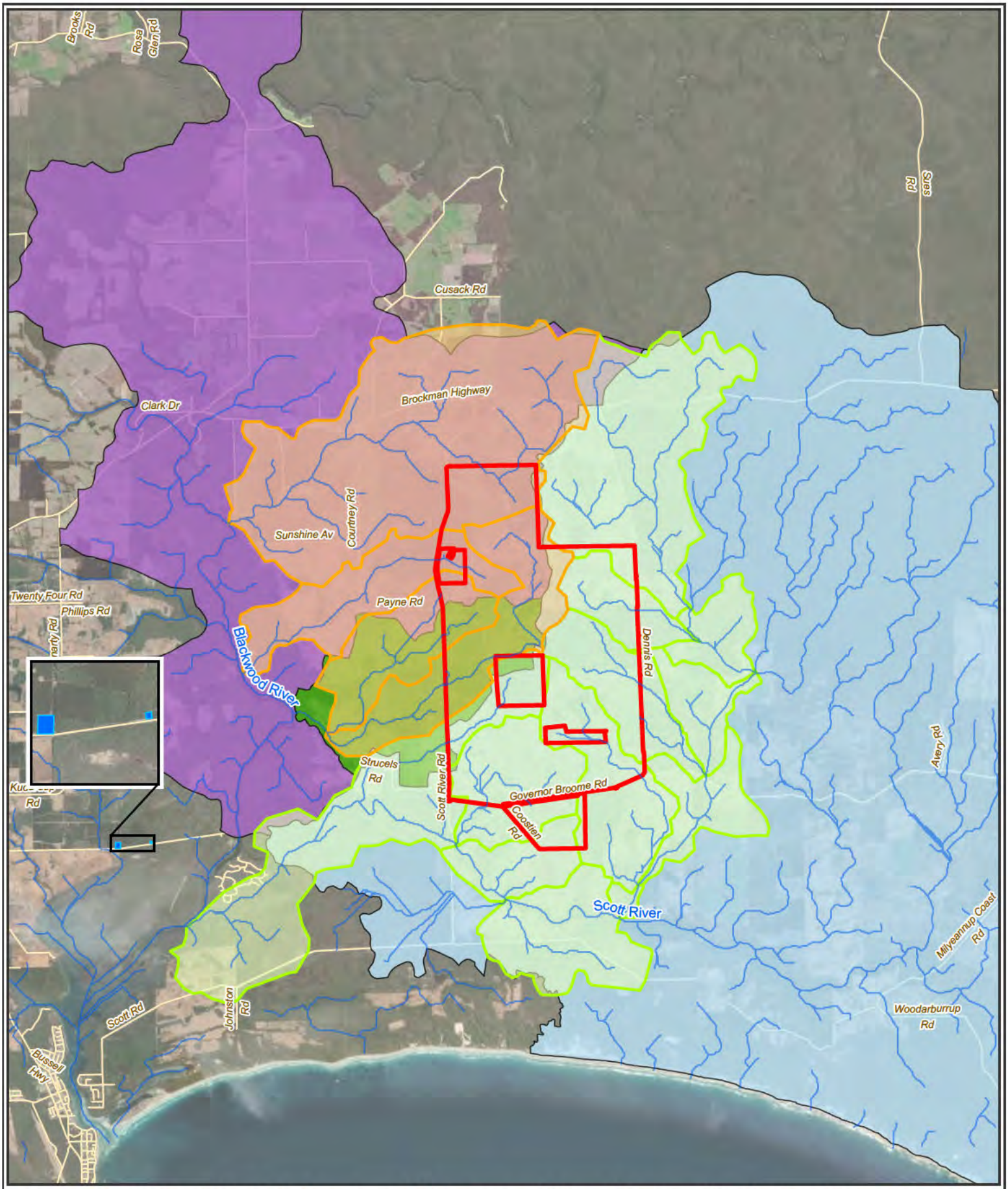

Figure 7-1: Surface Water Catchments and Waterways within and Surrounding the Development Envelope

- Roads
- Rivers and Tributaries
- Development Envelope

Catchment Plan

- Scott River
- Blackwood River

Surface Water Management Subareas (DWER 2018b)

- Beenup
- Scott
- Lower Blackwood

Public Drinking Water Source Areas (DWER 2025d)

- Fisher Road Wellfield Water Reserve

0 1 2 4
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/16/2025

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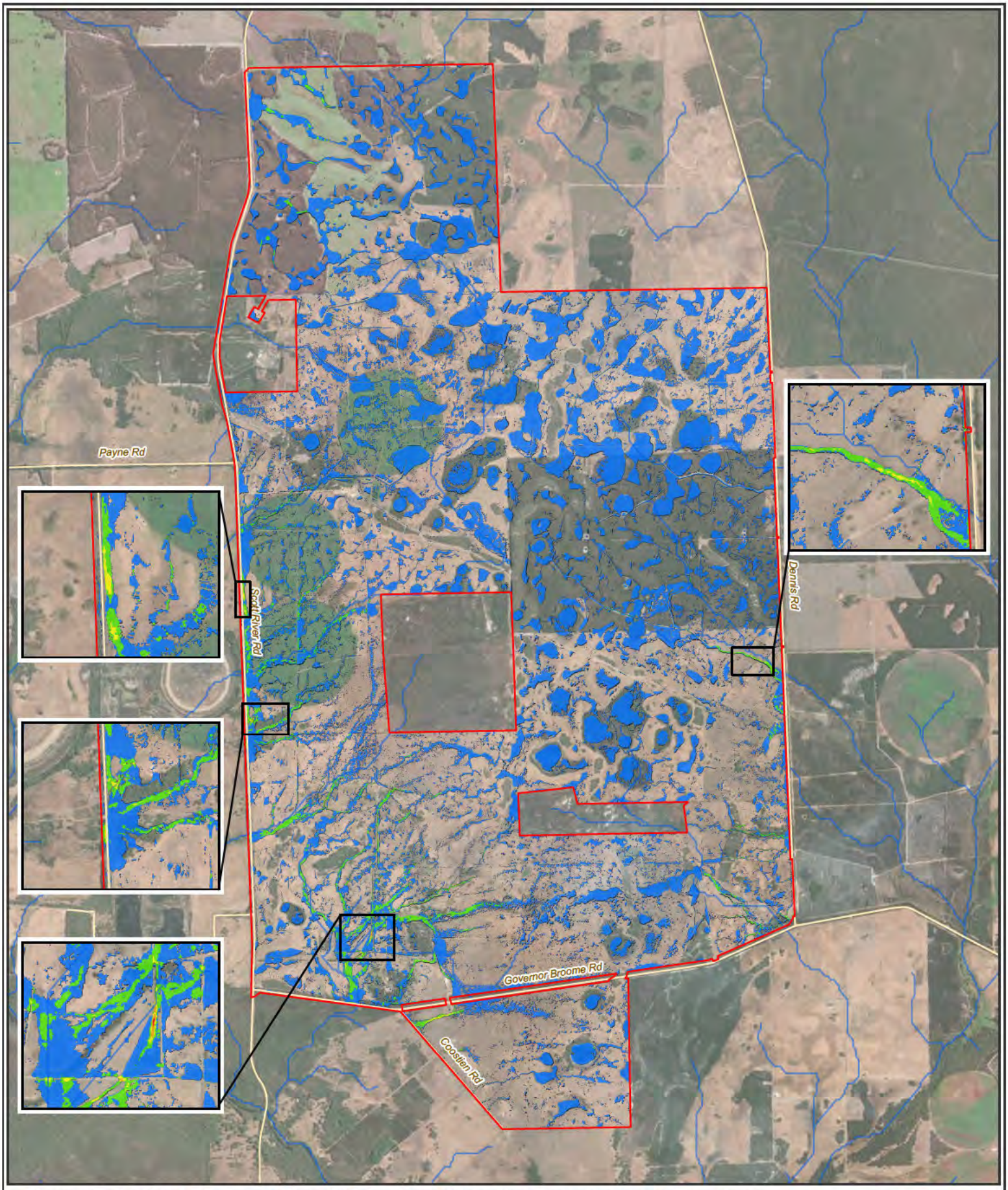

Figure 7-2: 1% AEP Peak Flood Velocity within the Development Envelope

Roads
Rivers and Tributaries
Development Envelope

Maximum Velocity (m/s) (Stantec 2025b)

- <0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 3.0

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date:
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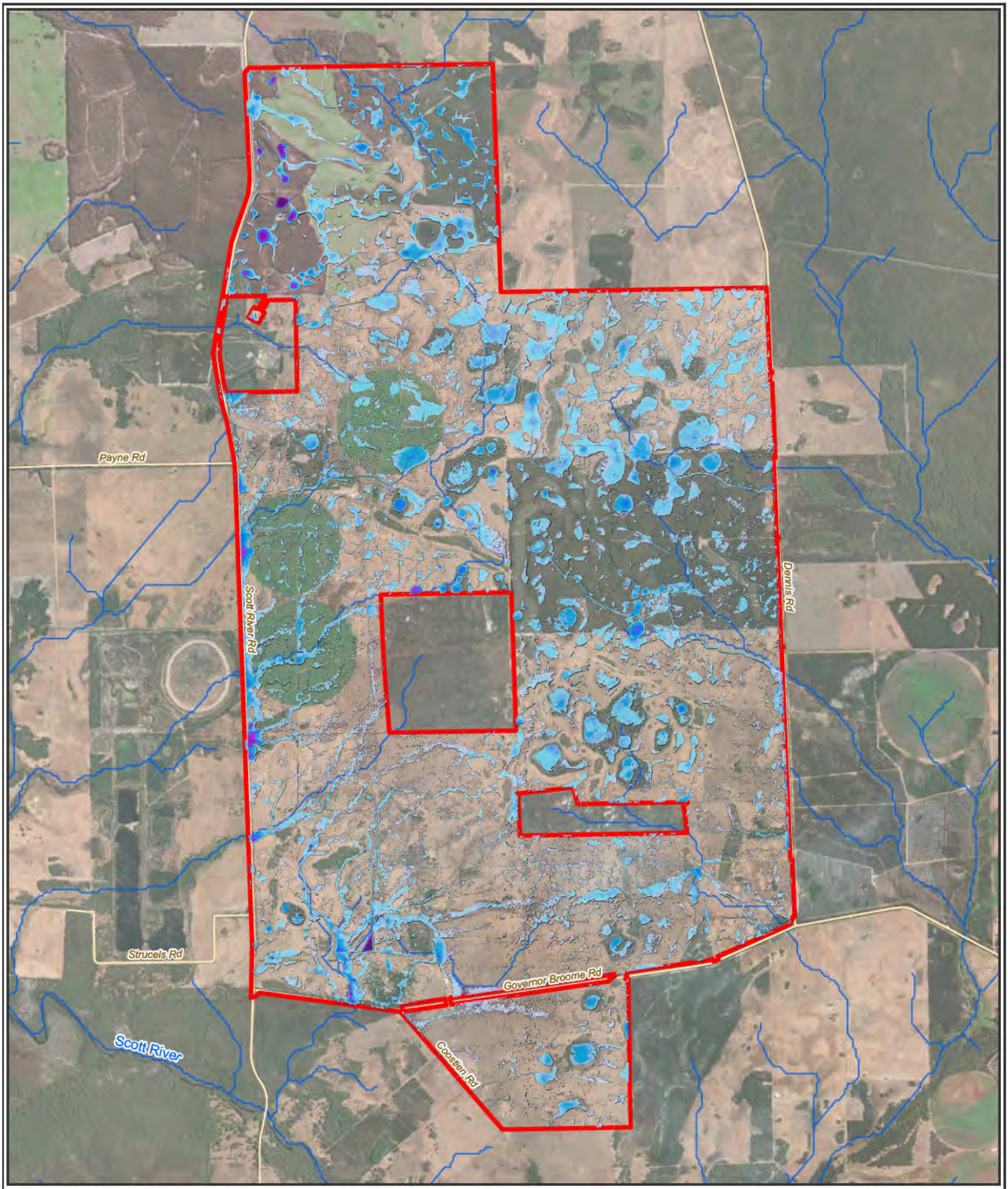

Figure 7-3: 1% AEP Peak Flood Depths within the Development Envelope

Roads
Rivers and Tributaries
Development Envelope

Maximum Ponding Depth (m) (Stantec 2025b)

0.0 - 0.03
0.03 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.5
0.5 - 0.7
0.7 - 1.0
1.0 - 1.5
>1.5

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/12/2025

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7.3.4.2. Wetlands

Within Western Australia, a wetland is defined under the EP Act (Schedule 5) as:

"An area of seasonally, intermittently, or permanently waterlogged or inundated land, whether natural or otherwise and includes lakes, swamps, marsh, spring, damplands, tidal flats or estuary".

According to Geomorphic Wetland mapping, approximately 83% of the Development Envelope is classified as a wetland (WRC 2017 as cited in Phoenix 2025a). While the geomorphic wetland mapping does not include management categories, the following geomorphic wetland types have been identified within the Development Envelope (Semeniuk 1995 and 1997, as cited by Stantec 2025b):

- Sumpland: located within a basin landform and defined as seasonally inundated
- Dampland: located within a basin landform and defined as seasonally waterlogged
- Palusplain: located on a flat landform and defined as seasonally waterlogged.

Field surveys conducted within the Development Envelope have concluded that the mapped Geomorphic Wetland boundaries are inaccurate (Phoenix 2025a). As such, wetland values within the Development Envelope have been assessed based on the three wetland habitat types mapped within its boundaries (Phoenix 2025b); discussed further in Section 9 (Terrestrial Fauna). While a large wetland to the south Governor Broome Road, and a cluster of wetlands in the north, were observed to persist into summer and are considered to have the potential to be permanently inundated (perennial) the wetlands are mostly ephemeral and shallow, with water levels of typically less than 1 m (Phoenix 2025b).

There may be seasonal connection between the Superficial Aquifer where there is locally perched and seasonally present groundwater in proximity to wetlands (Stantec 2025b; Section 7.3.5.1).

Refer to Section 7.3.5.2 for related discussion on groundwater dependent ecosystems [GDEs]) and Section 9.3.6.2 for related discussion on and mapping of wetland habitats, including potentially groundwater dependent wetlands.

7.3.4.3. Surface Water Quality

Surface water quality assessments have been undertaken in the vicinity of the Development Envelope as part of DWER's Healthy Rivers Program. Findings suggest that tributaries have elevated salinity and nutrient concentrations compared to the Scott River, attributable to the clearing within the catchment and agricultural runoff (Stantec 2025b). The waterways experience increased salinity during summer and increased nutrient and salt levels following periods of heavy rainfall. High temperatures, algal blooms and low flow conditions in the summer are known to have contributed to lower dissolved oxygen levels in this catchment (DWER 2024 as cited in Stantec 2025b).

Overall, surface water quality within the Development Envelope is characterised by elevated nutrients, salinity, turbidity, and metals, influenced mainly by agricultural land use and associated runoff, with some tested parameters exceeding health and ecological guideline thresholds (Stantec 2025a). Seasonal effects were not clearly identified due to limited data. Water quality monitoring was undertaken at five surface water creekline discharge sites and three wetlands in April 2024, July 2024, September 2024 and January 2025. Results are summarised as follows:

- pH: Ranged from neutral to alkaline (6.7–7.8). Most values were within regional reference ranges, though two wetland sites exceeded lower guideline triggers in September 2024. Some pH increases were noted but data was insufficient to confirm seasonal effects.
- Salinity: All sites were classified as freshwater, with total dissolved solids (TDS) ranging from 214 to 2,240 mg/L. Some sites exceeded non-potable use salinity triggers. Average salinity during the program (650 mg/L) was higher than past regional data (500 mg/L). Electrical conductivity and turbidity often exceeded guideline triggers, attributed to disturbed agricultural land influences. No clear seasonal trends were observed.
- Ionic composition: generally, Na>Ca>K>Mg (cations), and Cl>HCO_3>SO_4 (anions). Sodium and chloride concentrations exceeded non-potable water triggers at several sites, reflecting salinity trends. Limited data prevented seasonal analysis.
- Nutrients: Total nitrogen and phosphorous levels were variable but mostly exceeded guideline triggers, consistent with regional data. Concentrations are linked to agricultural fertiliser use and soil conditions leading to runoff. An increase in total nitrogen from September 2024 to January 2025 was considered to relate to lower water volumes and increased algae in warmer months.
- Dissolved metals: Most metal concentrations were below detection limits except for iron and aluminium. Iron exceeded non-potable and irrigation guideline triggers widely across creekline and wetland sites. Aluminium exceeded triggers at some wetland sites. Metal elevations likely result from natural mineralisation, land disturbance, runoff, and groundwater irrigation. No clear seasonal patterns were evident.

7.3.4.4. Surface Water Management and Public Drinking Water Areas

The Development Envelope intersects three Surface Water Management Areas: Lower Blackwood, Beenup and Scott Surface (Stantec 2025b). The nearest Public Drinking Water Source Area to the Development Envelope is the Fisher Road Wellfield Water Reserve, located approximately 10 km south-west (Figure 7-1).

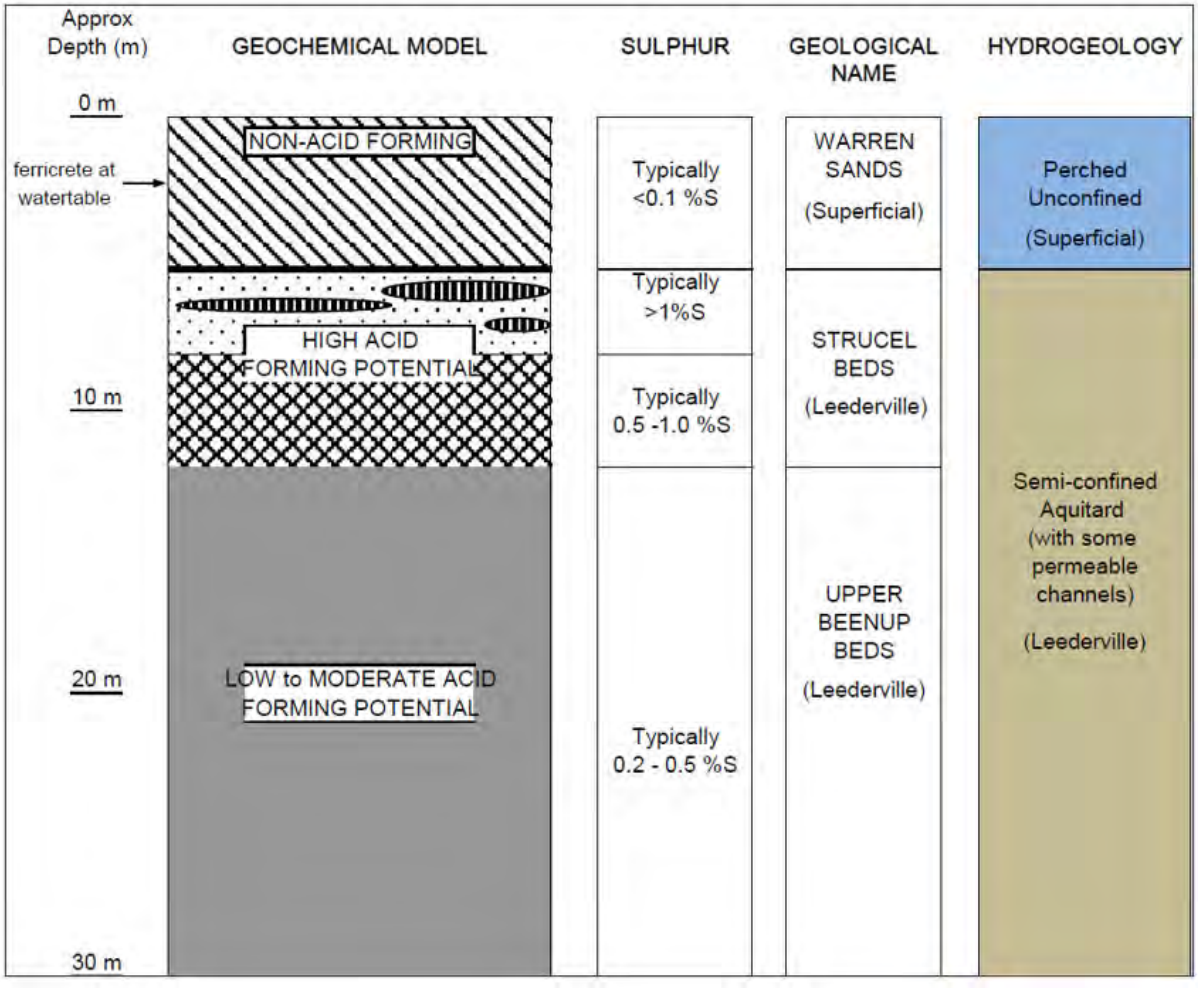
7.3.5. Groundwater

7.3.5.1. Hydrostratigraphy

The groundwater system within the Development Envelope comprises two main aquifers (Figure 7-4; Stantec 2025b):

- Superficial Aquifer
- Leederville Aquifer.

The Lesueur Aquifer is a deeper confined formation that is also known to occur regionally. However, this unit was not encountered during recent hydrogeological investigations and is not expected to be encountered during construction of the Proposal (Stantec 2025b), and as such it is not discussed further in this assessment.



Adapted from BHP 2015, cited in Stantec 2025b

Figure 7-4: Conceptual Hydrological and Geochemical Schematic Model of the Historic Beenup Titanium Mine (adjacent to the Development Envelope)

7.3.5.1.1. Superficial Aquifer

The Superficial Aquifer is separated from the underlying Leederville Aquifer by the Mowen aquitard. Regionally, the Superficial Formation has a saturated thickness of less than 10 m, excluding the coastal dunes and western sections of the coastal plains where it is only a few metres thick (Mohsenzadeh and Diamond 2000, as cited by Stantec 2025b). The Superficial Aquifer occurs in localised areas, comprising

perched groundwater bodies situated above the impermeable beds of the Leederville Formation, along with discrete confinement zones characterised by low permeability within the lateritic (ferricrete) profile (DoW 2009b).

Within the Development Envelope, the Superficial Aquifer is generally less than 3 m deep. This discontinuous, perched aquifer is present across the Development Envelope and likely to be seasonal (Stantec 2025b). The formation is comprised of sand and ferricrete of variable thickness, with the presence of ferricrete potentially representing the accumulation and precipitation of dissolved iron in the watertable. The perched aquifer was identified through groundwater seepage recorded in several shallow test pits across the Development Envelope, with measurements ranging from 1.1 mbgl to 2.0 mbgl (Stantec 2025b). Groundwater standing levels in the Superficial Aquifer across the Development Envelope ranged from 0.11 mbgl to 3.15 mbgl.

The Superficial Aquifer is recharged by direct diffuse rainfall infiltration and downward leakage from creeks, wetlands and irrigation through alluvial soils (Stantec 2025b). Upward leakage from the underlying Leederville Formation may also occur. Lateral flow may serve as an alternate source of recharge, infiltrating from adjacent areas with higher groundwater levels, such as nearby wetlands and dune peaks. During the winter (wet season), the watertable is shallow, with potential for some groundwater expression occurring at the surface and in wetlands. The depth to watertable increases during the drier summer months, with some areas becoming dry. Discharge from the Superficial Aquifer occurs through evapotranspiration, lateral flow and downward leakage into underlying formations.

7.3.5.1.2. Leederville Aquifer (Warnbro Group)

The Leederville Aquifer is a confined aquifer that lies beneath the superficial formations of the coastal plains (Stantec 2025b). In some areas of the Blackwood River the aquifer has been weathered and lateritised and can be found at the surface. The Mowen aquitard consists of two main layers, the Quindalup and Mowen members, which are largely comprised of clay and silty clay. In areas where the Quindalup member contains more sand and the Mowen member is thinner, the overall sand content increases. Together, these two members form a complex unit that merges with the Leederville Aquifer, creating a multi-layered groundwater system composed of alternating sand and clay layers. This system is typically up to 100 m thick but may reach thicknesses of 200 m in some locations (DoW 2009 as cited in Stantec 2025b). These features are defined as the Beenup Beds (sand) and Strucel Beds (clay) (Stantec 2025b).

The Leederville Aquifer is recharged via lateral flow, downward leakage from the Superficial Aquifer and potential upward leakage from the Lesueur Aquifer. The aquifer discharges to rivers, creeks, the coast and other aquifers through vertical leakage.

The Leederville Aquifer was identified in groundwater monitoring bores across the Development Envelope at depths ranging from 0.07 mbgl to 2.25 mbgl (Stantec 2025b).

7.3.5.1. Existing Groundwater Use and Management

A total of 24 registered groundwater bores occur within 500 m of the Development Envelope (Figure 7-5; Stantec 2025b). One of these bores is registered for water supply, one is registered for stock and domestic use, 11 are registered as subject to monitoring and 11 are registered as ‘unknown’ and are expected to be associated with groundwater monitoring for the historic Beenup Mineral Sands Mine.

The Development Envelope occurs within the Beenup Groundwater Management Subarea and Beenup Subarea of the South-West Groundwater Allocation Plan (Figure 7-5; Stantec 2025b). The Development Envelope also intersects Groundwater Management Zone 7, which is classified as ‘a buffer zone area defined by acid sulfate soil plume from Beenup mine site’ (DoW 2009a). The implementation of

Groundwater Management Zone 7 has restricted water use from the Superficial and Leederville aquifers, with no new water allocation, bores or excavations permitted to be constructed within those aquifers within the management zone boundary other than exempt uses, monitoring, replacement of existing bores or remediation (Stantec 2025b).

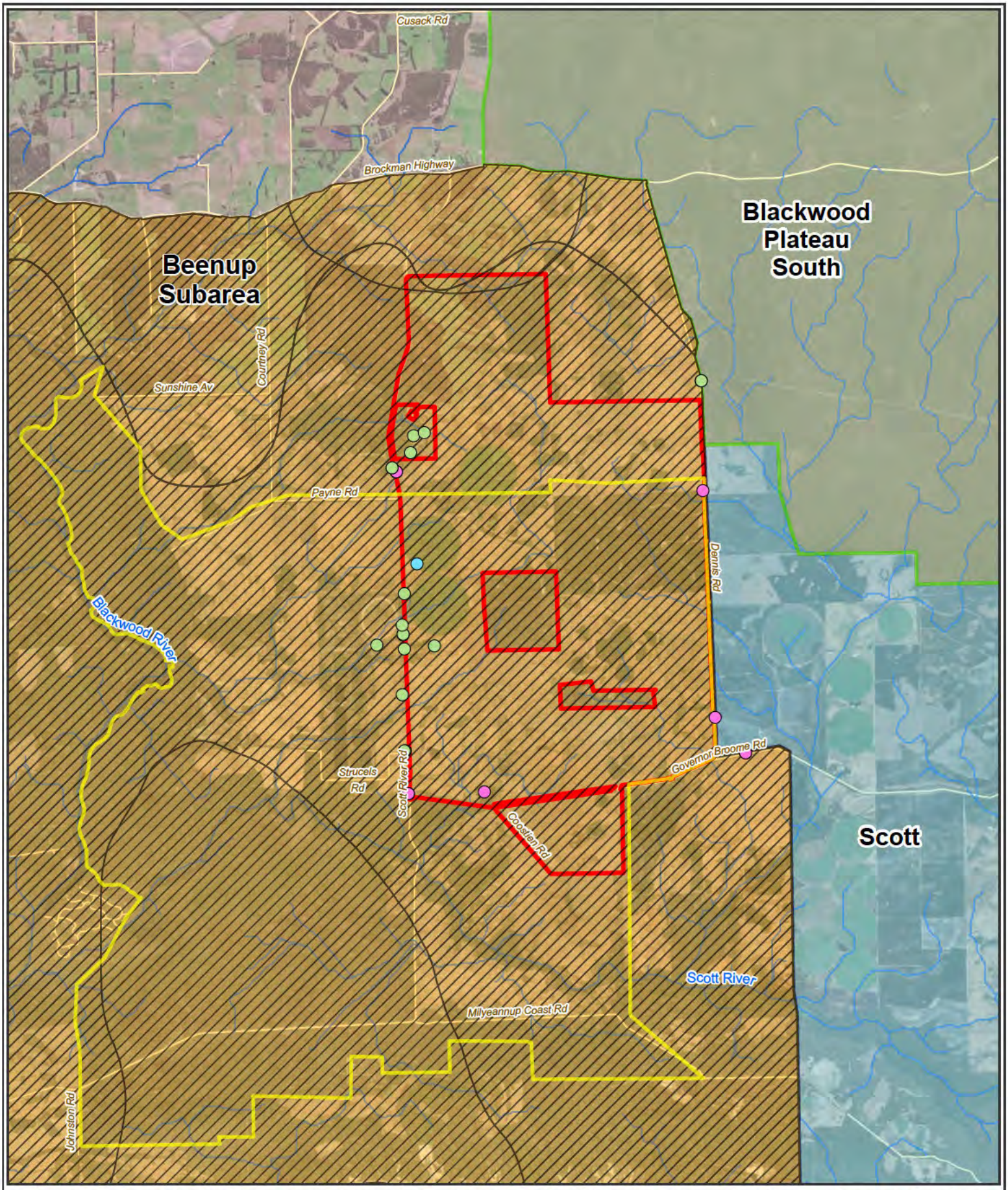


Figure 7-5: Groundwater Management Areas and Registered Bores within and Surrounding the Development Envelope

- Roads
- Rivers and Tributaries
- Development Envelope
- Groundwater Management Zone 7

Groundwater Management Subareas (DWER 2025e)

- Beenup
- Blackwood Plateau South
- Scott

South-west Groundwater Allocation Area (DWER 2025f)

- Beenup Subarea

Registered Bores (BoM 2025c)

- Monitoring
- Stock and Domestic
- Unknown

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/12/2025

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7.3.5.2. Groundwater Levels and Flow

Groundwater levels vary slightly across the Development Envelope, based on monitoring undertaken between April 2024 and January 2025 (Stantec 2025b; Stantec 2025a). Watertable levels recorded were:

- -0.11[1] mbgl to 3.15 mbgl in the Superficial Aquifer
- 0.07 mbgl to 2.25 mbgl in the Leederville Aquifer.

Groundwater flow across the Development Envelope within the Superficial Aquifer is likely to be discontinuous, with flow pathways influenced by recharge, evapotranspiration and seasonal rainfall (Stantec 2025b). Groundwater is expected to generally follow the topographic gradient, flowing towards the south or south-west, or south-east within the eastern portion of the Development Envelope.

Within the Leederville Aquifer, higher groundwater levels towards the north of the Development Envelope indicate a southward groundwater flow.

Both the Superficial and Leederville aquifers experience seasonal groundwater level variation, strongly correlated to rainfall, with peak groundwater levels occurring in the winter months and beginning of spring and declining by up to 2 m during dry periods (Stantec 2025b). The shallow bores of the Superficial Aquifer indicate a stronger response to rainfall than the deeper bores of the Leederville Aquifer; however, both aquifers were observed to experience seasonal fluctuation in water levels of between 1-2 m (Stantec 2025b). This is consistent with long-term monitoring undertaken by BHP which demonstrates fluctuations between 1 and 2 m over summer in both the Superficial and Leederville aquifers (BHP 2015 as cited in Stantec 2025b). Groundwater levels are also influenced by seasonal irrigation pumping schemes.

7.3.5.1. Groundwater Quality

The Superficial and Leederville aquifers are generally fresh at a regional level, with TDS of less than 500 mg/L (DoW 2009b). Within the Development Envelope, groundwater was classified as acidic to neutral, and fresh (Stantec 2025a).

Groundwater quality within the aquifers exceeded relevant guideline trigger values, derived from ANZECC & ARMCANZ (2000) and related guidelines on environmental and potable water quality, for multiple water quality parameters (Table 7-2). Generally, there were no clear seasonal trends apparent for most analytes, other than a spike in turbidity and nutrient concentrations in July 2024, a spike in nutrient concentrations in September 2024 and spike in aluminium concentrations in September 2024 (Stantec 2025a). A total of 11 metals were not detected at concentrations above the level of analytical detection across both the Superficial Aquifer and the Leederville Aquifer. A further four metals were recorded at concentrations below guideline triggers, or did not have an available guideline trigger (barium, boron, silicon, sulphur). The remaining four metals (aluminium, copper, iron and manganese) occurred in concentrations exceeding relevant trigger values across the Superficial Aquifer and the Leederville Aquifer.

[1] A negative value indicates watertable levels above the surface

Table 7-2: Groundwater Quality within the Development Envelope

Groundwater Quality Characteristic	Superficial Aquifer	Leederville Aquifer
pH **Trigger value:** 6.8	Classified as acidic to neutral with all pH values exceeding the lower ANZECC & ARMCANZ (2000) trigger value.	Classified as acidic to neutral with all pH values exceeding the lower ANZECC & ARMCANZ (2000) trigger value.
Salinity (TDS) **Trigger value:** 600 mg/L	Classified as freshwater although the Department of Health (DoH; 2014, cited in Stantec 2025a) non-potable use trigger (600 mg/L) was exceeded at three monitoring bores across multiple monitoring events (maximum value 822 mg/L). The exceedances were likely attributable to surrounding agricultural land use.	Classified as freshwater. Dominated by sodium and chloride, with concentrations of Cl exceeding the DoH (2014; cited in Stantec 2025a) non-potable use trigger (250 mg/L) within the Superficial Aquifer at WM03-W-S04 during July 2024 (287 mg/L), September 2024 (320 mg/L), and January 2025 (307 mg/L).
Salinity (Electrical conductivity) **Trigger value:** 300 µS/cm	Exceeded the ANZECC & ARMCANZ (2000) trigger value in the majority of bores across all monitoring events. Exceedances attributed to surrounding land use.	Exceeded the ANZECC & ARMCANZ (2000) trigger value in the majority of bores across all monitoring events. Exceedances attributed to surrounding land use.
Turbidity **Trigger value:** 20 NTU	Exceeded the ANZECC & ARMCANZ (2000) trigger value in the majority of bores across most monitoring events. Exceedances attributed to surrounding land use.	Exceeded the ANZECC & ARMCANZ (2000) trigger value in the majority of bores across most monitoring events. Exceedances attributed to surrounding land use.
Total nitrogen **Trigger value:** 1.2 mg/L	Results ranged between 0.1 mg/L and 42 mg/L. Exceeded the ANZECC & ARMCANZ (2000) trigger value in the majority of bores across most monitoring events.	Below the relevant guideline triggers across all bores and monitoring events (range between 0.2 mg/L and 0.6 mg/L).
Ammonia **Trigger value:** 0.4 mg/L	Exceeded the DoH (2014) non-potable use trigger in three bores across three monitoring events (exceedance ranging from across all bores 0.04 mg/L to 1.2 mg/L with a spike of 35.1 mg/L in September 204 at one bore).	Below the relevant guideline triggers across all bores and monitoring events.
Aluminium **Trigger value:** 0.15 mg/L and 0.2 mg/L	Exceeded the Water Quality Australia (2021) default guideline value (DGV) and the DoH (2014, cited in Stantec 2025a) non-potable use trigger in two bores across four monitoring events.	Below the relevant guideline triggers across all bores and monitoring events.
Copper **Trigger value:** 0.0025 mg/L	Exceeded the Water Quality Australia (2021) DGV in all bores. With exceedances ranging from 0.003 mg/L to 0.006 mg/L.	Exceeded the Water Quality Australia (2021) DGV in all bores, with exceedances ranging between 0.003 mg/L to 0.005 mg/L, excluding a January 2025 spike (0.189 mg/L) in one bore.
Iron **Trigger value:** 0.2 mg/L and 0.3 mg/L	Exceeded the DoH (2014, cited in Stantec 2025a) non-potable use trigger and the ANZECC & ARMCANZ (2000) agricultural long-term trigger value (LTV) in all bores across the majority of monitoring events. Exceedances ranged from 0.2 mg/L to 30.2 mg/L.	Exceeded the DoH (2014 as cited in Stantec 2025b) non-potable use trigger and the ANZECC & ARMCANZ (2000) agricultural LTV in all bores across all but one monitoring event. Exceedances ranged from 2.6 mg/L to 14.9 mg/L.
Manganese **Trigger value:** 0.2 mg/L	Exceeded the ANZECC & ARMCANZ (2000) agricultural LTV in three bores across multiple monitoring events. Exceedances ranged from 0.06 mg/L to 0.61 mg/L.	Exceeded the ANZECC & ARMCANZ (2000) agricultural LTV in two bores across three monitoring events. Exceedances ranged from 0.21 mg/L to 0.61 mg/L.

Source: Stantec 2025b; Stantec 2025a

7.3.5.2. Groundwater Dependent Ecosystems

GDEs require access to groundwater to meet their ecological water requirements (Phoenix 2025c). GDEs can be classified as either obligate or facultative depending upon their degree of groundwater dependency (Eamus et al. 2006). Obligate GDEs are reliant on groundwater for the maintenance of all or part of their ecosystem function. Facultative GDEs use groundwater when it is available; however, its absence does not impact the ecological functioning of the ecosystem.

GDEs include aquatic (wetlands), terrestrial (groundwater dependent vegetation [GDV]) and subterranean ecosystems (BoM 2025b). Subterranean fauna have been assessed as unlikely to be present within the Development Envelope, given the lack of suitable habitat present (Invertebrate Solutions 2024a; Section 5.2). As such, subterranean GDEs are not considered relevant to the Proposal.

Locally perched and seasonally present groundwater within the Superficial Aquifer in proximity to wetlands within the Development Envelope may be seasonally connected (Stantec 2025b). The Leederville Aquifer is not expected to be directly connected to wetlands present within the Development Envelope, with the exception of areas of potential outcropping near the northern boundary.

Known and potential GDV and other potential GDEs (wetland habitats) are described in Section 8.3.2.7 and 9.3.6.2 respectively.

7.4. Potential Environmental Impacts

The potential direct and indirect impacts of the Proposal on inland waters prior to mitigation being applied have been identified as:

- Groundwater drawdown associated with construction dewatering leading to temporary reduction in groundwater levels (quantity) and reduced interaction with surface water
- Excavation penetrating an aquitard causing excessive leakage from the Superficial Aquifer
- Changes to surface hydrological regimes due to Proposal infrastructure
- Changes to groundwater flow due to Proposal infrastructure
- Acidification and/or toxicity of surface water and/or groundwater during construction due to:
    - Disturbance and/or inappropriate handling of PASS
    - Inappropriate management of dewater.
- Reduced quality of surface water and/or groundwater due to erosion, sedimentation or mobilisation of nutrients from ground disturbing activities
- Contamination of surface water and/or groundwater from accidental loss or spills of hydrocarbons and other hazardous materials
- Acidification of groundwater through the draw in of the adjacent Beenup Mineral Sands acid mine plume during construction dewatering
- Groundwater drawdown associated with construction dewatering reducing water security for surrounding bore users.

Associated impacts to GDEs are largely addressed in Section 8 (Flora and Vegetation) and Section 9 (Terrestrial Fauna).

7.5. Mitigation

The Proponent has applied the mitigation hierarchy during the design of the Proposal to reduce the potential impacts to inland waters within and surrounding the Development Envelope as far as practicable.

Specific mitigation and management measures proposed to be implemented by the Proponent have been detailed in Table 7-3. Key management measures are discussed below.

Turbine and other mast/tower foundations have been designed to limit dewatering requirements, while achieving the necessary mass and stability. Three foundation options are being considered (Section 2.2.1.1; Figure 2-3). The specific foundation option chosen for each turbine/mast/tower location will be determined based on detailed site investigation and revised modelling to ensure that any proposed dewatering would not result in significant impacts to groundwater or surface water quality. Dewatering will be managed to ensure drawdown does not exceed 2 mbgl at the perimeter of each foundation nor exceed 0.1 m beyond 100 m from any dewatering location. Below ground foundations will only be used where it is confirmed that the proposed turbine/mast/tower location would not require dewatering.

Borrow pits will be excavated above the groundwater level, and so will not require dewatering, and will be backfilled to a level that prevents groundwater seepage and ponding during high rainfall periods.

Due to the presence of PASS within the Development Envelope (Section 6), the Proponent commits to the preparation and implementation of an ASSDMP prepared in accordance with relevant guidance to manage potential impacts to surface water and groundwater during construction of the Proposal. A Preliminary ASSDMP (PTG 2025; Appendix B) has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP, which will be developed following completion of detailed site investigations and detailed design prior to construction of the Proposal. The ASSDMP is expected to be a condition of DA approval.

A CEMP (SynergyRED 2025; Appendix H) has been prepared to manage potential environmental impacts during the construction phase of the Proposal. The CEMP details the management measures used to minimise potential impacts to surface water and groundwater during construction of the Proposal, including key management targets and actions, contingency actions, monitoring and reporting requirements.

Table 7-3: Proposed Inland Waters Mitigation Measures

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Dewatering leading to temporary reduction in groundwater levels and reduced interaction with surface water	• Borrow pits will be constructed above watertable. • Transmission poles and towers will utilise concrete caisson (bored concrete) foundations.	• Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable • Dewatering will be managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B), to ensure that drawdown does not present an unacceptable impact on the environment. This will be achieved through: - Application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location - Drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDEs (see Section 8 and Section 9). - Use of alternative turbine foundations (Section 2.2.1.1) - Strategic disposal of dewater to, and location of, infiltration basins/trenches around the point of extraction to minimise the cone of depression - Application of other management strategies as required (e.g. sheet piling).	N/A	Potential for minor temporary and localised drawdown during construction. The assessment and significance of this residual impact is detailed in Section 7.6.1.
Penetration of an aquitard causing excessive leakage from the Superficial Aquifer	N/A	• Use of alternative turbine foundations (Section 2.2.1.1) to minimise the requirement to excavate beyond the ferricrete or clay layers of the aquitard.	N/A	Penetration of an aquitard that would lead to excessive leakage for the Superficial Aquifer is unlikely. The assessment and significance of this residual impact is detailed in Section 7.6.2.
Changes to surface hydrological regimes due to Proposal infrastructure	• No clearing of native vegetation growing in association with wetland values, including any	• Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable.	N/A	Potential for minor and localised changes to surface water flow and surface water depth.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
	contiguous native vegetation within 50 m.	• Modification of existing drainage infrastructure will be avoided, where possible, unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors. • Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion. • Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. • Design and construction works will ensure that local grading and excavation areas do not create areas of pooled water. • Exposed soils will be vegetated or covered (e.g. with rock or synthetic liners) in disturbed areas where surface water flow velocities exceed 1 m/s and remain below 2 m/s.		The assessment and significance of this residual impact is detailed in Section 7.6.3.
Changes to groundwater flow due to Proposal infrastructure	N/A	• Use of alternative turbine foundations (Section 2.2.1.1).	N/A	Potential for minor and localised upstream mounding and downstream shadowing of groundwater at locations of underground foundations. The assessment and significance of this residual impact is detailed in Section 7.6.4.
Acidification and/or toxicity of surface water and/or groundwater during construction due to: • Disturbance and/or inappropriate handling of PASS • Inappropriate management of dewater.	• Dewater will not be discharged to waterways/wetlands (directly or indirectly). • Borrow pits will be constructed above watertable. • Transmission poles and towers will utilise concrete caisson (bored concrete) foundations.	• PASS disturbance and dewatering will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B). This will include: - Application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location. - Use of alternative turbine foundations (Section 2.2.1.1) - Strategic disposal of dewater to, and location of, infiltration basins / trenches around the point of extraction to minimise the cone of depression	N/A	Potential for minor and localised impacts to surface water or groundwater quality as a result of PASS disturbance during construction. The assessment and significance of this residual impact is detailed in Section 7.6.5.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
		- Treatment of dewater with lime to ensure the pH is neutral to alkaline (7-8.5) to increase the buffering potential of any dewater being returned to the aquifer - Dewater will be transferred to a limestone lined settlement pond prior to transfer to an infiltration basin/trench and/or reused. - Infiltration basins will be designed and maintained to ensure no overflow/release of treated dewater to surrounding areas, including waterways or wetlands. - Soil treatment, as detailed in Section 6.		
Reduced water quality due to erosion, sedimentation and/or mobilisation of nutrients from ground disturbing activities	N/A	• Ground disturbance adjacent to waterbodies, including wetlands and waterways, will be delayed as long as possible to minimise potential for sedimentation. • The CEMP (Appendix H) will include the following key management in support of minimising erosion: - Runoff from infrastructure (such as the substation, O&M and concrete batching areas) will be captured and directed to an on-site retention basin for settlement and infiltration and/or controlled discharge through a stormwater overflow designed to manage sediment removal and reduce stormwater velocity - Erosion protection will be installed in line with relevant guidelines - Drainage control structures (e.g. drains and culverts) will be appropriately located, designed and constructed to maintain surface water flow regimes and minimise erosion • Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable. - Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets - Exposed soils will be vegetated or covered (e.g. with rock or synthetic liners) in disturbed areas where velocities exceed 1 m/s and remain below 2 m/s - Implementation of sediment barriers to prevent runoff into wetlands and waterways during construction, where required.	N/A	Potential for minor and localised impacts to surface water or groundwater quality as a result of erosion, sedimentation or mobilisation of nutrients during construction. The assessment and significance of this residual impact is detailed in Section 7.6.6.
Contamination of surface water and/or groundwater from accidental loss or spills of	N/A	• Potentially contaminating substances such as solid and liquid wastes and bulk hydrocarbons will be stored and handled as per the requirements of the *Dangerous Goods Safety Act 2004*.	N/A	Potential for accidental loss or spill of hazardous materials to result in contamination of surface

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
hydrocarbons and other hazardous materials.		• Infrastructure which may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, concrete batching area, refuelling locations) will be located at least 100 m from any wetland habitat (as defined in Section 9.3.6.2). • The CEMP (Appendix H) will include the following key management relevant to hydrocarbons and hazardous materials: - All liquid chemicals will be bunded. Bunds will be impermeable, have a capacity of 110% of the largest container stored or 25% the total volume stored and be covered/protected from rainfall and stormwater ingress - Bunds will be inspected regularly and kept free of residue, litter and stormwater - All chemical and fuel containing facilities will be regularly inspected for leaks and spills - Storage containers will be labelled as per the relevant SDS - Appropriate spill equipment is to be available during the transportation and handling of hazardous materials - Potentially contaminated water will be treated on site before being discharged into stormwater drainage or contained and removed as contaminated waste.		water, including wetlands, or groundwater. The assessment and significance of this residual impact is detailed in Section 7.6.7.
Draw in of the adjacent Beenup Mineral Sands acid mine plume during construction dewatering	N/A	• Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable. • Dewatering will be managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B), including the application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation. - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location.	N/A	No interaction with the Beenup Mineral Sands acid mine plume is expected. The assessment and significance of this residual impact is detailed in Section 7.6.8.
Groundwater drawdown associated with construction dewatering reducing water security for surrounding bore users	N/A	• Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable. • Dewatering will be managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B), including the application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location.	N/A	No significant effect on bore productivity is expected. The assessment and significance of this residual impact is detailed in Section 7.6.9.

7.6. Assessment and Significance of Residual Impacts

7.6.1. Dewatering Leading to Temporary Reduction in Groundwater Levels and Reduced Interaction with Surface Water

Dewatering for the construction of Proposal infrastructure may result in groundwater drawdown, causing a temporary reduction in the groundwater level within the Superficial Aquifer, that may in turn lead to reductions in the extent and availability of surface water (Stantec 2025b).

A hydrogeological conceptual model was developed to predict the potential impacts of dewatering for the partial above ground foundation (primary option) on groundwater drawdown extents (Stantec 2025b). Several models applicable to the unconfined Superficial Aquifer were used to predict and analyse a range of aquifer and dewatering variables:

- Cooper Jacobs: Time-variant dewatering from a bore. Used to predict initial dewatering rates for specific time to achieve a target drawdown
- Dupuit-Thiem: Steady-state dewatering from a bore. Used to predict steady-state dewatering discharge rates and distance-drawdown
- Marinelli and Niccoli (2000) model: Steady-state inflow into a mine pit. This model was used to predict steady-state dewatering discharge rates.

The modelling was based on the following assumptions for proposed infrastructure excavations:

- Turbines: 0.8 mbgl and a target groundwater drawdown of 2 mbgl over an excavation of 30 m x 30 m
- Met mast: 1.5 mbgl and a target groundwater drawdown on 3 mbgl over an excavation of 2.2 m x 2.2 m.

Drawdown modelling also conservatively assumed groundwater will be at surface level during dewatering (i.e. drawdown will occur when the watertable is at or near its highest point), which is not anticipated given civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable. The Proponent also commits to a maximum drawdown of 2 mbgl at the perimeter of each foundation for all dewatering required.

The modelling categorised the Development Envelope into two zones based on hydrogeological characteristics and expected horizontal hydraulic conductivity (Figure 7-6; Stantec 2025b).

- Zone 1 (WMO1 bore group) Sandy clay (typical silt, clay range) located in the north of the Development Envelope. Comprises a thin layer of dune sands up to 2.0 mbgl overlying saturated grey and dark grey, interbedded / alternating bands of clayey and sandy soils and frequent pockets of organic and peaty material, likely residual soils developed on the Leederville Formation. Hydraulic conductivity set to 0.5 m/day.
- Zone 2: (WMO2 and WMO3 bore groups) in southern and central south of the Development Envelope, respectively. Sand (typical fine sand range) with hydraulic conductivity set conservatively to 20 m/day. This zone comprises:
    - Southern (WM02 bore group) parts: A layer of dune sands up to 6.0 mbgl with interbedded ferricrete, indurated to a duricrust. The ferricrete was encountered as a thick, massive rock unit directly overlying weakly cemented organic rich sands, likely associated with historic dune swales and lacustrine depositional environments. The soils comprising dominant clay, below the sands, were likely residual soils developed on the Leederville Formation.

- Central southern (WMO3 bore group) parts: Similar to WM02, dune sands up to 6.2 mbgl, with ferricrete encountered as thick, massive rock unit within the sands. Weakly cemented organic rich sands were present directly beneath the ferricrete, extending to 6.2 mbgl before intersecting clayey and sandy soils, likely residual soils developed on the Leederville Formation. A thin layer of sandstone was encountered at 19.65 m overlying more residual soils, encountered to the base of the borehole.

Dewatering at each foundation is expected to occur over approximately 33 days, allowing five days of initial pumping to attain target drawdown, followed by 28-day steady-state pumping to maintain the target drawdown during the concrete curing period (Stantec 2025b). Time taken to achieve target drawdown may vary depending on the conditions of the foundation location.

The results of the modelling indicate that initial pumping rates to achieve target drawdown within five days range between 1,525 m^3/day (meteorological tower within Zone 2) and 2,295 m^3/day (turbines within Zone 2). To maintain target drawdown for 28 days, pumping rates ranged between approximately 293 m^3/day (met mast within Zone 2) and 2,058 m^3/day (turbines within Zone 2). With modelling conservatively based on peak watertable levels, the actual rates required are anticipated to be lower.

The modelled predicted distance-drawdown results vary for dewatering of the turbine towers and meteorological masts given differing target drawdowns, as well as depending on the hydrogeological characteristics of their location within the Development Envelope (Stantec 2025b), as follows (Table 7-4; Figure 7-6):

- Zone 1 (north): Maximum target drawdown depths required for construction are expected to result in 0.5 m of drawdown extending to 43 m from turbine foundations
- Zone 2 (southern and central): Maximum target drawdown depths required for construction are expected to result in 0.5 m of drawdown extending to 117 m from turbine foundations.

The modelled predicted distance-drawdown results are expected to apply throughout each zone, in the event any turbine or met mast were required to be relocated from the points used in the models

Table 7-4: Predicted Steady-State Distance-Drawdown (Dupuit-Thiem Model)

Infrastructure Type	Target Drawdown (m)	Zone*	Predicted Distance-Drawdown (m) from Centre of Bore to a Depth (m) of:			
			>3	2	1	0.5
Turbine tower	2	Zone 1	9.5	17	31	43
		Zone 2	5	17	60	117
Met mast	3	Zone 1**	N/A	N/A	N/A	N/A
		Zone 2	1	6	34	86

Source: Stantec 2025b *Zone 1 is the sandy clay (typical silt, clay range) northern area of the Development Envelope and Zone 2 is the sand (typical fine sand range) found in the remainder of the Development Envelope (Figure 7-6). **Not applicable as no met masts are proposed in this area.

Groundwater levels within the Development Envelope are influenced by seasonal variation, with both the Superficial and Leederville aquifers experiencing natural variation of approximately 1 to 2 m (Stantec 2023b).

While drawdown modelling predicts 0.5 m drawdown extending 117 m from foundations in Zone 2, the Proponent will ensure that drawdown does not exceed 0.1 m beyond 100 m from any foundation location. The modelling undertaken conservatively assumed a surface level watertable (i.e. works conducted during the wet season) and did not account for infiltration of dewater through strategically

placed infiltration basins/trenches. Revised modelling will be undertaken based on detailed geotechnical investigations to ensure drawdown does not exceed 0.1 m beyond 100 m from any foundation location.

Dewatering will be scheduled to occur during the dry season where practicable. Dewatering will be temporary and is expected to be constrained to the Superficial Aquifer, which is expected to recover in the subsequent winter following dry season dewatering (Stantec 2025b). Although the Leederville Aquifer is not expected to be intercepted it is considered that if drawdown in the aquifer were to occur, it would recover rapidly (within a number of weeks or months) as it is recharged by vertical downward leakage from the Superficial Aquifer and horizontal and vertical flow from the north (Stantec 2025b).

Dewatering will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B) to ensure that drawdown does not present an unacceptable impact on the environment. This will be achieved through the following mitigation:

- Application of the following drawdown limits:
    - Maximum groundwater drawdown of 2.0 mbgl at the perimeter of each foundation (turbines/met masts/towers).
    - Groundwater drawdown will not exceed 0.1 m beyond 100 m from any dewatering location
    - Groundwater drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDEs.
- Use of alternative turbine foundations determined based on detailed site investigation and revised modelling (Section 2.2.1.1)
- Strategic disposal of dewater to, and location of, infiltration basins / trenches around the point of extraction to minimise the cone of depression
- Application of other management strategies as required (e.g. sheet piling)
- Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable

Borrow pits will also be located and designed to ensure that no dewatering is required. The Proponent will continue to refine the design of the Proposal to minimise impacts from dewatering.

Given the implementation of the ASSDMP and the temporary and spatially constrained nature of the proposed dewatering, predicted groundwater drawdown is not expected to significantly impact the existing groundwater regime or interactions with surface water features within or surrounding the Development Envelope.

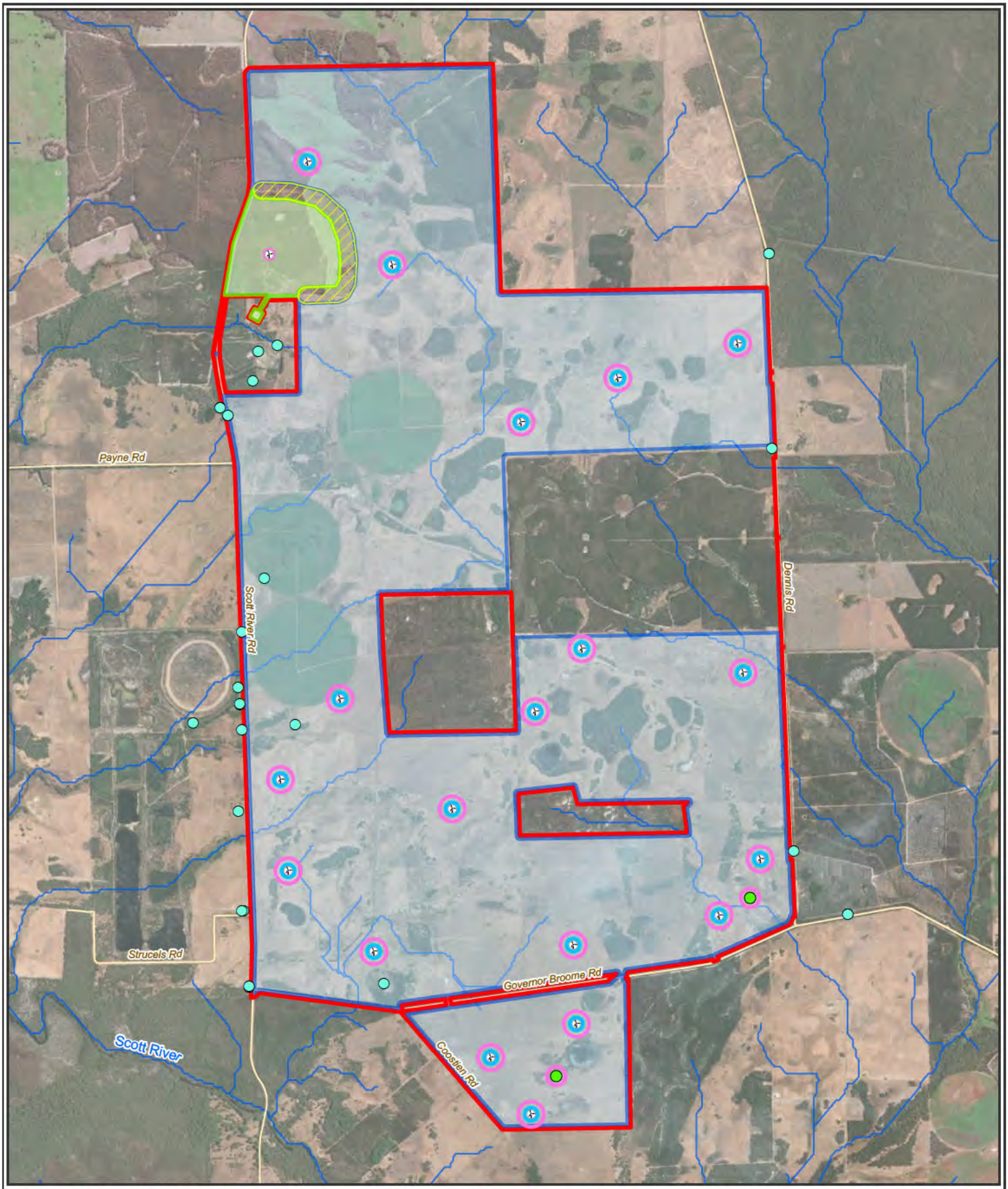

Figure 7-6: Predicted Steady-State Drawdown and Drawdown-Distance Across the Hydrological Zones of the Development Envelope

7.6.2. Penetration of an Aquitard Causing Excessive Leakage from the Superficial Aquifer

Excavation for Proposal infrastructure has the potential to penetrate ferricrete or clay layers which may be acting as an aquitard and thereby result in excessive leakage from the Superficial Aquifer into the underlying Leederville Aquifer (Stantec 2025b). However, ferricrete is not consistently present (locally confined) across the Development Envelope and a level of existing connection between the aquifers is expected in this location.

The Proposal is not expected to result in significant alterations to groundwater levels as a result of penetration of the aquitard during construction as the use of the two primary foundation options will reduce the likelihood of aquitard penetration, given excavations will be limited to up to 1.2 mbgl.

On this basis, any minor leakage of groundwater from the Superficial Aquifer is not expected to significantly impact the existing groundwater regime within and surrounding the Development Envelope.

7.6.3. Changes to Surface Hydrological Regimes due to Proposal Infrastructure

Proposal infrastructure has the potential to interfere with existing surface water flow patterns resulting in increased volume and duration of surface water inundation upstream, decreased flow downstream of infrastructure, and increased erosion and sedimentation (Stantec 2025b).

Changes to surface water flow and depth as a result of Proposal infrastructure are expected to be minimal given that key infrastructure is not proposed to be located within any potential waterways, inundation zones greater than 0.3 m or high velocity areas exceeding 2 m/s (Stantec 2025b).

Final infrastructure design will ensure that flood vulnerability requirements have been considered. A CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for impacts to surface hydrological regimes and flow patterns. Key management measures include scheduling civil construction, specifically activities that require excavation, to occur during the dry season where practicable, using drainage control methods (e.g. drains and culverts) in flood-prone areas, and vegetating or covering exposed soils in disturbed areas where velocities exceed 1 m/s.

Through the implementation of mitigation measures within the CEMP and considered Proposal design, the Proposal is not expected to result in significant impacts to surface hydrological regimes.

7.6.4. Changes to Groundwater Flow due to Proposal Infrastructure

Proposal infrastructure has the potential to interfere with existing groundwater flow, resulting in upstream mounding and reduced groundwater availability downstream (Stantec 2025b).

The Proposal is not expected to result in mounding or flow disruption beyond levels of natural seasonal variation (Stantec 2025b). The maximum depth of the primary foundation options is 1.2 mbgl and below ground foundations will only be utilised where there is no potential for interception with groundwater.

Through the implementation of the CEMP and ASSDMP, the Proposal is not anticipated to significantly impact groundwater flows.

7.6.5. Acidification and/or Toxicity of Surface Water and/or Groundwater During Construction

PASS material remains benign when in a natural, undisturbed and anoxic state. Construction of the Proposal, including excavation and dewatering, has the potential to expose PASS to oxygen, which may result in impacts to surface water or groundwater quality.

Some impact to groundwater quality is expected as a result of PASS disturbance. Typical impacts include elevated sulfate, low pH, high acidity, elevated acidity, elevated metals (particularly Iron and Aluminium) and low alkalinity in groundwater. It is noted that some areas within the Proposal already observe some of the aforementioned conditions (pers comm. Alan Foley 2025).

Potential for exposure of PASS, during excavation and dewatering has been minimised through the Proposals design. Three potential foundation designs (two primary, one secondary) have been included as part of the Proposal (see Section 2.2.1.1), with the two primary foundation options (above ground and partially above ground foundations) minimising the amount of PASS proposed to be excavated (as detailed in Section 6.6.1) and reducing associated dewatering requirements and magnitude (as detailed in Section 7.6.1). Furthermore, borrow pits will be located and designed to ensure that no dewatering is required.

Any PASS soils excavated during construction will be treated with lime where required, in accordance with the Preliminary ASSDMP (Appendix B) and reused onsite where possible. Treated soil will be assessed to validate the adequacy of the lime treatment and retreated and tested where required.

In accordance with the Preliminary ASSDMP (Appendix B) and as detailed in Section 7.6.1, appropriate groundwater level triggers will also be developed to ensure drawdown does not exceed 2 mbgl at the perimeter of each foundation and does not exceed 0.1 m beyond 100 m from any drawdown location in accordance with DWER guidelines (2015b), thereby limiting the dewatering exposure of PASS. Drawdown at GDEs will also not exceed natural seasonal variation levels (i.e. will remain above natural seasonal low in watertable).

Dewater will be treated for acidity and alkalinity as required in accordance with DWER guidelines (2015b) and the Preliminary ASSDMP (Appendix B) and reinfiltrated on-site where possible through the use of strategically placed infiltration basins/trenches. Dewater will be treated to ensure the pH is neutral to alkaline (7-8.5) to increase the buffering capacity of any dewater being returned to the aquifer. No dewater will be discharged to wetlands or waterways.

The Proponent considers that potential impacts of PASS disturbance during construction can be appropriately managed through the implementation of the ASSDMP, which will be prepared in accordance with relevant guidance and the Preliminary ASSDMP (Appendix B), and is expected to be a condition of the DA approval (Section 3.3). On this basis, construction of the Proposal is not expected to result in significant impacts to surface water or groundwater quality.

7.6.6. Reduced Water Quality due to Erosion, Sedimentation or Mobilisation of Nutrients

Clearing of vegetation, excavation and construction of the Proposal may result in erosion, sedimentation or the mobilisation of nutrients including nitrogen and phosphorus which has potential to impact the quality of surface water or groundwater.

Soil erosion within the Development Envelope during construction is unavoidable. Erosion will be limited to ground disturbance areas within the Indicative Disturbance Footprint, of which the majority (94.92%) is existing cleared areas. The Proposal has been designed to minimise clearing of native vegetation as much as possible, with a maximum clearing extent of 1 ha.

A CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for erosion, sedimentation and mobilisation of nutrients. Key management measures include installing erosion protection in line with relevant guidelines, capturing runoff from Proposal infrastructure in retention basins, vegetating or covering exposed soils in disturbed areas where velocities exceed 1 m/s, using drainage control methods (e.g. drains and culverts) in flood-prone areas, and scheduling civil

construction, specifically activities that require excavation, to occur during the dry season where practicable

Through the implementation of the CEMP, it is expected that erosion or sedimentation as a result of the Proposal will be limited and will not result in significant impacts to the quality of surface water or groundwater.

7.6.7. Contamination of Surface Water and/or Groundwater from Accidental Loss or Spills of Hydrocarbons and Other Hazardous Materials

Hydrocarbons and other chemicals will be used and stored within the Development Envelope during construction and operation of the Proposal (e.g. fuels, lubricants, cement, admixtures and other chemicals required for concrete batching). There is potential for accidental spills to occur, which may result in contamination of soil and subsequent impacts to environmental values, such as surface water and groundwater systems.

All potentially hazardous substances will be stored and handled in accordance with the *Dangerous Goods Safety Act 2004.* A CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for surface water or groundwater contamination. Spill response equipment will be readily available and accessible at the site of hazardous materials storage and use to ensure a prompt response to any accidental spills. All liquid chemicals will be bunded and covered/protected from rainfall and stormwater ingress and bunds will be regularly inspected and maintained. Any infrastructure which may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, concrete batching areas, refuelling locations) will be located at least 100 m from wetlands.

Given the provision for appropriate contaminant containment and clean-up in the unlikely event of a large spill, the accidental loss or spill of hydrocarbons or other hazardous materials are not expected to result in significant residual impacts to surface water, groundwater.

7.6.8. Draw In of the Adjacent Beenup Mineral Sands Acid Mine Plume during Construction Dewatering

Dewatering for the Proposal has potential to interact with the acid mine plume from the adjacent Beenup Mineral Sands mine, resulting in acidification of groundwater.

However, the groundwater levels within the Development Envelope are higher than the adjacent Beenup Mineral Sands mine, with no suspected interaction (Stantec 2025b). Furthermore, the modelled drawdown extent of the Proposal does not interact with the acid groundwater plume (Stantec 2025b).

Through the implementation of the management measures outlined in the ASSDMP (Table 7-3), the Proposal is not expected to interact with the Beenup Mineral Sands acid mine plume.

7.6.9. Groundwater Drawdown Reducing Water Security for Surrounding Bore Users

Temporary reductions in the groundwater level within the Superficial Aquifer from dewatering may result in impacts to surrounding bores users.

Section 7.6.1 describes the modelling assessment undertaken to predict the extent of groundwater drawdown during construction. As discussed in this section:

- The Proponent will ensure that dewatering does not exceed 2 mbgl at the perimeter of each foundation and no more than 0.1 m beyond 100 m from any drawdown location

- The secondary foundation option (below ground) will only be used where it is confirmed prior to construction that dewatering would not be required.

No registered bore is intersected by the area of predicted drawdown (0.5 m contour) (Figure 7-6). Given this, and the temporary nature of dewatering, the Proponent does not anticipate any impact to surrounding bore users.

7.7. Environmental Outcomes

No significant impacts to surface water or groundwater are expected as a result of the Proposal. In consideration of the proposed avoidance and mitigation measures, the environmental outcomes of the Proposal for the Inland Waters environmental factor are:

- Minor, localised (i.e. largely within the watertables natural seasonal variation and managed to within 100 m of each dewatering location), and temporary impact to groundwater levels as a result of construction dewatering, with the Superficial Aquifer expected to recover by the subsequent winter period following construction
- No excessive leakage of the Superficial Aquifer as a result of excavations penetrating an aquitard
- Minor, short-term and localised acidification of groundwater as a result of construction dewatering
- Minor and localised impact to surface and ground water flows as a result of Proposal infrastructure
- Minor, localised and temporary impacts to surface water and/or groundwater quality resulting from ASS disturbance and management, erosion and sedimentation, mobilisation of nutrients, and/or the accidental loss or spill of hazardous materials
- No interaction with the Beenup Mineral Sands acid mine plume
- No impact on surrounding bore users.

Impacts will be managed through the implementation of management plans, including a CEMP (Appendix H) and a detailed ASSDMP prepared in consideration of Preliminary ASSDMP (Appendix B).

The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Inland Waters environmental factor "*to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected"*.

8. Flora and Vegetation

8.1. EPA Environmental Factor Objective

The EPA's objective for the Flora and Vegetation factor is to "*protect flora and vegetation so that biological diversity and ecological integrity are maintained*" (EPA 2016a).

For the purposes of EIA, the EPA defines 'flora' as native vascular plants and 'vegetation' as groupings of different flora patterned across the landscape that occur in response to environmental conditions (EPA 2016a).

8.2. Relevant Policy and Guidance

Relevant policy and guidance documents for Flora and Vegetation and how they have been considered for this Proposal are summarised in Table 8-1.

Table 8-1: Policy and Guidance for Flora and Vegetation

Policy / Guidance	Consideration
Environmental Factor Guideline: Flora and Vegetation (EPA 2016a)	The information provided in this section addresses the 'considerations for environmental impact assessment' outlined within the guideline.
Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016d)	This document guides the appropriate obtainment and collation of flora and vegetation data to be used in EIA. All studies conducted for the Proposal have been undertaken with regard for this guidance document.
Approved Conservation Advice for Scott River Ironstone Association (DSEWPaC 2013).	This advice identifies the key diagnostic characteristics, conservation objectives, critical habitat, key threats and priority management actions for Scott River Ironstone Association to guide the EIA.
Survey Guidelines for Australia's Threatened Orchids. Guidelines for detecting orchids listed as "Threatened" under the *Environment Protection and Biodiversity Conservation Act 1999* (DoE 2014)	This guidance was considered in the design of the targeted flora searches as part of the Detailed and Targeted flora and vegetation survey.

8.3. Receiving Environment

8.3.1. Studies and Survey Effort

A Detailed and Targeted flora and vegetation survey has been undertaken over approximately 99.95% of the Development Envelope (Phoenix 2025c). The field survey was conducted in spring 2023 across three phases to target certain flora flowering periods, particularly conservation significant flora. Additional Targeted flora searches were also undertaken in November 2024. The survey covered approximately 3,891.6 ha (the Survey Area).

An additional Reconnaissance flora and vegetation assessment was undertaken to fill the gap in the Phoenix (2025c) survey effort, covering approximately 0.05% of the Development Envelope (ELA 2025b). The survey covered approximately 1.72 ha. For the purposes of EIA, the data collected from this survey has been combined with that obtained during the Detailed and Targeted flora and vegetation survey (Phoenix 2025c).

The details and spatial extents of the above survey areas are provided in Table 8-2 and presented in Figure 8-1.

Several other flora and vegetation surveys have been conducted within the vicinity of the Survey Area, providing a greater understanding of the flora and vegetation values within the broader region to inform survey efforts. These include:

- Proposed Milyeannup Wind Farm - Single season detailed flora and vegetation assessment (Biota 2009a)
- Scott National Park - Flora and vegetation surveys conducted between 1990 – 1991 (Robinson and Keighery 1997)
- ESA C98 - Site inspection report (Woodman 2019b)
- ESA C458 - Site inspection report (Woodman 2019a).

Table 8-2: Flora and Vegetation Studies

Survey	Area (ha)	Scope & timing	Study/Survey Effort	Limitations
Detailed flora and vegetation survey for a Proposed Wind Farm in Scott River (Phoenix 2025c **Appendix I**	3, 891.56	The initial field survey was conducted across three phases in Spring 2023: • 1 – 5 September 2023 • 23 – 27 October 2023 • 13 – 17 November 2023. Additional targeted searches were conducted on 20 November 2024. The scope of the survey included: • A desktop assessment of databases and available literature to identify potential flora and vegetation values • Field surveys to establish and survey quadrats and relevés, as well as undertake targeted flora searches along meandering transects within habitats considered likely to support conservation significant flora and within previously recorded locations or significant plants • Mapping of vegetation communities and condition and compilation of a species inventory • Identification of conservation significant flora and vegetation communities.	The field survey included a total of 102 sample sites (72 10 x 10 m quadrats, 30 relevés). A total of 123 mapping notes were taken to provide supplementary data.	Limitations and constraints associated with this field survey are detailed as follows: • Not all historical significant flora records identified in the desktop review were visited. As such, these have been assumed as present (see Section 8.3.3.1).
Wind Farm in Scott River - Ecological Gap Survey (ELA 2025b) **Appendix J**	1.72	The Reconnaissance flora and vegetation assessment was conducted on 26 June 2025. The scope of the survey included: • A desktop assessment of the Phoenix (2025c) report to obtain information relating to conservation significant flora and ecological communities • A field survey to establish relevés • Mapping of vegetation communities to expand upon mapping completed by Phoenix (2025c).	The field survey included a total of three relevés.	Limitations and constraints associated with this field survey are detailed as follows: • The flora and vegetation survey was undertaken outside of the recommended survey timing for this region (September – November). However, detectability of species for the requirement of a Reconnaissance flora and vegetation survey was not considered to be a constraint as a post survey flora likelihood of occurrence assessment was undertaken in view of survey timing. An additional Targeted flora survey will be conducted within this survey area prior to development of the Proposal.

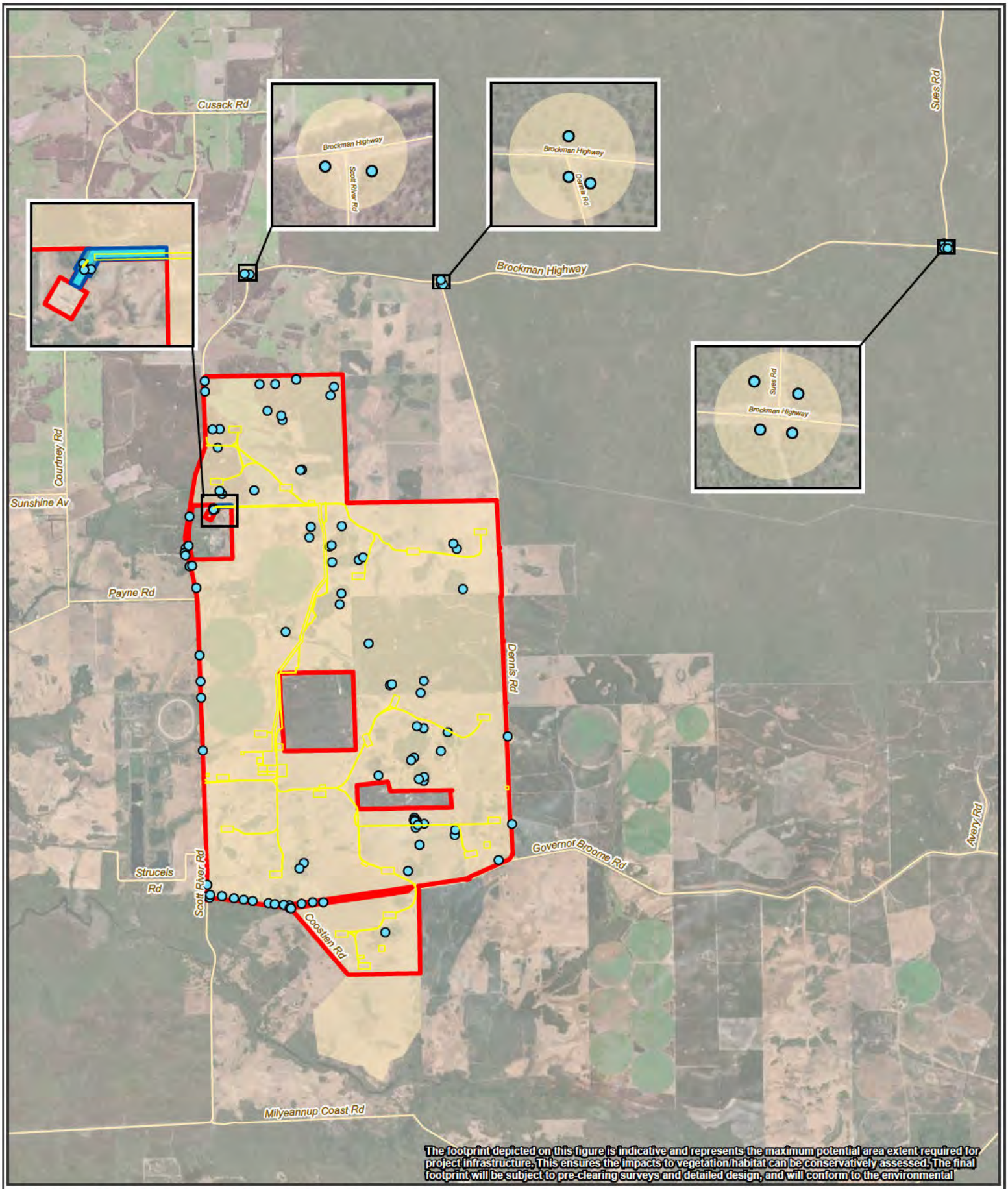

Figure 8-1: Flora and Vegetation Survey

- Sample Sites
- Roads
- Development Envelope
- Indicative Disturbance Footprint
- Survey extent of Gap Ecological Survey (ELA 2025b)
- Survey Extent of Phoenix (2025c) Detailed and Targeted Flora and Vegetation Survey

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 7886-DH Date: 9/25/2025

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8.3.2. Vegetation

8.3.2.1. Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) defines 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; DCCEEW 2024a). These bioregions are further refined into 419 subregions representing more localised and homogenous geomorphological units in each bioregion (DCCEEW 2024a). IBRA divides WA into 26 biogeographic regions and 53 subregions based on dominant landscape characteristics of climate, lithology, geology, landform and vegetation.

The Development Envelope is located predominantly within the Warren bioregion and subregion of the same name (WAR01) (Table 8-3). A small area in the north of the Development Envelope occurs within the Jarrah Forest bioregion and Southern Jarrah Forest (JAF02) subregion (Table 8-3).

Table 8-3: IBRA Subregions within the Development Envelope

IBRA subregion	Description	Total Extent (ha)	Total Extent within the Development Envelope (ha)	Proportion of Extent within the Development Envelope (%)
Warren	Dissected undulating country of the Leeuwin Complex and Albany Orogen with loamy soils supporting Karri Forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting paperbark/sedge swamps, and Holocene marine dunes with *Agonis flexuosa* woodlands.	844,771.62	3,586.45	0.42
Southern Jarrah Forest (JAF02)	Jarrah-Marri forest on laterite gravels and in the eastern part, by Wandoo – Marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands.	261,0294.94	10.40	<0.01
Total			3,596.85	-

8.3.2.2. Land Systems

Land systems mapping prepared by the Department of Primary Industries and Regional Development (DPIRD) provides a comprehensive and standardised description of landscapes, soils and vegetation of Western Australia at a regional scale (DPIRD 2022). These surveys describe the biophysical characteristics of each region and subsequently divide each region into land systems; land systems being defined as repeating patterns of topography, soils and vegetation (DPIRD 2022). The Development Envelope intersects two land systems: the Nillup Plain System and the Scott River Plain System (Table 8-4).

Table 8-4: Land Systems within the Development Envelope

Land System	Description	Total Extent (ha)	Total Extent within the Development Envelope (ha)	Proportion of Extent within the Development Envelope (%)
Nillup Plain System	Poorly drained plain, in the southern Donnybrook Sunkland. Sandy gravel, non-saline wet soil, grey deep sandy duplex, loamy gravel and pale deep sands. Jarrah-Marri-paperbark woodland.	50,929.98	15.66	0.03
Scott River Plain System	Poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and Jarrah-Marri-paperbark woodland.	63,905.0	3,581.19	5.60
Total			3,596.85	-

8.3.2.3. Pre-European Vegetation Associations

Vegetation type and extent have been mapped at a regional scale by Beard (2013) who categorised vegetation into broad vegetation associations (VAs). Based on this mapping, DPIRD has compiled a list of vegetation extent and types across Western Australia (DPIRD 2019; Shepherd *et al.* 2002).

Nine pre-European VAs occur within the Development Envelope (Table 8-5). All these VAs have greater than 30% of their pre-European extent remaining within the Warren and Jarrah Forest Bioregions.

The VA with the greatest proportion of its current extent represented in the Development Envelope is VA 1137, with 17.61%, all others have less than 10% of their current extents represented within the Development Envelope. The largest area of any one unit within the Development Envelope is VA 27, with 442.96 ha mapped within the Development Envelope. All others cover between less than 0.01 ha (VA 1134) and 226.61 ha (VA 3) within the Development Envelope.

Table 8-5: Pre-European Vegetation Associations

Vegetation association	Extent within the Warren and Jarrah Forest Bioregions			Extent within Development Envelope (ha)*	Proportion (%) of Current Extent within the Development Envelope
	Pre-European extent (ha)^	Current extent (ha)	Pre-European extent remaining (%)		
3, Medium Forest; Jarrah-Marri	2,640,853.64	1,799,419.74	68.14	226.61	0.01
14, Low Forest; Jarrah	93,960.86	70,081.19	74.59	51.63	0.07
27, Low woodland; paperbark (*Melaleuca* sp.)	120,081.46	88,997.90	74.11	442.96	0.50
51, Sedgeland; reed swamps, occasionally with heath	55,829.09	31,217.95	55.92	193.15	0.62
949, Low woodland; *Banksia*	3,196.76	1,539.26	48.15	117.31	7.62
973, Low Forest; paperbark (*Melaleuca rhaphiophylla*)	2,477.29	1,484.22	59.91	18.01	1.21
975, Low woodland; Jarrah	4,890.86	4,042.13	82.65	18.46	0.46
1134, Medium woodland; Jarrah (south coast)	37,488.91	30,358.47	80.98	0.75	<0.01
1137, Shrublands; *Melaleuca incana, Hakea tuberculata, Viminaria juncea* scrub on ironstone, south coast	1,079.83	346.53	32.09	61.01	17.61
Total				1129.89	-

^ Data Source: 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report) (GoWA 2019).

*The total extent of vegetation associations within the Development Envelope does not align with the total extent of the native vegetation types mapped by Phoenix (2025c) due to the broadscale nature of the State (GoWA 2019) vegetation mapping.

8.3.2.4. Vegetation Types

A total of 18 vegetation types were identified within the Development Envelope, covering a total of 3,596.85 ha (Phoenix 2025c). The majority (approximately 81%) of the Development Envelope (2,902,29 ha) comprises Cleared areas (2,476.41 ha), Plantations (Egg, Psp, 413.56 ha) and Water (12.32 ha). Vegetation type EmmAffMtAsDb, a Jarrah woodland, represents the largest area of intact native vegetation, covering 132.85 ha (approximately 4%) of the Development Envelope (Table 8-6; Figure 8-2).

Table 8-6: Vegetation Types within the Development Envelope

Vegetation types	Description	Extent within Survey Area (ha)	Extent within Development Envelope** (ha)	% of Development Envelope	Extent within Native-vegetated Portion of Survey Area* (%)
Aff	Low sparse woodland to woodland of *Agonis flexuosa* var. *flexuosa*, over variable low grassland of pasture weed species.	98.90	99.04	2.75	12.51
AmBsHc	Tall open shrubland variously composed of *Acacia myrtifolia*, *Banksia occidentalis*, and *Taxandria inundata*, over mid sparse shrubland variously composed of *Beaufortia sparsa*, *Hakea sulcata*, and *Hakea lasianthoides*, over variably present low to tall open sedgeland to sedgeland variously composed of *Hypolaena caespitosa*, *Machaerina rubiginosa*, and Melanostachya ustulata.	1.64	1.10	0.03	0.21
AsLs	Occasionally present low open woodland of *Agonis flexuosa* var. *flexuosa*, over tall open to closed shrubland of *Astartea scoparia*, over tall sparse sedgeland to sedgeland of *Leptocarpus scariosus*, *Machaerina rubiginosa*, and *Cyathochaeta clandestina*.	24.02	24.02	0.67	3.04
CcTpCeOh	Mid woodland to open forest of *Corymbia calophylla*, *Eucalyptus marginata* subsp. *marginata*, and occasionally *Agonis flexuosa* var. *flexuosa*, over variable mid to tall sparse shrubland to shrubland of *Taxandria parviceps*, *Xanthorrhoea preissii*, and *Acacia myrtifolia*, over tall sedgeland of *Cyathochaeta equitans*, *Anarthria scabra*, and *Hypolaena caespitosa*, over low sparse forbland of *Opercularia hispidula*, *Patersonia occidentalis* var. *latifolia*, and *Dasypogon bromeliifolius*.	75.26	36.01	1.00	9.49
CcTlXpAp	Mid open woodland to open forest of *Corymbia calophylla* occasionally with *Eucalyptus marginata* subsp. *marginata*, over tall sparse shrubland to shrubland of *Taxandria linearifolia*, variably with *T. parviceps* and *Acacia myrtifolia*, over mid open shrubland of *Xanthorrhoea preissii*, *Grevillea manglesioides* subsp. *manglesioides*, *and Hakea lasianthoides*, over tall sparse sedgeland to sedgeland of *Anarthria prolifera*, *Lepidosperma* sp. Blackwood (R. Davis 7696), and *Mesomelaena tetragona*.	2.12	-	-	0.27
ClcVj	Mid open to closed shrubland of *Calothamnus lateralis* var. *crassus*, *Adenanthos detmoldii*, and *Comesperma virgatum*, over tall open rushland/sedgeland variably composed of *Viminaria juncea*, *Leptocarpus laxus*, and *Leptocarpus scoparius*.	0.79	0.79	0.02	0.10
Egg	Planted mid woodland of **Eucalyptus globulus* subsp. *globulus* over low isolated grasses to sparse grassland of **Bromus diandrus* and **Lolium perenne* with variable collection of isolated herbs.	415.43	412.29	11.46	-

Vegetation types	Description	Extent within Survey Area (ha)	Extent within Development Envelope** (ha)	% of Development Envelope	Extent within Native-vegetated Portion of Survey Area* (%)
EmmAffMtAsDb	Mid open woodland to woodland of *Eucalyptus marginata* subsp. *marginata*, over variably composed low open woodland to woodland of *Agonis flexuosa* var. *flexuosa*, *Nuytsia floribunda*, and *Allocasuarina fraseriana*, over mid sparse to open shrubland of *Melaleuca thymoides*, *Jacksonia horrida*, and *Xanthorrhoea preissii*, over tall sedgeland of *Anarthria scabra*, *Lyginia imberbis*, and *A. prolifera*, over low sparse forbland of *Dasypogon bromeliifolius* and *Phlebocarya ciliata*.	135.20	132.85	3.69	17.11
EmmTpAs	Low to mid woodland to open forest of *Eucalyptus marginata* subsp. *marginata*, over tall sparse to open shrubland of *Taxandria parviceps* and *Melaleuca preissiana*, over tall sparse to open sedgeland of *Anarthria scabra*, *Juncus pallidus*, and *Machaerina articulata*.	28.43	10.62	0.30	3.60
EmmTpGoMtPu	Mid open woodland to open forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, over tall sparse to open shrubland of *Taxandria parviceps*, with clumps of *Kingia australis* and/or *Dasypogon hookeri*, over low sparse to open shrubland of *Gompholobium obovatum*, *Acacia browniana* var. *browniana*, and *Hibbertia cunninghamii*, over tall open sedgeland of *Anarthria prolifera*, *Mesomelaena tetragona*, and variable dense clumps of *Lepidosperma leptostachyum*, over tall sparse to open forbland of *Patersonia umbrosa* var. *xanthina*, *Lomandra pauciflora*, *Tetrarrhena laevis*.	2.13	-	-	0.27
EmmXpMtDb	Low to mid open woodland to forest of *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa*, over mid sparse shrubland of *Xanthorrhoea preissii*, *Kunzea recurva*, and *Hakea ceratophylla*, over tall sparse to open sedgeland of *Mesomelaena tetragona*, *Hypolaena pubescens*, and *Anarthria scabra*, over low sparse forbland to forbland of *Dasypogon bromeliifolius*, *Conostylis aculeata* subsp. *aculeata*, and *Microtis media* subsp. *media*.	79.05	73.46	2.04	10.00
Mj	Tall open sedgeland to sedgeland of *Machaerina juncea*, *Leptocarpus scariosus*, and *Lepidosperma longitudinale*.	106.69	90.54	2.52	13.50
MpXpHfSs	Variably present low sparse woodland of *Melaleuca preissiana*, over mid to tall sparse to open shrubland of *Xanthorrhoea preissii*, variably with *Homalospermum firmum* and/or *Astartea scoparia*, over variable low to tall open sedgeland of *Sporadanthus strictus*, *Loxocarya cinerea*, and *Leptocarpus* spp.	3.84	3.83	0.11	0.49

Vegetation types	Description	Extent within Survey Area (ha)	Extent within Development Envelope** (ha)	% of Development Envelope	Extent within Native-vegetated Portion of Survey Area* (%)
MrCh	Low to mid woodland of *Melaleuca rhaphiophylla* occasionally with *M. preissiana*, over irregular sparse rushland of *Cycnogeton huegelii*, *Lepidosperma longitudinale*, and *Juncus pallidus*.	41.39	41.39	1.15	5.24
MrTjLs	Low open woodland to woodland of *Melaleuca rhaphiophylla* and/or *Melaleuca preissiana*, over tall open to closed shrubland of *Taxandria juniperina*, *Astartea scoparia*, and occasionally *Callistachys lanceolata*, over sedgeland of *Leptocarpus scariosus*, *Cycnogeton huegelii*, and *Aphelia cyperoides*.	93.64	93.64	2.60	11.85
PeeLs	Low to mid open shrubland of *Pericalymma ellipticum* var. *ellipticum*, variously with *Grevillea papillosa* and/or *Grevillea diversifolia* subsp. *subtersericata*, over tall open sedgeland to sedgeland of *Leptocarpus scariosus*, *Chordifex amblycoleus*, and *Juncus pallidus*.	16.07	16.07	0.45	2.03
Psp	Planted mid open woodland of **Pinus* sp.	1.60	1.27	0.04	-
TiLs	Tall shrubland of *Taxandria inundata*, *Astartea scoparia*, and *Calothamnus lateralis* var. *crassus*, over open sedgeland to sedgeland of *Leptocarpus scariosus*, *Juncus pallidus*, and *Machaerina juncea*.	40.99	40.99	1.14	5.19
XpAs	Mid sparse to open shrubland of *Xanthorrhoea preissii*, *Gompholobium tomentosum*, and *Taxandria parviceps*, over tall open to closed sedgeland of *Anarthria scabra*, *A. prolifera*, and *Hypolaena caespitosa*.	25.55	23.84	0.66	3.21
XpMdLm	Mid sparse to open shrubland of *Xanthorrhoea preissii*, *Acacia myrtifolia*, and *Kunzea recurva*, over low sparse shrubland to shrubland of *Melaleuca densa*, *Pimelea rosea* subsp. *rosea*, and *Hibbertia stellaris*, over tall open sedgeland to sedgeland of *Loxocarya magna*, *Mesomelaena tetragona*, and *Hypolaena pubescens*.	15.05	6.40	0.18	1.90
Non-vegetated units					
Cleared	Devoid of native vegetation.	2,673.22	2,476.41	68.85	-
Water	Areas of open water.	12.32	12.32	0.34	-
Total		3,893.33	3,596.85	100.00	100.00

*Phoenix (2025c) survey area. **Small areas equating to less than 1% of the Development Envelope were extrapolated.

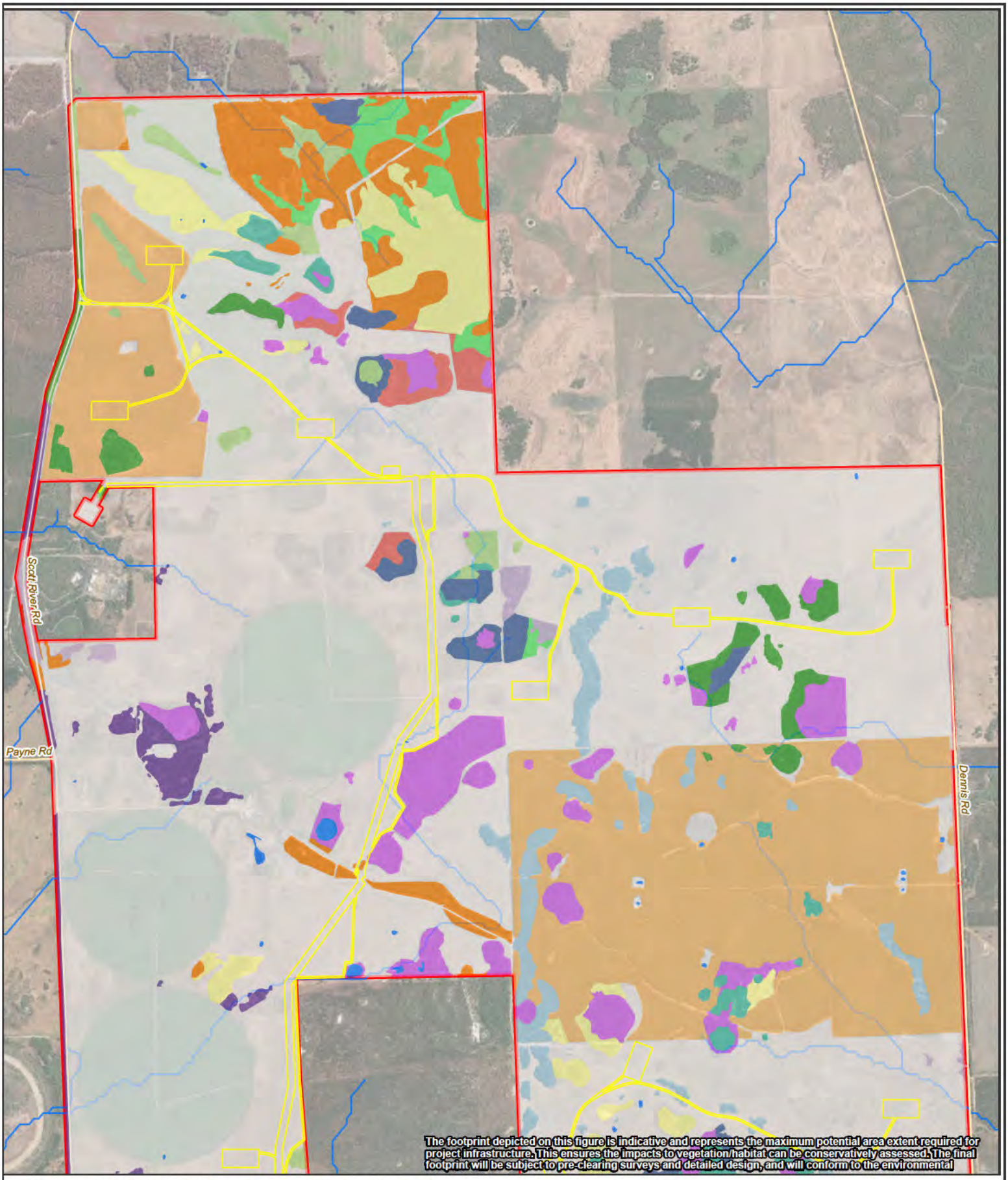
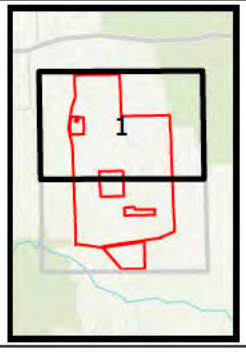


Figure 8-2: Vegetation Types (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint
- Cleared

Veg type

- Aff
- AsLs
- CcTpCeOh
- Egg
- EmmAffMtAsDb
- EmmTpAs
- EmmXpMtDb
- Mj
- MpXpHfSs
- MrCh
- MrTjLs
- PeeLs
- TiLs
- Water
- XpAs



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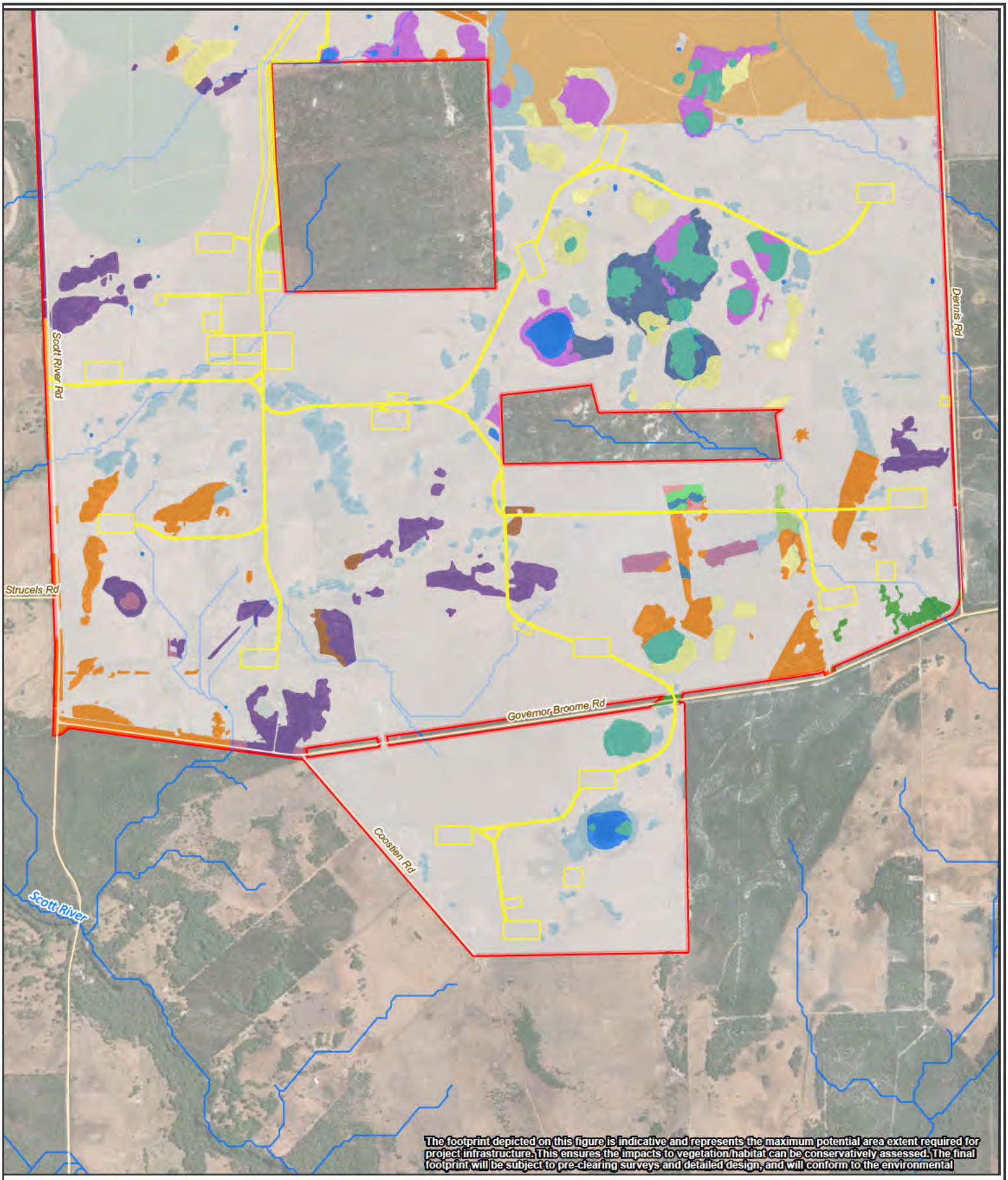
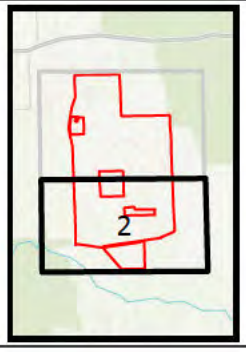


Figure 8-2: Vegetation Types (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint
- Cleared

Veg type

- Aff
- AmBsHc
- AsLs
- CcTpCeOh
- ClcVj
- Egg
- EmmAffMtAsDb
- EmmTpAs
- EmmXpMtDb
- Mj
- MpXpHfSs
- MrCh
- MrTjLs
- PeeLs
- Psp
- TiLs
- Water
- XpAs
- XpMdLm



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8.3.2.5. Vegetation Condition

The majority (approximately 80%) of vegetation within the Development Envelope is considered to be in Completely Degraded condition based on the Keighery (1994) vegetation scale provided in the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (Phoenix 2025c; EPA 2016d; Table 8-7; Figure 8-3).

Table 8-7: Vegetation Condition across the Development Envelope

Condition Rating	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	% of Development Envelope
Pristine	30.20	25.62	0.71
Excellent	248.99	237.67	6.61
Very Good	178.74	165.08	4.59
Good	124.95	112.15	3.12
Degraded	207.89	154.07	4.28
Completely Degraded	3,090.25	2889.94	80.35
Water (not assessed)	12.31	12.31	0.34
Total	3,893.33	3596.85	100.00

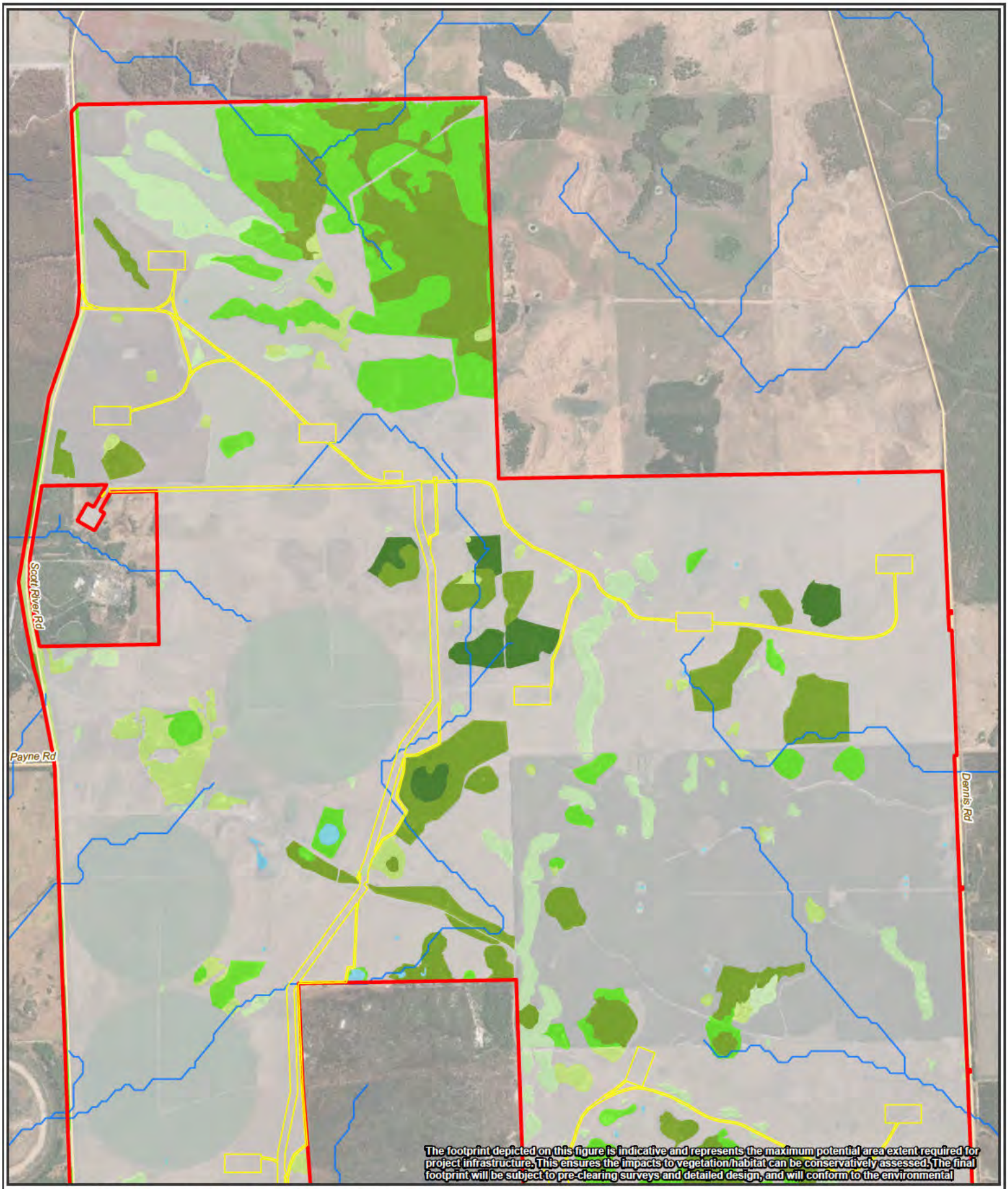
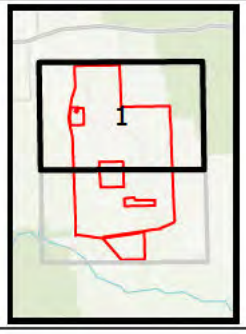


Figure 8-3: Vegetation Condition (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Vegetation condition

- Pristine
- Excellent
- Very Good
- Good
- Degraded
- Completely degraded
- Water



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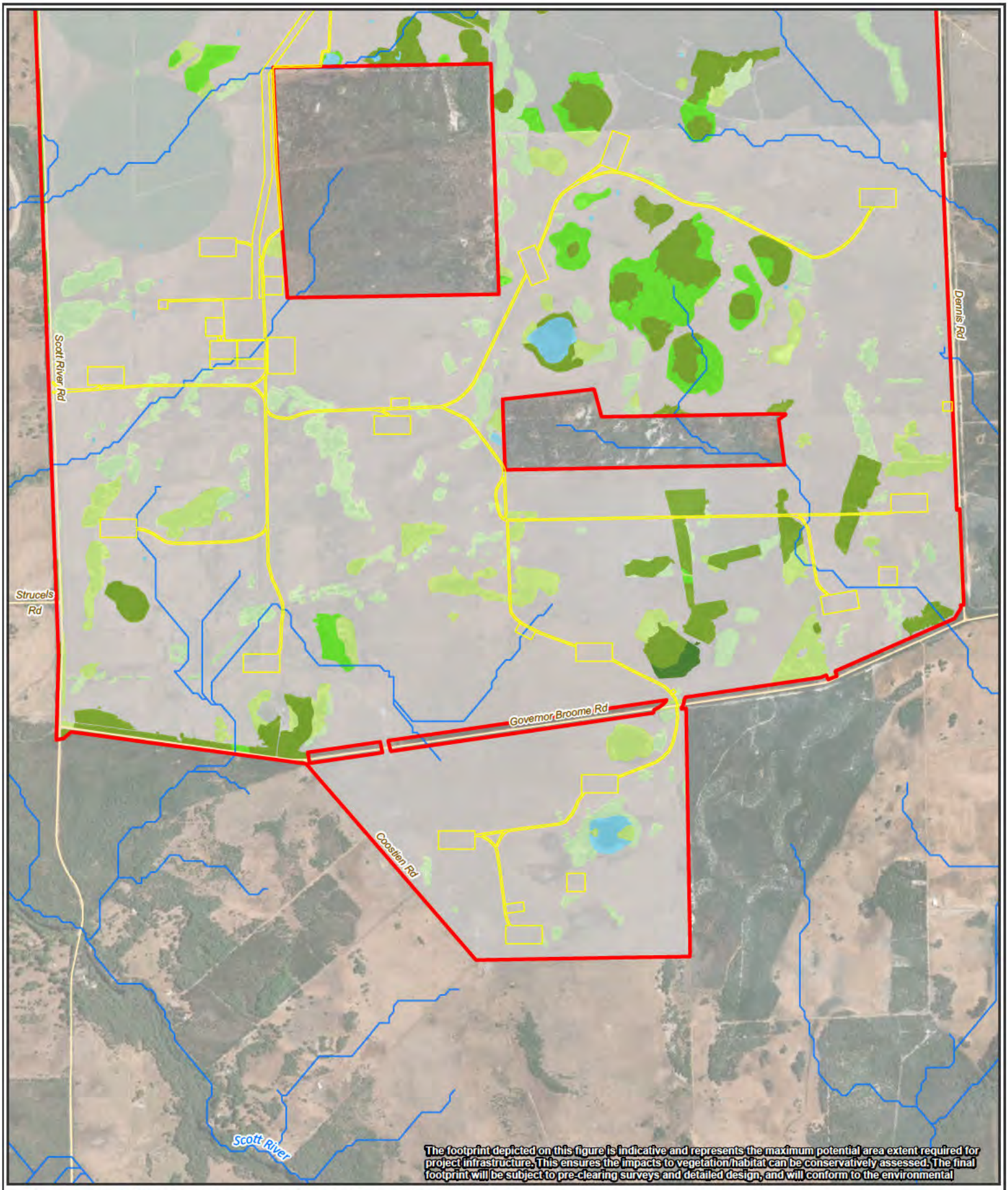
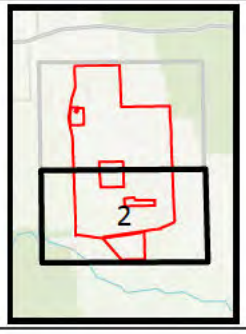


Figure 8-3: Vegetation Condition (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Vegetation condition

- Pristine
- Excellent
- Very Good
- Good
- Degraded
- Completely degraded
- Water



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8.3.2.6. Conservation Significant Vegetation

Threatened and Priority Ecological Communities

One TEC listed under the EPBC Act and BC Act intersects the Development Envelope, namely the Scott River Ironstone Association Community (Scott River Ironstone TEC; listed as Endangered [EN] under the EPBC Act and BC Act) (Figure 8-4). Four vegetation types were considered representative of this TEC, and as such are considered to be of regional significance, including:

- AmBsHc
- EmmTpAs
- Mj
- XpMdLm.

A total of 109.5 ha of Scott River Ironstone TEC was delineated within the Survey Area, with 83.58 ha occurring within the Development Envelope. In accordance with the *Approved conservation advice for Scott River Ironstone Association* (DSEWPaC 2013), occurrences of XpMdLm, EmmTpAs, Mj and AmBsHc mapped as Degraded were not defined as TEC.

The Development Envelope was also assessed for the presence of the *Empodisma* peatlands of southwestern Australia TEC (listed as EN under the EPBC Act and BC Act). None of the vegetation types recorded within the Development Envelope were considered representative of this TEC, due to a lack of key indicator species, community structure and peaty soils (DCCEEW 2023a; Phoenix 2025c).

In addition, none of the vegetation types present within the Development Envelope or Survey Area were found to represent any Priority Ecological Communities (PECs) as listed by DBCA.

Restricted Vegetation Types

Three vegetation types within the Development Envelope were identified as restricted communities as they occupy less than 1.0% of the of the native vegetated portion of the Survey Area (Phoenix 2025c; Table 8-6). As such, they are considered locally significant. These are:

- AmBsHc
- ClcVj
- MpXpHfSs.

Habitat for Significant Flora Species

Nine vegetation types within the Development Envelope (AmBsHc, AsLs, ClcVj, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb, TiLs, XpAs and XpMdLm) were identified as being of local significance as they support populations of Threatened or Priority flora species.

Vegetation type EmmXpMtDb was identified as being primary habitat for the greatest amount of conservation significant species, with nine Threatened/Priority flora species recorded within its surveyed extent.

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Figure 8-4: Threatened Ecological Communities (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Threatened Ecological Communities

- Scott River Ironstone Association (Phoenix 2025c)

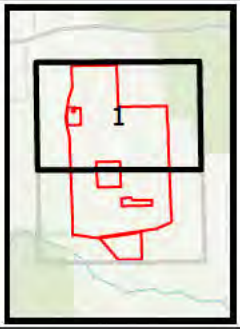

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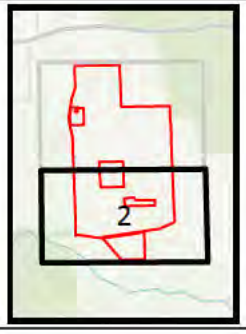
Figure 8-4: Threatened Ecological Communities (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Threatened Ecological Communities

- Scott River Ironstone Association (Phoenix 2025c)



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8.3.2.7. Groundwater Dependent Vegetation

Groundwater Dependent Ecosystems (GDEs) are defined as ecosystems that require groundwater to meet their ecological water requirements (Phoenix 2025c), and can include aquatic, terrestrial (GDV) and subterranean ecosystems. For the purposes of this chapter, the GDEs discussed are those that relate to flora and vegetation values only which includes terrestrial GDV.

GDV is generally classified as either obligate or facultative phreatophytes depending upon degree of groundwater dependency of the vegetation. Obligate phreatophytes rely entirely on groundwater for survival, whereas facultative phreatophytes use groundwater situationally and is not dependent on its presence (Thomas 2013 as cited by Stantec 2025b).

Based on available literature, seven of the vegetation types delineated within the Development Envelope are considered GDV (Phoenix 2025c; Table 8-8; Figure 8-5) including:

- Four known GDV comprising obligate phreatophytes
- Three potential GDV comprising facultative phreatophytes.

The Scott River Ironstone TEC is considered obligate GDV that is believed to depend heavily on the Superficial Aquifer to provide water supply, particularly during the summer months (CALM 2008; Phoenix 2025c). Therefore, all vegetation types that represent Scott River Ironstone TEC, are recognised as confirmed and obligate GDV. This includes AmBsHc, EmmTpAs, Mj and XpMdLm, which collectively cover 108.65 ha within the Development Envelope (Table 8-8), including 25.07 ha that was not mapped as TEC due to its degraded condition (Section 8.3.2.6.1).

Vegetation types where *Melaleuca* spp. dominate the species assemblage were assigned as potential facultative GDV; as no site-specific studies have been conducted to confirm groundwater dependence (Phoenix 2025c). An area of 138.86 ha of potential facultative *Melaleuca*-dominated GDV from three vegetation types have been mapped within the Development Envelope (Table 8-8).

Six additional vegetation types within the Development Envelope contain incidental or non-dominant groundwater dependent species, and while they do not qualify for the entire vegetation unit to be considered as GDV, polygons containing these species have the potential to qualify as GDV (Table 8-8). Non-dominant/incidental phreatophytes recorded within the Development Envelope include several banksia species, namely *Banksia littoralis* (obligate), *Banksia ilicifolia* (obligate) and *Banksia attenuata* (facultative). Other facultative phreatophytes recorded include *Melaleuca preissiana* and *Melaleuca rhaphiophylla*.

Table 8-8: Known and Potential Groundwater Dependent Vegetation Types within the Development Envelope

Vegetation Type	Basis for Inclusion as GDV	Likely Groundwater Dependence Type	Extent within Development Envelope (ha)
Confirmed GDV			
AmBsHc	GDV (TEC)	Obligate	1.10
EmmTpAs	GDV (TEC/ Analogous to TEC)	Obligate	10.62
Mj	GDV (TEC)	Obligate	90.54
XpMdLm	GDV (TEC)	Obligate	6.40
Potential GDV			
MpXpHfSs	GDV (*Melaleuca* spp. dominated)	Facultative	3.83
MrCh	GDV (*Melaleuca* spp. dominated)	Facultative	41.39
MrTjLs	GDV (*Melaleuca* spp. dominated)	Facultative	93.64

Vegetation Type	Basis for Inclusion as GDV	Likely Groundwater Dependence Type	Extent within Development Envelope (ha)
Vegetation types containing incidental or non-dominant groundwater dependent species			
AsLs	Presence of *M. preissiana*	Facultative	24.02
CcTpCeOh	Presence of *B. attenuata and M. preissiana*	Facultative	35.89
EmmAffMtAsDb	Presence of *B. attenuata* and *B. ilicifolia*	Facultative	132.85
EmmXpMtDb	Presence of *B. littoralis* and *B. ilicifolia*	Obligate	73.46
PeeLs	Presence of *B. littoralis*	Obligate	16.07
TiLs	Presence of *M. rhaphiophylla*	Facultative	40.99
Total	-	-	**570.80**

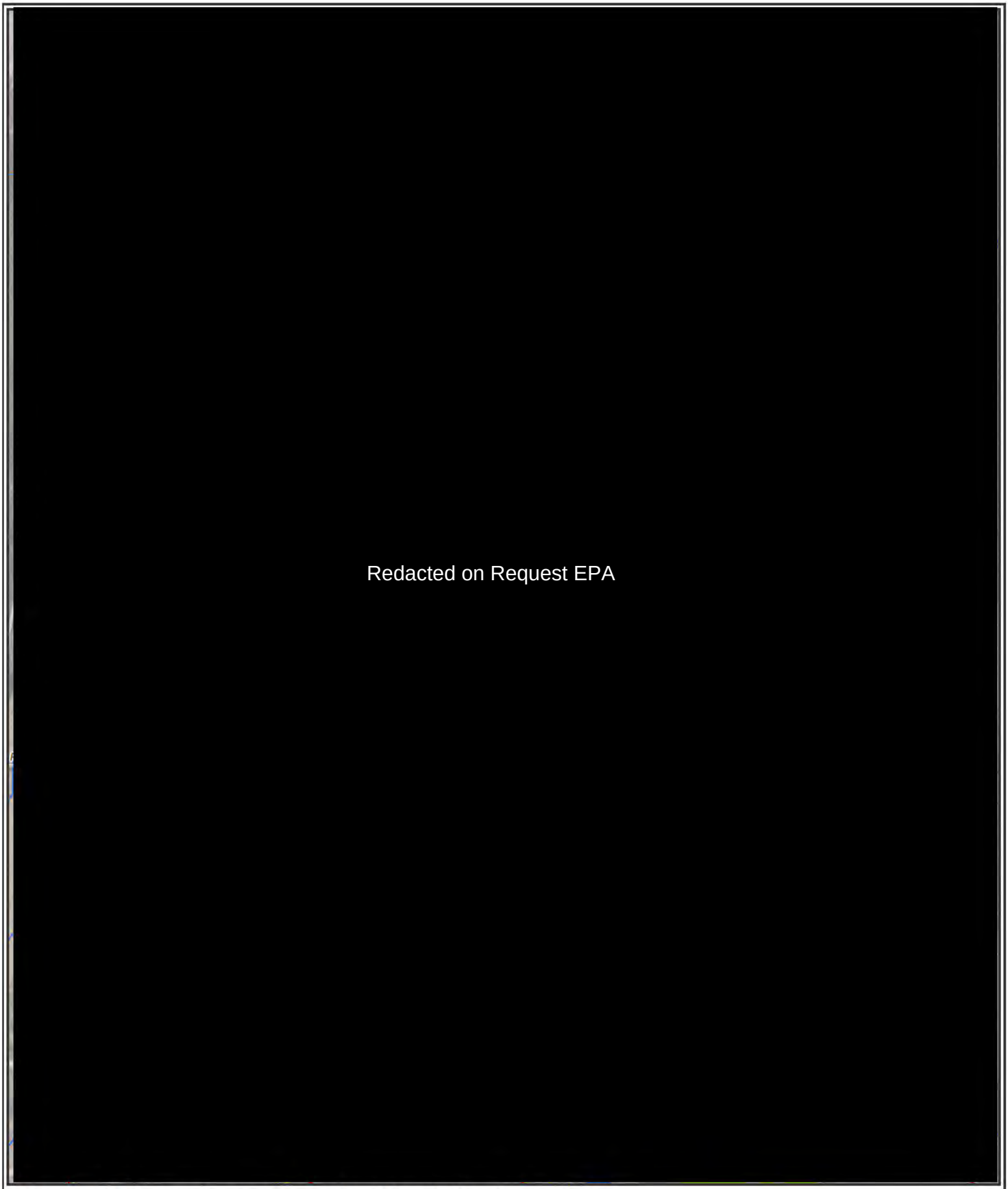

Figure 8-5: Groundwater Dependent Vegetation (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Groundwater Dependent Vegetation

Confirmed GDV

- Confirmed GDV (Analogous to TEC)
- Confirmed GDV (TEC)

Potential GDV

- Known to contain record(s) of GDV associated species
- Potential GDV (Melaleuca spp.)

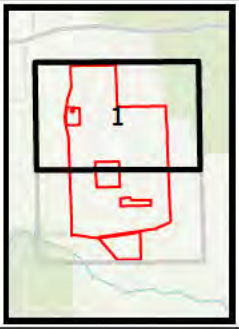

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Figure 8-5: Groundwater Dependent Vegetation (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

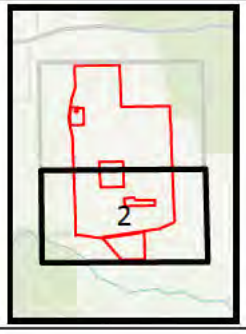
Groundwater Dependent Vegetation

Confirmed GDV

- Confirmed GDV (Analogous to TEC)
- Confirmed GDV (TEC)

Potential GDV

- Known to contain record(s) of GDV associated species
- Potential GDV (Melaleuca spp.)



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8.3.3. Flora

The survey identified a total of 423 taxa (353 native and 70 introduced) in the Survey Area, representing 65 families and 209 genera. The most dominant families within this assemblage include Fabaceae, Proteaceae, Poaceae, Myrtaceae, Restionaceae and Cyperaceae.

8.3.3.1. Conservation Significant Flora

Three flora species listed as Threatened under the EPBC Act were recorded in the Survey Area, namely (Phoenix 2025c):

- *Lambertia orbifolia* subsp. *vespera* (listed as EN under the EPBC Act and BC Act) – recorded within the Development Envelope
- *Verticordia plumosa* var. *vassensis* (listed as EN under the EPBC Act and BC Act) – not recorded within the Development Envelope
- *Grevillea brachystylis* subsp. *australis* (listed as Vulnerable [VU] under the EPBC Act and Critically Endangered [CR] under the BC Act) – recorded within the Development Envelope.

A total of 16 Priority flora species were recorded during the survey, of which twelve occur within the Development Envelope (Phoenix 2025c).

Two additional Threatened and three Priority species have been previously recorded within the Development Envelope, but were not targeted during the survey, given they were located a substantial distance from the expected areas of disturbance. Therefore, these unconfirmed desktop records have been treated as present.

Table 8-9, Figure 8-6 and Figure 8-7 detail the records of conservation significant flora within the Development Envelope.

8.3.3.2. Introduced Flora

A total of 70 introduced (weed) flora species were recorded during the survey (Phoenix 2025c). None of the recorded species are listed as a Declared Pest or Weed of National Significance (WoNS) under the *Biosecurity and Agricultural Management Act 2007* (BAM Act).

Table 8-9: Conservation Significant Flora recorded in the Development Envelope

Species	Conservation Status		Habitat	Vegetation Type Presence	No. of Populations (Individuals) Recorded during Survey	No. of Populations (Individuals) in Development Envelope Recorded during Survey	No. of Unconfirmed Desktop Individuals in Development Envelope
	BC Act/DBCA	EPBC Act					
Conospermum quadripetalum	CR	-	Shrubs, 0.20-0.30 m high. Sandy clay, sand. Flats behind coastal hills. Peppermint and Jarrah/ paperbark woodlands over mixed shrubs and sedgelands. Flowers September to November.	AsLs, TiLs, EmmTpAs, XpAs, CcTlXpAp and EmmTpGoMtPu	0 (0)	0 (0)	6
Darwinia ferricola	EN	EN	Large, much branched, semi-climbing or rounded shrub, to 1.5 m high. Shallow red or brown clays over winter-wet ironstone. Flowers late winter to early summer, peak in spring.	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm and ClcVj	0 (0)	0 (0)	1
Lambertia orbifolia subsp. vespera	EN	EN	Sand or sandy clay in association with ironstone in seasonally wet areas. Open woodland of *Eucalyptus marginata*, *Corymbia calophylla* or *Agonis flexuosa* over closed shrubland, or shrubland over dense heath (WAH 1998-).	XpAs	1 (4)	1 (4)	0
Grevillea brachystylis **subsp.** *australis*	VU	VU	Wet depressions and swamps in grey clayey sand. Grows amongst *Corymbia calophylla, Agonis flexuosa* and *Agonis parviceps* (WAH 1998-)	EmmXpMtDb	6 (6)	6 (6)	67
Synaphea nexosa	P1	-	Depressions in road verges and wet disturbed areas on brown clayey sand. Often growing amongst weeds (WAH 1998-).	EmmXpMtDb	4 (36)	2 (31)	20
Boronia anceps	P3	-	Winter wet depressions and flat areas next to road verges. Grows amongst *Agonis flexuosa, Nuytsia floribunda*, *Eucalyptus marginata* and *Corymbia calophylla* with *Adenanthos detmoldii* (WAH 1998-).	AmBsHc, ClcVj, EmmTpAs and EmmXpMtDb	13 (160)	9 (115)	5

Species	Conservation Status		Habitat	Vegetation Type Presence	No. of Populations (Individuals) Recorded during Survey	No. of Populations (Individuals) in Development Envelope Recorded during Survey	No. of Unconfirmed Desktop Individuals in Development Envelope
	BC Act/DBCA	EPBC Act					
Calothamnus lateralis **var.** *crassus*	P3	-	Winter-wet flats, swamps, depressions and drainage lines. Often amongst *Agonis flexuosa*, *Hakea* spp., *Restionaceae* spp. (WAH 1998-).	AsLs, CcTlXpAp, ClcVj, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb, MrCh, PeeLs, TiLs and XpAs	63 (2,334)	42 (190)	24
Dampiera heteroptera	P3	-	Grey-black-brown soils on winter-wet depressions, sandy rises and drainage lines. Often grows amongst *Eucalyptus marginata*, *Corymbia calophylla* and *Taxandria* spp. (WAH 1998-).	CcTlXpAp, CcTpCeOh, ClcVj, EmmXpMtDb and XpAs	7 (10)	4 (4)	0
Leucopogon alternifolius	P3	-	Swamps and wetlands on grey-black peaty sand. Amongst *Homalospermum firmum* and *Beaufortia sparsa* (WAH 1998-).	XpAs	2 (2)	2 (2)	0
Leucopogon wheelerae	P3	-	Restricted to heath or woodland edge on seasonally wet flats. Flowers from August to November.	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp and EmmTpGoMtPu	0 (0)	0 (0)	1
Loxocarya magna	P3	-	Sand, loam and clay ironstone in seasonally inundated or damp habitats (WAH 1998-).	EmmTpAs and XpMdLm	27 (189)	11 (74)	8

Species	Conservation Status		Habitat	Vegetation Type Presence	No. of Populations (Individuals) Recorded during Survey	No. of Populations (Individuals) in Development Envelope Recorded during Survey	No. of Unconfirmed Desktop Individuals in Development Envelope
	BC Act/DBCA	EPBC Act					
Grevillea manglesioides **subsp.** *ferricola*	P3	-	Swampy plains and winter-wet flats on red-brown clay-loam over ironstone. Heathlands or shrublands amongst *Viminaria juncea* and *Melaleuca* spp. (WA 1998-).	AmBsHc, ClcVj, EmmTpAs and XpMdLm.	39 (285)	7 (35)	10
Gastrolobium formosum	P3	-	Riverbanks or swamps in clay loam soils (WAH 1998-).	EmmXpMtDb.	9 (30)	9 (30)	17
Grevillea papillosa	P3	-	Swamps and winter-wet flat on white-grey sandy soils, next to road verges, drainage lines and winter wet depressions. Often growing amongst *Adenanthos detmoldii*, *Melaleuca* spp. and *Nuytsia floribunda* (WAH 1998-).	Aff, AsLs, CcTpCeOh and EmmXpMtDb.	70 (396)	20 (74)	60
Adenanthos detmoldii	P4	-	Swampy roadsides and wetland plains on white-grey clayey sand soils. Often grows amongst *Xanthorrhoea preissii*, *Agonis parviceps* and *Eucalyptus marginata* (WAH 1998-).	ClcVj, EmmAffMtAsDb, EmmTpAs and EmmXpMtDb.	91 (1,779)	49 (358)	62
Adenanthos x pamela	P4	-	Grey sand, laterite. Damp flats and roadsides (WAH 1998-).	EmmXpMtDb	2 (2)	2 (2)	0
Aotus carinata	P4	-	Wetlands and damp plains on brown clayey loam with grey sand. Often grows with Eucalyptus marginata, *Adenanthos detmoldii* and *Beaufortia sparsa* (WAH 1998-).	EmmTpAs and XpAs	4 (18)	4 (18)	0

Species	Conservation Status		Habitat	Vegetation Type Presence	No. of Populations (Individuals) Recorded during Survey	No. of Populations (Individuals) in Development Envelope Recorded during Survey	No. of Unconfirmed Desktop Individuals in Development Envelope
	BC Act/DBCA	EPBC Act					
Banksia meisneri **subsp.** *ascendens*	P4	-	Shrub, 0.70-1.5 m high; branchlets hairy. Sand, sandy loam and sandy clay over laterite. Swampy flats. Jarrah low woodlands, mixed shrublands over sedgelands. Flowers April to September.	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp and EmmTpGoMtPu	0 (0)	0 (0)	1
Stylidium leeuwinese	P4	-	Erect perennial, herb, 0.15-0.6 m high. Grey to black peaty sand. Winter-wet habitats and depressions. Shrubland, heath, sedgeland or low woodland. Flowers February to May.	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu	0 (0)	0 (0)	3

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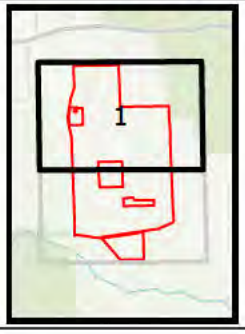
Figure 8-6: Conservation Significant Flora Recorded during the Survey (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Conservation Significant Flora

- *Adenanthos detmoldii* P4 (DBCA list)
- *Banksia meisneri subsp. ascendens* P4 (DBCA list)
- *Boronia anceps* P3 (DBCA list)
- *Calothamnus lateralis var. crassus* P3 (DBCA list)
- *Conospermum quadripetalum* CR (BC Act)
- *Darwinia ferricola* EN (EPBC & BC Acts)
- *Gastrolobium formosum* P3 (DBCA list)
- *Grevillea brachystylis subsp. australis* VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides subsp. ferricola* P3 (DBCA list)
- *Grevillea papillosa* P3 (DBCA list)
- *Leucopogon wheelerae* P3 (DBCA list)
- *Loxocarya magna* P3 (DBCA list)
- *Stylidium leeuwinense* P4 (DBCA list)
- *Synaphea nexosa* P1 (DBCA list)



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Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 7886-DH Date: 9/11/2025

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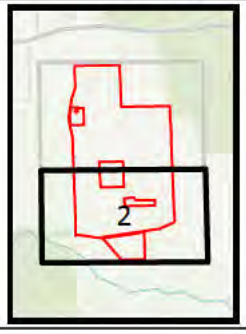
Figure 8-6: Conservation Significant Flora Recorded during the Survey (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Conservation Significant Flora

- *Adenanthos detmoldii* P4 (DBCA list)
- *Banksia meisneri subsp. ascendens* P4 (DBCA list)
- *Boronia anceps* P3 (DBCA list)
- *Calothamnus lateralis var. crassus* P3 (DBCA list)
- *Conospermum quadripetalum* CR (BC Act)
- *Darwinia ferricola* EN (EPBC & BC Acts)
- *Gastrolobium formosum* P3 (DBCA list)
- *Grevillea brachystylis subsp. australis* VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides subsp. ferricola* P3 (DBCA list)
- *Grevillea papillosa* P3 (DBCA list)
- *Leucopogon wheelerae* P3 (DBCA list)
- *Loxocarya magna* P3 (DBCA list)
- *Stylidium leeuwinense* P4 (DBCA list)
- *Synaphea nexosa* P1 (DBCA list)



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Datum/Projection:
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Project: 7886-DH Date: 9/11/2025

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Figure 8-7: Unconfirmed Desktop Records (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Conservation Significant Flora

- *Adenanthos detmoldii* P4 (DBCA list)
- *Banksia meisneri subsp. ascendens* P4 (DBCA list)
- *Boronia anceps* P3 (DBCA list)
- *Calothamnus lateralis var. crassus* P3 (DBCA list)
- *Conospermum quadripetalum* CR (BC Act)
- *Darwinia ferricola* EN (EPBC & BC Acts)
- *Gastrolobium formosum* P3 (DBCA list)
- *Grevillea brachystylis subsp. australis* VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides subsp. ferricola* P3 (DBCA list)
- *Grevillea papillosa* P3 (DBCA list)
- *Leucopogon wheelerae* P3 (DBCA list)
- *Loxocarya magna* P3 (DBCA list)
- *Stylidium leeuwinense* P4 (DBCA list)
- *Synaphea nexosa* P1 (DBCA list)

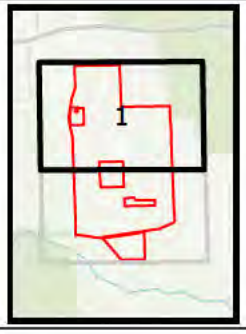

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Figure 8-7: Unconfirmed Desktop Records (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Conservation Significant Flora

- *Adenanthos detmoldii* P4 (DBCA list)
- *Banksia meisneri subsp. ascendens* P4 (DBCA list)
- *Boronia anceps* P3 (DBCA list)
- *Calothamnus lateralis var. crassus* P3 (DBCA list)
- *Conospermum quadripetalum* CR (BC Act)
- *Darwinia ferricola* EN (EPBC & BC Acts)
- *Gastrolobium formosum* P3 (DBCA list)
- *Grevillea brachystylis subsp. australis* VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides subsp. ferricola* P3 (DBCA list)
- *Grevillea papillosa* P3 (DBCA list)
- *Leucopogon wheelerae* P3 (DBCA list)
- *Loxocarya magna* P3 (DBCA list)
- *Stylidium leeuwinense* P4 (DBCA list)
- *Synaphea nexosa* P1 (DBCA list)



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Kilometers

Datum/Projection:
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Project: 7886-DH Date: 9/11/2025

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8.4. Potential Environmental Impacts

The potential direct and indirect impacts of the Proposal on flora and vegetation prior to mitigation being applied have been identified as:

- Loss of native vegetation due to clearing
- Loss of conservation significant flora species due to clearing
- Loss of conservation significant vegetation communities due to clearing
- Increased fragmentation of native vegetation due to clearing
- Degradation of vegetation from increased dust deposition
- Degradation of vegetation from introduction and/or spread of weeds and/or dieback
- Groundwater drawdown associated with construction dewatering potentially reducing the hydroperiod and health of GDV
- Degradation or alteration of vegetation as a result of altered hydrological regimes
- Degradation of vegetation from increased risk of bushfires.

8.5. Mitigation

The Proponent has applied the mitigation hierarchy during the design of the Proposal to reduce the potential impacts to any flora and vegetation within and surrounding the Development Envelope as far as practicable. Potential impacts have primarily been avoided or minimised through the design of the Proposal during the planning phase.

A key mitigation measures is the preparation of a CEMP to manage potential environmental impacts during the construction phase. Management and mitigation measures used to minimise the impacts to flora and vegetation during construction are detailed in the CEMP (Appendix H).

The specific mitigation and management measures proposed to be implemented by the Proponent have been detailed in Table 8-10.

Table 8-10: Proposed Flora and Vegetation mitigation measures

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Loss of native vegetation due to clearing.	• Clearing of the following native vegetation has been avoided through the refinement of the Indicative Disturbance Footprint: - Native vegetation within conservation covenant areas - Locally restricted vegetation types (AmBsHc, ClcVj and MpXpHfSs) - Native vegetation growing in association with wetland habitats, including any contiguous* native vegetation within 50 m (Section 9.6.1).	• The Indicative Disturbance Footprint has been designed to utilise existing cleared areas and tracks as much as practicable to reduce clearing of native vegetation. • All temporary construction infrastructure (e.g., laydown areas and concrete batching plant) will be located within areas of existing disturbance, reducing clearing. • Clearing of vegetation in Very Good to Pristine condition will be limited to a 0.02 ha area that could not be avoided, located adjacent to the existing transmission line in support of connecting the Proposal to the existing Beenup substation (Figure 8-8). • An additional Targeted flora survey will be conducted within the ecological gap survey area (ELA 2025b) to confirm the absence of Threatened and Priority flora. • A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to minimise impacts from clearing, which will include: - Requiring all site personnel and contractors to undertake site-specific environmental induction to ensure they are aware of native vegetation clearing requirements and locations of Threatened and Priority flora prior to commencement of works - Requiring all clearing and ground disturbance activities to have an active ground disturbance permit - Requiring all areas to be cleared to be clearly pegged and demarcated by a qualified surveyor	• Areas that are cleared in support of the Proposal will be rehabilitated during decommissioning in accordance with the Preliminary Decommissioning Plan (Appendix C).	Based on the mitigation proposed the Proposal will result in the clearing of a maximum of 1.0 ha of remnant native vegetation. The assessment and significance of this residual impact is detailed in Section 8.6.1.
Loss of conservation significant flora species due to clearing.	• The optimisation of the Indicative Disturbance Footprint during the planning phase of the Proposal has avoided clearing of Scott River Ironstone TEC and all Threatened and Priority flora individuals. • Clearing of contiguous native vegetation within 50 m of the Scott River Ironstone TEC and within 50 m of known records of Threatened and P1 species and within 20 m of P2, P3 and P4 species, will be avoided, with the exception of the southern site entrance where a buffer of only 18 m can be maintained (Figure 8-8). A larger buffer could not be maintained at this location as detailed in Section 8.6.2.			Based on the mitigation proposed no residual impact is likely for conservation significant flora species as a result of clearing.
Loss of conservation significant vegetation communities due to clearing activities.				Based on the mitigation proposed minor disturbance (0.01 ha) will occur within the 50 m buffer of a single occurrence of Scott River Ironstone TEC. The assessment and significance of this residual impact is detailed in Section 8.6.2.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Increased fragmentation of native vegetation.	N/A	- Requiring all known locations of Threatened and Priority Flora, and Scott River Ironstone TEC and associated contiguous native vegetation within 50 m of a clearing boundary to be identified and clearly pegged or demarked prior to clearing - Undertaking routine inspections of the disturbance demarcation to ensure no disturbance outside of the designated area and recording of land disturbance in a register to support compliance audits and reporting.		Based on the mitigation proposed minor increase in fragmentation of remnant vegetation is considered likely. The assessment and significance of this residual impact is detailed in Section 8.6.3.
Degradation of vegetation from increased dust deposition.	N/A	• A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to minimise impacts from dust: - Dust suppression techniques during construction, such as water carts - Speed limits on unsealed roads/tracks - Progressive clearing, and rehabilitation of temporary disturbance areas.	• Land temporarily disturbed during construction (e.g. laydown areas and concrete batching plant) will be rehabilitated to the original land use or to a post closure land use agreed with the landowners, reducing the potential for dust emissions.	Based on the mitigation proposed the Proposal will result in localised short-term increase in fugitive dust during construction. The assessment and significance of this residual impact is detailed in Section 8.6.4.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Degradation of vegetation from introduction and/or spread of weeds and/or dieback.	N/A	• Preparation and Implementation of the CEMP (Appendix H) to minimise impacts from weeds, which will include: - Limiting access points to only those necessary - Ensuring all vehicles, equipment machinery and personnel (including footwear) arriving to the proposal site are clean of plant material, seeds and soil - The Vehicle-Machinery Hygiene Checklist shall be completed for all vehicles, equipment and machinery arriving onsite - Ensuring any vegetation or soil that is infested with weeds or pathogens is handled, stored and disposed of as pest contaminated material (e.g. covered during transport, contained) - Undertake a risk assessment to identify potential spread of weeds associated with planned activities. - Conduct a pre and post construction weed survey to validate controls and provide a baseline - Manage all imported basic raw materials to minimise the risk of introducing weeds, seeds and pathogens - Confirm any cleared material to be mulched and reused onsite is free of weed material prior to use • Completion of a *Phytophthora* dieback survey prior to construction. • Develop and implement a Dieback Management Plan to minimise the risks related to the introduction and/or spread of dieback, where required.	N/A	Based on the mitigation proposed the Proposal will result in the potential introduction and/or spread of weeds and/or dieback. The assessment and significance of this residual impact is detailed in Section 8.6.5.
Groundwater drawdown associated with construction dewatering potentially reducing the hydroperiod and health of GDV	• Borrow pits will be constructed above watertable. • Transmission poles and towers will utilise concrete caisson (bored concrete) foundation.	• Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable • Dewatering will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix H), to ensure that drawdown does not present an unacceptable impact to the environment. This will be achieved through: - Application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation	N/A	Based on the mitigation proposed the Proposal is not anticipated to impact health of GDV as a result of dewatering during construction. The assessment and significance of this residual impact is detailed in Section 8.6.6.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
		- Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location - Drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE. • Use of alternative turbine foundations (Section 2.2.1.1). • Strategic disposal of dewater to, and location of, infiltration basins / trenches around the point of extraction to minimise the cone of depression. • Application of other management strategies as required (e.g. sheet piling).		
Degradation or alteration of vegetation as a result of altered hydrological regimes.	N/A	• Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable. • Modification of existing drainage infrastructure will be avoided, where possible, unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors. • Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion. • Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. • Design and construction works will ensure that local grading and excavation areas do not create areas of pooled water. - Exposed soils will be vegetated or covered (e.g. with rock or synthetic liners) in disturbed areas where surface water flow velocities exceed 1 m/s and remain below 2 m/s.	N/A	Potential for minor changes to surface water flow that could have minor impacts on vegetation. The assessment and significance of this residual impact is detailed in Section 8.6.7.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Degradation of vegetation as a result of increased risk of bushfires.	N/A	• A Bushfire Management Plan (BMP; Linfire 2025a) and Bushfire Risk Management Plan (BRMP; Linfire 2025b) will be implemented during construction and operation of the Proposal. This will include the following key management measures: - Establishment of non-vegetation and asset protection zones - All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system - All buildings and vehicles will be fitted with first response fire equipment - Adhering to local government fire restrictions, including daily checks of fire danger ratings - Emergency services will have full access to the Development Envelope and water tanks for emergency response inside or outside of the Development Envelope.	N/A	Minor increase in risk of accidental bushfires. The assessment and significance of this residual impact is detailed in Section 8.6.8.

*Contiguous native vegetation is defined as remnant native vegetation not separated by more than 5 m of cleared land.

8.6. Assessment and Significance of Residual Impacts

The following sections assess and determine the significance of the residual impacts to Flora and Vegetation, as identified in Table 8-10.

8.6.1. Loss of Native Vegetation due to Clearing

The Proposal has been designed to largely avoid areas of remnant vegetation by preferentially locating the Development Envelope in a highly disturbed landscape, with much of the native vegetation having been cleared for agricultural use.

Table 8-11 presents the approximate loss of native vegetation based on the Indicative Disturbance Footprint. The Indicative Disturbance Footprint represents the maximum potential extent required for the Proposal of which only 0.71 ha (0.64%) is located within areas mapped as native vegetation (Figure 8-2; Table 8-11). However, the Proposal allows for clearing of up to 1.00 ha of native vegetation to provide flexibility to refine the Indicative Disturbance Footprint within the Development Envelope during detailed design (Figure 8-2; Table 8-11; Table 8-12).

Clearing of native vegetation will be restricted to small areas to facilitate ingress of turbine components, upgrades to the existing Beenup Mine to Manjimup 132 kV transmission line, and where an alternative layout was not possible due to the avoidance of other significant receptors. Specifically, the clearing of native vegetation is considered unavoidable at the following sites (Figure 8-8):

- Area 1: Clearing of approximately 0.19 ha of native vegetation mapped as Good condition at the northern main site entrance, required for ingress of the turbine components. However, review of aerial imagery and a subsequent site visit by (G Wells, personal communication, 22 November 2025) confirmed that this area will only require the removal of an isolated number of native sedges. This location was selected to utilise existing farm track and minimise clearing requirement.
- Area 2: Clearing of approximately 0.02 ha of native vegetation in Degraded to Excellent condition, required for the new transmission line to connect the Proposal to the existing Beenup substation. This was located to avoid potential nesting trees for black cockatoos and to be as close as possible to the existing transmission line to reduce clearing requirements.
- Area 3: Clearing of approximately 0.14 ha of native vegetation in Degraded condition required for the Proposal transmission line. This transmission line route was selected to avoid impacts to the adjacent Conservation Covenant Area.
- Area 4: Clearing of approximately 0.01 ha of native vegetation in Good Condition to facilitate transport of turbine components south of Governor Broome Road. This location was selected to minimise clearing requirements by utilising an existing farm access point in the southern road reserve and to avoid impacts to sensitive environmental values, including TEC, a lodged Aboriginal Heritage site and other sensitive environmental values (i.e. conservation significant flora, potential nesting trees for black cockatoos, and higher quality habitat for western ringtail possum and black cockatoos) (Section 9.3.4).

The clearing of vegetation in Very Good to Pristine condition will be limited to the 0.02 ha of clearing required for the new transmission line (Area 2), in support of connecting the Proposal to the existing Beenup substation (Table 8-12). The impacts on individual vegetation types are expected to be minimal given the maximum clearing allowance and the linear configuration of the Indicative Disturbance Footprint allows for clearing to be distributed across a range of vegetation types, with no single

vegetation type being substantially cleared. In addition, no clearing of locally restricted vegetation types (AmBsHc, ClcVj and MpXpHfSs) is proposed.

Table 8-13 presents the approximate loss of mapped pre-European vegetation associations based on the Indicative Disturbance Footprint, as well as the maximum proposed clearing of each VA. Based on the Indicative Disturbance Footprint, at a regional scale, the Proposal will result in minimal clearing within the current mapped extent (GoWA 2019) of each VA, particularly given the linear configuration of the Indicative Disturbance Footprint.

Clearing will also be minimised as much as possible within VA 1137 given it has been reduced by 67.91% from its original extent. In the unlikely event all potential native vegetation clearing (1.00 ha) were required to impact VA 1137, 32.00% would remain intact (i.e. an increase in loss of 0.09%, or a 68.00% reduction from its original extent).

The Proponent commits to the avoidance of restricted vegetation types and vegetation in Very Good to Pristine condition, with the exception of 0.02 ha of Excellent condition vegetation, required for a new transmission line (Area 2). Given this, and the relatively small amount of vegetation to be cleared in comparison to the extent of the Development Envelope and the large remnants of vegetation present within adjacent national parks, the proposed clearing of 1.00 ha of remnant native vegetation is not expected to be considered significant.

Table 8-11: Approximate Clearing within the Indicative Disturbance Footprint by Vegetation Type

Vegetation Types	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Extent within Indicative Disturbance Footprint (%)	Maximum Proposed Native Vegetation Clearing (ha)**
AsLs	24.02	24.02	0.04	0.04	
TiLs	40.99	40.99	0.00	0.00	
PeeLs	16.07	16.07	0.01	0.01	
MrCh	41.39	41.39	0.00	0.00	
MrTjLs	93.64	93.64	0.22	0.20	
XpAs	25.55	23.84	0.01	0.01	
Aff	98.90	99.04	0.12	0.12	1.00*
EmmXpMtDb	79.05	73.46	<0.01	<0.01	
EmmAffMtAsDb	135.20	132.85	0.18	0.17	
CcTpCeOh	75.26	36.01	0.07	0.07	
Mj	106.69	90.54	<0.01	<0.01	
EmmTpAs	28.43	10.62	0.00	0.00	
XpMdLm	15.05	6.40	0.00	0.00	
AmBsHc	1.64	1.10	0.00	0.00	
ClcVj	0.79	0.79	0.01	0.01	0.00
MpXpHfSs	3.84	3.83	0.04	0.03	
Total	786.51	694.59	0.71	0.66	1.00
Non-native Vegetation					
Psp	1.60	1.27	0.00	0.00	-
Egg	415.43	412.29	4.71	4.42	-
Water	12.32	12.32	0.00	0.00	-
Cleared	2,673.22	2,476.41	101.20	94.92	-
Total	3,102.57	2,902.29	105.90	99.34	-
Total (overall)	3,889.08	3596.85	106.61	100.00	1.00

*This impact excludes occurrences of these vegetation types that are representative of the Scott River Ironstone Association TEC. NB: Minor discrepancies due to rounding.

** Provides maximum limits on how much clearing can occur for each vegetation type but total clearing will not exceed 1 ha.

Table 8-12: Approximate Clearing within the Indicative Disturbance Footprint by Vegetation Condition

Vegetation Condition	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Extent within Indicative Disturbance Footprint (%)	Maximum Proposed Clearing of Native Vegetation (ha)*
Pristine	30.20	25.62	0.00	0.00	0.02
Excellent	248.99	237.67	0.20	0.19	
Very Good	178.74	165.08	<0.01	<0.01	
Good	124.95	112.15	0.23	0.21	1.00
Degraded	207.89	154.07	0.28	0.26	
Completely Degraded	3,090.25	2889.94	105.90	99.34	
Water (not assessed)	12.31	12.31	0.00	0.00	-
Total	3,893.33	3596.85	106.61	100.00	1.00

*Provides maximum limits on how much clearing can occur for each vegetation condition but total clearing will not exceed 1 ha.

Table 8-13: Approximate Clearing within the Indicative Disturbance Footprint by Pre-European Vegetation Association

Vegetation Association	Extent within the Warren and Jarrah Forest Bioregions			Extent within Development Envelope (ha)^	Extent within Indicative Disturbance Footprint (ha)^	Maximum Proposed Clearing of Native Vegetation (ha)
	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)			
3, Medium Forest; Jarrah-Marri	2,640,853.64	1,799,419.74	68.14	226.61	0.19	1.00
14, Low Forest; Jarrah	93,960.86	70,081.19	74.59	51.63	0.00	
27, Low woodland; paperbark (*Melaleuca* sp.)	120,081.46	88,997.90	74.11	442.96	18.51	
51, Sedgeland; reed swamps, occasionally with heath	55,829.09	31,217.95	55.92	193.15	2.29	
949, Low woodland; *Banksia*	3,196.76	1,539.26	48.15	117.31	2.29	
973, Low Forest; paperbark (*Melaleuca rhaphiophylla*)	2,477.29	1,484.22	59.91	18.01	0.00	
975, Low woodland; Jarrah	4,890.86	4,042.13	82.65	18.46	0.00	
1134 Medium woodland; Jarrah (south coast)	37,488.91	30,358.47	80.98	0.75	0.00	

Vegetation Association	Extent within the Warren and Jarrah Forest Bioregions			Extent within Development Envelope (ha)^	Extent within Indicative Disturbance Footprint (ha)^	Maximum Proposed Clearing of Native Vegetation (ha)
	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)			
1137, Shrublands; *Melaleuca incana, Hakea tuberculata, Viminaria juncea* scrub on ironstone, south coast	1,079.83	346.53	32.09	61.01	3.55	
Total	2,959,858.70	2,027,487.38	-	1129.89	26.82	1.00

^The total extent of vegetation associations within the Development Envelope and Indicative Disturbance Footprint does not align with the total extent of the native vegetation types mapped by Phoenix (2025c) due to the broadscale nature of the State (GoWA 2019) vegetation mapping.

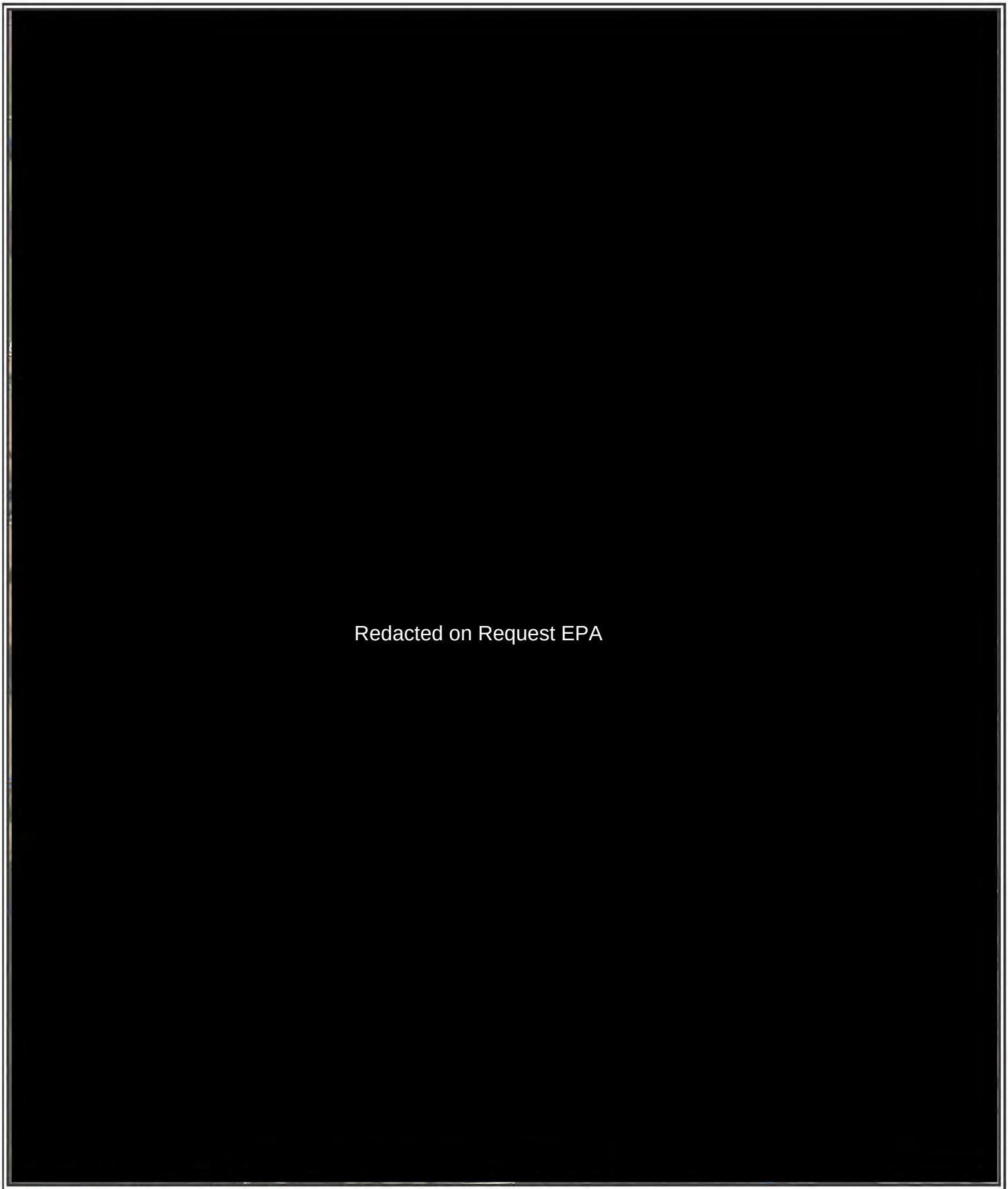

Figure 8-8: Unavoidable Areas of Native Vegetation Clearing

- Roads
- Watercourses
- Development Envelope
- Unavoidable Clearing Area
- Indicative Disturbance Footprint
- Threatened Ecological Communities (Scott River Ironstone Association)

Native Vegetation

- Pristine
- Excellent
- Very Good
- Good
- Degraded

Non-native Vegetation

- Water
- Completely Degraded

0 0.5 1 2

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 7886-DH Date: 9/25/2025

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8.6.2. Loss of Conservation Significant Vegetation Communities due to the Clearing Activities

The implementation of the Proposal will not result in the clearing of any TECs listed under the EPBC Act or BC Act, or any PECs listed by DBCA, including the Scott River Ironstone TEC. All areas of the Scott River Ironstone TEC and any contiguous native vegetation within 50 m will be clearly pegged and demarcated by a qualified surveyor prior to clearing, where located within 50 m of proposed clearing activity.

In accordance with the *Approved Conservation Advice for Scott River Ironstone Association TEC* (DSEWPaC 2013), it is recommended that a buffer zone of at least 50 m be maintained around a patch of Scott River TEC, to protect against weed introduction and hydrological impacts. A maximum of 0.01 ha of contiguous native vegetation is required to be cleared at one location within 50 m of the Scott River Ironstone TEC (Figure 8-8, Area 4). This clearing is currently unavoidable as it is required to facilitate blade transport to the most southern wind turbine locations, however, ensures the least amount of clearing whilst avoiding TEC, a lodged Aboriginal Heritage site and other sensitive environmental values (i.e. conservation significant flora, potential nesting trees for black cockatoos, and higher quality habitat for western ringtail possum and black cockatoos) (Section 9.3.4).

Some additional minor disturbance may also occur within the 50 m buffer in already cleared areas or within areas of native vegetation not contiguous with the TEC. All ground disturbance will be managed in accordance with the CEMP (Appendix H) to mitigate weed intrusion, hydrological changes and other indirect impacts on TEC (Sections 8.6.4 to 8.6.8).

Given the complete avoidance of TEC, minimal amount of clearing required within 50 m of the TEC (0.01 ha), implementation of the CEMP, and as indirect impacts are not expected to be significant (Sections 8.6.4 to 8.6.8), the Proposal is unlikely to result in loss of TEC.

8.6.3. Increased Fragmentation of Native Vegetation due to Clearing

Fragmentation occurs when the continuity of vegetation is disrupted and reduced into several smaller patches. The spatial separation of these patches can lead to a decline in biodiversity and reduced population size. This can lead to reduced recruitment for flora species and altered community structures.

The landscape in which the Proposal will be constructed is already highly fragmented from historical land clearing for agricultural use. The potential for fragmentation is minimised as the internal access roads have been designed to follow existing cleared areas and tracks or occur along the periphery of native vegetation wherever possible. Some minor fragmentation will occur at Governor Broome Road (Figure 8-8), where clearing is required to facilitate the transport of turbine components. Given this is the only instance of fragmentation expected to occur, the Proposal is not expected to result in significant impacts to native vegetation due to fragmentation.

8.6.4. Degradation of Vegetation from Increased Dust Deposition

Localised short-term increases in fugitive dust emissions will occur primarily during the construction phase of the proposal from activities including vegetation clearing, excavations, earthworks and vehicle movements. During construction, dust emissions will be managed through the mitigation measures outlined in the CEMP (Appendix H), as detailed in Section 8.5. Dust emissions may also be generated during the operational phase by infrequent vehicle movements on unsealed internal access roads.

Given the relatively minimal disturbance required (approximately 107 ha within the 3,597 ha Development Envelope) and the short construction phase (18-24 months) impacts that may occur during construction would be relatively short in duration and restricted to the areas of construction and access roads. Once operational, vehicle movement within the Development Envelope will be minimal, with access tracks to be used by approximately five full time staff when undertaking wind farm maintenance activities, landowner liaison, environmental management and safety. Therefore, only minor dust generation is expected during the operational phase. Moreover, given the location of the Proposal within a mostly cleared, fragmented landscape, it is not anticipated that remnant vegetation, most of which will not be adjacent to major Proposal activities (e.g. wind turbine construction areas), will be significantly impacted by occasional and temporary potential dust deposition occurrences.

The Proposal may result in a minor, temporary increase in dust deposition on vegetation during construction; however, through the implementation of dust management and mitigation measures, impacts associated with increased dust emissions are expected to be localised and temporary. Therefore, impacts are not expected to be significant.

8.6.5. Degradation of Vegetation from Introduction and/or spread of Weeds and/or Dieback

Clearing, vehicle and machinery movements have the potential to spread and/or introduce weed species and pathogens such as *Phytophthora cinnamomi*. The landscape in which the Proposal occurs is largely cleared and weed species are common throughout the agricultural land of the local area. A total of 70 weed species were recorded during the survey, none of which are listed as a Declared Pest or WoNS under the BAM Act. Given the existing presence of weeds throughout the Development Envelope, the Proposal is unlikely to introduce or spread weeds that will further degrade vegetation.

Phytophthora cinnamomi infestation is a threatening process affecting the viability and genetic diversity of the native flora of south-western Australia. The pathogen is recognised in the EPBC Act as one of five key threatening processes affecting biodiversity in Australian ecosystems (Dunstan et al. 2008). The pathogen can spread through soil, water or infected plant material, where moist or wet conditions

favour dispersal of the pathogen. Several species within the Scott River Ironstone TEC are considered susceptible to Dieback, particularly members of the Proteaceae and Epacridaceae (Luu and English 2004). Hygiene measures such as Clean on Entry procedures and vehicle checks will be implemented in accordance with the CEMP (Appendix H) to limit the potential for the introduction and/or spread of weeds and dieback. To assess and mitigate the potential impacts of dieback within the Development Envelope, a dieback assessment will be undertaken, and a subsequent Dieback Management Plan developed prior to construction of the Proposal, where required.

As native vegetation clearing will be limited to a maximum of 1.00 ha, the potential for clearing activities to spread and/or introduce weed species and pathogens within native vegetation is expected to be low. Given this, the existing presence of weeds throughout the degraded landscape and that weed and pathogen management measures will be implemented, no significant residual impacts on vegetation from the introduction or spread of weeds and/or dieback are anticipated from the Proposal.

8.6.6. Groundwater Drawdown Potentially Reducing the Hydroperiod and Health of GDV

Temporary reductions in the groundwater level within the Superficial Aquifer from dewatering during construction (Section 7.6.1) may result in impacts to the inundation period of groundwater dependent wetland values and the health of GDV. Section 7.6.1 describes the modelling assessment undertaken to predict the extent of groundwater drawdown during construction. As discussed, the Proponent will ensure that:

- Drawdown does not exceed the natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at any GDV
- Below ground foundations (Section 2.2.1.1) will only be used where it is confirmed prior to construction that dewatering would not be required.

Based on the modelled drawdown less than 0.04 ha of GDV occurs within an area modelled to experience less than 0.5 m dewatering, which is well within the anticipated levels of natural seasonal variation of 1-2 m (Table 8-14; Figure 8-9; Stantec 2025b).

Table 8-14: Predicted Drawdown Interaction with GDV Receptors

GDV Category	GDV Subcategory	Extent within Development Envelope (ha)	Area within Drawdown Extents (ha) (%of Extent within Development Envelope)		
			>2 m	1–2 m	0.5–1 m
Confirmed GDV	Scott River Ironstone TEC*	108.66	0 (0)	0 (0)	0.03 (0.03)
Potential GDV	Vegetation types dominated by *Melaleuca rhaphiophylla* and *Melaleuca preissiana* (MrCh)^	138.86	0 (0)	0 (0)	0.01 (<0.01)
Total		247.52	0 (0)	0 (0)	0.04 (0.02)

*Coincides with fauna habitat GDE (Section 9.3.6.2): Seasonally Inundated Sedgeland wetland.
^Coincides with fauna habitat GDE (Section 9.3.6.2): Seasonally Inundated Paperbark Woodland. Source: Stantec 2025b

This modelled impact is expected to be conservative based on the conservative nature of the drawdown modelling (i.e. assumes groundwater at surface and does not account for recharge associated with infiltration of dewater). To further minimise the extent of drawdown the Proponent commits to:

- Scheduling civil construction activities, specifically activities that require excavation, to occur during the dry season, where practicable

- Managing dewatering so that drawdown does not exceed 0.1 m beyond 100 m from any dewatering location or natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE.
- Discharge of dewater to strategically placed infiltration basins to further minimise drawdown
- Utilisation of alternative management measures if required (e.g. reduced dewatering rates, use of above ground foundation option, sheet piling based on detailed site investigation and revised modelling)
- Implementation of detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B).

Given the temporary and spatially constrained nature of the proposed dewatering and the implementation of the detailed ASSDMP, the Proponent considers that drawdown of groundwater is not expected to significantly impact GDV within or surrounding the Development Envelope.

8.6.7. Degradation or Alteration of Vegetation as a Result of Altered Hydrological Regimes

Proposal infrastructure has the potential to interfere with existing surface water flow patterns resulting in decreased downstream flow, upstream waterlogging, or increased erosion and sedimentation, which has the potential to degrade or alter vegetation.

As outlined in Section 7.6.3, changes to surface water flow and depth as a result of Proposal infrastructure are expected to be minimal given that key infrastructure is not proposed to be located within any potential waterways, inundation zones greater than 0.3 m or high velocity areas exceeding 2 m/s. Furthermore, a CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for impacts to surface hydrological regimes and flow patterns, in turn ensuring minimal impact to relevant existing native vegetation.

Through the implementation of mitigation measures within the CEMP and considered Proposal design, the Proposal is not expected to result in significant impacts to surface hydrological regimes including flow regimes such that vegetation may be significantly impacted.

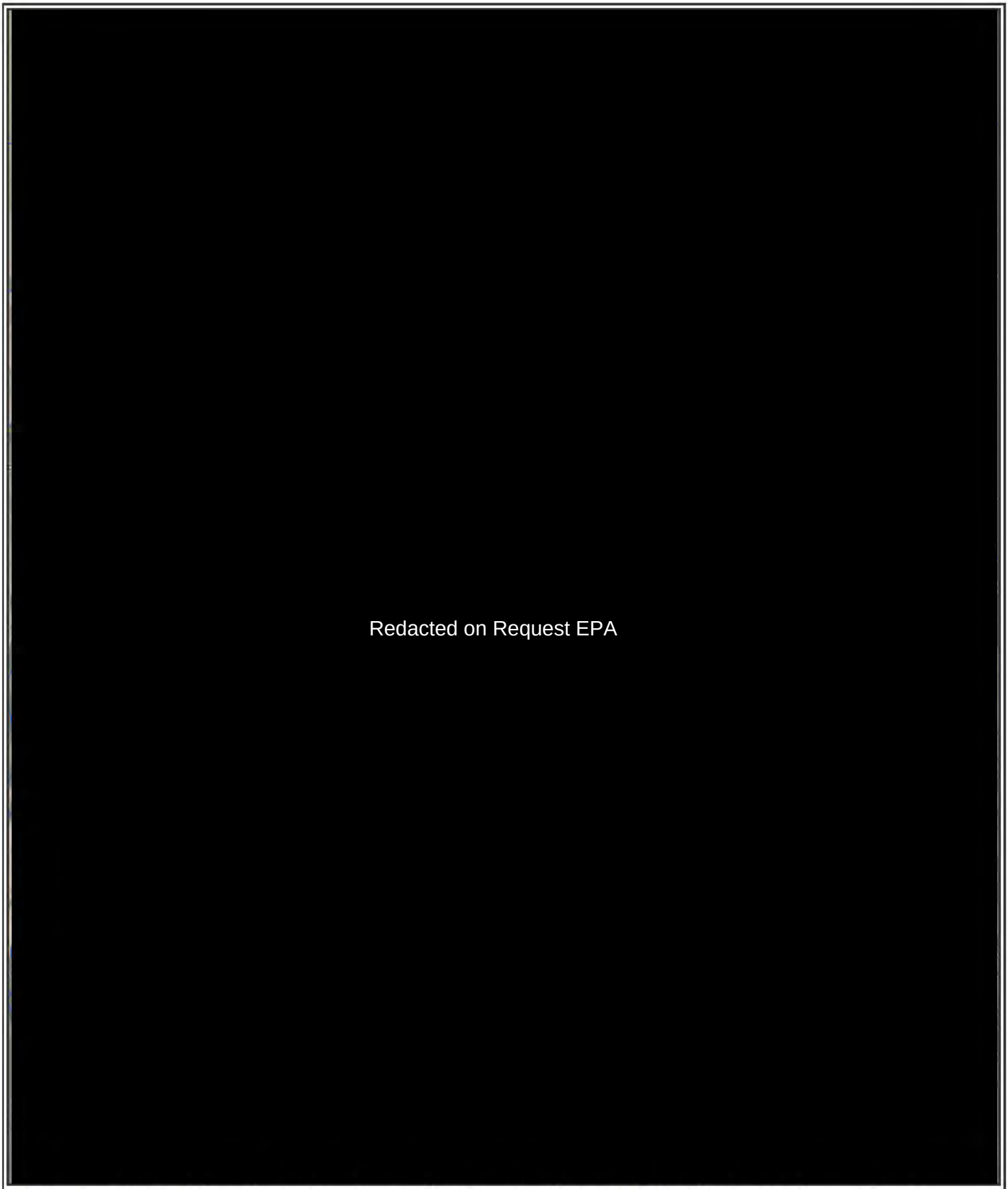

Figure 8-9: Predicted Groundwater Drawdown and Confirmed and Potential GDV within the Development Envelope

- Met Masts
- Wind Turbine
- Rivers and Tributaries
- Roads
- Development Envelope

Predicted Drawdown (m)

- 0.5
- 1
- 1.5
- 2
- 2.5
- 3

Groundwater Dependent Vegetation

Confirmed GDV

- Confirmed GDV (Analogous to TEC)
- Confirmed GDV (TEC)

Potential GDV

- Known to contain record(s) of GDV associated species
- Potential GDV (Melaleuca spp.)

0 0.5 1 2

Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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8.6.8. Degradation of Vegetation from Increased Risk of Bushfires

Construction activities, particularly clearing of native vegetation, welding and the movement of vehicles and heavy machinery have the potential to result in a bushfire that could degrade native vegetation and flora. In addition, fire hazards specific to wind farms can include electrical hazards (power surges, hot surfaces, lightning strike), chemical hazards (leakage of oils and other flammables), increased fire spread due to air flow or falling debris (including turbine blades), obstruction of aerial firefighting access and landscape hazards (ignition within the wind farm facility or external ignition of infrastructure from radiant heat or embers) (Linfire 2025b). The Development Envelope is designated as a bushfire prone area (DFES 2024), with the continuous native vegetation in the surrounding forests presenting the highest bushfire risk in the local area (Linfire 2025b).

However, as noted by the Australasian Fire and Emergency Services Authorities Council, the likelihood of turbine fires is considered to be low given appropriate protection measures are applied (Linfire 2025b). Furthermore, wind farms can reduce bushfire risk through:

- Improved private access roads, allowing better access for emergency services in case of fire and providing additional firebreaks
- Having full time operational staff on site, meaning more eyes and ears on the ground to spot bush fires early
- Attracting lightning strikes during thunderstorms (rather than hitting the ground and vegetation), with strikes safely managed by their built-in protection systems (AFESCA 2018)
- Installing remote monitoring systems to notify personnel if a fire is detected
- Providing dedicated water tanks at the wind farm which can be used in the event of a fire.

The risk of fire associated with the Proposal will be managed through the implementation of a BMP (Linfire 2025a) and BRMP (Linfire 2025b). Vegetation will be maintained around all infrastructure to reduce bushfire risk, including the implementation of NVZ and APZ around the base of each wind turbine. All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system. In the event of a turbine fire, the affected turbine will automatically shut down. Turbines will also have the capability to be remotely shut down and de-energised in the event of bushfire. The fire detection and alarm system will include notification to relevant personnel, such as wind farm staff, DFES, the local fire brigade and/or neighbouring landowners.

In accordance with the BMP (Linfire 2025a), the Proposal will be:

- Equipped with a mobile fire trailer (or similar approved device) which the Proponent must ensure is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank
- Provide water for managing fire, currently proposed to be stored in three clearly signposted 45 kL firewater tanks across the site.

The Proponent will ensure that access to the Development Envelope and water tanks is available to emergency services at any time.

On the basis of the above, the Proposal is not expected to increase the risk of bushfires.

8.7. Environmental Outcomes

The Proposal is not anticipated to have any significant residual impacts on flora or vegetation due to the following:

- The Proposal will result in the clearing of up to 1.00 ha of native vegetation, including a maximum of 0.02 ha of vegetation in Very Good or better condition
- Clearing will be restricted to small areas required for the construction of internal access roads, particularly to facilitate ingress of turbine components, upgrades to the existing Beenup Mine to Manjimup 132 kV transmission line, and where an alternative layout was not possible due to the avoidance of other significant receptors. Approximately 0.36 ha of native vegetation clearing is considered unavoidable. The remainder of the 1.00 ha clearing will allow for flexibility in project design
- The avoidance of conservation significant flora (including contiguous native vegetation within 50 m of known Threatened and P1 species and within 20 m of P2, P3 and P4 species), TEC, and locally restricted vegetation types that occur within the Development Envelope during clearing
- Clearing of a maximum of 0.01 ha of contiguous native vegetation within the Scott River Ironstone TEC 50 m buffer (Figure 8-8)
- The Proposal has been designed to preferentially locate infrastructure within cleared agricultural land and is thus unlikely to cause significant fragmentation to native vegetation within the Development Envelope
- There will be negligible impact to GDV as a result of the minor, localised and temporary construction dewatering, noting drawdown will be managed so as not to exceed the natural seasonal variation (i.e. will remain above natural seasonal low in watertable)
- Impacts to vegetation due to altered hydrological regimes will be minimal
- The indirect impacts likely to occur during construction and operation of the Proposal, namely increased dust deposition, the introduction and/or spread of weeds and dieback, dewatering impacts to GDEs, alterations to hydrological regimes and accidental bushfires will be minimised through the implementation of the mitigation measures outlined within the Proposal's CEMP (Appendix H), a Dieback Management Plan (as required), an ASSDMP (Appendix B), a BMP (Linfire 2025a) and BRMP (Linfire 2025b).

The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Flora and Vegetation factor to "*protect flora and vegetation so that biological diversity and ecological integrity are maintained*".

9. Terrestrial Fauna

9.1. EPA Environmental Factor Objective

The EPA's objective for the Terrestrial Fauna factor is to "*protect terrestrial fauna so that biological diversity and ecological integrity are maintained*" (EPA 2016c).

For the purposes of EIA, the EPA defines terrestrial fauna as "animals living on land or using land (including aquatic systems) for all or part of their lives. Terrestrial fauna includes vertebrate (birds, mammals including bats, reptiles, amphibians, and freshwater fish) and invertebrate (arachnids, crustaceans, insects, molluscs and worms) groups" (EPA 2016c).

9.2. Relevant Policy and Guidance

Relevant policy and guidance documents for Terrestrial Fauna and how they have been considered for this Proposal are summarised in Table 9-1.

Table 9-1: Policy and Guidance for Terrestrial Fauna

Policy / Guidance	Consideration
Environmental Factor Guideline: Terrestrial Fauna (EPA 2016c)	The information provided in this section addresses the 'considerations for environmental impact assessment' outlined within the guideline.
Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2016)	This document guides the appropriate obtainment and collation of terrestrial fauna data to be used in Environmental Impact Assessment (EIA). All studies conducted for the Proposal were undertaken with regard for this guidance document.
Technical Guidance: Sampling of short range endemic invertebrate fauna (EPA 2016e)	This document guides the appropriate sampling and collation of Short Range Endemic (SRE) invertebrate fauna data to be used in EIA. All studies conducted for the Proposal were undertaken with regard for this guidance document.
Referral Guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) (DAWE 2022)	Used to guide impact assessment criteria and survey methodology for Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo (collectively referred to as black cockatoos).
Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos (Bamford 2021)	This scoring system guides the assessment of foraging habitat quality for black cockatoos based on site condition, context and stocking rate.
Survey guidelines for Australia's Threatened birds. Guidelines for detecting birds listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010b)	This document guides the appropriate obtainment and collation of data relating to bird species listed as Threatened under the EPBC Act.
Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as Threatened under the *Environmental Protection and Biodiversity Conservation Act 1999* (DEWHA 2010a)	This document guides the appropriate obtainment and collation of data relating to bat species listed as Threatened under the EPBC Act.
Survey guidelines for Australia's Threatened mammals. Guidelines for detecting mammals listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DSEWPaC 2011)	This document guides the appropriate obtainment and collation of data relating to mammal species listed as Threatened under the EPBC Act.
EPBC Act Policy Statement 3.10 Significant impact guidelines for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia (DEWHA 2009b)	Used to guide impact assessment for the Western Ringtail Possum which is listed as CR under the EPBC Act.

Policy / Guidance	Consideration
EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed Migratory shorebird species (DoEE 2017)	Used to guide impact assessment for shorebird species listed as Migratory under the EPBC Act.
Wind Farms and Birds: Interim Standards For Risk Assessment. Australian Wind Energy Association Report (Brett Lane and Associates 2005)	This document guides the appropriate methodology to be applied for the Bird and Bat Risk Assessment and utilisation surveys.
Onshore Wind Farm Guidance: Best practice approaches when seeking approval under Australia's national environment law (Draft)	This document guides best practice approaches to the assessment of proposed onshore wind farm projects, with a focus on bird and bat management.

9.3. Receiving Environment

9.3.1. Studies and Survey Effort

A range of fauna surveys and assessments were completed for the Proposal, including basic and targeted fauna surveys, a preliminary bird and bat risk assessment (BBRA) survey and SRE Invertebrate desktop assessment. All fauna surveys have been conducted in accordance with the relevant guidance outlined in Section 9.2. The methodology and timing for these surveys is discussed in the following sections, as well as Table 9-2.

9.3.1.1. Basic and Targeted Fauna Survey

A Basic and Targeted fauna survey has been undertaken over approximately 99.95% of the Development Envelope (Phoenix 2025a). The field survey was undertaken across three phases from 2023 to 2025. The initial survey phase occurred in August 2023 and targeted wetland habitats to account for rainfall and inundated conditions. The second survey took place in December 2023, where all habitat types were able to be sampled unlike during winter, when access was restricted by seasonally inundated wetlands. The third phase occurred over spring 2024 to summer 2025, when 14 field trips were completed, mostly to assess black cockatoo and Western Ringtail Possum habitat values. The fauna Survey Area covered a total of 3,891.6 ha, inclusive of the Development Envelope and three road intersections to the north of the Development Envelope (Figure 9-1). A total of 151 sites were sampled across the survey phases and opportunistic observations were made at an additional 63 locations.

The following field methods were used to record and characterise terrestrial fauna species and habitat data during the Basic and Targeted fauna survey:

- Broad fauna habitat assessment
- Active diurnal searches
- Avifauna searches
- Bat echolocation recordings
- Targeted survey for black cockatoos
- Targeted survey for Western Ringtail Possum
- Targeted survey for Australasian Bittern.

9.3.1.2. Basic and Targeted Fauna Gap Survey

An additional Basic fauna survey and Targeted black cockatoo and Western Ringtail Possum habitat assessment was undertaken to fill the gap in the Phoenix (2025a) survey effort, covering approximately 0.05% of the Development Envelope (ELA 2025b). The survey covered approximately 1.72 ha (Figure 9-1). For the purposes of EIA, the data collected from this survey has been combined with that obtained during the Basic and Targeted fauna survey conducted by Phoenix (2025c).

Additional historical terrestrial vertebrate fauna surveys have been conducted within the vicinity of the Survey Area, providing a greater understanding of the terrestrial fauna values within the broader region to inform survey efforts. These include:

- Heavy minerals mine Beenup – comprehensive fauna survey (LEC 1990)
- Milyeannup wind farm terrestrial fauna survey (Biota 2009c)
- Beenup Mineral Sands Mine site – wetland bird monitoring (Ninox 2011)
- Expansion of recreational facilities at Gloucester Park, Margaret River – Level 1 fauna assessment, Level 1 terrestrial vertebrate fauna (Litoria Ecoservices 2016)
- Augusta Boat Harbour to Dead Finish Pathway Project – Western Ringtail Possum habitat assessment (Litoria Ecoservices 2017)
- Lot 2602 McDonald Road, Karridale Flora and Fauna Assessment (ELM 2017)
- Turner Caravan Park – Augusta – Targeted vertebrate fauna survey assessment (Harewood 2018)
- Margaret River Senior High School – fauna significance assessment (Ecosystem Solutions 2020).

9.3.1.3. Preliminary Bird and Bat Risk Assessment Survey

The Preliminary Bird and Bat Risk Assessment (BBRA) Survey was undertaken within the Development Envelope and included a level two investigation comprising a regional overview of the area, bird and bat utilisation surveys (BBUS) and a preliminary risk assessment (Phoenix 2025b). Bird and bat utilisation surveys were conducted across two phases, including four sampling events across each season in Year 1 (May 2023 to January 2024) to account for seasonal changes in bird and bat occurrence and an additional eight monthly sampling events in Year 2 (between September 2024 and March 2025) focusing on the activity periods for species of concern identified during Year 1 surveys (i.e. black cockatoos and migratory birds). The Year 1 field survey included a total of 16 sites, comprising three Reference sites and 13 Impact sites. The site selection was revised following the Year 1 surveys in response to the Year 1 survey findings and the proposed turbine placement. A total of 12 new sites were added, and ten original sites were not resampled, totalling 18 sample sites in Year 2. Five of these new sites were Regional reference sites located at the Hardy Inlet (located 10 km – 14 km from the Development Envelope), for the purpose of collecting contextual data on Migratory shorebird activity within the region. The BBUS area covered a total of 3,882.2 ha with all Impact, reference and regional sites shown in Figure 9-2. Specifically, the following surveys were undertaken:

- Bird utilisation surveys
- Bat utilisation surveys
- Audio recordings for Masked Owl and black cockatoos.

Bird and bat data was also sourced from the Basic and Targeted fauna survey (Phoenix 2025a, see Section 9.3.1.1). This suite of additional work provided supplementary data for the BBUS in lieu of

roaming surveys recommended by Brett Lane and Associates (2005). Opportunistic records of birds were also made whenever observed during both the BBRA and Basic and Targeted fauna surveys.

9.3.1.4. SRE Invertebrate Desktop Assessment

The SRE Invertebrate Desktop Assessment (Invertebrate Solutions 2024a) was undertaken to identify known SRE fauna within the Development Envelope, as well as habitats in which they are likely to occur. The primary sources of data for the desktop assessment were WAM records, database searches and a literature review. The Desktop Study Area covered approximately 100,000.0 ha, based on a search area of 100 km from the centre of the Development Envelope (Appendix M).

Table 9-2: Terrestrial Fauna Studies

Survey	Area (ha)	Scope & Timing	Study / Survey Effort	Limitations
Basic and Targeted vertebrate fauna survey for a Proposed Wind Farm in Scott River (Phoenix 2025a) **Appendix K**	3,891.6	The field survey was conducted across three phases: • **Phase 1:** Winter (28–31 August 2023) • **Phase 2:** Summer (6–12 December 2023) • **Phase 3:** Spring (Late October and late November 2024) and Summer (December 2024 and early January 2025). The scope of the survey included: • A desktop assessment of databases and available literature to identify conservation significant fauna that may occur • Active diurnal searches and targeted searches for conservation significant species identified in the desktop assessment • Avifauna censusing • Bat echolocation recordings • Broad fauna habitat assessments and habitat assessments for conservation significant fauna • Mapping of desktop assessment results, conservation significant fauna records and habitat within the survey area.	The field survey included a total of 151 sampling sites. Opportunistic observations were made at an additional 63 locations. The total survey effort for each field method is detailed as follows: • Active diurnal searches: 45 hours • Avifauna census: 12 hours • Audio recordings: 223 nights • Bat echolocation recordings: 14 nights • Black cockatoo breeding/roosting surveillance: 34 hours • Targeted searches for Western Ringtail Possum: 15 hours.	Limitations and constraints associated with this field survey are detailed as follows: • Few comprehensive or systematic fauna surveys have been undertaken within the Scott River region to provide contextual information.
Wind Farm in Scott River Ecological Gap Survey (ELA 2025b) **Appendix J**	1.72	The field survey was conducted on 26 June 2025. The scope of the survey included: • A desktop assessment of the Phoenix (2025a) report to obtain information relating to conservation significant fauna • A field survey to collect fauna data and assess fauna habitats, including nocturnal searching to identify Western Ringtail Possum individuals • Habitat assessments for black cockatoos and Western Ringtail Possum • Mapping of desktop assessment results and conservation significant fauna habitat within the survey area.	The field survey included a total of three sampling sites. Opportunistic observations were made at ten locations as part of the Basic Fauna survey.	Limitations and constraints associated with the field survey are detailed as follows: • Rainy conditions encountered during the targeted Western Ringtail Possum survey may have impacted the ability to detect Western Ringtail Possum individuals, representing a potential constraint.

Survey	Area (ha)	Scope & Timing	Study / Survey Effort	Limitations
Bird and Bat Risk Assessment for a Proposed Wind Farm in Scott River – Level Two Investigation (Phoenix 2025b) **Appendix L**	3,882.2	Field surveys were undertaken over 12 periods between May 2023 and March 2025: • **Autumn:** 24–26 May 2023 • **Winter:** 1 –16 August 2023 • **Spring:** 17–20 November 2023 • **Summer:** 10–2 January 2024 • **Spring:** 27 – 30 September 2024 • **Spring:** 17 – 18, 21 October 2024 • **Spring:** 13 – 14 November 2024 • **Summer:** 2 December 2024 • **Summer:** 11 – 12 December 2024 • **Summer:** 16 – 17 January 2025 • **Summer:** 13 – 14 February 2025 • **Autum:** 6 – 7 March 2025. The scope of the survey included: • A desktop assessment of databases to identify potential habitat attributes for birds and bats and prepare a list of birds and bats, including conservation significant species that may occur • Bird utilisation surveys to generate quantitative data on birds within the survey area and surrounds • Bat utilisation surveys to generate quantitative data on bats within the survey area and surrounds • Audio recordings for conservation significant bird species • A likelihood of occurrence assessment for conservation significant species and identification of additional non-conservation significant species of concern • A preliminary risk assessment using a combination of likelihood and consequence of impact on bird and bat species of concern.	• The bird utilisation survey included a total of 28 sites, comprising nine Impact sites, 14 Reference sites and five Regional reference sites. The survey effort comprised: - Fixed-point counts at each location for 30 minutes each sample event - Two to six counts conducted in each survey phase at most Impact and Reference sites, including morning and afternoon counts - Regional reference sites were sampled once each in spring and autumn, and were accessed by boat at variable times of the day - A total survey effort of 150 hours; 63.5 hours from Impact sites, 82.0 hours from Reference sites and 4.5 hours at Regional reference sites. • The bat utilisation survey was undertaken during Year 1 of the survey program and comprised: - Placement of echolocation recorders at the same 16 fixed-point locations as the Year 1 bird utilisation survey - Recorders were operated for one night (unless conditions were windy) from 30 minutes before sunset to 30 minutes after sunrise - A total survey effort of 71 nights; 11 nights from Impact sites and 60 nights from Reference sites - Echolocation data was analysed by WA Bat Call. Audio recordings for conservation significant birds comprised: • Placement of audio recorders at each of the 16 Year 1 sample sites during winter, spring and summer	Limitations and constraints associated with this field survey are detailed as follows: • As bats were detected via echolocation recordings it was not possible to determine flight heights or distance and direction from the recorder • Two sites could only be surveyed once, due to land holder restrictions which took effect during the Year 1 sampling event. This limitation was addressed during the revision of Year 2 sites. • Below average rainfall between July and December may have influenced the number and diversity of Migratory bird records in Spring 2023.

Survey	Area (ha)	Scope & Timing	Study / Survey Effort	Limitations
			• Recorders were operated for one night during each sample period from 30 minutes before sunset to 30 minutes after sunrise • A total survey effort of 55 nights • Analysis of the audio data focused on Masked Owl and three Threatened black cockatoo species.	
Desktop Assessment of Short Range Endemic Fauna for a Proposed Wind Farm in Scott River – Western Australia (Invertebrate Solutions 2024a) **Appendix M**	100,000.0	The scope of the desktop assessment included: • A search of the WAM databases for Arachnids, Crustacea and Molluscs for potential SRE taxa occurring in the Scott River region • A likelihood of occurrence assessment for SRE invertebrates using a combination of regional and local botanical and landform information and database searches • Examination of taxonomic groups known to contain SRE representatives to determine if SRE status is to be assigned • Assessment of SRE habitat within the Development Envelope using broad groupings associated with the vegetation types in Phoenix (2025c).	The desktop assessment consulted the following databases and information sources: • Published and unpublished reports concerning SRE invertebrates from the region • Protected Matters Search Tool (PMST) (DCCEEW 2024e) • Fauna records (WAM 2024a,b,c) • Vegetation descriptions and mapping within the Detailed flora and vegetation survey for a Proposed Wind Farm in Scott River (Phoenix 2025c).	-

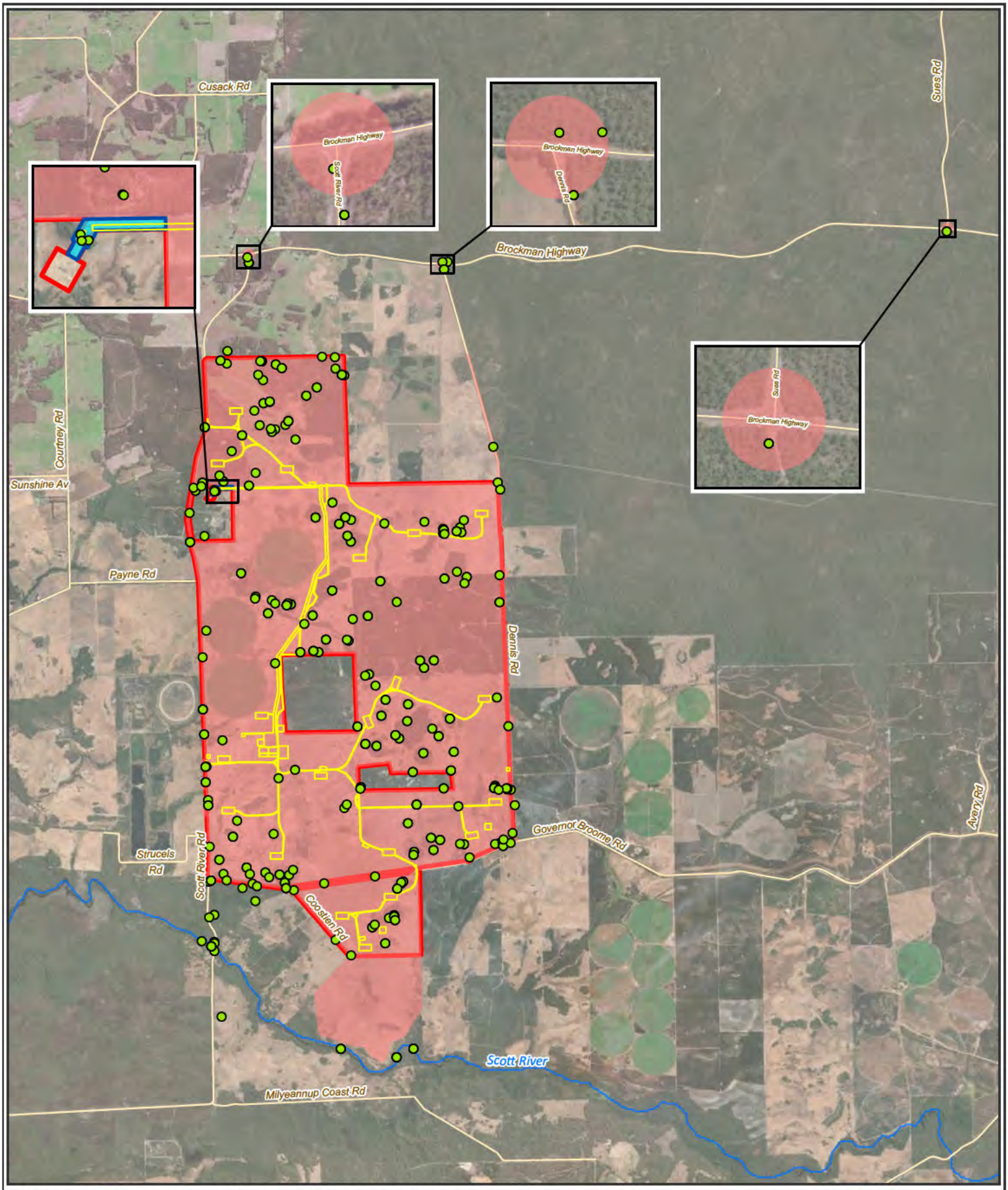

Figure 9-1: Terrestrial Vertebrate Fauna Survey

- Sample Sites
- Roads
- Watercourses
- Development Envelope
- Indicative Disturbance Footprint
- Ecological gap survey extent (ELA 2025b)
- Basic and Targeted vertebrate fauna survey extent (Phoenix 2025a)

0 0.75 1.5 3
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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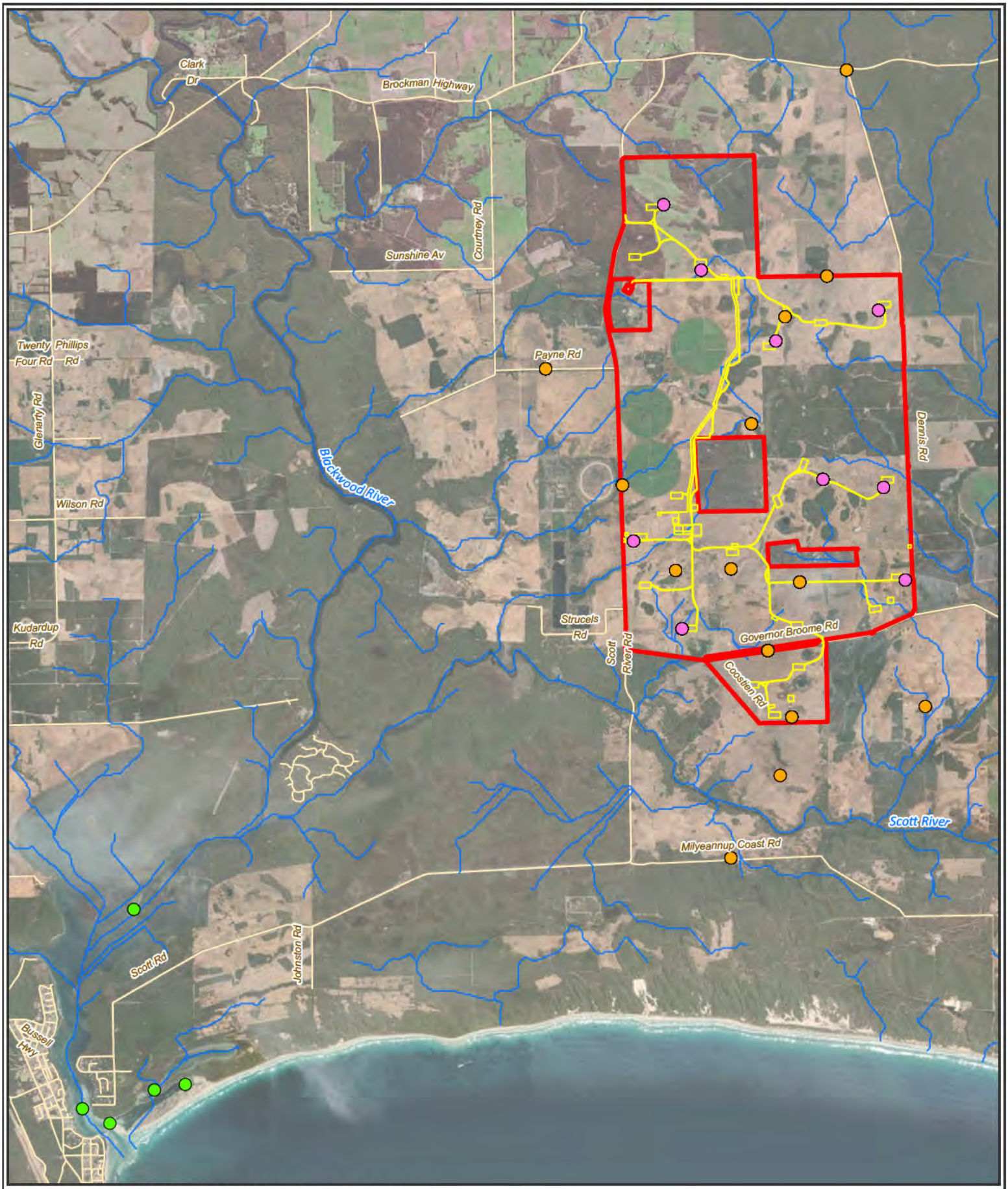

Figure 9-2: Bird and Bat Utilisation Survey

Roads
Rivers and Tributaries
Development Envelope
Indicative Disturbance Footprint

Survey site

Impact Sites
Reference Sites
Regional Reference Sites

0 0.75 1.5 3
Kilometers

Datum/Projection:
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Project: 24PER7886-DH Date: 9/25/2025

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9.3.2. Terrestrial Fauna Habitat

Ten broad fauna habitat types were identified during the Basic and Targeted fauna survey, including three wetland habitats, two woodlands and five highly modified habitats (Table 9-3; Figure 9-3; Phoenix 2025a). All of these fauna habitat types occur within the Development Envelope, covering a total of 3,596.85 ha.

The majority (approximately 80%) of the Development Envelope comprises the highly modified habitats, which cover 2,892.54 ha and provide limited value for fauna, however, the cleared paddocks may provide seasonal foraging value to bird species, such as black cockatoos, during seeding. The plantations also represent potential food sources for Carnaby's and Baudin's cockatoos and the dams are considered a drinking water source for fauna.

Specific habitat requirements for conservation significant species with a likelihood rating of Possible (rare) or greater are discussed further in Section 9.3.4.

Table 9-3: Fauna Habitat Type Extent and Description within the Proposal

Habitat Type	Fauna Habitat Description	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	% of Development Envelope	Representative Photograph
Wetlands					
Seasonally inundated paperbark woodland (wetland)	Seasonally inundated sumplands with low open paperbark (*Melaleuca*) woodlands over shrubs, sedges and/or grasses.	144.89	144.89	4.03	
Seasonally inundated sedgeland (wetland)	Seasonally inundated sumplands/floodplains with open to dense mixed sedges, occasional paperbark (*Melaleuca*).	107.01	90.54	2.52	
Seasonally inundated shrubland (wetland)	Seasonally inundated sumplands with variable open to sparse shrublands, species including paperbarks (*Melaleuca*), Peppermint (*Agonis flexuosa* var. *flexuosa*), *Acacia* and occasional Balga (*Xanthorrhoea preissii*).	126.07	116.90	3.25	
Woodlands					

Habitat Type	Fauna Habitat Description	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	% of Development Envelope	Representative Photograph
Marri-Jarrah-Peppermint woodland	Low to mid open woodlands of Jarrah (*Eucalyptus marginata* subsp. *marginata*), Marri (*Corymbia calophylla*) and Peppermint (*Agonis flexuosa* var. *flexuosa*).	322.18	252.93	7.03	
Open woodland of Peppermint trees (degraded)	Open Peppermint (*Agonis flexuosa* var. *flexuosa*) woodlands over pastures.	98.90	99.05	2.75	

Habitat Type	Fauna Habitat Description	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	% of Development Envelope	Representative Photograph
Highly modified					
Cleared	Cleared areas absent or near absent of native vegetation; agricultural paddocks and roads. May contain isolated paddock trees, generally of Peppermint (*Agonis flexuosa* var. *flexuosa*).	2,667.32	2476.44	68.85	
Cleared - degraded sumpland	Sumpland wetland that has been cleared and is devoid of native vegetation. Essentially paddock (as above 'Cleared' habitat) but seasonally inundated with occasional, isolated sedge plants remaining.	8.23	0.84	0.02	
Dam	Artificial pond or dam with standing water.	1.70	1.70	0.05	

Habitat Type	Fauna Habitat Description	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	% of Development Envelope	Representative Photograph
Bluegum plantation	Planted mid woodland of Bluegum (**Eucalyptus globulus* subsp. *globulus*).	415.43	412.29	11.46	
Pine plantation	Planted open woodland of pine (**Pinus* sp.) plantation.	1.60	1.27	0.04	
Total	-	3,893.33	3,596.85	100.00	-

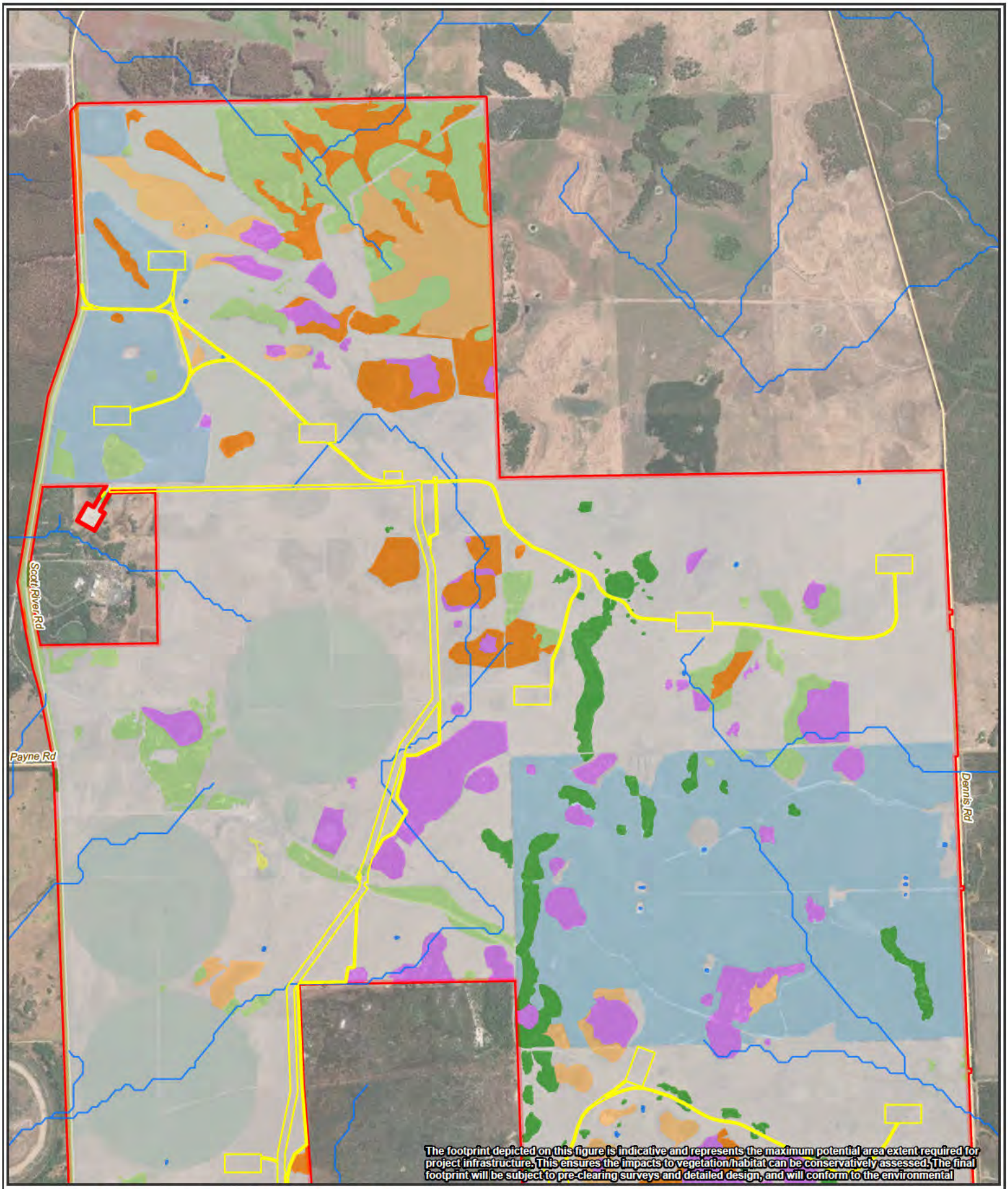
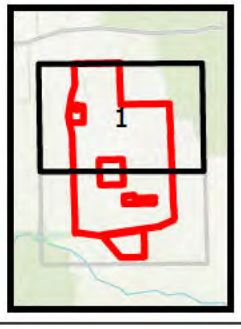


Figure 9-3: Terrestrial Fauna Habitat Types (Page 1 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint
- Cleared

Terrestrial Fauna Habitat (Phoenix 2025a)

- Bluegum plantation
- Cleared - degraded sumpland
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Dam



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Project: 24PER7886-DH Date: 9/15/2025

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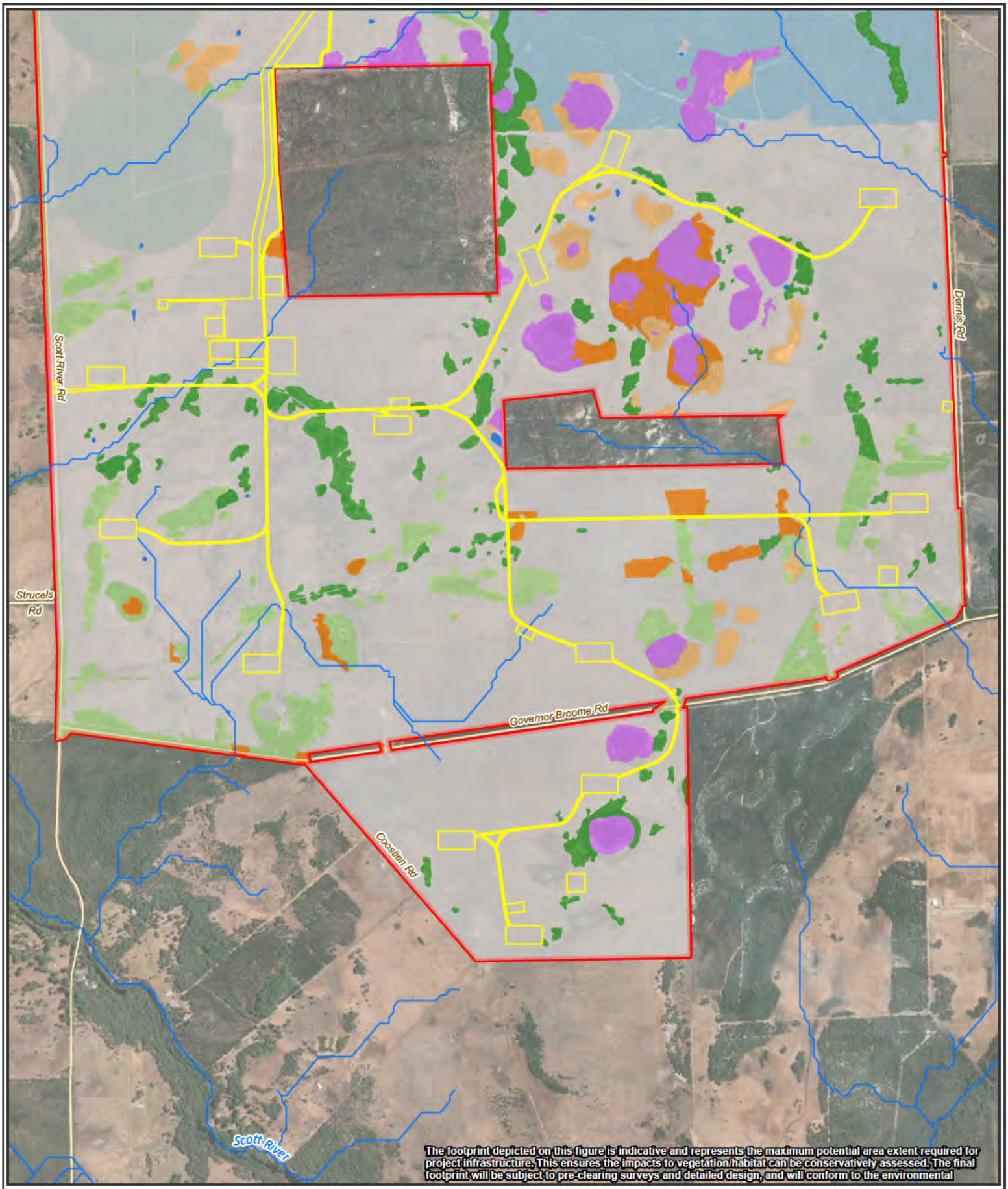
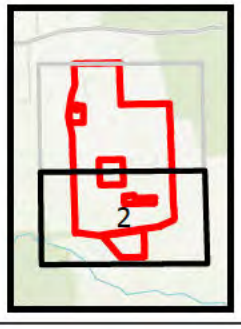


Figure 9-3: Terrestrial Fauna Habitat Types (Page 2 of 2)

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint
- Cleared

Terrestrial Fauna Habitat (Phoenix 2025a)

- Bluegum plantation
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Dam



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Datum/Projection:
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Project: 24PER7886-DH Date: 9/15/2025

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9.3.3. Vertebrate Fauna Species Assemblage

The desktop review identified a total of 262 vertebrate species as potentially occurring within a 10 km or 40 km radius, including 12 amphibians, 24 reptiles, 198 birds and 28 mammals (Phoenix 2025a). During the field surveys, a total of 137 terrestrial vertebrate species were recorded, comprising nine amphibians, 105 birds, 17 mammals and six reptiles.

Of the 137 species of vertebrate fauna recorded, 130 species were native and seven were introduced. The introduced species assemblage included three feral predators, namely Cat, Dog and Red Fox.

9.3.4. Conservation Significant Vertebrate Fauna

A total of seven conservation significant terrestrial fauna species listed under the EPBC Act, BC Act or as Priority fauna by DBCA were recorded within the Development Envelope (Phoenix 2025a; Figure 9-4) comprising the following:

- Western Ringtail Possum (*Pseudocheirus occidentalis;* listed as CR under the EPBC Act and BC Act)
- Baudin's Cockatoo (*Zanda baudinii*; listed as EN under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris;* listed as EN under the EPBC Act and BC Act)
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; listed as VU under the EPBC Act and BC Act)
- Wood Sandpiper (*Tringa glareola;* listed as Migratory [MI] under the EPBC Act and BC Act)
- Osprey (*Pandion haliaetus;* listed as MI under the EPBC Act and BC Act)
- Western False Pipistrelle (*Falsistrellus mackenziei;* listed as P4 by DBCA).

Another three conservation significant terrestrial fauna species were recorded outside the Development Envelope, namely Peregrine Falcon (*Falco peregrinus*; listed as Other Specially Protected Fauna [OS] under the BC Act), Quenda (*Isoodon fusciventer*; listed as P4 by DBCA) and Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; listed as P3 by DBCA).

An assessment of the likelihood of occurrence of conservation significant terrestrial fauna species within the Development Envelope is provided in Appendix K. A total of seven conservation significant fauna species are considered likely to occur within the Development Envelope, based on the currency and proximity of desktop records and the suitability of habitat present, including the three species recorded outside the Development Envelope (Phoenix 2025a). A further ten species are considered to possibly occur as a temporary, seasonal visitor, and an additional 11 species were considered to possibly occur, but only on rare occasions, hence they were assigned as Possible (rare) (Figure 9-4).

All species with a likelihood rating of Possible (rare) or greater are described in detail in Table 9-4, along with consideration of suitability of the fauna habitat recorded within the Development Envelope. A more detailed discussion of the distribution, occurrence and potential habitat of the Western Ringtail Possum and black cockatoos within the Development Envelope is provided in Section 9.3.4.1 and 9.3.4.2.

Table 9-4:Significant Fauna Recorded or Likely to Occur within the Development Envelope

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
Birds				
Curlew Sandpiper (*Calidris ferruginea*)	Critically Endangered (EPBC Act and BC Act) Migratory (EPBC Act)	Occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons. Known to favour non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bores/drains, usually with bare edges of mud or sand (DCCEEW 2024g).	**Possible** Nearby record. Suitable habitat present. Arrives in the South West in spring; therefore, may be a temporary, seasonal visitor.	The Development Envelope contains 2,831.32 ha of potentially suitable habitat for the species (Wetland habitats, Cleared, Cleared-degraded sumpland, Dam).
Australasian Bittern (*Botaurus poiciloptilus*)	Endangered (EPBC Act and BC Act)	Found in large, relatively undisturbed, freshwater or brackish swamps with dense vegetation (Birdlife Australia 2013), including wetlands on the south coast from Augusta to Cape Arid. Habitat critical to survival is described as generally large, fresh to moderately brackish wetlands with pH of 5.5-8.5 (DBCA 2018).	**Possible (rare)** Development Envelope is within known range and potentially suitable habitat is present. No previous records within 10 km. Targeted searches and recorders did not detect the species. However, the potential for occasional presence at the larger wetlands within the Development Envelope cannot be discounted, but unlikely to be a regular visitor or regularly transit through the Development Envelope.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species, comprising the three wetland habitats.
Baudin's Cockatoo (*Zanda baudinii)*	Endangered (EPBC Act and BC Act)	The Baudin's Cockatoo typically inhabits the temperate forests and woodlands of the southwest of WA that are dominated by Jarrah, Marri and *Eucalyptus diversicolor* (Karri) (Johnstone et al. 2010). Generally, night roosting habitat occurs in or near riparian environments or other permanent water sources, comprising tall trees, but particularly Jarrah, Flooded Gum, Blackbutt, Tuart and introduced eucalypts such as Blue Gum (*E. globulus*) and Lemon Scented Gum (*Corymbia citriodora*) (DAWE 2022).	**Recorded** A total of 57 individuals were recorded from seven observations. The following additional records were also recorded that could not be identified to species level and may be associated with this species: • 117 individuals from 84 records of white-tailed black cockatoos (either Carnaby's or Baudin's)	The Development Envelope contains: • 580 potential nesting trees, including 4 suitable breeding trees • 38.31 ha of High quality foraging habitat and 321.84 ha of Moderate quality foraging habitat • Potential roosting habitat within the Marri-Jarrah Peppermint Woodland habitat, Seasonally inundated shrubland wetland and Seasonally inundated paperbark woodland (wetland) habitats.

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
			• 99 individuals from 18 records of black cockatoos (could represent any of the black cockatoo sp.). A total of 572 minutes of white-tailed black cockatoos were collected in audio recordings.	A more detailed habitat assessment for Baudin's Cockatoo is provided in Section 9.3.4.2 and presented in Figure 9-7.
Carnaby's Cockatoo (*Zanda latirostris*)	Endangered (EPBC Act and BC Act)	Carnaby's Cockatoo utilises a variety of forests, shrublands and banksia woodlands. The species uses native shrubland, kwongan heathland and proteaceous woodland, including banksia woodland for foraging, where it feeds on mainly the seeds and less often the nectar of *Eucalyptus* spp., *Banksia* spp., *Hakea* spp. and even *Pinus* spp. (DCCEEW 2026b). Roosting habitat occurs in or near riparian environments or natural and artificial permanent water sources and comprises any tall trees, but particularly Flat-topped Yate (*E. occidentalis*), Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, and introduced eucalypts and pines (DAWE 2022).	**Recorded** A total of 154 individuals were recorded from 38 observations. The following additional records were also recorded that could not be identified to species level and may be associated with this species: • 117 individuals from 84 records of white-tailed black cockatoos (Carnaby's or Baudin's) • 99 individuals from 18 records of black cockatoos (could represent any of the black cockatoo species). A total of 572 minutes of white-tailed black cockatoos were collected in audio recordings. There is no breeding habitat for Carnaby's Cockatoo within the Development Envelope, as it occurs within the non-breeding range for the species, as defined in DAWE (2022).	The Development Envelope contains: • 28.91 ha of High quality foraging habitat and 497.78 ha of Moderate quality foraging habitat • Potential roosting habitat within the Marri-Jarrah Peppermint Woodland habitat, Seasonally inundated shrubland wetland, Seasonally inundated paperbark woodland (wetland) and Pine plantation habitats. A more detailed habitat assessment for Carnaby's Cockatoo is provided in Section 9.3.4.2 and presented in Figure 9-6.
Common Greenshank (*Tringa nebularia*)	Endangered (EPBC Act) Migratory (EPBC Act and BC Act)	Occurs in wetlands throughout Australia (DCCEEW 2025b). Prefers coastal or inland wetlands, in estuaries and mudflats, mangrove swamps and lagoons. Foraging habitat includes mudflats, channels, or the edges of mangroves, sedges and saltmarsh. Does not breed in Australia. Breeding occurs in the Palaearctic. Arrives in the South West as early as August.	**Likely** Many records (>90) in proximity to the Development Envelope, primarily associated with the Blackwood River, Scott Rivier and the adjacent Beenup artificial wetlands. The species is found in a wide variety of inland wetlands (DCCEEW 2024c. Therefore,	The Development Envelope contains 354.87 ha of potentially suitable habitat for the species (Wetland habitats, Cleared degraded sumpland and Dam).

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
			suitable habitat is present. Likely to occur within the Development Envelope in September and October when the wetland habitats and some areas of paddock are likely to be inundated after winter.	
Siberian Sand Plover (*Anarhynchus Mongolus*)	Endangered (EPBC Act and BC Act) Migratory (EPBC Act)	Typically found in coastal and estuarine environments. Utilises intertidal mudflats and sandflats, as well as sheltered harbours. Occasionally occupies sandy beaches, rock platforms, saltmarshes, mangrove saltworks, brackish swamps and silt islands (DCCEEW 2024j).	**Possible (rare)** Nearby record but mainly occurs in coastal habitats. Main habitats not present.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species, comprising the three wetland habitats.
Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)	Vulnerable (EPBC Act and BC Act)	The species roosts in dense forests comprised of mostly tall trees, but particularly Jarrah, Marri, Blackbutt, Tuart and introduced eucalypt trees, that on average receive more than 600 mm of annual rainfall (DAWE 2022; Saunders and Ingram 1995). These dense forests are also utilised for foraging, where, in small family groups, the cockatoos leave the roost at sunrise to feed (Johnstone and Kirkby 1999).	**Recorded** A total of 206 individuals were recorded from 48 observations The following additional records were also recorded that could not be identified to species level and may be associated with this species: • 99 Individuals from 18 records of black cockatoos (could represent any of the black cockatoo sp.). A total of 42 minutes of Forest Red-tailed Black Cockatoos were collected in audio recordings.	The Development Envelope contains: • 580 potential nesting trees, including 4 suitable nesting trees • 151.75 ha of High quality foraging habitat and 201.71 ha of Moderate quality foraging habitat • Potential roosting habitat within the Marri-Jarrah Peppermint Woodland habitat, Seasonally inundated shrubland wetland and Seasonally inundated paperbark woodland (wetland) habitats. A more detailed habitat assessment for Forest Red-tailed Black Cockatoo is provided in Section 9.3.4.2 and presented in Figure 9-8.
Great Knot (*Calidris tenuirostris*)	Vulnerable/Migratory (EPBC Act) Critically Endangered (BC Act)	Usually occupies sheltered coastal habitats, mudflats and sandflats such as inlets, bays, harbours, estuaries and lagoons. Known to use reefs and rock platforms, as well as shorelines and mangroves. There are also records in swamps	**Possible (rare)** Nearby records. Suitable habitat present. However, mainly occurs in coastal habitats and is uncommon in South West.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species, comprising the three wetland habitats.

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
		near the coast, salt lakes and non-tidal lagoons (DAWE 2021a).		
Grey Plover (*Pluvialis fulva*)	Vulnerable (EPBC Act) Migratory (EPBC Act and BC Act)	Inhabits coastal areas, typically those that are sheltered, such as embayments and estuaries, although is also known to occupy rocky coasts and platforms. Occasionally found in inland waterbodies (DCCEEW 2024o).	**Possible (rare)** Nearby record from the Blackwood River but occurs mostly in coastal habitats.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species comprising the three wetland habitats.
Sharp-tailed Sandpiper (*Calidris acuminata*)	Vulnerable (EPBC Act) Migratory (EPBC Act and BC Act)	Muddy edges of shallow fresh or brackish vegetated wetlands, including lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hyper-saline salt lakes inland (DCCEEW 2024b).	**Possible** Nearby record. Suitable habitat present in the seasonally inundated wetland habitats in early spring, coinciding with arrival of the species in the South West. Therefore, may be a temporary, seasonal visitor.	The Development Envelope contains 354.03 ha of potentially suitable habitat for the species, comprising the three wetland habitats and Dam.
Bar-tailed Godwit (*Limosa lapponica*)	Migratory (EPBC Act and BC Act)	Occurs in intertidal sandflats, banks, mudflats, estuaries coastal lagoons and harbours. Has also been found on occasion on inland wetlands or in areas of short grass, such as paddocks (DCCEEW 2024m).	**Possible (rare)** Nearby record. Suitable habitat present but not primary habitat. Potential presence is considered very rare.	The Development Envelope contains 2684.72 ha of potentially suitable habitat for the species (Seasonally inundated sedgeland, Seasonally inundated shrubland, Cleared, Cleared-degraded sumpland).
Black-tailed Godwit (*Limosa limosa*)	Migratory (EPBC Act and BC Act)	Typically found in coastal environments with sheltered bays, estuaries and lagoons, as well as shallow and sparsely vegetated near-coastal wetlands (DCCEEW 2024n). There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. Habitat use is dictated by tides.	**Possible (rare)** Old (1980) desktop records <10 km from Development Envelope at a site near artificial wetlands and one near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet and coast. Recorded during BBRA survey from Regional reference sites. Occurs almost entirely in coastal habitats such as intertidal sandflats, mudflats and estuaries. It has been observed on occasion on inland wetlands and paddocks but potential	The Development Envelope does not contain any suitable habitat for the Black-tailed Godwit.

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
			presence in the Development Envelope is considered very rare. The species is only expected to fly over the Development Envelope on occasion.	
Broad-billed Sandpiper (*Calidris falcinellus*)	Migratory (EPBC Act and BC Act)	Found in sheltered coastal environments, mudflats and favours estuarine habitats. Occasionally in saltmarshes, freshwater lagoons, saltworks and sewage farms. Has also been known to occupy creeks, swamps and lakes near the coast, favouring those with mudflats and exposed sands with receding tides (DCCEEW 2024l).	**Possible (rare)** Old (1979 - 80) desktop records <10 km from the Development Envelope from a site near artificial wetlands. All recent desktop records are from the Hardy Inlet. Only occasional records from swamps and lakes. Arrives in South West in September but rare.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species within the wetland habitats.
Caspian Tern (*Hydroprogne caspia*)	Migratory (EPBC Act and BC Act)	Found in sheltered coastal embayments (such as harbours, lagoons, inlets, bays, estuaries and river deltas). Also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, but especially lakes, and artificial wetlands and reservoirs and near-coastal terrestrial wetlands (DCCEEW 2024k). Common in the Blackwood River estuary.	**Possible (rare)** Nearby record. Wetlands present are shallow and unlikely to provide the food sources the species requires. The species is only expected to fly over the Development Envelope on occasion.	The Development Envelope does not contain any suitable habitat for the Caspian Tern.
Common Sandpiper (*Actitis hypoleucos*)	Migratory (EPBC Act and BC Act)	Small ponds, large inlets, mudflats where they forage on the shore usually close to the vegetation (DCCEEW 2024f). Uses a wide variety of coastal wetlands and some inland wetlands. Species arrives in the South West in September to October (DCCEEW 2024f).	**Possible** Nearby record. Suitable habitat present within the wetland habitat, but receding as species arrives in the South West in spring, therefore, may be a temporary, seasonal visitor.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species within the wetland habitats.
Double-banded Plover (*Anarhynchus bicinctus*)	Migratory (EPBC Act and BC Act)	Found on littoral, estuarine and fresh or saline terrestrial wetlands, rivers, saltmarshes, lagoons, grasslands and pasture. Also occurs on muddy, sandy, shingled or rocky beaches, bays and inlets (DCCEEW 2024i).	**Possible (rare)** Previous desktop records <10 km from the Development Envelope but old (1979 - 1980) and from a single site near artificial wetlands. While the species is known to use terrestrial wetlands and pasture near the coast, it only occurs rarely in WA. Therefore,	The Development Envelope contains 2,829.62 ha of potentially suitable habitat for the species (Wetland habitats, Cleared, Cleared-degraded sumpland).

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
			considered unlikely to occur, except as possibly a very rare visitor.	
Fork-tailed Swift (*Apus pacificus*)	Migratory (EPBC Act and BC Act)	Occurs in a wide range of dry or open habitats, including riparian woodlands, tea tree swamps, low scrub, heathland, saltmarsh, grassland and spinifex sandplains, open farmland and inland and coastal sand dunes (DCCEEW 2021).	**Possible** Within species distribution, but no nearby records. Occupies wide range of habitats. Aerial feeder, may feed on insects over the Development Envelope on occasion.	The Development Envelope contains 3,183.29 ha of potentially suitable habitat for the species (Wetland habitats, Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded), Cleared, Cleared-degraded sumpland, Dam).
Grey-tailed Tattler (*Tringa brevipes*)	Migratory (EPBC Act and BC Act) Priority 4 (DBCA)	Occurs on sheltered coasts with reefs and rock platforms or mudflats and can also be found on reefs or platforms that are exposed at low tide (DCCEEW 2024p). It is occasionally found around near-coastal wetlands, such as lagoons, and lakes and ponds, in sewage farms and saltworks. Inland records for the species are rare (Higgins & Davies 1996).	**Possible (rare)** Nearby record. Inland records for the species are rare. Main habitats not present. The species is only expected to fly over the Development Envelope on occasion.	The Development Envelope does not contain any suitable habitat for the Grey-tailed Tattler.
Grey Wagtail (*Motacilla cinerea*)	Migratory (EPBC Act and BC Act)	Uses a wide array of habitats. A small wagtail that is a vagrant visitor to mainly northern Australia that inhabits fast flowing streams and rivers (IUCN 2019).	**Possible (rare)** Desktop record is projected distribution only. Suitable habitat is present but occurs in a wide range of habitats. Very few records of this species from the region. May occur in on rare occasions only.	The Development Envelope contains 706.01 ha of potentially suitable habitat for the Grey Wagtail (Wetland habitats, Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded), Dam).
Marsh Sandpiper (*Tringa stagnatilis*)	Migratory (EPBC Act and BC Act)	Lives in permanent or ephemeral wetlands of varying salinity (DCCEEW 2023b). In WA they prefer freshwater to marine environments. Does not breed in Australia. Breeding occurs in east Europe, southern Siberia and northern China.	**Possible** No previous desktop records <10 km of study area, last record in December 2000 at the Hardy Inlet. Suitable habitat present when species arrives in South West during September and early October when the wetland habitats are still inundated.	The Development Envelope contains 354.03 ha of potentially suitable habitat for the species (Wetland habitats, Dam).

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
Osprey (*Pandion haliaetus*)	Migratory (EPBC Act and BC Act)	The species is distributed along Australia's northern coastline, from south-west WA to south-east New South Wales (DCCEEW 2025b). Habitat includes coastal habitat and terrestrial wetlands of tropical and temperate Australia and offshore islands. Foraging requires the presence of extensive areas of saline, brackish or fresh water. Breeding in Australia occurs from Albany in WA's south and around the northern coastline to southern New South Wales.	**Recorded** One individual was recorded within the Development Envelope. There are no sites of International or National Importance within proximity to the Development Envelope. The wetland habitat types within the Development Envelope provide minor foraging habitat for the species (Phoenix 2025a).	The Development Envelope contains 352.33 ha of minor foraging habitat for the species (Wetland habitats).
Pacific Golden Plover (*Pluvialis fulva*)	Migratory (EPBC Act and BC Act)	Usually inhabits coastal habitats (e.g. beaches, mudflats and sandflats, harbours, estuaries and lagoons), but will use inland wetlands, such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. It may even use other terrestrial habitats such as short grass in paddocks (DAWE 2021b).	**Possible** Nearby record. Suitable habitat present. May occur on occasion when they arrive in spring, before the ephemeral wetlands dry for the summer.	The Development Envelope contains 2,829.62 ha of potentially suitable habitat for the species (Wetland habitats, Cleared, Cleared-degraded sumpland).
Pectoral Sandpiper (*Calidris melanotos*)	Migratory (EPBC Act and BC Act)	Utilises shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DCCEEW 2023c).	**Possible** Nearby record. Suitable habitat present. Arrives in South West in spring; therefore. may be a temporary, seasonal visitor.	The Development Envelope contains 2,829.62 ha of potentially suitable habitat for the species (Wetland habitats, Cleared, Cleared-degraded sumpland)
Red-necked Stint (*Calidris ruficollis*)	Migratory (EPBC Act and BC Act)	Found across a wide range of open mudflat-like habitats in salt and freshwater systems (DCCEEW 2024h).	**Possible** Old (1979-80) desktop records within 10 km of Development from a site near artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers sheltered coastal habitats with large intertidal flats. Rarely uses swamps near the coast and salt lakes. Uncommon in the South West.	The Development Envelope contains 2,831.32 ha of potentially suitable habitat for the species (Wetland habitats, Cleared, Cleared-degraded sumpland, Dam)

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
Wood Sandpiper (*Tringa glareola*)	Migratory (EPBC Act and BC Act)	Recorded in largest numbers in north-western Australia, although also distributed throughout Queensland, Vitoria, New South Wales and South Australia (DCCEEW 2025b). The species occurrence in Western Australia is widespread but scattered. Typically inhabits shallow freshwater wetlands well-vegetated with emergent reeds and grass, surrounded by tall plants and dead trees. Foraging occurs in wet or dry mud at the edges of wetlands (Higgins and Davies 1996). Does not breed in Australia, with breeding occurring throughout Eurasia.	**Recorded** Three individuals were recorded from a single observation within the Seasonally inundated paperbark woodland habitat within the Development Envelope.	The Development Envelope contains 352.33 ha of potentially suitable habitat for the species, comprising the three wetland habitats (Phoenix 2025a).
Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*)	Priority 3 (DBCA)	This species roosts and nests in heavy forest; hunts over open woodland and farmland (Morcombe and Stewart 2021). It has also been recorded roosting in plantations.	**Likely** Two audio records outside the Development Envelope (Phoenix 2025a). Suitable habitat present. Given the lack of large suitable hollows present, the species is unlikely to breed within the Development Envelope.	The Development Envelope contains 764.26 ha of potentially suitable habitat for the species (Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded), Bluegum plantation).
Blue-billed Duck (*Oxyura australis*)	Priority 4 (DBCA)	This species is almost entirely aquatic, favouring deep water, and is rarely seen on land (Birdlife Australia 2025a).	**Likely** Records <1 km from the Development Envelope. Suitable habitat present.	The species is considered likely to utilise the open water present within the 144.89 ha of Seasonally inundated paperbark woodland (wetland) habitat within the Development Envelope.
Peregrine Falcon (*Falco peregrinus*)	Other Specially Protected Fauna (BC Act)	This species occurs in most habitats, from the arid zone to rainforests (Birdlife Australia 2025b). The Peregrine Falcon prefers open woodlands near water, or coastal and inland cliffs. It is widespread, and hunts over rainforests, estuaries and offshore island seabird colonies.	**Likely** One individual was recorded directly adjacent to the Development Envelope during the BBRA survey. Suitable habitat present. The habitats within the Development Envelope provide ample hunting grounds for the species. Unlikely to nest within the Development Envelope.	A total of 3,451.96 ha of suitable foraging habitat for a resident individual/pair occurs within the Development Envelope, within all habitats except the Seasonally inundated paperbark woodland.

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
Mammals				
Western Ringtail Possum (*Pseudocheirus occidentalis*)	Critically Endangered (EPBC Act and BC Act)	Preferred habitat for this species includes Peppermint forests, woodlands, and Eucalyptus forests, usually with a Peppermint understorey, where the species feeds exclusively in the dominant or co-dominant upper and mid-storey (DPaW 2017).	**Recorded** Five individuals were recorded from two observations. Three of these records were from road intersection areas and two were within the Development Envelope. The records included one female with a juvenile.	The Development Envelope contains: • 91.85 ha of High quality habitat. • 26.73 ha of Moderate quality habitat • 539.28 ha of Low quality habitat. A more detailed habitat assessment for Western Ringtail Possum is provided in Section 9.3.4.1 and presented in Figure 9-5.
Chuditch (*Dasyurus geoffroii*)	Vulnerable (EPBC Act and BC Act)	Confined to south-WA, occurring in only 5% of its former range. Mostly found in Jarrah Forest and woodland of the south-west or heath and mallee habitats along the south coast. Uses horizontal hollow logs or earth burrows as refugia and dens (DEC 2012b).	**Possible** One nearby record. While Chuditch will disperse long distances the closest records are old, pre-dating 1934. Suitable habitat is present, though somewhat marginal. Numerous unexpected sightings in the South West in recent years. Potential for presence therefore cannot be discounted.	The Development Envelope contains 1,116.59 ha of potentially suitable habitat (Wetland habitats, Marri-Jarrah-Peppermint woodland, Open woodland of peppermint trees (degraded), Bluegum plantation).
Quenda (*Isoodon fusciventer)*	Priority 4 (DBCA)	This species typically occurs in dense shrubland and in understorey of adjacent forest.	**Likely** Three records from just outside the Development Envelope (Phoenix 2025a). Suitable habitat present but is unlikely to constitute critical habitat given the abundance of higher quality intact habitat to the south-west, east and north of the Development Envelope.	The Development Envelope contains 605.26 ha of potentially suitable habitat for the species (Wetland habitats, Marri-Jarrah-Peppermint woodland).
Western Brush Wallaby (*Notamacropus irma*)	Priority 4 (DBCA)	Grazing species, occurs in open forest or woodland with low grasses and scrubby thickets, and also found in some areas of mallee and heathland (DEC 2012c).	**Possible** Only a dew desktop records, but this includes some relatively close and recent records. Suitable habitat present, particularly in the large	The Development Envelope contains 252.93 ha of potentially suitable habitat for the species (Marri-Jarrah-Peppermint Woodland).

Species	Conservation Status	Habitat Preferences	Likelihood of Occurrence	Suitable Habitat within the Development Envelope
			remnant bushland on the northern-central boundary of the Development Envelope.	
Western False Pipistrelle (*Falsistrellus mackenziei)*	Priority 4 (DBCA)	This species typically occurs within mature or even old-growth forest where nesting and roosting hollows are more plentiful (Churchill 2008).	**Recorded** Recorded via audio recordings from seven locations on ten occasions, within and outside of the Development Envelope. Suitable habitat present but provides limited roosting and breeding value for the species.	The Development Envelope contains 351.97 ha of potentially suitable habitat for the species (Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded).
South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger)*	Conservation Dependent Fauna (BC Act)	This species has been observed in dry sclerophyll forest and open woodlands with hollow-bearing trees (DEC 2012a). Prefers open forest with sparse groundcover but uses habitats ranging from mallee to rainforest. Highly arboreal, typically on rough-barked trees, and seldom forages on the ground.	**Likely** A few records close to the Development envelope including a recent record (2014) within 10 km. Suitable habitat present. The species is most likely to utilise the large woodland - wetland mosaic remnant on the northern boundary of the Development Envelope where it is close to other remnants that may act as linkages to the conservation reserves to the north. Habitat within the Development Envelope is unlikely to constitute critical habitat given the abundance of higher quality intact habitat to the south-west, east and north of the Development Envelope.	The Development Envelope contains 252.93 ha of potentially suitable habitat for the species (Marri-Jarrah-Peppermint woodland).
Reptiles				
Short-nosed Snake (*Elapognathus minor)*	Priority 2 (DBCA)	Prefers heathlands at swamp margins, in sedgelands, and wet sclerophyll forests (Cogger 2014).	**Likely** One record <500 m south of the Development Envelope. Suitable habitat present.	The Development Envelope contains 605.26 ha of potentially suitable habitat for the species (Wetland habitats, Marri-Jarrah-Peppermint woodland).

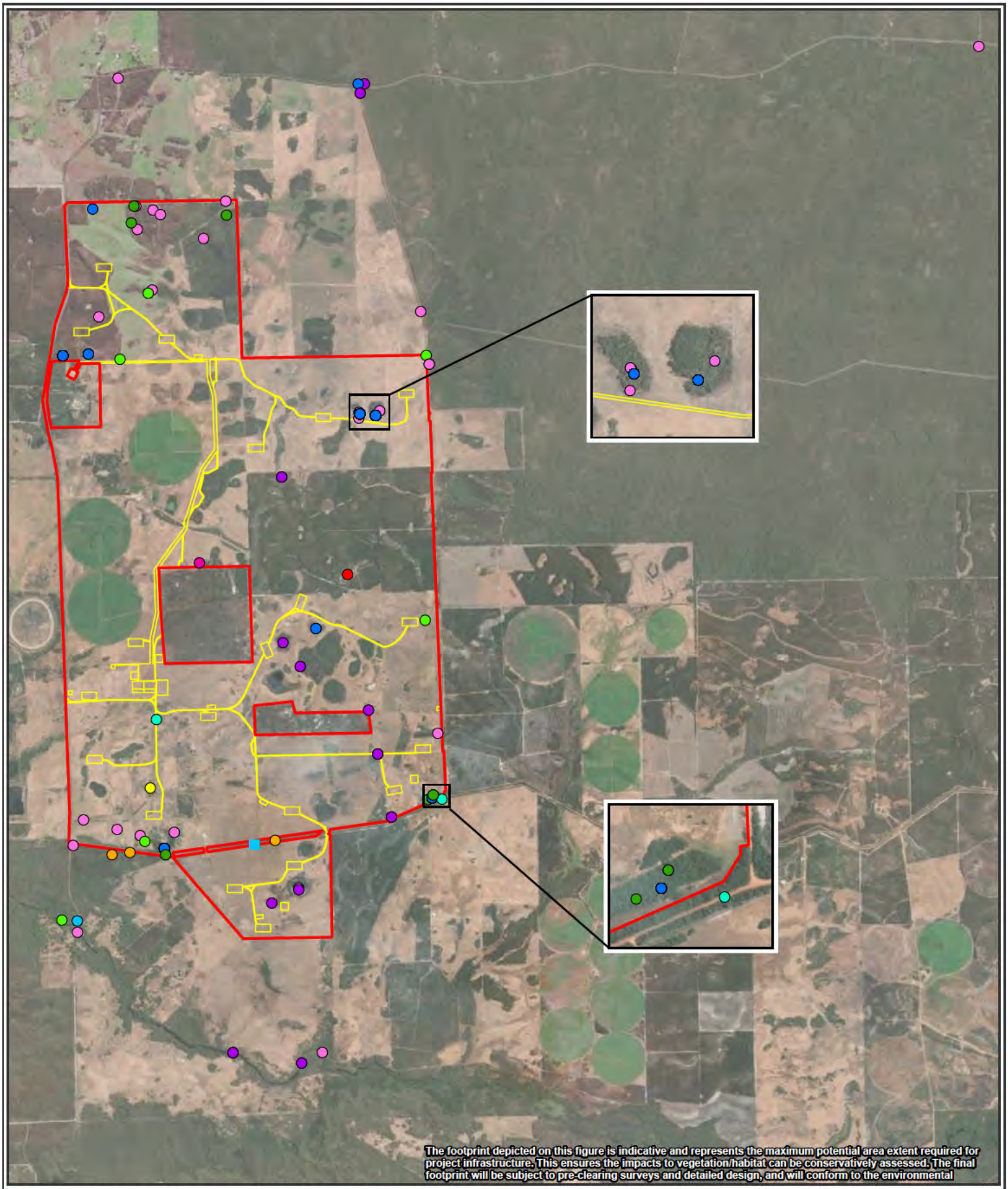

Figure 9-4: Conservation Significant Fauna Records

Indicative Disturbance Footprint
Development Envelope

Conservation Significant Fauna Records (Phoenix 2025a, Phoenix 2025b)

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; VU)
- Western False Pipistrelle (*Falsistrellus mackenziei*; P4)
- Quenda (*Isoodon fusciventer*; P4)
- Osprey (*Pandion haliaetus*; MI)
- Western Ringtail Possum (*Pseudocheirus occidentalis*; CR)
- Wood Sandpiper (*Tringa glareola*; MI)
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; P3)
- Baudin's Cockatoo (*Zanda baudinii*; EN)
- Carnaby's Cockatoo (*Zanda latirostris*; EN)
- Zanda sp.
- Calyptorhynchus/Zanda sp.
- Peregrine Falcon (*Falco peregrinus*; OS)

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Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/24/2025

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9.3.4.1. Western Ringtail Possum Habitat

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is listed as Critically Endangered (CR) under the EPBC Act and the BC Act.

Habitat quality for Western Ringtail Possum was assessed based on habitat suitability, site context and species stocking rate. Each fauna habitat type was assigned a habitat quality category of None, Low, Moderate or High. The Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan defines critical habitat as 'any habitat where Western Ringtail Possums occur naturally', which generally comprises 'long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity and high foliage nutrients (high in nitrogen and low toxin levels); jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) forests and woodlands' (DPaW 2017). In accordance with the Recovery Plan, linkages between suitable habitat patches are also considered critical to the species survival (DPaW 2017). The Recovery Plan has identified three key management zones for Western Ringtail Possum within Western Australia, namely the Swan Coastal Plain, Southern Forest and South Coast. The Development Envelope is not located within a management zone; however, the Swan Coastal Plain Management Zone is in proximity, to the east; therefore, the management priorities and actions assigned to this zone have been applied to the population within the Development Envelope.

A total of 91.30 ha of High quality and 26.84 ha of Moderate quality habitat for Western Ringtail Possum occurs within the Development Envelope (Table 9-5; Figure 9-5). High and Moderate quality foraging habitat was solely represented by Marri-Jarrah-Peppermint woodland. This High and Moderate value habitat occurs typically in the larger remnants on the extremities of the Development Envelope adjoining or near contiguous vegetation adjacent to the Development Envelope.

Low value habitat was associated with Bluegum plantation, Open woodland of Peppermint trees (degraded), Seasonally inundated paperbark woodland (wetland), Seasonally inundated sedgeland (wetland), Seasonally inundated shrubland (wetland) and poor condition, isolated or low density (reduced canopy cover) Marri-Jarrah-Peppermint woodland.

While the open woodland of Peppermint trees habitat is dominated by peppermint trees and widespread throughout the Development Envelope, this habitat type was mapped as low quality within the Development Envelope due to their degraded condition (i.e. lacking midstory and understorey and reduced canopy cover) and fragmentation (i.e. separated by open paddock by more than 50 m) with consideration for the arboreal nature of this species (Phoenix 2025a).

Table 9-5: Quality and Extent of Western Ringtail Possum Habitat within the Development Envelope

Habitat Quality Score	Extent within Survey Area (ha)	Extent within Development Envelope (ha)
None (0)	2,767.21	2,560.51
Low (0.5-4.5)	924.90	918.20
Moderate (5-7.5)	103.22	26.84
High (8-10)	98.00	91.30
Total	3,893.33	3,596.85

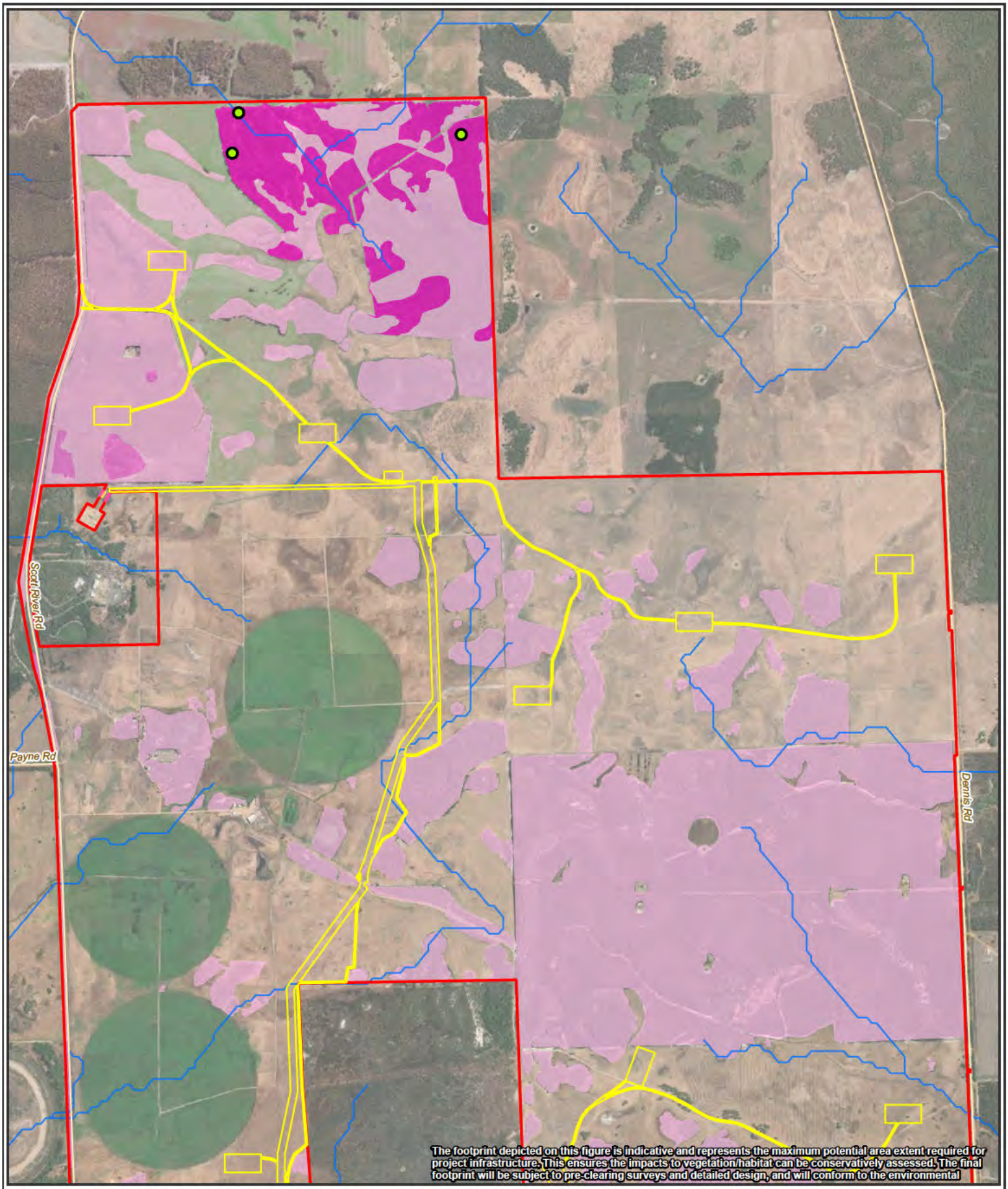
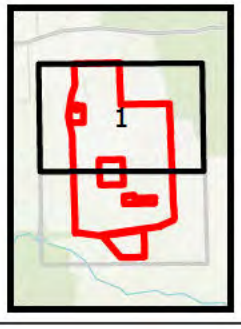


Figure 9-5: Western Ringtail Possum Habitat (Page 1 of 2)

- Western Ringtail Possum (*Pseudocheirus occidentalis*; CR)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Western Ringtail Possum Habitat Quality Score (Phoenix 2025a)

- Low
- Moderate
- High



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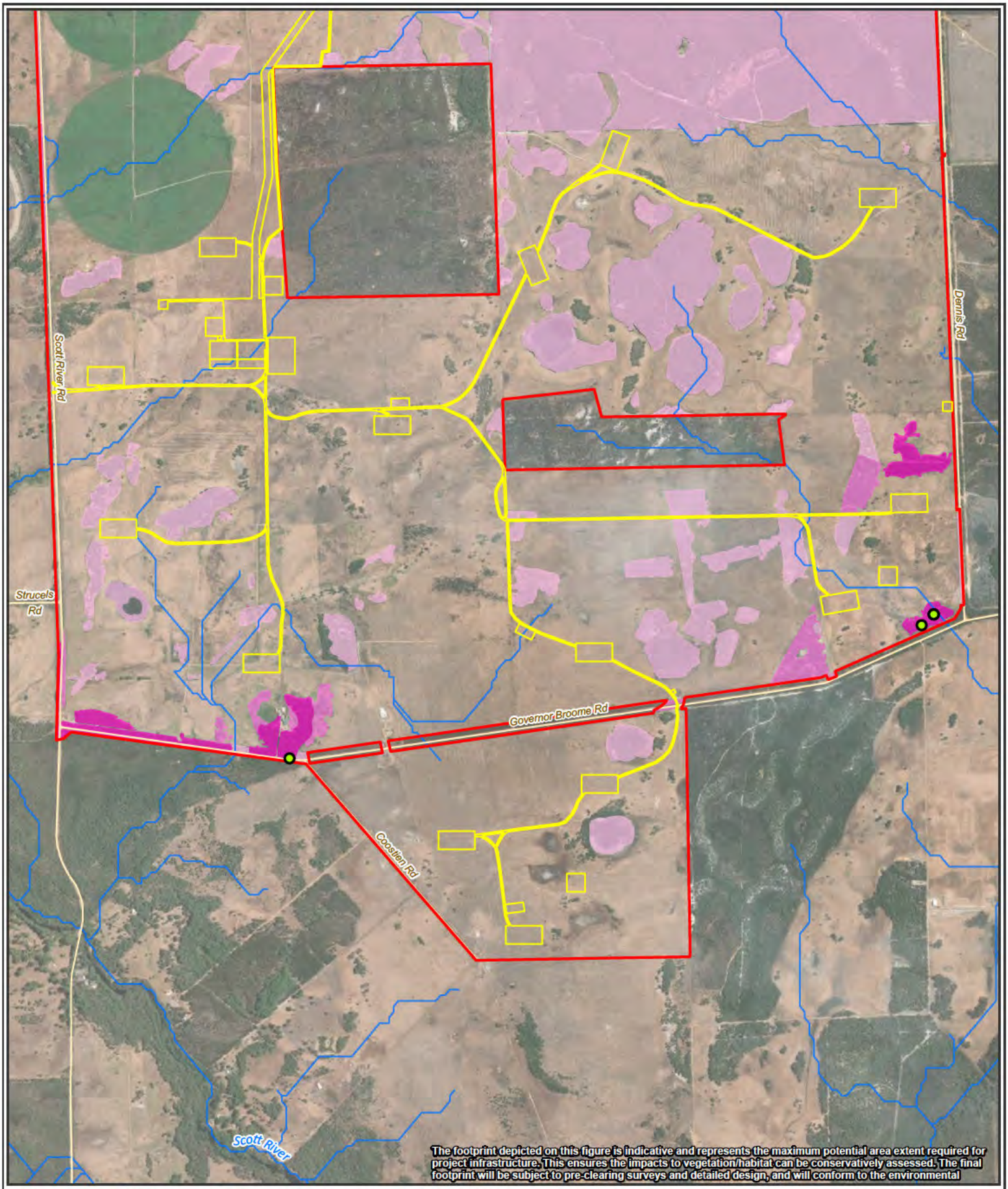
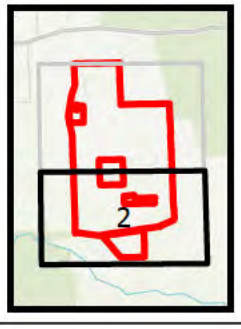


Figure 9-5: Western Ringtail Possum Habitat (Page 2 of 2)

- Western Ringtail Possum (*Pseudocheirus occidentalis*; CR)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Western Ringtail Possum Habitat Quality Score (Phoenix 2025a)

- Low
- Moderate
- High



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9.3.4.2. Black Cockatoo Habitat

9.3.4.2.1. Breeding Habitat

Black cockatoo breeding habitat is defined in DAWE (2022) as 'trees of species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow'. For most species of trees, suitable breeding hollows are found in trees with a DBH of at least 500 mm (or 300 mm for Salmon Gum and Wandoo; DAWE 2022). It should be noted that the breeding habitat present within the Development Envelope is relevant only to Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo, as the Development envelope is outside the breeding range for Carnaby's Cockatoo (DAWE 2022). Potential nesting trees were classified according to the following parameters, which largely align with the definition in DAWE (2022):

- Known breeding tree – trees which contain a hollow where a black cockatoo has been directly recorded breeding, or has evidence of use
- Suitable breeding tree – trees with suitable DBH for the species, containing a suitable hollow (a hollow in a live tree with a near vertical alignment, >300 mm in internal diameter and >5 m above the ground) but with no evidence of use
- Potential breeding tree – any tree with DBH >500 mm that do not currently contain a suitable hollow.

Potential nesting trees recorded within the Development Envelope include Jarrah (*Eucalyptus marginata* subsp. *marginata*), Flooded Gum (*Eucalyptus rudis*), Marri (*Corymbia calophylla*), and dead unidentifiable *Eucalyptus* spp. Each of these species has a minimum DBH requirement of 500 mm to meet the criteria of potential nesting tree for black cockatoos.

A total of 580 potential nesting trees were recorded within the Development Envelope (Phoenix 2025a; Table 9-6; Figure 9-7; Figure 9-8). These trees were recorded within the Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland) and Seasonally inundated paperbark woodland (wetland) habitats.

Of these 580 nesting trees recorded within the Development Envelope, 116 contained hollows, with no tree bearing more than a single hollow. None of these hollow bearing trees were known breeding trees and only four were considered suitable for breeding, with the remainder considered Potential breeding trees, with no suitable hollows (Table 9-6).

Table 9-6: Black Cockatoo Potential Nesting Trees within the Development Envelope

Potential Nesting Trees	No. within Survey Area	No. within Development Envelope
Known breeding tree	0	0
Suitable breeding tree	4	4
Potential breeding tree	766	576
Total	770	580

9.3.4.2.2. Roosting Habitat

There are no known roosting sites within the Development Envelope (DBCA 2023), and after 34 hours of night roosting/breeding surveillance (Phoenix 2025a) and 278 nights of audio recordings (Phoenix 2025a); Phoenix 2025b), no evidence of night roosting by black cockatoos was recorded. Tree species that are known to provide roosting habitat that are present within the Development Envelope include several *Eucalyptus* spp., *Corymbia calophylla* and *Pinus* spp. (the latter for Carnaby's Cockatoo only). Habitats that provide suitable roosting trees include Marri-Jarrah-Peppermint woodland, as well as Seasonally inundated shrubland wetland and Seasonally inundated paperbark woodland (wetland) and Pine plantation (Carnaby's Cockatoo only). Given the presence of suitable roosting trees and availability of water nearby there is potential for black cockatoos to roost within the Development Envelope.

9.3.4.2.3. Foraging Habitat

The foraging values of each broad fauna habitat type were assessed for Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo based on site condition, site context and species stocking rate (Bamford 2021). Vegetation within each broad fauna habitat type has been assessed and assigned a foraging value of None, Low, Moderate and High.

Carnaby's Cockatoo

Carnaby's Cockatoo (*Zanda latirostris*) is listed as Endangered under the EPBC Act and BC Act. A total of 28.91 ha of High quality Carnaby's Cockatoo foraging habitat occurs within the Development Envelope, solely represented by the Marri-Jarrah-Peppermint woodland habitat type (Table 9-7; Figure 9-6). A further 497.78 ha was classified as Moderate quality habitat, whilst the majority (approximately 85%) of the Development Envelope provides Low (3,065.94 ha [2,880.88 ha non-native, 185.06 ha native]) to no (4.23 ha) foraging value for the species. The majority of the Development Envelope is considered to provide some foraging value to Carnaby's Cockatoo as this species is known to forage on a small variety of paddock grasses (e.g. *Erodium* spp., *Arctotheca calendula*) and melons, as was observed during fauna surveys.

Table 9-7: Carnaby's Cockatoo Foraging Habitat within the Development Envelope

Habitat Quality	Extent within Survey Area (ha)	Extent within Development Envelope (ha)
None (0)	3.04	4.23
Low (non-native habitat) (1 - 4)	3,083.00	2,880.88
Low (native habitat) (1 - 4)	107.00	185.06
Moderate (5 - 7)	620.77	497.78
High (8 - 10)	79.52	28.91
Total	3,893.33	3,596.85

Baudin's Cockatoo

Baudin's Cockatoo (*Zanda baudinii*) is listed as Endangered under the EPBC Act and BC Act. A total of 38.31 ha of High quality Baudin's Cockatoo foraging habitat occurs within the Development Envelope, also occurring solely within Marri-Jarrah-Peppermint woodland (

Table 9-8; Figure 9-7). A further 321.84 ha was classified as Moderate quality. In contrast to Carnaby's Cockatoo, only 246.43 ha provides Low quality foraging value for this species, and 2,990.27 ha provides no foraging value.

Table 9-8: Baudin's Cockatoo Foraging Habitat within the Development Envelope

Habitat Quality	Extent within Survey Area (ha)	Extent within Development Envelope (ha)
None (0)	3,192.94	2,990.27
Low (1 - 4)	261.80	246.43
Moderate (5 - 7)	392.27	321.84
High (8 - 10)	46.32	38.31
Total	3,893.33	3,596.85

Forest Red-tailed Black Cockatoo

The Forest Red-Tailed Black Cockatoo (*Calyptorhynchus banksii naso*) is listed as Vulnerable under the EPBC Act and BC Act. A total of 151.75 ha of High quality Forest Red-tailed Black Cockatoo foraging habitat occurs within the Development Envelope, all within Marri-Jarrah-Peppermint woodland (Table 9-9; Figure 9-8). A further 201.71 ha was classified as Moderate quality. Similarly to Baudin's Cockatoo, the remainder of the Development Envelope provided Low (15.31 ha) to no (3,228.08 ha) foraging value for the species.

Table 9-9: Forest Red-tailed Black Cockatoo Foraging Habitat within the Development Envelope

Habitat Quality	Extent within Survey Area (ha)	Extent within Development Envelope (ha)
None (0)	3,445.11	3228.08
Low (1 - 4)	15.90	15.31
Moderate (5 - 7)	261.6	201.71
High (8 - 10)	170.72	151.75
Total	3,893.33	3,596.85

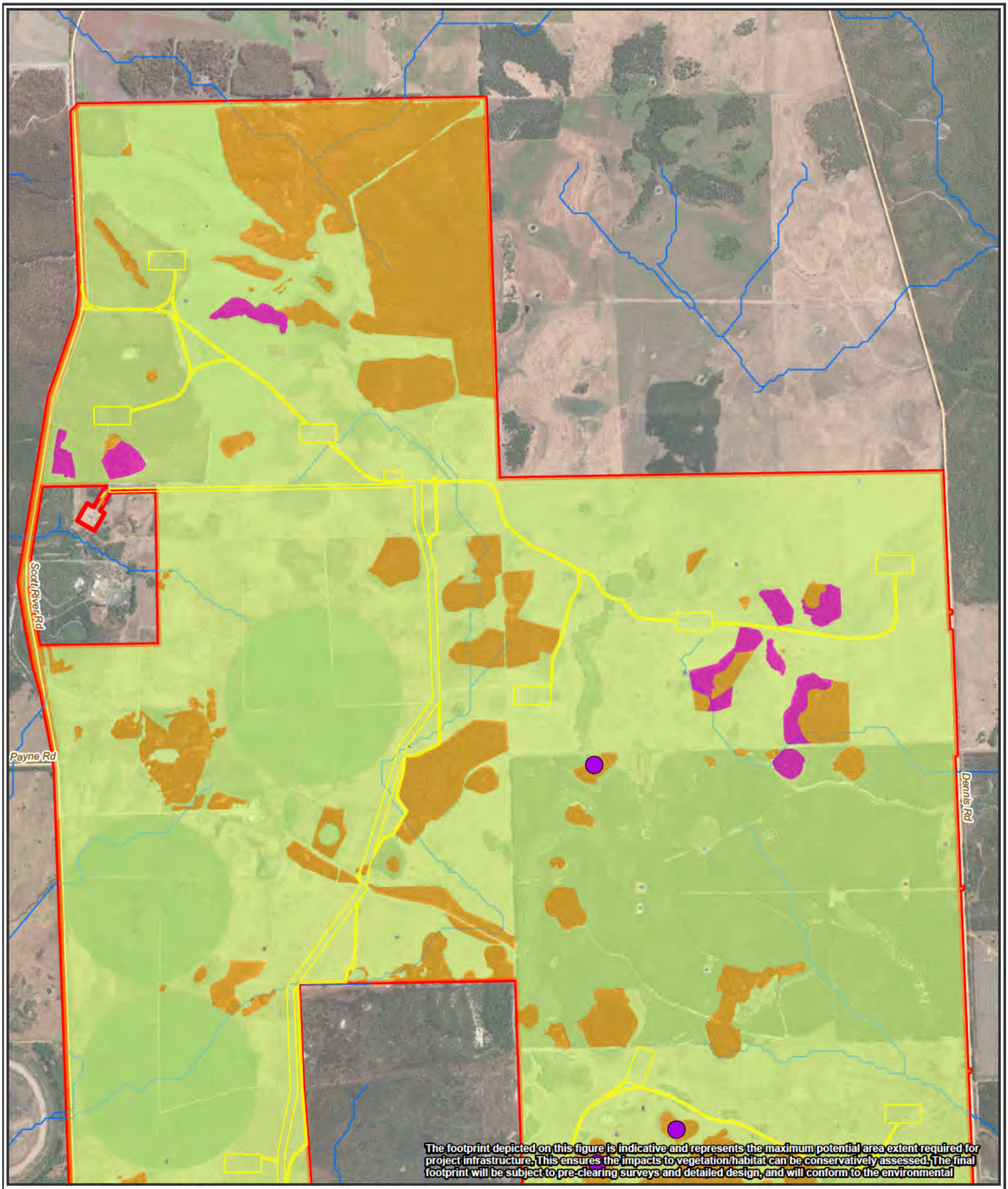


Figure 9-6: Carnaby's Cockatoo Habitat (Page 1 of 2)

Carnaby's Cockatoo (*Zanda latirostris*; EN)

Roads

Rivers and Tributaries

Development Envelope

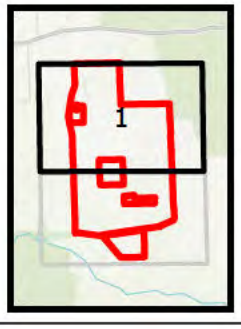
Indicative Disturbance Footprint

Carnaby's Cockatoo Foraging Habitat (Phoenix 2025a)

Low

Moderate

High



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Project: 24PER7886-DH Date: 9/25/2025

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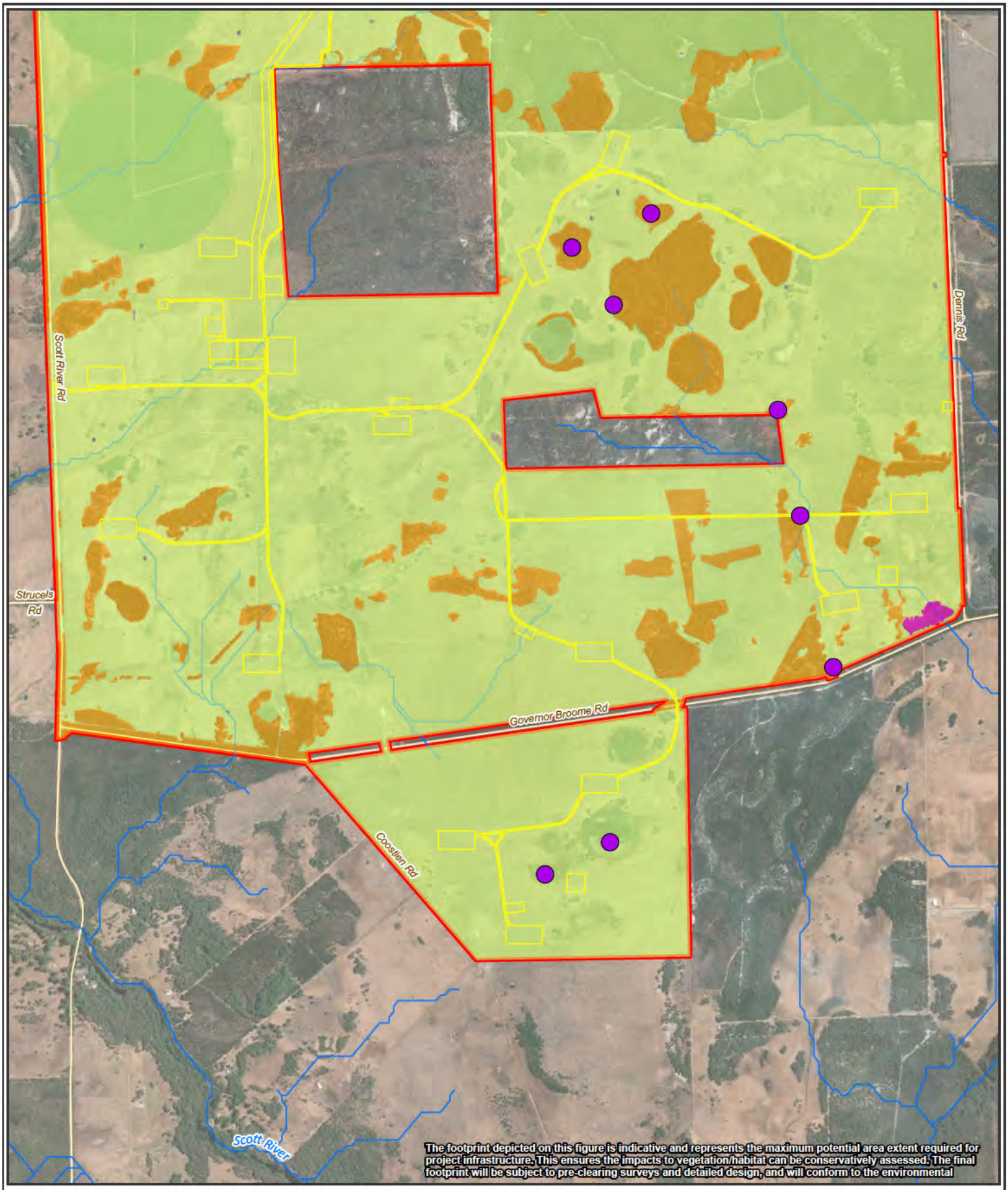


Figure 9-6: Carnaby's Cockatoo Habitat (Page 2 of 2)

Carnaby's Cockatoo (*Zanda latirostris*; EN)

Roads

Rivers and Tributaries

Development Envelope

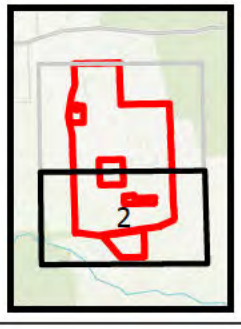
Indicative Disturbance Footprint

Carnaby's Cockatoo Foraging Habitat (Phoenix 2025a)

Low

Moderate

High



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Project: 24PER7886-DH Date: 9/25/2025

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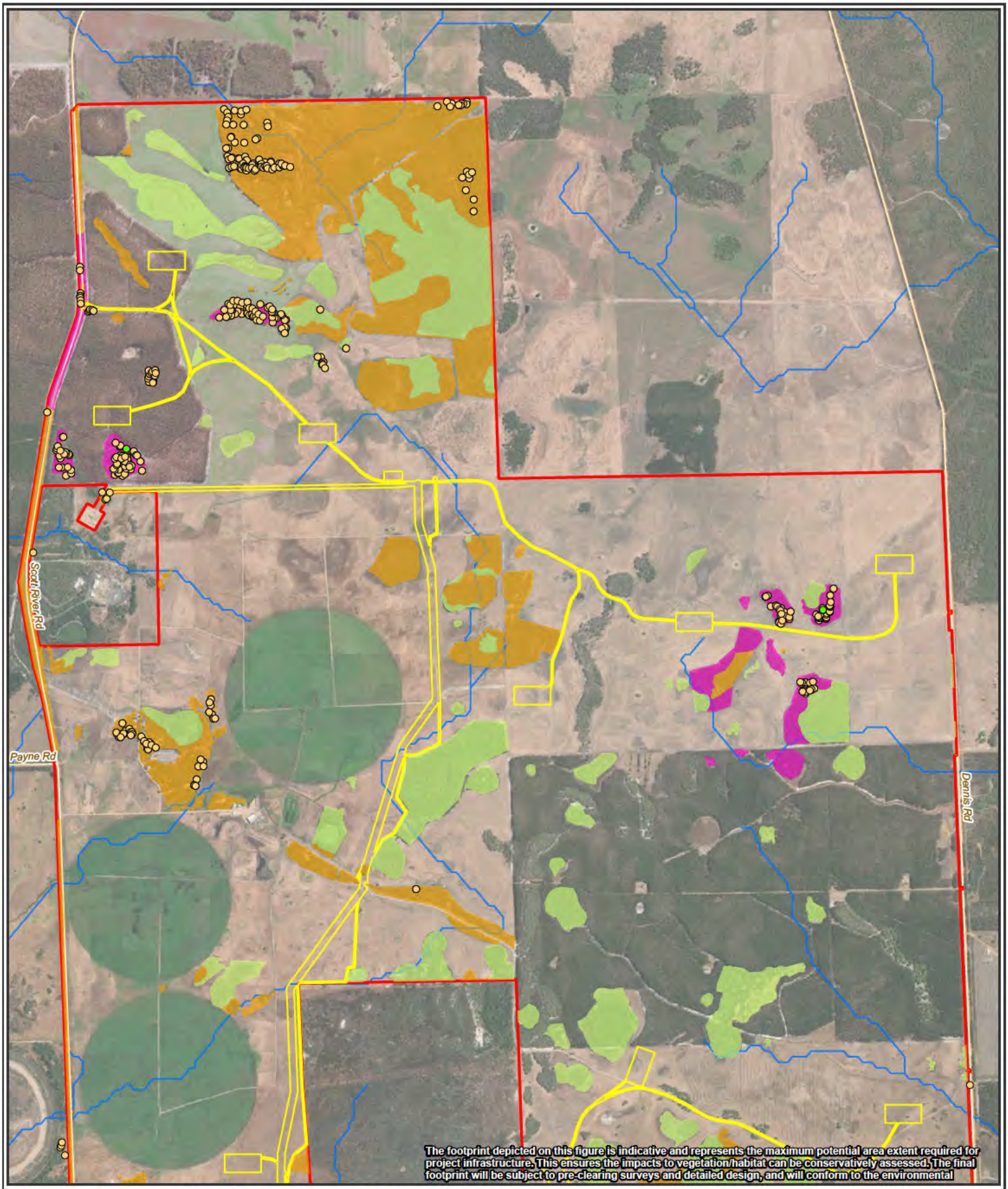


Figure 9-7: Baudin's Cockatoo Habitat (Page 1 of 2)

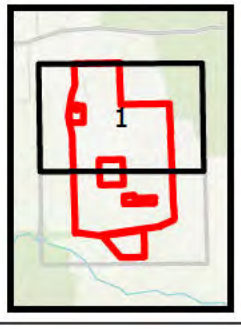
- Baudin's Cockatoo (*Zanda baudinii*; EN)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Potential Nesting Trees

- Suitable Breeding Trees
- Potential Breeding Trees

Baudin's Cockatoo Foraging Habitat (Phoenix 2025a)

- Low
- Moderate
- High



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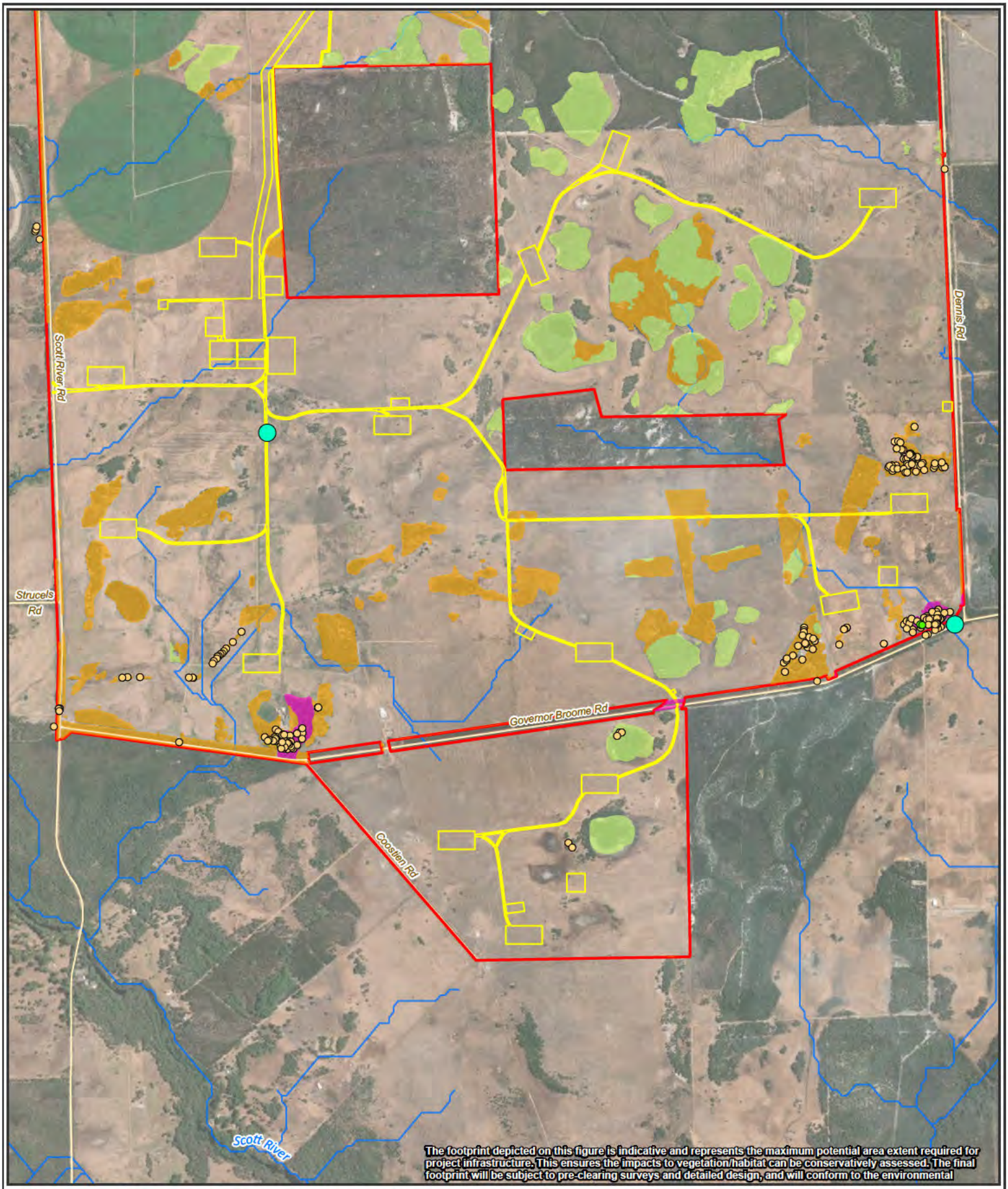


Figure 9-7: Baudin's Cockatoo Habitat (Page 2 of 2)

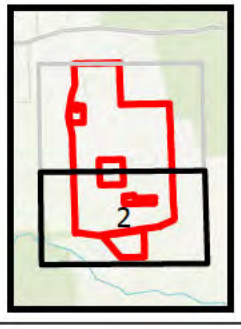
- Baudin's Cockatoo (*Zanda baudinii*; EN)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Potential Nesting Trees

- Suitable Breeding Trees
- Potential Breeding Trees

Baudin's Cockatoo Foraging Habitat (Phoenix 2025a)

- Low
- Moderate
- High



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Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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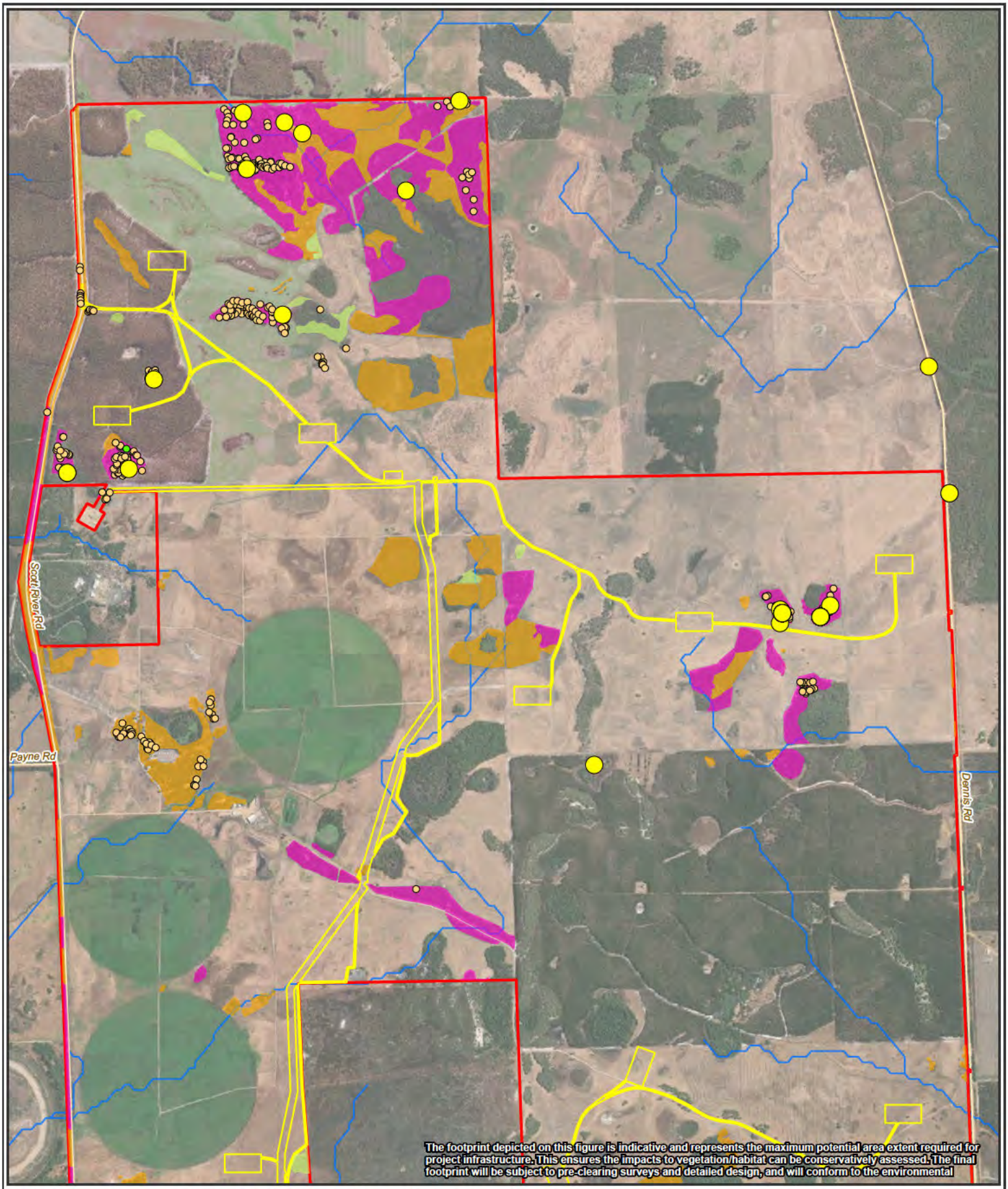


Figure 9-8: Forest Red-tailed Black Cockatoo Habitat (Page 1 of 2)

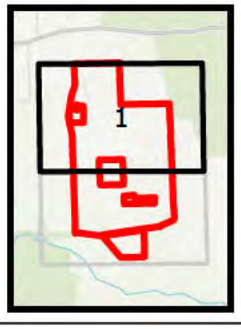
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; VU)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Potential Nesting Trees

- Suitable Breeding Trees
- Potential Breeding Trees

Forest Red-tailed Black Cockatoo Foraging Habitat (Phoenix 2025a)

- Low
- Moderate
- High



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Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/24/2025

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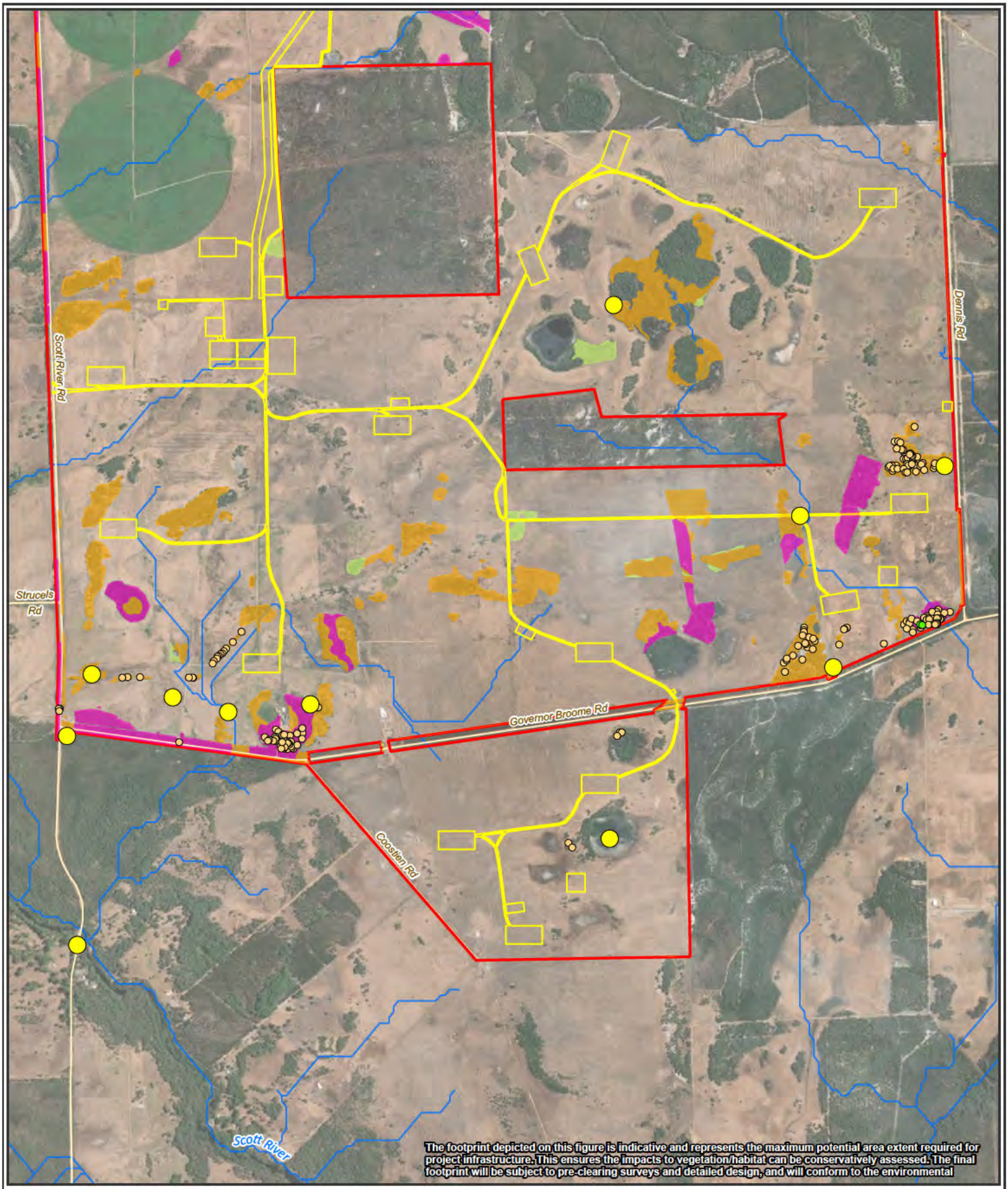


Figure 9-8: Forest Red-tailed Black Cockatoo Habitat (Page 2 of 2)

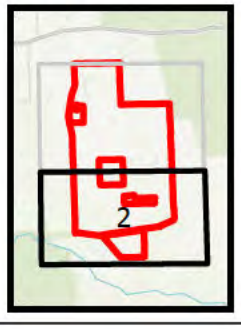
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; VU)
- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Potential Nesting Trees

- Suitable Breeding Trees
- Potential Breeding Trees

Forest Red-tailed Black Cockatoo Foraging Habitat (Phoenix 2025a)

- Low
- Moderate
- High



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Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/24/2025

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9.3.5. Short-range Endemic Invertebrate Fauna

SRE invertebrate fauna are invertebrates that, due to evolutionary isolation, have naturally small distribution (below 10,000 km^2) and are often characterised by low fecundity, confinement to disjunct habitats and poor dispersal capabilities (Harvey 2002).

9.3.5.1. SRE Invertebrate Fauna Habitat

The Development Envelope contains five potential SRE habitats (Table 9-10; Figure 9-9)Figure 9-9 Invertebrate Solutions 2024a). These habitats are all continuous in the landscape and do not form habitat isolates present over evolutionary timescale in the regional landscape. As such, they are considered to be of low value for SREs (Figure 9-9). The remainder of the Development Envelope comprises Modified landscapes and Cleared/Degraded areas which provide 'Nil' value for SRE invertebrates.

Table 9-10: SRE Invertebrate Habitats within the Development Envelope

SRE Habitat Suitability	SRE Habitats	Extent within Development Envelope (ha)
Low	Shrublands over sedgelands	698.05
	Mixed shrublands over tall sedgelands	
	Paperbark woodland swamps over sedgelands	
	Jarrah woodlands over shrublands	
	Jarrah-Marri woodlands over shrublands	
Nil	Modified landscapes	2898.80
	Cleared/Degraded	
Total		3596.85

9.3.5.2. SRE Invertebrate Fauna Species Assemblage

Based on the desktop review, seven Confirmed, five Likely and one Possible SRE taxa have been recorded within the Desktop Study Area, although records were all outside the Development Envelope (Invertebrate Solutions 2024a). This includes four conservation significant species:

- Hairy Marron (*Cherax tenuimanus*, listed as CR under the EPBC Act and BC Act)
- Margaret River Burrowing Crayfish (*Engaewa pseudoreducta*, listed as CR under the EPBC Act and BC Act)
- Dunsborough Burrowing Crayfish (*Engaewa reducta*, listed as CR under the EPBC Act and EN under the BC Act)
- Cape Leeuwin Freshwater Snail (*Austroassiminea letha*, listed as VU under the BC Act).

Each of these aquatic invertebrates are discussed further in Section 9.3.6.3. The remaining Confirmed, Likely and Possible SRE taxa are considered to have a Low to Very Low likelihood of occurrence due to an absence of habitat and the proximity to nearby records.

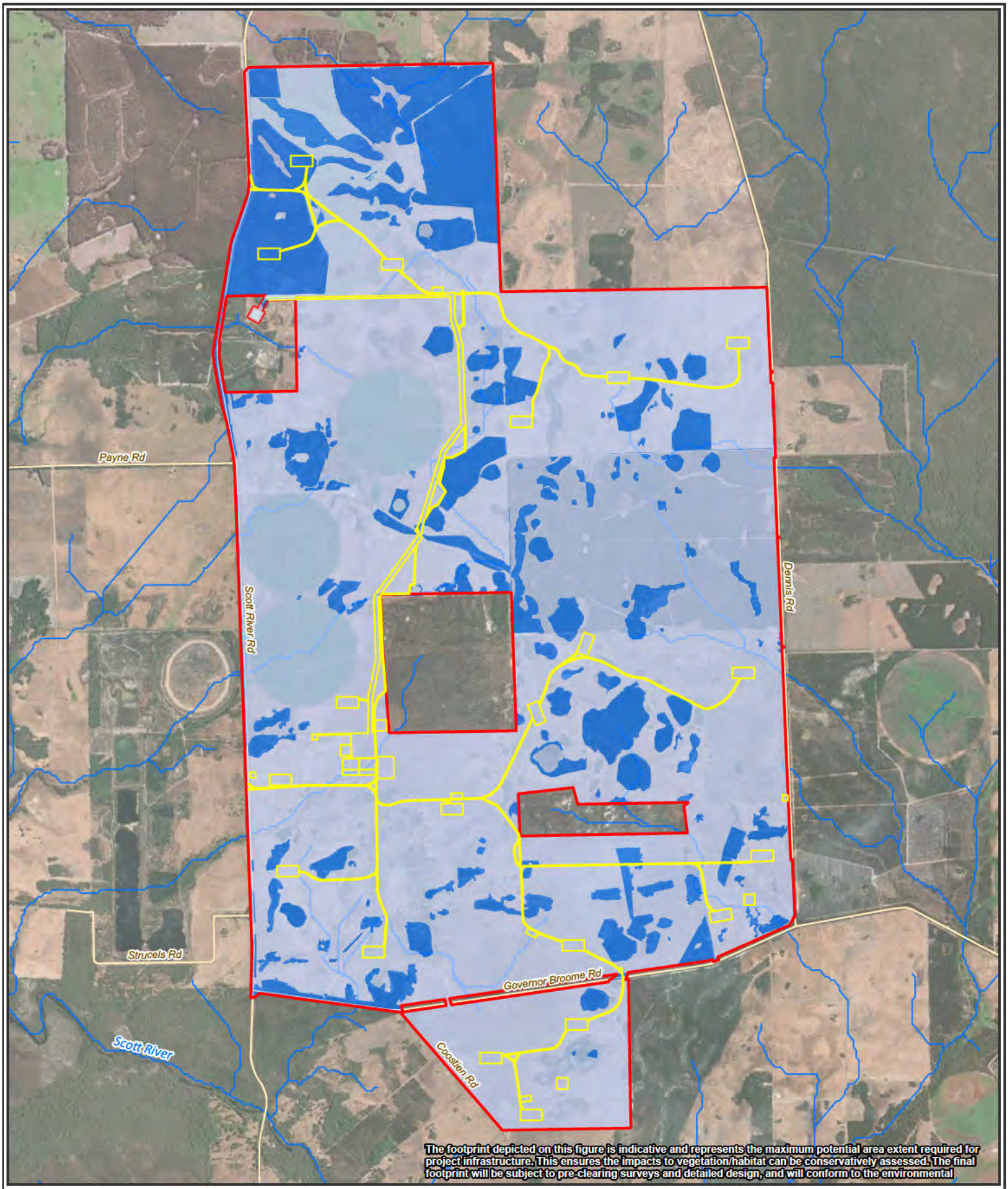

Figure 9-9: Short Range Endemic Invertebrate Potential Habitat

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

SRE Habitat Quality Score

- Low
- Nil

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/15/2025

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9.3.6. Aquatic Ecosystems

9.3.6.1. River Systems

The Blackwood River is an important nursery and spawning ground for aquatic and semi-aquatic fauna, with a high species richness and endemism of fish and crayfish, as well as a diverse community of macroinvertebrates (Stantec 2025b). Similarly, the main channel of the Scott River has a diverse fauna assemblage (LBLCDC 2020, cited in Stantec 2025b). Both these are located outside of the Development Envelope.

9.3.6.2. Wetland Habitats

Wetland habitats within the Development Envelope are a mix of seasonally inundated Paperbark woodlands, shrublands and sedgelands (Figure 9-10). These wetlands are patchily distributed, collectively covering 352.33 ha (9.80%) of the Development Envelope.

There is a largely cohesive mosaic of remnant vegetation and wetlands towards the northern boundary of the Development Envelope, while wetlands towards the centre of the Development Envelope are in generally poor condition, separated by paddocks. The southern portion of the Development Envelope contains an isolated group of fenced wetlands and one unfenced, larger wetland to the south (Phoenix 2025a).

Although that larger southern wetland and a cluster of wetlands in the north were observed to persist into summer and are considered to have the potential to be permanently inundated (perennial), wetlands within the Development Envelope are mostly ephemeral and shallow (Section 7.3.4.2). Nonetheless, for the purposes of this assessment, two of the wetland fauna habitat types within the Development Envelope are considered potential GDEs (Section 7.3.5.2), based on the presence of obligate and facultative phreatophyte plant species (Section 8.3.2.7; Phoenix 2025a), these include (Figure 9-3; Figure 9-10):

- Seasonally inundated Paperbark woodland
- Seasonally inundated sedgeland.

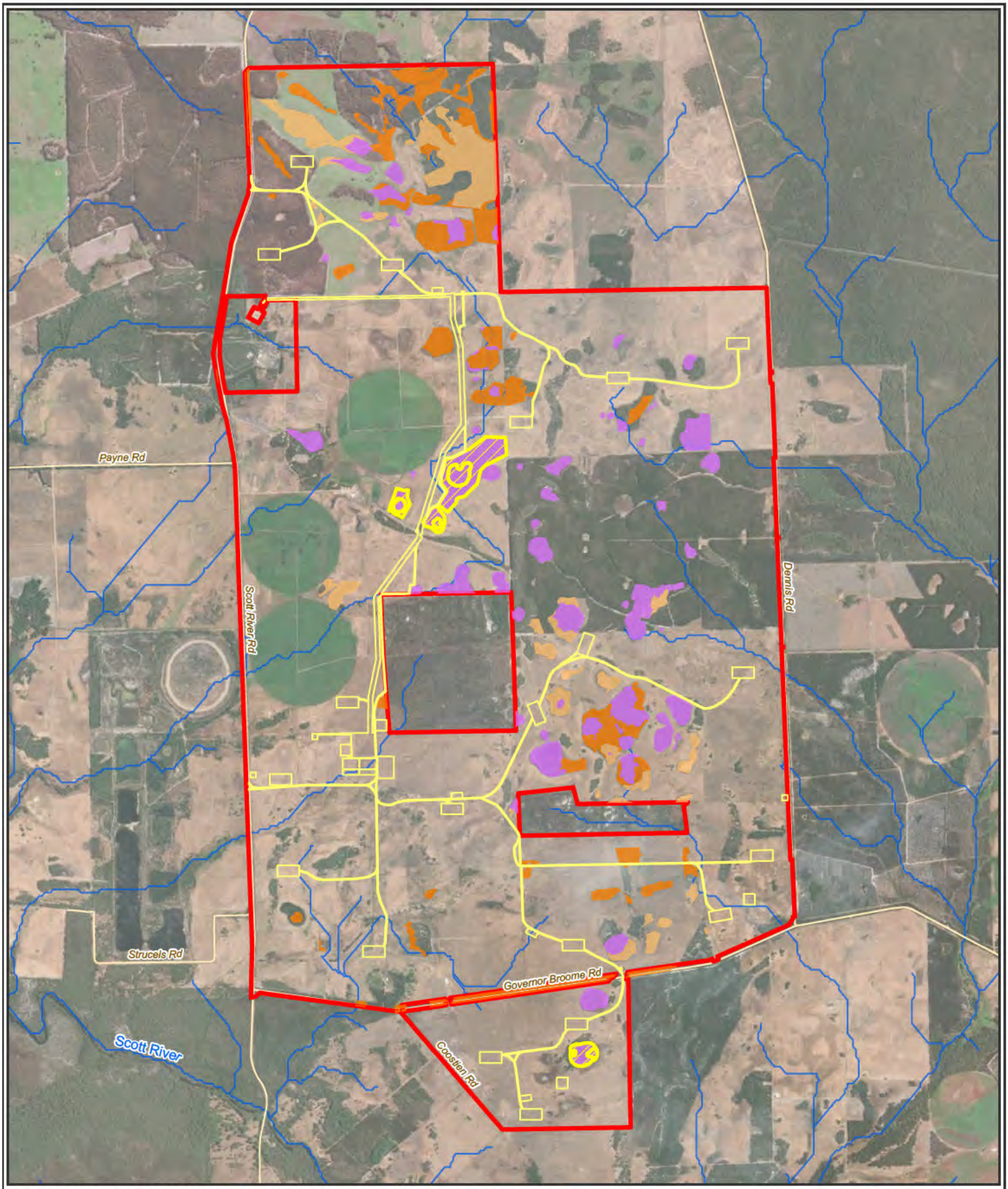

Figure 9-10: Wetland Values within the Development Envelope

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

Wetland Values (Phoenix 2025a)

- Seasonally inundated paperbark woodland
- Seasonally inundated sedgeland
- Seasonally inundated shrubland
- Seasonally inundated paperbark woodland (wetland) - potentially permanently inundated

0 0.5 1 2
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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9.3.6.3. Aquatic Fauna

A total of 11 aquatic and semi-aquatic fauna species listed under the EP Act, EPBC Act or as Priority species by DBCA are considered to potentially occur within, or near to, the Development Envelope (Stantec 2025b). This includes three crustaceans, two molluscs, five fish, and two frog species (Table 9-11).

Studies of aquatic fauna of the Blackwood River and its tributaries indicates that, due to salinisation, the forested tributaries of this system are integral to the conservation of aquatic fauna, in particular significant fish species.

All aquatic and semi-aquatic fauna species have the potential to be groundwater-dependent, where wetlands in the Development Envelope are supported by the shallow groundwater aquifer, and where there is connectivity between the Superficial Aquifer and the deeper Leederville Aquifer. The Leederville Aquifer is not expected to be in direct connection to ephemeral surface water features within the Development Envelope (Section 7; Stantec 2025b). Nevertheless, the level of connectivity between surface water and groundwater is currently unknown.

Table 9-11 provides an assessment of the likelihood of occurrence of the listed aquatic fauna species with potential to occur within the Development Envelope. None of the listed species are considered likely to occur within the Development Envelope, and two fish species, Salamanderfish and Black-stripe Minnow, have the potential to occur given their presence in the locality within seasonally inundated wetlands, although the neutral to alkaline conditions of wetlands within the Development Envelope contrast with the low acidity conditions where these species are known to occur.

Table 9-11: Likelihood of Occurrence for Aquatic Fauna with Potential to Occur within the Development Envelope

Species	Status	Habitat and Location	Likelihood of Occurrence and Justification
Crustaceans			
Margaret River Hairy Marron *Cherax tenuimanus*	Critically Endangered (EPBC Act and BC Act)	River habitat. Restricted to the Margaret River, approximately 30 km north of the Development Envelope (TSSC 2006).	**Unlikely** Given their habitat requirements and highly restricted known locations and distance from the Development Envelope, the Proposal is not expected to impact these species.
Margaret River Burrowing Crayfish *Engaewa pseudoreducta*	Critically Endangered (EPBC Act and BC Act)	River habitat. May only live in just two places, in the narrow creek tributaries of the Margaret and Carbunup Rivers, approximately 30 km and 50 km north of the Development Envelope, respectively (DCCEEW 2023b).	
Dunsborough Burrowing Crayfish *Engaewa reducta*	Critically Endangered (EPBC Act) Endangered (BC Act)	River habitat. Known from an area between Dunsborough and the Margaret River, 30 km and more north of the Development Envelope (DEWHA 2009a).	
Molluscs			
Carter's Freshwater Mussel (*Westralunio carteri*)	Vulnerable (EPBC Act and BC Act)	Endemic to the south-west of WA. Known to occur in slow flowing permanent and semi-permanent riverine habitats, pools and dams between Moore River and Esperance. However, its extent of occurrence is estimated to have declined by 49% in the last 50 years. The species has recently been revised into three distinct and separate species - *Westralunio carteri*, *W. inbisi inbisi*, and *W. inbisi meridiemus*. In the vicinity of the Development Envelope, there is potential for both *W. inbisi inbisi*, and *W. inbisi meridiemus* to occur in the Scott River, as well as Chapman Brook and St. John Brook (approximately 11 km north-west and 40 km north-east of the Development Envelope, respectively).	**Unlikely** This species is not expected to occur within the seasonally inundated wetland habitats within the Development Envelope as it relies on permanent and semi-permanent riverine habitats. Note that no impacts on this species' Scott River habitat (e.g. changes to water quality) are expected from indirect downstream effects of the Proposal - refer to Section 7.6.3 and 7.6.6. As such this species is not discussed further.
Cape Leeuwin Freshwater Snail (*Austroassiminea letha*)	Vulnerable (BC Act)	Known from six sites from Cape Leeuwin in the south to Cape Naturaliste in the north (DEC 2009). Inhabits seepage films or splash zones alongside freshwater streams and springs draining from limestone near the coast (DEC 2009).	**Unlikely** Given the species habitat requirements and highly restricted known locations along the coast, the Proposal is not expected to impact these species.

Species	Status	Habitat and Location	Likelihood of Occurrence and Justification
Fish			
Balston's Pygmy Perch *Nannatherina balstoni*	Vulnerable (EPBC Act and BC Act)	Balston's Pygmy Perch is known from the Scott River, restricted to tributaries and/or a perennial section of the main channel of the Blackwood River that receives freshwater baseflow from associated groundwater aquifers.	**Unlikely** This species is not expected to occur within the seasonally inundated wetland habitats within the Development Envelope as it relies on permanent riverine habitats. Note that no potential impacts on this species' habitat (e.g. changes to water quality) are expected from indirect downstream effects of the Proposal, as addressed in Section 7.6.3 and 7.6.6, as such this species is not discussed further.
Salamanderfish *Lepidogalaxias salamandroides*	Endangered (BC Act)	Documented from the Blackwood River catchment in pools across the Scott River floodplain. Primarily found in highly acidic (pH 3.0-6.5)., shallow, temporary (dry out in summer), usually darkly tannin-stained pools and swamps in coastal heathland (DWER 2025b; Australian Museum 2019). Fish survive drying through summer months by burrowing into the substrate where they aestivate. They will remain in the damp sandy soils until rains re-submerge the habitat the following year.	**Possible** It is possible these species occur within the Development Envelope given the presence of seasonally inundated wetlands, and as the species are known to occur in the locality; however, they have not been categorised as Likely to occur as surface water analysis within the Development Envelope indicated neutral to alkaline conditions (pH ranged from 6.7 to 7.5) (Stantec 2025a) in contrast to the low acidity (pH 3.0-6.5) conditions of wetlands in which they have been recorded.
Black-stripe Minnow *Galaxiella nigrostriata*	Endangered (EPBC Act and BC Act)	Occupies the same ephemeral habitats as the salamanderfish and, like that species, is also capable of burrowing and aestivating (DWER 2025a). Documented from the Blackwood River catchment in pools across the Scott River floodplain. Generally restricted to ephemeral pools during dry conditions, burrowing into the substrate when pools dry out in warmer months.	
Western Dwarf Galaxias *Galaxiella munda*	Vulnerable (BC Act)	Documented from the local catchment. It typically occurs in the headwaters and tributaries of flowing rivers within peat flats and forested areas, as well as in pools of various depths connected to streams (DCCEEW 2025a).	**Unlikely** This species is not expected to occur within the seasonally inundated wetland habitats within the Development Envelope as it relies on flowing rivers within peat flats and forested areas.
Pouched Lamprey *Geotria australis*	Priority 3 (DBCA)	The Pouched Lamprey occurs in many of the rivers of the south-west coast from Perth through to Albany however records are sporadic – particularly outside of the south-west corner (Capel to Denmark). It inhabits marine, estuarine or freshwater environments depending on its life stage (ALA n.d.; DWER n.d.).	**Unlikely** This species is not expected to occur within the seasonally inundated wetland habitats within the Development Envelope as it relies on permanent riverine habitats.

Species	Status	Habitat and Location	Likelihood of Occurrence and Justification
Frogs			
White-bellied Frog *Anstisia alba* (formerly *Geocrinia alba*)	Critically Endangered (EPBC Act and BC Act)	Areas north of the Brockman Highway are known to support both frog species, that have extremely restricted and fragmented distribution within their area of occurrence. The White-bellied Frog occurs within an area north and west of the Blackwood River between Margaret River and Augusta (approximately 6 km or more west of the Development Envelope) and the Orange-bellied Frog is largely confined to an area within the Blackwood River National Park (approximately 9 km north of the Development Envelope). The White-bellied Frog occurs in permanently moist sites in relatively dry and seasonal climatic zones. The Orange-bellied Frog is known from the lower reaches of six waterways that drain south into the Blackwood River. It is considered unlikely that many additional undetected populations exist due to the high survey effort undertaken prior to, and within the first two years of, the implementation of the Orange-bellied and White-bellied Frogs Recovery Plan (DPaW 2015 cited in Stantec 2025b). The Orange-bellied Frog occurs in permanently moist sites within six unconnected and undisturbed areas of riparian vegetation.	**Unlikely** Given their highly restricted known locations and distance from the Development Envelope, the Proposal is not expected to impact these species.
Orange-bellied Frog *Anstisia vitellina* (formerly *Geocrinia vitellina*)	Vulnerable (EPBC Act and BC Act)		

Source: Stantec 20259(127), Phoenix 2025a), Invertebrate Solutions 2024a

9.4. Potential Environmental Impacts

The potential direct and indirect impacts of the Proposal on terrestrial fauna prior to mitigation being applied have been identified as:

- Loss of vertebrate fauna habitat
- Increased fragmentation of vertebrate fauna habitat
- Loss or injury to fauna individuals through turbine strike, barotrauma or collision with transmission infrastructure
- Loss or injury to fauna individuals through vehicle/machinery movements
- Loss or injury to fauna individuals through entrapment in excavations, dams, basins and borrow pits during construction.
- Disturbance to fauna movement patterns and behaviour from wind turbine movement, light, noise and/or vibration
- Increased competition or predation by feral fauna
- Groundwater drawdown associated with construction dewatering potentially reducing the hydroperiod and health of GDEs (wetland habitats and aquatic fauna habitat)
- Degradation of fauna habitat as a result of:
    - Increased dust deposition
    - Introduction and/or spread of weeds and/or dieback
    - Increased risk of bushfires
    - Altered hydrological regimes.

9.5. Mitigation

The Proponent is committed to conducting all activities in a manner that respects and protects the environment, meets compliance obligations, and manages the impacts of climate change to achieve net zero emissions by 2050.

The Proponent has applied the mitigation hierarchy during the design of the Proposal to reduce the potential impacts to any terrestrial fauna within and surrounding the Development Envelope as far as practicable. Potential impacts have primarily been avoided or minimised through the design of the Proposal during the planning phase. The specific mitigation and management measures proposed to be implemented by the Proponent have been detailed in Table 9-12 and key mitigation measures are discussed below.

A CEMP has been prepared to manage potential environmental impacts during the construction phase. Management and mitigation measures used to minimise the impacts to terrestrial fauna during construction are detailed in the CEMP (Appendix H).

A preliminary Bird and Bat Adaptive Management Plan (BBAMP) has also been prepared to monitor and manage potential environmental impacts to bird and bat species arising from the operation of the Proposal (ELA 2025a Appendix N).

Table 9-12: Proposed Terrestrial Fauna mitigation measures

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Loss of vertebrate fauna habitat	• Clearing of the following habitat values has been avoided through the refinement of the Indicative Disturbance Footprint: - Wetland habitats and contiguous* native vegetation within 50 m - Suitable and potential breeding trees for black cockatoos and contiguous* native vegetation within 10 m.	• The Indicative Disturbance Footprint has been designed to utilise existing cleared areas and tracks as much as practicable to reduce clearing and fragmentation of native vegetation/habitat. • All temporary construction infrastructure (e.g., laydown areas and concrete batching plant) will be located within areas of existing disturbance, reducing clearing. • Fragmentation associated with clearing of the ecological linkage at the southern site entrance (0.01 ha; Figure 8-8) will be minimised by limiting the clearing width at this location to 5 m. • A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to minimise fragmentation and loss of fauna habitat: - Requiring all site personnel and contractors to undertake site-specific environmental induction to ensure they are aware of native vegetation clearing requirements and locations of suitable and potential nesting trees and wetlands prior to commencement of works. - Requiring all clearing and ground disturbance activities to have an active ground and vegetation disturbance permit. - Requiring all areas to be cleared to be clearly pegged and demarcated by a qualified surveyor. - Undertaking routine inspections of the disturbance demarcation to ensure no disturbance outside of the designated area and records of land disturbance will be kept in a register to support compliance audits and reporting.	Areas that are cleared in support of the Proposal will be rehabilitated during decommissioning in accordance with the Preliminary Decommissioning Plan (Appendix C).	Based on the mitigation proposed the Proposal will result in the clearing of a maximum of 1.00 ha of fauna habitat represented by native vegetation, including: • No more than 0.5 ha of habitat for Western Ringtail Possum, including a maximum of 0.03 ha of Moderate to High quality habitat • No more than 1.0 ha of black cockatoo foraging habitat, including a maximum of 0.5 ha of Moderate to High quality black cockatoo foraging habitat The Proposal will also result in impacts to fauna habitat not represented by native vegetation (i.e. Cleared areas). The assessment and significance of this residual impact is discussed in Section 9.6.1.
Increased fragmentation of vertebrate fauna habitat	N/A			Based on the mitigation proposed minor increase in fragmentation of fauna habitat is considered likely. The assessment and significance of this residual impact is discussed in Section 9.6.2.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Loss or injury to fauna individuals through turbine strike, barotrauma or collision with transmission infrastructure	• The wind farm layout has been designed to avoid the placement of wind turbines in proximity (minimum of 100 m from the centre point of the turbine) to remnant native vegetation/habitat to prevent blade overhang.	• The minimum blade height has been increased from 25 m to 40 m above ground level to minimise impacts to low flying bird and bat species. • The number of turbines has been reduced from 30 to 20 turbines during the design phase, minimising the potential impacts to at-risk bird and bat species. • A CEMP (Appendix H) will be implemented during construction of the Proposal and a BBAMP (Appendix N) will be implemented during commissioning and operation. These will include the following key management measures to minimise loss or injury to fauna: - Lighting will be kept to a minimum to avoid attracting birds, bats, and insects to Proposal infrastructure. Specific measures to reduce potential impacts of lighting will include the use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable. - Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions. - Carrion (e.g. dead livestock, birds, bats, native mammals and rabbits) removal will occur, where required, to reduce the risk of raptors colliding with turbine blades. - Where there is a measurable increase in observations of European Rabbits and raptor collision, a feral fauna control program will be undertaken within the Development Envelope in accordance with the BBAMP.	N/A	Based on the mitigation proposed there is the potential for loss or injury to fauna individuals through turbine strike, barotrauma or collision with transmission infrastructure. The assessment and significance of this residual impact is discussed in Section 9.6.3.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
		- The final turbine design will minimise the availability of raptor perches through the use of smooth and round surfaces where possible. - Visual bird diverters will be installed along the Proposal's transmission line and guy wires of permanent met masts. - Where possible, and agreed to by landholders, grain feeding of stock will be restricted to paddocks more than 200 m from operational turbines to reduce the risk of birds being attracted to the area - Regular and opportunistic monitoring of bird and bat injury and mortality - Where injury or mortality results , or is likely to result, in a significant impact to a species in response to trigger criteria having been met, appropriate adaptive mitigation strategies will be developed and implemented (e.g. deterrents).		
Loss or injury to fauna individuals through vehicle/machinery movements and habitat clearing	• No suitable or potential breeding tree for black cockatoos will be cleared including contiguous native vegetation within 10 m.	• A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to minimise loss or injury to fauna individuals: - During clearing of the 0.03 ha of Moderate quality Western Ringtail Possum habitat, a fauna spotter will be available on-site to spot and respond to any Western Ringtail Possum individuals encountered within the clearing area. - Clearing will occur in a slow, progressive manner, towards native vegetation to allow fauna to move into adjacent habitat. - If native fauna is found on site, works in the immediate vicinity will cease until the individual moves or can be safely relocated by a fauna handler.	N/A	Based on the mitigation proposed there is the potential for injury or mortality of fauna from vehicle/machinery interaction. The assessment and significance of this residual impact is discussed in Section 9.6.4.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
		- Vehicle movement will be restricted to existing access tracks. - Speed limits on access tracks will be limited to 50 km/hr. - Nighttime construction activities will be avoided where practicable. - If any native fauna is injured during works the Wildcare Helpline (9474 9955) will be contacted for advice and rehabilitation. - Carrion (e.g. dead livestock, birds, bats, native mammals and rabbits) removal will occur, where required to avoid attracting other individuals to roads.		
Loss or injury to fauna individuals through entrapment in excavations, dams, basins and borrow pits during construction	N/A	• A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to prevent fauna entrapment: - Excavations will be kept open for the minimum time required to enable construction activities - Excavations deeper than 500 mm and open for more than 24 hours will be inspected twice daily - Borrow pits will be designed and constructed to permit egress of fauna - If any native fauna is trapped during works the Wildcare Helpline (9474 9955) will be contacted for advice and rehabilitation - Water storage dams and dewater treatment and settlement basins will be fenced and constructed to ensure point of fauna egress - Infiltration basins will be shallow and low profile.	N/A	Based on the mitigation proposed there is the potential for loss or injury to fauna individuals from entrapment in excavations, dams, basins and borrow pits during construction of the Proposal. The assessment and significance of this residual impact is discussed in Section 9.6.5.
Disturbance to fauna movement patterns and behaviour from wind turbine	• The wind farm layout has been designed to avoid the placement of wind turbine infrastructure in proximity (minimum of 100 m from the centre point of the turbine) to	• The minimum blade height has been increased from 25 m to 40 m above ground level to minimise impacts to low flying bird and bat species.	N/A	Based on the mitigation proposed there is the potential for minor alterations to birds and bats movement patterns and behaviour

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
movement, light, noise and/or vibration.	remnant native vegetation/habitat to avoid blade overhang.	• Turbines will be regularly maintained to ensure noise emissions are not adversely impacted by turbine wear. • A CEMP (Appendix H) will be implemented during construction of the Proposal and a BBAMP (Appendix N) will be implemented during commissioning and operation. These will include the following key management measures to minimise disturbance to fauna movement and behaviour: - Nighttime works will be avoided where practicable. - Lighting will be kept to a minimum to avoid attracting birds, bats, and insects to Proposal infrastructure. Specific measures to reduce potential impacts of lighting will include the use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable. - Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions. - Ensure vehicles and machinery are serviced and maintained to minimise machinery noise - Regular and opportunistic monitoring of bird and bat behaviour and strikes.		from wind turbine, light, noise and/or vibration. The assessment and significance of this residual impact is discussed in Section 9.6.6.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Increased competition or predation by feral fauna	N/A	• The following measures will be implemented as part of the CEMP (for construction) and/or BBAMP (for operation) to minimise attraction of feral fauna to the Development Envelope: - Appropriate storage of food wastes in sealed bins - Prompt carrion removal to minimise the attraction of feral predators such as Red Foxes and Feral Cats - Record all introduced fauna sightings. • Where there is a measurable increase in observations of European Rabbits and raptor collision, a feral fauna control program will be undertaken within the Development Envelope in accordance with the BBAMP.	N/A	Based on the mitigation proposed there is the potential for the Proposal to support an increased abundance of feral animals which may increase competition for resources and/or predation. The assessment and significance of this residual impact is discussed in Section 9.6.7.
Degradation of fauna habitat as a result of increased dust deposition	N/A	• A CEMP (Appendix H) will be implemented during construction. This will include the following key management measures to minimise impacts from dust: - Dust suppression techniques during construction, such as water carts - Speed limits on unsealed roads/tracks - Progressive clearing, and rehabilitation of temporary disturbance areas.	• Land temporarily disturbed during construction (e.g. for laydown areas and concrete batching plant) will be rehabilitated to the original land use or to a post closure land use agreed with the landowners.	Based on the mitigation proposed the Proposal will result in a localised short-term increase in fugitive dust during construction. The assessment and significance of this residual impact is discussed in Section 9.6.8
Degradation of fauna habitat as a result of introduction and/or spread of weeds and/or dieback	N/A	• Preparation and Implementation of the CEMP (Appendix H) to minimise impacts from weeds, which will include: - Limiting access points to only those necessary - Ensuring all vehicles, equipment machinery and personnel (including footwear) arriving to the proposal site are clean of plant material, seeds and soil	N/A	Based on the mitigation proposed the Proposal will result in the potential introduction and/or spread of weeds and/or dieback The assessment and significance of this residual impact is detailed in Section 9.6.9.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
		- The Vehicle-Machinery Hygiene Checklist shall be completed for all vehicles, equipment and machinery arriving onsite - Ensuring any vegetation or soil that is infested with weeds or pathogens is handled, stored and disposed of as pest contaminated material (e.g. covered during transport, contained) - Undertake a risk assessment to identify potential spread of weeds associated with planned activities. - Conduct a pre and post construction weed survey to validate controls and provide a baseline • Completion of a *Phytophthora* dieback survey prior to construction • Develop and implement a Dieback Management Plan to minimise the risks related to the introduction and/or spread of dieback, where required		
Degradation of fauna habitat as a result of increased risk of bushfires	N/A	• A BMP (Linfire 2025a) and BRMP (Linfire 2025b) will be implemented during construction and operation of the Proposal. This will include the following key management measures: - Establishment of non-vegetation and asset protection zones - All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system - All buildings and vehicles will be fitted with first response fire equipment - Adhering to local government fire restrictions, including daily checks of fire danger ratings • Emergency services will have full access to the Development Envelope and water tanks for emergency response inside or outside of the Development Envelope.	N/A	Based on the mitigation proposed, the Proposal will result in a minor increase in risk of accidental bushfires. The assessment and significance of this residual impact is discussed in Section 9.6.10.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Groundwater drawdown from dewatering during construction potentially reducing the hydroperiod and health of GDEs (wetlands and aquatic fauna habitat)	• Borrow pits will be constructed above watertable • Transmission poles and towers will utilise concrete caisson (bored concrete) foundation.	• Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable • Dewatering will be managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B]), to ensure that drawdown does not present an unacceptable impact on the environment. This will be achieved through: - Application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location. - Drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE. • Use of alternative turbine foundations (Section 2.2.1.1). • Strategic disposal of dewater to, and location of, infiltration basins around the point of extraction to minimise the cone of depression. • Application of alternative management strategies as required (e.g., sheet piling).	N/A	Based on the mitigation proposed the Proposal is not anticipated to impact health of GDEs as a result of dewatering during construction. The assessment and significance of this residual impact is detailed in Section 9.6.11.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impacts
Degradation of fauna habitat as a result of changes to hydrological regimes	N/A	• Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable. • Modification of existing drainage infrastructure will be avoided, where possible, unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors. • Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion. • Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. • Design and construction works will ensure that local grading and excavation areas do not create areas of pooled water. • Exposed soils will be vegetated or covered (e.g. with rock or synthetic liners) in disturbed areas where surface water flow velocities exceed 1 m/s and remain below 2 m/s.	N/A	Potential for minor changes to surface water flow that could have minor impacts on fauna habitat. The assessment and significance of this residual impact is detailed in Section 9.6.12.

*Contiguous native vegetation is defined as remnant native vegetation not separated by more than 5 m of cleared land.

9.6. Assessment and Significance of Residual Impacts

9.6.1. Loss of Vertebrate Fauna Habitat

The Proposal has been designed to avoid areas of high value fauna habitat as much as possible by preferentially locating the Development Envelope in a highly disturbed landscape with much of the native vegetation having already been cleared for agricultural use. The Development Envelope has reduced from approximately 5,600 ha to 3,597 ha to remove areas of conservation estate, high value habitat and increased the separation distance from the Scott River and South Blackwood State Forest (see Section 2.4.3).

Table 9-13 presents the approximate loss of vertebrate fauna habitat based on the Indicative Disturbance Footprint. The Indicative Disturbance Footprint represents the maximum potential extent required for the Proposal of which currently only 0.71 ha (0.66%) is located within areas mapped as fauna habitat represented by native vegetation (Figure 9-11; Table 9-13). However, the Proposal allows for clearing of up to 1.00 ha of habitat represented by native vegetation to provide flexibility to refine the Indicative Disturbance Footprint within the Development Envelope during detailed design (Table 9-13).

Clearing of fauna habitat represented by native vegetation will be restricted to small areas to facilitate ingress of turbine components, upgrades to the existing Beenup to Manjimup 132 kV transmission line, and where an alternative layout was not possible due to the avoidance of other significant receptors. Specifically, the clearing of fauna habitat represented by native vegetation is considered unavoidable at the following sites (Figure 9-11; Table 9-14):

- Area 1: Clearing of approximately 0.19 ha of fauna habitat represented by native vegetation at the northern main site entrance, required for ingress of the turbine components. This vegetation has been mapped as Moderate-High quality black cockatoo and Low quality Western Ringtail Possum habitat represented by the Marri-Jarrah-Peppermint woodland habitat type. However, review of aerial imagery and a subsequent site visit by Phoenix (G Wells, personal communication, 22 November 2025) confirmed that this area will only require the removal of an isolated number of sedges, so is unlikely to impact black cockatoos or Western Ringtail Possum. This location was selected to utilise existing farm track and minimise clearing requirement.
- Area 2: Clearing of approximately 0.02 ha of native vegetation, classified as Moderate-High quality black cockatoo habitat and Moderate quality Western Ringtail Possum habitat. This is required for the new transmission line to connect the Proposal to the existing Beenup substation and was located to avoid potential nesting trees for black cockatoos and to be as close as possible to the existing transmission line to reduce clearing requirements.
- Area 3: Clearing of approximately 0.14 ha of native vegetation, classified as Moderate quality Black Cockatoo habitat and Low quality Western Ringtail Possum habitat, required for the Proposal transmission line. This transmission line route was selected to avoid impacts to the adjacent Conservation Covenant Area.
- Area 4: Clearing of approximately 0.01 ha of native vegetation, classified as Moderate-High quality black cockatoo habitat and Moderate quality Western Ringtail Possum habitat. This clearing is required to facilitate transport of turbine components south of Governor Broome Road. This location was selected to minimise Western Ringtail Possum habitat clearing requirements by utilising the existing farm access point in the southern road reserve and to

avoid impacts to other sensitive environmental values, including TEC, a lodged Aboriginal Heritage site, potential nesting trees for black cockatoos, conservation significant flora and higher quality Western Ringtail Possum and black cockatoo habitat.

The impacts on individual habitats are expected to be minimal, given the maximum clearing allowance and the linear configuration of the Indicative Disturbance Footprint allows for clearing to be distributed across a range of habitat types and patches, with no single habitat being substantially disturbed. The three wetland habitats (Seasonally inundated paperbark woodland, Seasonally inundated sedgeland and Seasonally inundated shrubland) will be completely avoided during clearing, including any contiguous native vegetation within 50 m of wetland habitats, along with the plantations, which will only be developed if the trees have been harvested by the plantation operator prior.

In addition to this, there is also a substantial amount of more suitable native fauna habitat present within adjacent expansive, intact conservation reserves including the Scott National Park, Pagett Nature Reserve, Chester Nature Reserve, and the directly adjacent Un-named Nature Reserve (Figure 1-1; Phoenix 2025a). Given this, and the highly modified nature of the Development Envelope and relatively small amount of habitat to be cleared in comparison to the overall extent of the Development Envelope, the clearing of native vertebrate fauna habitat is not expected to be significant.

Impacts associated with clearing of habitat for specific conservation significant species are discussed further in Section 9.6.13.

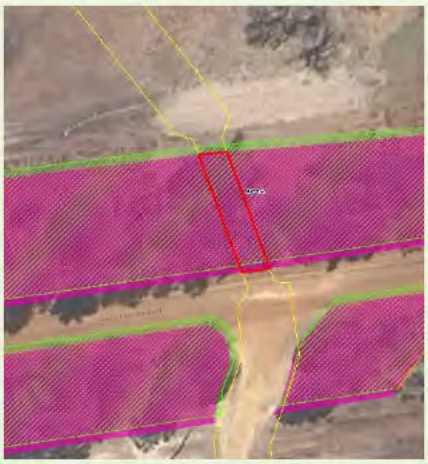
Table 9-13: Fauna Habitat Clearing within the Development Envelope

Habitat Types	Extent within Survey Area (ha)	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Extent within Indicative Disturbance Footprint (%)	Maximum Proposed Clearing of Native Fauna Habitat (ha)**
Native Vegetation					
Seasonally inundated paperbark woodland (wetland)	144.89	144.89	0.22	0.21	0.00
Seasonally inundated sedgeland (wetland)	107.01	90.54	<0.01	<0.01	
Seasonally inundated shrubland (wetland)	126.07	116.90	0.10	0.09	
Marri-Jarrah-Peppermint woodland	322.18	252.93	0.26	0.24	1.00*
Open woodland of Peppermint trees (degraded)	98.90	99.05	0.12	0.12	
Cleared – degraded sumpland	8.23	0.84	0.01	0.01	
Total	807.28	705.15	0.71	0.66	1.00
Non-native Vegetation					
Pine plantation	1.60	1.27	0.00	0.00	0.00
Bluegum plantation	415.43	412.29	4.71	4.42	
Cleared	2,667.32	2476.44	101.20	94.92	1.00*
Dam	1.70	1.70	0.00	0.00	
Total	3086.05	2891.7	105.91	99.34	-
Total (overall)	3,893.33	3,596.85	106.61	100.00	1.00

*The 1.00 ha maximum proposed clearing allowance will also account for any unavoidable removal of unmapped native vegetation from within" Cleared" habitat (e.g., paddock trees).

**Provides maximum limits on how much clearing can occur for each habitat type but total clearing will not exceed 1 ha.

Table 9-14: Unavoidable Areas of Western Ringtail Possum and Black Cockatoo Habitat Clearing

Area	Legend
	Area 1 Indicative Disturbance Footprint Unavoidable Clearing Area Potential Breeding Trees Western Ringtail Possum Habitat Low Quality Black Cockatoo Foraging Habitat High Quality
	Area 2 Indicative Disturbance Footprint Unavoidable Clearing Area Potential Breeding Trees Western Ringtail Possum Habitat Moderate Quality Black Cockatoo Foraging Habitat High Quality Moderate Quality
	Area 3 Indicative Disturbance Footprint Unavoidable Clearing Area Western Ringtail Possum Habitat Low Quality Black Cockatoo Foraging Habitat Moderate Quality
	Area 4 Indicative Disturbance Footprint Unavoidable Clearing Area Western Ringtail Possum Habitat Moderate Quality Black Cockatoo Foraging Habitat High Quality

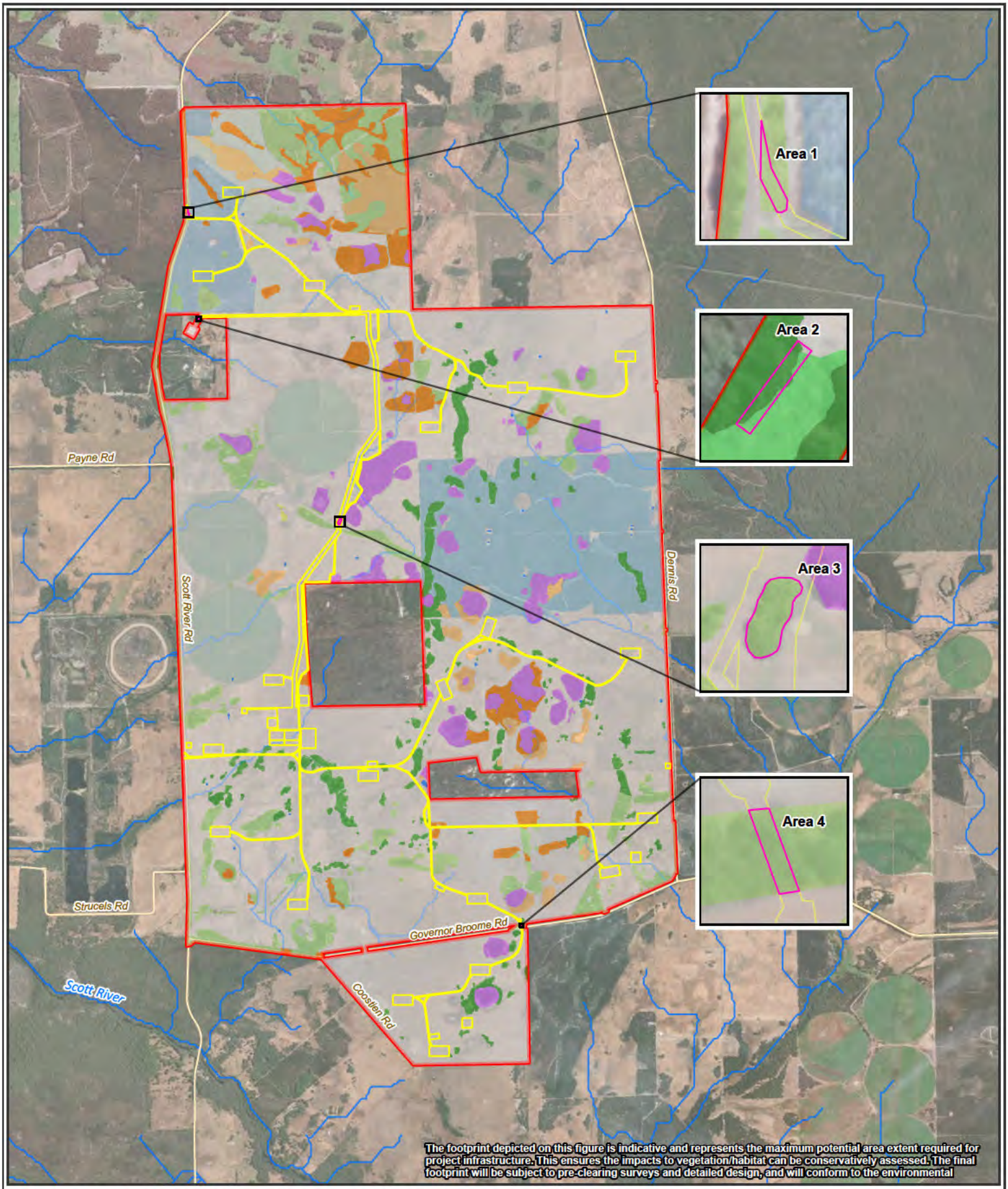


Figure 9-11: Unavoidable Areas of Significant Fauna Habitat Clearing

- Roads
- Rivers and Tributaries
- Unavoidable Clearing Area
- Development Envelope
- Indicative Disturbance Footprint
- Cleared

Terrestrial Fauna Habitat (Phoenix 2025a)

- Bluegum plantation
- Cleared - degraded sumpland
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Dam

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/15/2025

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9.6.2. Increased Fragmentation of Vertebrate Fauna Habitat

The fragmentation of fauna habitat occurs when the continuity of vegetation is disrupted and reduced into several smaller patches. The spatial separation of these patches can potentially lead to the following effects:

- Increased degradation of fauna habitat from 'edge effects' where cleared areas such as road corridors become transmitters for weeds, induce changes to surface drainage and increase the deposition of dust. This degradation may indirectly result in reduction of habitat quality for fauna
- Reduction in the number of corridors that enable fauna individuals to travel between vegetation patches, reducing overall genetic flow and diversity in the ecosystem.

The potential for exacerbating existing fragmentation is low given the landscape in which the Proposal will be constructed is already highly fragmented as a result of land clearing for agricultural use. The potential for fragmentation is further minimised as the internal access roads have been designed to follow existing cleared areas or tracks or occur along the periphery of native vegetation wherever possible, minimising the clearing of fauna habitat represented by native vegetation to a maximum to 1.00 ha. Some minor fragmentation will occur at Governor Broome Road (Figure 9-11 Figure 9-12), where clearing of fauna habitat is required to facilitate the transport of turbine components. This impact is discussed in further detail in Section 9.6.13.1. Given this is the only instance of fragmentation expected to occur, the Proposal is not anticipated to result in significant impacts to terrestrial fauna habitat or fauna dispersal as a result of fragmentation.

9.6.3. Loss or Injury to Fauna Individuals through Turbine Strike, Barotrauma or Collision with Transmission Infrastructure

There is a risk of injury or mortality of bird and bat species from collision with transmission infrastructure and for those that fly within the RSA of the wind turbines. To minimise the risk of collision visual bird diverters will be installed along the Proposal's transmission line and on guy wires of permanent met masts.

The risk of injury or mortality of bird and bat species from wind turbines can occur through direct collision with turbine infrastructure, particularly moving blades, or from barotrauma. Barotrauma occurs when changes in air pressure expand or compress gas contained within an individual's body. Wind turbine blades can create zones of low pressure as air flows over them and individuals that enter these low-pressure zones may suffer barotrauma. Bats are believed to be more susceptible to barotrauma than birds due to differences in their respiratory anatomy (Baerwald et al. 2008).

The Proposal has been designed to avoid areas of high value fauna habitat where risk of turbine strike is greatest by preferentially locating the Development Envelope in a highly disturbed landscape with much of the native vegetation having already been cleared for agricultural use. In addition, during the design phase of the Proposal the number of turbines has been reduced from 30 to 20, and based on the results of the initial BBRA (Phoenix 2025b) the RSA was amended from 25–250 m to 40–250 m above ground level to minimise potential impacts to low flying bird and bat species such as black cockatoos.

The preliminary bird and bat risk assessment (Phoenix 2025b) was revised as part of the BBAMP (ELA 2025a; Appendix N), with consideration of the proposed mitigation measures (Section 9.5), including the adjusted RSA, as well as technical advice provided by Johnstone (2025) (Table 9-14). Of the 47 Threatened, Migratory and at-risk bird and bat species assessed:

- 35 species recorded a Negligible risk level

- 11 species recorded a Low risk level
- One species recorded a Moderate risk level.

Mitigation measures have been proposed within the BBAMP (Appendix N) to manage the risk of turbine collision and barotrauma from the operation of the Proposal. The BBAMP also includes provisions for carcass monitoring during and after commissioning to determine the direct impact of turbine strike/barotrauma, as well as mitigation strategies proposed in response to increased mortality or injury to ensure no significant impacts to bird and bat species as a result of turbine strike/barotrauma.

With these proposed measures, and by implementing an adaptive management approach as detailed in the BBAMP, the operation of the turbines and placement of the transmission lines is not expected to significantly impact populations of non-conservation significant bird and bat species. Turbine strike/barotrauma impacts to conservation significant bird and bat species are discussed further in Section 9.6.13.

Table 9-15: Risk Assessment for Potential Species of Concern

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	Roosting Foraging Breeding	48 (206)	0-24 (3) [54] 25-50 (2) [11]	Direct collision/ barotrauma Displacement Habitat loss	Potential	Medium	Moderate	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles). A large flock (>30 individuals) was recorded south of the Development Envelope. Heights were not recorded for many observations, and it was mostly observed at or below tree height. There were five flight height records for this species; three were below 24 m and two were within 25-50 m and therefore potentially within the RSA. In addition, flight height data was collected for black cockatoos which could not be identified to a species level, comprising 15 records of *Calyptorhynchus/Zanda* sp. Of these records, one was recorded within the adjusted RSA at 40 m. There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025b; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025b). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes only minor loss of native foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025a). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Forest Red-tailed Black Cockatoo (Phoenix 2025a). No known breeding or roost sites within the Development Envelope. This species is known to mainly forage in the canopy and lower levels of Jarrah-Marri forests, and when moving from site-to-site generally flies just above the canopy (Johnstone 2025), as was supported by most of the flight observations within the BBUS, which were below 25 m. The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. However, this species is generally a poorer flier and less agile than Carnaby's and Baudin's cockatoos and therefore potentially more susceptible to turbine collision (Johnstone 2025). Therefore, a likelihood of impact rating of Potential was considered appropriate. Forest Red-tailed Black Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025b). Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years. Based on the above the risk to this species from the operation of the Proposal is considered Moderate. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Roosting Foraging Breeding	7 (57)	0-24 (3) [11]	Direct collision/ barotrauma Displacement Habitat loss	Unlikely	Medium	Low	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles, small flocks). All recorded flight heights were below RSA (0-24m). In addition, flight height data was collected for black cockatoos which could not be identified to a species level, including 15 records of *Calyptorhynchus/Zanda* sp. and two records of white-tailed black cockatoos (*Zanda* sp.). Of these records, all but one (*Calyptorhynchus/Zanda* sp.) were below the adjusted RSA, with the single record at 40 m. There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025b; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025b). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes only minor loss of foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality)). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025a). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Baudin's Cockatoo (Phoenix 2025a).

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
									No known breeding sites within the Development Envelope, but two known *Zanda* spp. roosts located within 12 km of the Development Envelope. Black cockatoos are known to forage in areas up to 20 km from night roosting habitat during the non-breeding season (Phoenix 2025b). The species generally flies at about 5 to 15 m above the ground (Johnstone 2025), which was confirmed by the results of the BBUS. Therefore, this species is most likely to fly below the RSA. It may occasionally fly above canopy height and therefore potentially within the RSA; however, it is considered a very competent flyer with excellent vision at night and in poor light and is therefore capable of avoiding wind turbines on the rare occasions that it flies within the RSA (Johnstone 2025). The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. Therefore, the likelihood of impact is considered unlikely. Baudin's Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025b). Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	Roosting Foraging	38 (154)	0-24 (22) [97] 30 (2) [2]	Direct collision/ barotrauma Displacement Habitat loss	Unlikely	Medium	Low	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles, small flocks). All recorded flights were below RSA, with 92% of recorded flights below 25 m, and two records (8% of flights) at flight height of 30 m. In addition, flight height data was collected for black cockatoos which could not be identified to a species level, including 15 records of *Calyptorhynchus/Zanda* sp. and two records of white-tailed black cockatoos (*Zanda* sp.). Of these records, one (*Calyptorhynchus/Zanda* sp.) was recorded within the adjusted RSA at 40 m. Cataby is one of the few areas where there is an operating wind farm (Yandin) close to a small breeding population of Carnaby's Cockatoo which has been monitored for over 20 years (Johnstone 2025). Foraging habitat is present within a few hundred metres of turbines and breeding habitat as close as 3.5-4 km. This small breeding population has remained stable since the wind farm was commissioned in 2021. Further, during the monitoring of this population no Carnaby's Cockatoo were anecdotally observed flying towards the wind turbines (Johnstone 2025). There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025b; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025b). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes minor loss of foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025a). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Carnaby's Cockatoo (Phoenix 2025a). No known roosting sites within the Development Envelope but two known *Zanda* sp. roosts located within 12 km of the Development Envelope. Black cockatoos are known to forage in areas up to 20 km from night roosting habitat during the non-breeding season (Phoenix 2025b). The species generally flies at about at about 5 to 15 m above the ground (Johnstone 2025), which was confirmed by the results of the BBUS and therefore is most likely to fly below the RSA. It may occasionally fly above canopy height and therefore potentially within the RSA; however, it is considered a very competent flyer with excellent vision at night and in poor light and is therefore capable of avoiding wind turbines on the rare occasions that it flies within the RSA (Johnstone 2025). The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. Therefore, the likelihood of impact is considered unlikely. Carnaby's Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025b). Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
									Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falsistrellus mackenziei (Western False Pipistrelle)	P4 (DBCA list)	Roosting Foraging Breeding	Low	NR[3]	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently detected in the Development Envelope but low number of calls (one mean detection per night). Suspected to fly at heights within RSA. No mortality monitoring data available for this species but there are recorded moderate mortalities (10–100) in carcass monitoring for closely related species *Falsistrellus tasmaniensis*. Consistent single detections suggest rare/occasional movement through cleared habitats between remnant patches, and thus foraging typically close to vegetation, rather than open paddocks. Some limited roosting opportunities within the Development Envelope (Phoenix 2025a). May breed in best examples of Marri-Jarrah-Peppermint woodland, where the potential breeding tree assessment (Phoenix 2025a) recorded the most trees with hollows, many of which would be considered suitably sized to support the species. Occasional loss of small numbers of individuals possible but unlikely to lead to reduction in local population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Botaurus poiciloptilus (Australasian Bittern)	EN (EPBC & BC Acts)	Roosting Foraging Breeding	-	-	Direct collision/ barotrauma	Unlikely	Medium	Low	No record from surveys, nor desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Known from Hardy Inlet ~12 km south-west of the Development Envelope and the Gingilup/Quitchup/Jasper wetlands ~30 km south-east (dates of records unknown). The latter is an important wetland suite for the species. Potential for occasional use of the larger wetlands in the Development Envelope but unlikely a regular visitor or regularly transit through the Development Envelope. WA population is very small therefore any loss of individuals may have temporary impact on local population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Pandion haliaetus (Osprey)	MI (EPBC & BC Acts)	Occasional foraging	7 (7)	0-24 (2) [2] 25-50 (3) [6] 51-75 (1)[1]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded only once in the Development Envelope across all surveys. Only recorded flying within RSA heights at regional reference sites. No mortalities recorded in carcass monitoring from reviewed sources at Australian sites, but collision deaths have been reported overseas. Common and widely distributed in coastal regions across most of the country. Many individual Osprey are known in the Busselton to Augusta region (B. Wykes pers. comm. cited in Phoenix 2025b). The population is limited by viable nest sites, not biological factors. Desktop records are nearly all south-west of the Development Envelope associated with Hardy Inlet, Augusta beaches, Scott and Blackwood Rivers. Sampling at the Regional reference sites supports this, with several records made during the Year 2 surveys at the Hardy Inlet coastal sites. Unlikely to utilise habitats in study area regularly because it primarily feeds on fish, though may be an occasional foraging site. Potential for rare loss of individuals but no reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Oxyura australis (Blue-billed Duck)	P4 (DBCA list)	Roosting Foraging Breeding	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Potential for occasional use of the open water present within wetlands in the Development Envelope but unlikely to be a regular visitor. A few records from the artificial wetlands west of the Development Envelope but limited desktop records returned within 10 km, and all from 2010 or older. Potential for rare loss of individuals but no reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Apus pacificus (Fork-tailed Swift)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, nor desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. Only one mortality recorded in carcass monitoring from reviewed sources. Common species, considered to possibly occur on occasion. Potential for rare loss of individuals but undetectable loss of East Asian-Australasian Flyway (EAAF) population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	Roosting Foraging Breeding	2 (2)	NR[3]	Direct collision/ barotrauma Displacement	Unlikely	Insignificant	Negligible	Recorded at two locations outside the Development Envelope, as singles. Only likely to fly at RSA heights when displaying courtship over a prospective nest site of which none are present in study area. Unlikely to fly within RSA while hunting. No mortality monitoring data available for this species. No other Masked Owl mortalities from reviewed sources. May hunt in woodland habitats of the Development Envelope and transit through but not likely to utilise extensively. Potential for rare loss of individuals but unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Pluvialis fulva (Pacific Golden Plover)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records <10 km of the Development Envelope. Desktop records all south-west of the Development Envelope associated with the Hardy Inlet and Scott River. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly uses coastal habitats. Potential for occasional use of paddocks and the larger wetlands in the Development Envelope but unlikely a regular visitor to the Development Envelope when present in the region, noting very limited overlap between species arrival in region (December) and persistence of suitable foraging habitat in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Anarhynchus bicinctus (Double-banded Plover)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous desktop records within 10 km of Development Envelope but old (1979-80). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Anarhynchus mongolus (Siberian Sand Plover)	EN/MI (EPBC Act); EN (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous old (1980) desktop record within 10 km of Development Envelope but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Pluvialis squatarola (Grey Plover)	VU/MI (EPBC Act); MI (BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but potential for rare use of wetlands in Development Envelope. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Hydroprogne caspia (Caspian Tern)	MI (EPBC & BC Acts)	None	6 (62)	0-24 (4) [59] 25-50 (2) [3]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded at Hardy Inlet during surveys however no records within the Development Envelope, although may possibly occur within the Development Envelope on rare occasions. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Previous desktop record within 10 km of Development Envelope. Known to utilise near-coastal terrestrial wetlands. May occur as a visitor but the wetlands present in the Development Envelope are too shallow to provide the species' preferred food source (fish). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris tenuirostris (Great Knot)	VU/MI (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from near artificial wetlands. Occurs mostly in coastal intertidal habitats, but rare use of swamps. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Motacilla cinerea (Grey Wagtail)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
									sources. No previous desktop records within 10 km of Development Envelope. Occurs in a wide range of habitats. Potential for rare loss of individuals but no reduction in population viability.
Calidris falcinellus (Broad-billed Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but occasional records from swamps and lakes so potential for rare use of wetlands in Development Envelope. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	Foraging	1 (1)	25-50 (1) [1]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in the Development Envelope only once across all surveys. Recorded flying at height between 26-50 m above ground level. Recorded mortalities in carcass monitoring from reviewed sources. The Development Envelope considered foraging habitat within a resident bird's home range. Unlikely to nest in the Development Envelope. Several desktop records, nearly all south-west of the Development Envelope, mainly associated with the Hardy Inlet and Scott River. Individuals/pairs may hunt in the Development Envelope on occasion as part of their large home range, and or transit through. Potential for rare loss of individuals but unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Actitis hypoleucos (Common Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Most desktop records associated with the Hardy Inlet south-west of the study area. Does not form large flocks (mainly occurs singly or in pairs). Potential for occasional use of the larger wetlands in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival (September-October) and when wetlands in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris acuminata (Sharp-tailed Sandpiper)	VU/MI (EPBC Act); MI. (BC Act)	Foraging	1 (40)	0-24 (1) [40]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in survey only from a regional site. Record is from Hardy Inlet in much more suitable and extensive habitat than the Development Envelope. Desktop records all south-west of the Development Envelope associated with Hardy Inlet and Scott River, with one record from artificial wetlands west of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. May arrive in Augusta area from September. Potential for occasional occurrence in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival and when wetlands/dams in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris ferruginea (Curlew Sandpiper)	CR/MI (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records nearly all south-west of the Development Envelope associated with Hardy Inlet, which aligns with its preferred foraging habitats. Desktop records indicate arrival from September. Potential for occasional use of paddocks, wetland habitats and dams in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival and when wetlands/paddocks in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris melanotos (Pectoral Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop record just outside the Development Envelope, on the Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks and in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Limosa lapponica (Bar-tailed Godwit)	MI (EPBC & BC Acts)	Foraging	1 (1)	0-24 (1) [1]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	One record within the during the surveys at Hardy Inlet, although may possibly occur within the Development Envelope on very rare occasion . Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from near artificial wetlands and at Blackwood River. Occurs mostly in coastal habitats but occasionally observed at inland wetlands and paddocks. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Limosa limosa (Black-tailed Godwit)	EN/MI. (EPBC Act); MI (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from artificial wetlands. Occurs mostly in coastal habitats but occasionally uses near-coastal wetlands and floodplains. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa brevipes (Grey-tailed Tattler)	MI (EPBC and BC Acts); P4 (DBCA list)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1981) desktop records within 10 km of the Development Envelope. Occurs mostly in coastal habitats but occasionally observed at near-coastal wetlands. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris ruficollis (Red-necked Stint)	MI (EPBC & BC Acts)	Foraging	2 (72)	0-24 (2) [72]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in survey only from regional sites. Records are from Hardy Inlet in much more suitable and extensive habitat than the Development Envelope. Desktop records also mainly south-west of the Development Envelope, associated with Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the South West in spring. Potential for occasional use of paddocks, wetland habitats and dams in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa glareola (Wood Sandpiper)	MI (EPBC & BC Acts)	Foraging	1 (3)	0-24 (1) [3]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Three individuals recorded in a single observation within the Development Envelope, across all surveys. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records (only two just west of the Development Envelope). Mainly occurs singly, in pairs or small flocks. Arrives in southwest in spring, though more common from summer to autumn when habitat in the Development Envelope mainly unsuitable (largely dried out). Occasional use of wetlands in the Development Envelope and transit through the Development Envelope by small numbers of birds. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa nebularia (Common Greenshank)	EN/MI(EPBC Act) MI (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records all south-west of the Development Envelope, mainly associated with Hardy Inlet, Scott River, but also recorded from artificial wetlands directly west of the Development Envelope. Arrives in the southwest in early spring. Occasional use of the paddocks/ wetland habitats in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa stagnatilis (Marsh Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No records from surveys, nor recorded within 10 km of the Development Envelope but suitable habitat present in the Development Envelope when they arrive in early spring. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records, south-west of the Development Envelope at Augusta. Occasional use of paddocks, wetland habitats in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Aquila audax (Wedge-tailed Eagle)	-	Foraging Roosting Breeding	37 (50)	0-24 (2) [3] 25-50 (12) [15] 51-75 (3) [3] 76-150 (11) [17] >150 (7) [10]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely uses the Development Envelope regularly for foraging. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Circus approximans (Swamp Harrier)	-	Foraging Roosting Breeding	57 (66)	0-24 (33) [37] 25-50 (12) [12] 51-75 (3) [4] 76-150 (3) [6]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely uses the Development Envelope regularly for foraging. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Elanus axillaris (Black-shouldered Kite)	-	Foraging Roosting Breeding	4 (4)	0-24 (1) [1] 25-50 (1) [1]	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in the Development Envelope, as singles. Recorded flying at RSA height. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Widespread, abundant species. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	-	Foraging	2 (2)	76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Only one record in the Development Envelope of a bird flying over. Recorded flying at RSA height. Only one recorded mortality in carcass monitoring from reviewed sources. Mostly occurs in coastal habitats. May hunt for waterbirds in the Development Envelope on occasion, or transit through but no breeding and unlikely to be a regular visitor. Territorial and occur sparsely across their range. Rare loss of individuals possible but reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Haliastur sphenurus (Whistling Kite)	-	Foraging Roosting Breeding	8 (9)	25-50 (3) [3] 51-75 (1) [1] 76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Hieraaetus morphnoides (Little Eagle)	-	Foraging Roosting Breeding	3 (3)	76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles recorded flying at RSA height. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tachyspiza cirrocephala (Collared Sparrowhawk)	-	Foraging Roosting Breeding	4 (4)	0-24 (2) [2] 25-50 (1) [1] 76-150 (1) [1]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Highly manoeuvrable species. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Tachyspiza fasciata (Brown Goshawk)	-	Foraging Roosting Breeding	6 (7)	0-24 (1) [2] 51-75 (1) [1] 76-150 (2) [2]	Direct collision/ barotrauma	Potential	Minor	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Falco berigora (Brown Falcon)	-	Foraging Roosting Breeding	17 (21)	0-24 (8) [9] 25-50 (4) [6] 51-75 (1) [1] 76-150 (1) [1]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Relatively heavy slow flight. Likely to forage in the Development Envelope regularly. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falco cenchroides (Australian Kestrel)	-	Foraging Roosting Breeding	47 (58)	0-24 (34) [44] 25-50 (8) [9] 76-150 (3) [3]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Observed foraging in the Development Envelope and likely to hunt there regularly. Potential for breeding but no known nest sites in the Development Envelope. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falco longipennis (Australian Hobby)	-	Foraging Roosting Breeding	3 (4)	0-24 (2) [2] 51-75 (1) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at height within RSA. Only one mortality in carcass monitoring from reviewed sources. Occasional foraging in the Development Envelope likely but not a regular inhabitant. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Austronomus australis (White-striped Free-tailed Bat)	-	Foraging Roosting Breeding	High	NR	Direct collision/ barotrauma	Almost certain	Minor	Low	Activity levels highest within the Development Envelope. Second highest total number of calls recorded, overall. Largely absent in winter and autumn. Suspected to fly at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Often represents the species with highest documented mortality. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the Development Envelope and surrounds, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Chalinolobus gouldii (Gould's Wattled Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Chalinolobus morio (Chocolate Wattled Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope. Far more active in summer by a factor of 10-20 compared with other seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Nyctophilus geoffroyi (Lesser Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Nyctophilus holtorum (Holt's Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope and present in summer and autumn only. Suspected to fly at heights within RSA. No data found on wind farm mortalities but was previously classified within *C. gouldii* (ref Parnaby), therefore assume similar mortality risk to this species (moderate mortalities). Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Nyctophilus major (Greater Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope, all year, almost absent in winter. Suspected to fly at heights within RSA. No data found on wind farm mortalities. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Vespadelus regulus (Southern Forest Bat)	-	Foraging Roosting Breeding	Moderate	NR	Direct collision/ barotrauma	Almost certain	Minor	Low	Moderate activity levels in the Development Envelope and high activity levels within the 10 km buffer. Active all seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the Development Envelope and surrounds, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

*Not all records included flight details; therefore the no. of flight height records does not necessarily match the number of records/individuals for all bird species.

9.6.4. Loss or Injury to Fauna Individuals through Clearing, Vehicle and Machinery Movements

Construction and operational activities within the Development Envelope such as vegetation clearing and vehicle and machinery movements could result in collision with fauna, leading to mortality or injury. Mitigation measures, including restricting vehicle movements to existing tracks and implementing speed limits, will be implemented in accordance with the CEMP (Appendix H), minimising the potential for vehicle strike. Nighttime construction activities will be avoided where practicable to avoid interactions with nocturnal species. Measures will also be implemented in accordance with the CEMP to minimise the risk of loss or injury to fauna associated with clearing.

By implementing management measures to mitigate the loss of fauna individuals, clearing, vehicle and machinery movements are not expected to significantly impact populations of fauna species.

9.6.5. Loss or Injury to Fauna Individuals through Entrapment in Excavations, Borrow Pits, Dams and Basins during Construction

Fauna individuals may fall into and become trapped in open excavations and borrow pits during construction. Excavations will be required to facilitate construction and installation of underground infrastructure (e.g. wind turbine/mast/tower foundations and underground cabling). Settlement basins and infiltration basins/trenches will also be present within the Development Envelope and can pose a drowning risk to fauna.

To mitigate the risk of fauna entrapment and mortality, open excavations will not exceed depths capable of being practically inspected and cleared by fauna handlers at the time of excavation and will be kept open for the minimum time required to enable construction activities. In addition, appropriate egress points will be installed at excavations deeper than 500 mm, with two daily inspections to occur in the early morning and late afternoon where open for more than 24 hours. Borrow pits, water storage dams and settlement basins will also provide appropriate egress points and fencing will be installed around water storage dams and dewater settlement basins to prevent fauna access. While infiltration basins/trenches will be shallow and have a low profile, minimising the risk of entrapment and drowning.

Overall, impacts associated with excavation can be appropriately managed and are not anticipated to result in a degree of fauna injury or mortality significant enough to affect local populations.

9.6.6. Disturbance to Fauna Movement Patterns and Behaviour from Wind Turbine Movements, Light, Noise and/or Vibration

Construction and operational activities pose a risk to the movement patterns and the breeding, foraging and migratory behaviour of fauna, particularly birds and bats, through the placement of wind turbines, light, noise and/or vibration. Wind turbines may act as a physical barrier to species movement within their home range, as birds and bats can often exhibit avoidance behaviour around wind turbines. While this avoidance behaviour may reduce collision risk, it can lead to habitat displacement or barrier effects where birds and bats avoid otherwise suitable areas.

Noise and vibration intensity will be highest within construction areas, although these effects will dissipate over greater distances. Noise can cause interruptions in feeding and resting behaviour, reducing reproductive success and resulting in abandonment of an area (Newport et al. 2014). Meanwhile, vibration has the potential to temporarily interfere with the ability of some species to detect prey or predators.

Artificial lights can disrupt the behaviour of nocturnal species, such as the Western Ringtail Possum, by interrupting nocturnal foraging behaviour, forcing them to leave their habitat which may increase

species interactions with vehicles, machinery or feral predators. Conversely, lighting on turbines may also attract fauna, particularly insectivorous birds and bats, placing them at risk of turbine collision.

The Proposal has been designed to avoid areas of high value fauna habitat by preferentially locating the Development Envelope in a highly disturbed landscape with much of the native vegetation having already been cleared for agricultural use. The Development Envelope has been reduced from approximately 5,600 ha to 3,597 ha to remove areas of conservation estate and high value fauna habitat and increased the separation distance -from the Scott River and South Blackwood State Forest (Section 2.4.3). In addition, ecological linkages associated with remnant vegetation and rivers surrounding the Development Envelope are likely to support ongoing bird and bat movement through the landscape (WALGA 2009).

Given the short construction period (18-24 months) impacts that may occur during construction would be relatively short in duration and restricted to the areas of construction and access roads. Mitigation measures will be implemented in accordance with the CEMP (Appendix H) to manage disturbances associated with light, noise and vibration during construction of the Proposal. All facilities will be designed to comply with the Environment Protection (Noise) Regulations 1997 and lighting will be kept to a minimum to avoid attracting birds, bats and insects to Proposal infrastructure. Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions.. Nighttime construction activities will be avoided where possible, and lighting will be limited to that required for safety purposes.

The abundance and species richness of bird and bat species of concern will be monitored during the operational bird and bat monitoring program, to determine whether species are exhibiting avoidance behaviours, as detailed within the BBAMP (Appendix N).

Overall, the Proposal is not anticipated to substantially alter the movement or behaviour of fauna species and impacts can be appropriately managed to ensure local populations are not significantly impacted. A detailed assessment of the impacts to conservation significant species recorded or likely to occur is discussed further in Section 9.6.13.

9.6.7. Increased Abundance, Competition or Predation by Feral Fauna

A total of seven introduced fauna species have been recorded within the Development Envelope. Vegetation clearing creates corridors that enable feral predators to move more freely through the landscape. Clearing for construction of the Proposal may force native fauna to traverse these cleared corridors to reach suitable habitats, leaving them susceptible to predation. In addition, food and water availability may increase from the Proposal through the production of food waste and water required for construction activities, increasing the presence of feral predators and competitors. An increased abundance in small feral mammals, such as rabbits, may also attract raptors of concern to the Development Envelope, increasing the risk of turbine strike.

Given the Development Envelope has been preferentially located within a highly disturbed landscape, with clearing of native vegetation only expected to be required at four locations (Section 9.6.1), the Proposal is unlikely to create additional corridors for feral fauna dispersal, nor result in significant increase in food/resource availability. The attraction of, and potential impacts of increased competition or predation by, feral fauna will be managed through the implementation of appropriate feral fauna mitigation measures outlined within the CEMP (Appendix H) and the BBAMP (Appendix N). It is

considered that any potential impacts can be managed and given the already disturbed landscape and minimal clearing of high value fauna habitat proposed, increased competition or predation by feral fauna is not expected to significantly impact any native fauna species.

9.6.8. Degradation of Fauna Habitat as a result of Increased Dust Deposition

Localised short-term increases in fugitive dust emissions will occur primarily during the construction phase of the proposal from activities including vegetation clearing, excavations, earthworks and vehicle movements. During construction, dust emissions will be managed through the mitigation measures outlined in the CEMP (Appendix H), as detailed in Section 9.5. Dust emissions may also be generated during the operational phase by infrequent vehicle movements on unsealed internal access roads.

Given the relatively minimal disturbance required (approximately 107 ha within the 3,597 ha Development Envelope) and the short construction phase (18-24 months), impacts that may occur during construction would be relatively short in duration and restricted to the areas of construction and access roads. Once operational, vehicle movement within the Development Envelope will be minimal, with access tracks to be used by approximately five full time staff when undertaking wind farm maintenance activities, landowner liaison, environmental management and safety. Therefore, only minor dust generation would be expected during the operational phase. Moreover, given the location of the Proposal within a mostly cleared, fragmented landscape, it is not expected that fauna habitat represented by native vegetation, most of which will not be adjacent to major Proposal activities (e.g. wind turbine construction areas), will be significantly impacted by occasional and temporary potential dust deposition occurrences.

The Proposal may result in a minor, temporary increase in dust deposition on fauna habitat during construction; however, through the implementation of dust management and mitigation measures, impacts associated with increased dust emissions are expected to be localised and temporary. Therefore, impacts are not expected to be significant.

9.6.9. Degradation of Fauna Habitat as a result of Introduction and/or Spread of Weeds and/or Dieback

Clearing, vehicle and machinery movements have the potential to spread and/or introduce weed species and pathogens such as *Phytophthora cinnamomi*. The landscape in which the Proposal occurs is largely cleared and weed species are common throughout the agricultural land of the local area. A total of 70 weed species were recorded during the survey, none of which are listed as a Declared Pest or WoNS under the BAM Act. Given the existing presence of weeds throughout the Development Envelope, the Proposal is unlikely to introduce or spread weeds that will further degrade fauna habitats.

Phytophthora cinnamomi infestation is a threatening process affecting the viability and genetic diversity of the native flora of south-western Australia. The pathogen is recognised in the EPBC Act as one of five key threatening processes affecting biodiversity in Australian ecosystems (Dunstan et al. 2008). The pathogen can spread through soil, water or infected plant material, where moist or wet conditions favour dispersal of the pathogen. Hygiene measures such as Clean on Entry procedures and vehicle checks will be implemented in accordance with the CEMP (Appendix H) to limit the potential for the introduction and/or spread of weeds and dieback. To assess and mitigate the potential impacts of dieback within the Development Envelope, a formal dieback assessment will be undertaken, and a subsequent Dieback Management Plan developed prior to construction of the Proposal, where required.

As native vegetation clearing will be limited to a maximum of 1.00 ha, clearing activities are not anticipated to spread and/or introduce weed species and pathogens. Given this, the existing presence of weeds throughout the degraded landscape and that weed and pathogen management measures will

be implemented, no significant residual impacts on fauna habitat from the introduction or spread of weeds and/or pathogens are anticipated from the Proposal.

9.6.10. Degradation of Fauna Habitat as a result of Increased Risk of Bushfires

Construction activities, particularly clearing of native vegetation, welding and the movement of vehicles and heavy machinery have the potential to result in a bushfire that could degrade fauna habitat. In addition, fire hazards specific to wind farms can include electrical hazards (power surges, hot surfaces, lightning strike), chemical hazards (leakage of oils and other flammables), increased fire spread due to air flow or falling debris (including turbine blades), obstruction of aerial firefighting access and landscape hazards (ignition within the wind farm facility or external ignition of infrastructure from radiant heat or embers) (Linfire 2025b). The Development Envelope is designated as a bushfire prone area (DFES 2024), with the continuous native vegetation in the surrounding forests presenting the highest bushfire risk in the local area (Linfire 2025b).

However, as noted by the Australasian Fire and Emergency Services Authorities Council, the likelihood of turbine fires is considered to be low given appropriate protection measures are applied (Linfire 2025b). Furthermore, wind farms can reduce bushfire risk through:

- Improved private access roads, allowing better access for emergency services in case of fire and providing additional firebreaks
- Attracting lightning strikes during thunderstorms (rather than hitting the ground and vegetation), with strikes safely managed by their built-in protection systems (AFESCA 2018)
- Having full time operational staff on site, meaning more eyes and ears on the ground to spot bush fires early
- Installing remote monitoring systems to notify personnel if a fire is detected
- Providing dedicated water tanks at the wind farm which can be used in the event of a fire.

The risk of fire associated with the Proposal will be managed through the implementation of a BMP (Linfire 2025a) and BRMP (Linfire 2025b). Vegetation will be maintained around all infrastructure to reduce bushfire risk, including the implementation of NVZ and APZ around the base of each wind turbine. All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system. In the event of a turbine fire, the affected turbine will automatically shut down. Turbines will also have the capability to be remotely shut down and de-energised in the event of bushfire. The fire detection and alarm system will include notification to relevant personnel, such as wind farm staff, DFES, the local fire brigade and/or neighbouring landowners.

In accordance with the BMP (Linfire 2025a), the Proposal will be:

- Equipped with a mobile fire trailer (or similar approved device) which the Proponent must ensure is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank
- Provide water for managing fire, currently proposed to be stored in three clearly signposted 45 kL firewater tanks across the site.

The Proponent will ensure that access to the Development Envelope and water tanks is available to emergency services at any time.

On the basis of the above, the Proposal is not expected to increase the risk of bushfires.

9.6.11. Groundwater Drawdown Potentially Reducing the Hydroperiod and Health of GDEs (Wetland Habitats and Aquatic Fauna Habitat)

Temporary reductions in the groundwater level within the Superficial Aquifer from dewatering may result in impacts to the inundation period of groundwater dependent wetland values, that may also support aquatic fauna. Section 7.6.1 describes the modelling assessment undertaken to predict the extent of groundwater drawdown during construction. As discussed in this Section, the:

- Proponent will ensure that dewatering does not exceed the natural seasonal variation of drawdown at groundwater dependent wetland values
- Below ground foundations (Section 2.2.1.1) will only be used where it is confirmed prior to construction that dewatering would not be required.

Based on the modelled drawdown less than 0.04 ha of wetland habitat (approximately 0.01% of the extent of the wetlands within the Development Envelope) occurs within an area modelled to experience less than 0.5 m dewatering, which is well within the anticipated levels of natural seasonal variation of 1-2 m (Table 9-16; Figure 9-12;Stantec 2025b). Furthermore, this modelled impact is expected to be conservative based on the conservative nature of the drawdown modelling (i.e. assumes groundwater at surface and does not account for recharge associated with infiltration of dewater).

Table 9-16: Predicted Drawdown Interaction with Groundwater Dependent Wetlands

GDE Category	GDE Subcategory	Extent within Development Envelope (ha)	Area within Drawdown Extents (ha) (% of Extent within Development Envelope)		
			>2 m	1–2 m	0.5–1 m
Confirmed GDE	Seasonally Inundated Sedgeland wetland*	90.54	0 (0)	0 (0)	0.03 (0.03)
Potential GDE	Seasonally Inundated Paperbark Woodland	144.89	0 (0)	0 (0)	<0.01 (<0.01)
Total		315.55	0 (0)	0 (0)	<0.04 (0.01)

*Coincides with GDV (Section 8): Scott River Ironstone TEC ^Coincides with GDV (Section 8): Vegetation types dominated by *Melaleuca rhaphiophylla* and *Melaleuca preissiana* (MrCh). Source: Stantec 2025b

To further minimise the extent of drawdown at wetland habitats the Proponent commits to:

- Scheduling civil construction activities, specifically activities that require excavation, to occur during the dry season, where practicable
- Managing dewatering so that drawdown does not exceed 0.1 m beyond 100 m from any dewatering location or natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE.
- Discharge of dewater to strategically placed infiltration basins to further minimise drawdown
- Utilisation of alternative management measures if required (e.g. reduced dewatering rates, use of above ground foundation option, sheet piling based on detailed site investigation and revised modelling)
- Implementation of a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B).

These wetland habitats do have the potential to support Salamanderfish and Black-stripe Minnow; however, no significant impact to these species is anticipated given:

- The wetlands within the Development Envelope are more neutral to alkaline, in contrast to these species' known occurrence in low acidity conditions
- The fish are adapted to ephemeral wetlands that are subject to seasonal wetting and drying
- Less than 0.04 ha of the wetlands intersect the 0.5-1 m drawdown contour, within natural seasonal variation, and representing approximately 0.01% of the extent of the wetlands within the Development Envelope.
- Implementation of the above commitments, including drawdown limits.

Given the temporary and spatially constrained nature of the proposed dewatering for the Proposal and the implementation of the ASSDMP, the Proponent considers that the predicted drawdown of groundwater is not expected to significantly impact confirmed and potential groundwater dependent wetlands and the communities they support within and surrounding the Development Envelope.

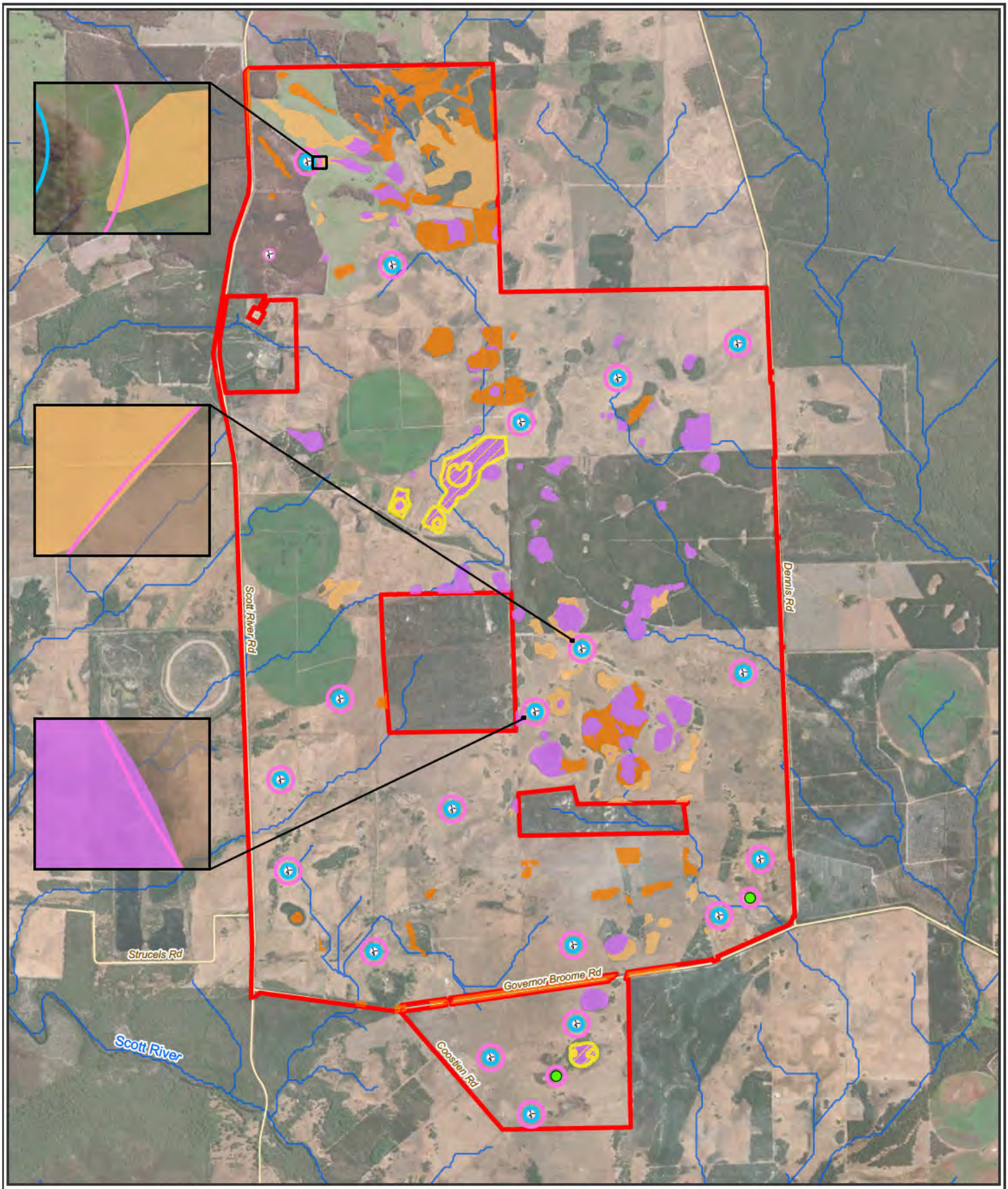

Figure 9-12: Predicted Groundwater Drawdown and Groundwater Dependent Wetlands within the Development Envelope

- Met Masts
- Wind Turbine
- Rivers and Tributaries
- Roads
- Development Envelope

Predicted Drawdown (m)

- 0.5
- 1
- 1.5
- 2
- 2.5
- 3

Wetland Values (Phoenix 2025a)

- Seasonally inundated paperbark woodland
- Seasonally inundated sedgeland
- Seasonally inundated shrubland
- Seasonally inundated paperbark woodland (wetland) - potentially permanently inundated

0 0.5 1 2
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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9.6.12. Degradation of Fauna Habitat as a result of Altered Hydrological Regimes

Proposal infrastructure has the potential to interfere with existing surface water flow patterns resulting in decreased downstream flow, upstream waterlogging, or increased erosion and sedimentation (Section 7.6.3), which has the potential to degrade or alter fauna habitats.

As outlined in Section 7.6.3, changes to surface water flow and depth as a result of Proposal infrastructure are expected to be minimal given that key infrastructure is not proposed to be located within any potential waterways, inundation zones greater than 0.3 m or high velocity areas exceeding 2 m/s. Furthermore, a CEMP (Appendix H) will be implemented during construction of the Proposal to minimise the potential for impacts to surface hydrological regimes and flow patterns, in turn ensuring minimal impact to relevant existing habitat.

Through the implementation of mitigation measures within the CEMP and considered Proposal design, the Proposal is not expected to result in significant impacts to surface hydrological regimes including flow regimes such that fauna habitat may in turn be significantly impacted.

9.6.13. Conservation Significant Species-Specific Impacts

Species specific impacts to conservation significant fauna recorded or those considered likely to occur within the Development Envelope are discussed in the following sections.

9.6.13.1. Western Ringtail Possum

Habitat Loss

Table 9-17 presents the approximate loss of Western Ringtail Possum habitat based on the Indicative Disturbance Footprint. However, the Proposal includes flexibility to alter the alignment of the Indicative Disturbance Footprint within the Development Envelope if wind turbine locations and associated infrastructure change during detailed design. The Indicative Disturbance Footprint represents the maximum potential extent required for the Proposal. However, regardless of any refinement of the Indicative Disturbance Footprint, the Proposal will only result in the maximum clearing of up to 1.00 ha of fauna habitat that is represented by native vegetation within the Development Envelope (Section 9.6.1).

The Proposal has principally been designed to utilise previously cleared agricultural land and existing farm tracks as much as is practicable and is committed to avoiding the clearing of High quality Western Ringtail Possum habitat and minimising impacts on Moderate and Low quality Western Ringtail Possum habitat wherever possible and will address this further through detailed design (e.g. limiting widening of existing tracks to 6 m where necessary). As a result, the Proposal commits to no clearing of High quality, and a maximum of 0.5 ha of clearing of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat which includes the four small areas of unavoidable clearing discussed in Section 9.6.1. The clearing of the Bluegum Plantation (low quality habitat) will be avoided as part of the Proposal, as this area will only be developed if the plantation is harvested by the landowner prior to construction occurring in this area.

Table 9-17: Western Ringtail Possum Habitat Clearing within the Development Envelope

Habitat Quality Score	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Maximum Proposed Clearing of Native Fauna Habitat (ha)**
None (0)	2,560.51	101.33	-
Low (0.5-4.5)	918.20	5.24*	0.50
Moderate (5-7.5)	26.84	0.04	0.03
High (8-10)	91.30	0.00	0.00
Total	3596.85	106.61	0.50

*This includes 4.71 ha associated within non-native Bluegum Plantation habitat which will not be cleared as part of this Proposal.
** Provides maximum limits on how much clearing can occur for each habitat quality score but the total clearing of native Moderate to Low Quality Western Ringtail Habitat will not exceed 0.50 ha.

In considering whether the proposed habitat loss presents the possibility of a significant impact to Western Ringtail Possum, the Proposal has given consideration to the *EPBC Act Policy Statement 3.10* (DEWHA 2009b; Table 9-18).

Table 9-18: Western Ringtail Possum Significant Impact Criteria Considerations

Significant Impact Criteria Relating to Clearing*	Proposal Considerations
Clearing in a remnant habitat patch that is greater than 0.5 ha in size for core and primary habitat	• No clearing of High value Western Ringtail Possum habitat. • Clearing of no more than 0.5 ha of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat. Given the maximum area of disturbance and linear nature of the development no single patch of Moderate quality habitat will be substantially disturbed. • Clearing will occur within one remnant habitat patch (with Moderate habitat value) that is greater than 0.5 ha in size at Area 4 (0.01 ha of clearing; Table 9-14 and Figure 9-11). However, given the minor nature of the proposed clearing and presence of large areas of High-quality habitat directly adjacent to the Development Envelope this clearing is unlikely to significantly impact this patch.
Clearing in a remnant habitat patch that is greater than 0.5 ha in size for supporting habitat	• Clearing no more than 0.5 ha of Low quality native Western Ringtail Possum habitat to facilitate the Proposal. • Clearing will occur within a remnant habitat patch (with Low habitat value) that is greater than 0.5 ha in size at Area 1 (0.19 ha of clearing). However, given this habitat is unlikely to represent Western Ringtail Possum habitat (Section 9.6.1), the clearing is unlikely to significantly impact Western Ringtail Possum.
Clearing of more than 50% of a remnant habitat patch that is between 0.1 and 0.5 ha in size for core and primary habitat	• No more than 50% of a Western Ringtail Possum habitat patch (with Moderate habitat value) that is between 0.1 ha and 0.5 ha in size will be cleared.
Clearing of more than 50% of a remnant habitat patch that is between 0.2 and 0.5 ha for supporting habitat.	• No more than 50% of a Western Ringtail Possum habitat patch (with Low habitat value) that is between 0.2 ha and 0.5 ha low value habitat will be cleared.

*DEWHA 2009b

Given the above, the retention of higher value habitat within the Development Envelope and the presence of large areas of High quality habitat directly adjacent to the Development Envelope, the loss of a maximum of 0.5 ha of Low to Moderate quality habitat is not expected to significantly impact the local population.

Habitat Fragmentation

According to the Western Ringtail Possum Recovery Plan (DPaW 2017), habitat fragmentation is considered a key threatening process to Western Ringtail Possum populations in coastal and near coastal zones. This is attributed to their dependency on midstorey and overstorey vegetation for food, shelter and protection, with individuals rarely traversing the ground.

According to the *EPBC Act Policy Statement 3.10* (DEWHA 2009b) there is the possibility of a significant impact to Western Ringtail Possum from the fragmentation of habitat linkages if habitat trees become separated by more than 6 m.

The potential for exacerbating existing fragmentation within the Development Envelope is low, given the:

- Landscape in which the Proposal will be constructed is already highly fragmented
- Proposal utilisation of existing farm tracks
- Small area of clearing of Western Ringtail Possum habitat proposed (0.5 ha).

Some minor habitat fragmentation may occur at Governor Broome Road, where 0.01 ha of unavoidable clearing of Moderate quality Western Ringtail Possum habitat is required to facilitate transport of turbine components, as discussed in Section 9.6.1 (Figure 9-11). This small area of clearing (0.01 ha) is located on the northern road reserve along Governor Broome Road and is bound by low quality Western Ringtail Possum habitat (mid sparse to open shrubland) before linking to other areas of Moderate and High quality Western Ringtail Possum habitat 1.7 km to the west and 450 m to the east (Figure 9-5). A number of existing farm tracks fragment this potential habitat linkage (varying in width between 3.5 m to 50 m wide) and no evidence of occupation (individuals or dreys) was recorded at this location, despite extensive survey effort. The Proponent commits to minimising the clearing width at this location to 5 m to reduce the effect of fragmentation in accordance with *EPBC Act Policy Statement 3.10* (DEWHA 2009b).

The Proponent commits to limiting the width of clearing to 6 m for all other roads that may intersect the remaining 0.49 ha of Western Ringtail Possum habitat proposed to be cleared to ensure habitat connectivity and fauna dispersal is maintained. Through the measures proposed, the Proposal is not anticipated to result in significant impacts to Western Ringtail Possum habitat or movement as a result of fragmentation.

Mortality or Injury

Construction and operational activities within the Development Envelope such as vegetation clearing, vehicle and machinery movements and entrapment in excavations, dams, basins and borrow pits could result in mortality or injury of Western Ringtail Possum individuals.

Mitigation measures will be implemented in accordance with the CEMP (Appendix H) to ensure the risk of mortality or injury is low. During clearing of Moderate quality Western Ringtail Possum habitat, a fauna spotter will be available on-site to spot and respond to any Western Ringtail Possum individuals encountered.

Most major construction activities (e.g. turbines infrastructure) will be situated well away from areas identified as High value Western Ringtail Possum habitat and known possum locations. Given the species small area of occupancy and largely arboreal nature the likelihood of Western Ringtail Possum individuals becoming entrapped in excavations, dams, basins or borrow pits is considered low. Furthermore, construction activities will predominantly occur during daylight hours, with nighttime

works to be avoided where possible. As a result, vehicle traffic during the species active period will be minimal, reducing the risk of vehicle collisions.

On the basis of the above, the Proposal is unlikely to cause mortality or injury to Western Ringtail Possum individuals at levels that would significantly affect the local population.

Indirect Impacts

According to the Western Ringtail Possum Recovery Plan (DPaW 2017), the following indirect impacts are considered key threatening process to Western Ringtail Possum:

- Disturbance to behaviour from light, noise and/or vibration (Section 9.6.6)
- Increased predation by feral fauna, including cats and foxes (Section 9.6.7)
- Degradation of habitat as a result of increased risk of bushfires (Section 9.6.10).

Key mitigation measure that will be applied to manage these impacts are outlined in Section 9.5 and the assessment of the significance of these indirect impacts is described in Section 9.6.6, 9.6.7 and 9.6.10 respectively. Based on this assessment the Proposal is not expected to result in any significant indirect impacts to the Western Ringtail Possum.

9.6.13.2. Black Cockatoos

Species-specific impacts to black cockatoos (Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo) are collectively addressed in this section as the anticipated impacts are largely consistent across all three species.

Habitat Loss & Fragmentation

Table 9-19 to Table 9-21 presents the approximate loss of habitat for each species of black cockatoo based on the Indicative Disturbance Footprint. However, the Proposal includes flexibility to alter the alignment of the Indicative Disturbance Footprint within the Development Envelope if wind turbine locations and associated infrastructure change during detailed design. The Indicative Disturbance Footprint represents the maximum potential extent required for the Proposal. However, regardless of any refinement of the Indicative Disturbance Footprint, the Proposal will only result in the maximum clearing of up to 1.00 ha of fauna habitat that is represented by native vegetation within the Development Envelope (Section 9.6.1).

The Proposal has been designed to utilise previously cleared agricultural land as much as possible, which has no foraging value for Baudin's or Forest Red-Tailed black cockatoos. However, it does provide supplementary non-native foraging habitat for Carnaby's Cockatoo, although this is considered of low value relative to the Marri-Jarrah-Peppermint habitat present within the Development Envelope.

The Proposal is committed to avoiding all 580 potential nesting trees, including any contiguous native vegetation within 10 m, and will clear no more than 1.00 ha of native black cockatoo habitat, including no more than 0.5 ha of Moderate to High quality black cockatoo habitat (Table 9-19 to Table 9-21). This potential clearing represents a small proportion of the available Moderate to High quality black cockatoo habitat within the Development Envelope (0.14% of Baudin's Cockatoo and Forest Red-tailed Black Cockatoo, 0.9% of Carnaby's Cockatoo) and includes the four small areas of unavoidable clearing discussed in Section 9.6.1. The clearing of the Bluegum Plantation (Low quality habitat for Carnaby's Cockatoo) will be avoided as part of the Proposal, as this area will only be developed if the plantation is harvested by the landowner prior to construction occurring in this area.

The Proposal will also disturb approximately 100.72 ha of Low-quality primarily cleared paddocks which are highly modified and do not represent native vegetation but are recognised as having low foraging value for Carnaby's Cockatoos. The impact associated with this clearing is unlikely to be considered significant.

Table 9-19: Carnaby's Cockatoo Foraging Habitat Clearing within the Development Envelope

Habitat Quality	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Maximum Proposed Clearing of Native Fauna Habitat (ha)**
None (0)	4.23	0.49	-
Low (non-native habitat) (1 - 4)	2,880.88	105.42*	-
Low (native habitat) (1 - 4)	185.06	0.24	1.00
Moderate (5 - 7)	497.78	0.44	0.50

Habitat Quality	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Maximum Proposed Clearing of Native Fauna Habitat (ha)**
High (8 - 10)	28.91	0.01	
Total	3,596.85	106.61	1.00

*This includes 100.72 ha associated with cleared areas and 4.71 ha associated with Bluegum Plantations

** Provides maximum limits on how much clearing can occur for each habitat quality score but the total clearing of native Low to High quality Carnaby Cockatoo Habitat will not exceed 1.00 ha.

Table 9-20: Baudin's Cockatoo Foraging Habitat Clearing within the Development Envelope

Habitat Quality	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Maximum Proposed Clearing of Native Fauna Habitat (ha)*
None (0)	2,990.27	106.03	-
Low (1 - 4)	246.43	0.24	1.00
Moderate (5 - 7)	321.84	0.27	0.50
High (8 - 10)	38.31	0.07	
Total	3,596.85	106.61	1.00

* Provides maximum limits on how much clearing can occur for each habitat quality score but the total clearing of native Low to High quality Baudin Cockatoo Habitat will not exceed 1.00 ha.

Table 9-21: Forest Red-tailed Black Cockatoo Habitat Clearing within the Development Envelope

Habitat Quality	Extent within Development Envelope (ha)	Extent within Indicative Disturbance Footprint (ha)	Maximum Proposed Clearing of Native Fauna Habitat (ha)*
None (0)	3,228.08	106.28	-
Low (1 - 4)	15.31	0.03	1.00
Moderate (5 - 7)	201.71	0.26	0.50
High (8 - 10)	151.75	0.04	
Total	3,596.85	106.61	1.00

* Provides maximum limits on how much clearing can occur for each habitat quality score but the total clearing of native Low to High quality Forest Red- Tailed Black Cockatoo Habitat will not exceed 1.00 ha.

In considering whether the proposed habitat loss presents the possibility of a significant impact to black cockatoos, consideration has been given to the *Referral guideline for three WA threatened black cockatoo species* (DAWE 2022 and the significant impact criteria for Endangered and Vulnerable species as outlined in *EPBC Act Policy 1.1 - MNES Significant Impact Guidelines* (DoE 2013). Residual impacts to these species are unlikely to be significant due to:

- No potential nesting trees or contiguous native vegetation within 10 m will be cleared
- No more than 1.00 ha of black cockatoo habitat represented by native vegetation will be cleared, including no more than 0.5 ha of Moderate to High quality foraging habitat
- The Proposal will clear approximately 100.72 ha of Low value non-native Carnaby's Cockatoo habitat, comprising the Cleared habitat type (i.e., pasture)
- No plantations will be cleared as part of the Proposal
- No evidence of night roosting was recorded within the Development Envelope
- The retention of Moderate to High value habitat within the Development Envelope, comprising:

- 526.19 ha (99.91%%) for Carnaby's Cockatoo
- 359.65 ha (99.86%) for Baudin's Cockatoo
- 352.96 ha (99.86%) for Forest Red-tailed Black Cockatoo.

- The presence of extensive higher quality habitat nearby including within conservation areas such as national parks
- The highly mobile natural of black cockatoos, therefore the removal of 1.00 ha of habitat represented by native vegetation is unlikely to fragment the local population.

Turbine Strike, Barotrauma or Collision with Transmission Infrastructure

The potential for collision with turbines or barotrauma within the Development Envelope poses a risk to black cockatoos due to their small population size, slow breeding and pair bonding attributes. Baudin's Cockatoo and Carnaby's Cockatoo were assigned a Low risk rating, and Forest Red-tailed Black Cockatoo was assigned a Moderate risk rating due to it potentially being recorded within the RSA and given that it is generally a poorer flier and less agile than Carnaby's Cockatoo and Baudin's Cockatoo, as detailed in Section 9.6.3. Further detail on how the risk of turbine collision to black cockatoos was calculated is provided in the BBAMP (Appendix N), with key points summarised below:

- Based on the BBUS and assessments completed to date, black cockatoos are unlikely to be present in large populations, given they were rarely observed flying in large flocks within the Development Envelope, with mostly singles recorded.
- Despite extensive survey effort (150 hours for the bird utilisation survey), no records of Carnaby's Cockatoo or Baudin's Cockatoo were recorded flying above the minimum 40 m RSA. Two records of Forest Red-tailed Black Cockatoo were within 25-50 m and therefore potentially within the RSA. Of the 17 records that could not be identified to a species level (*Calyptorhynchus*/*Zanda* sp. and *Zanda* sp.), only one was recorded within the adjusted RSA at 40 m. The number of black cockatoo flights potentially recorded within the RSA represent just 6.12% of all black cockatoo flight height records.
- Carnaby's Cockatoo and Baudin's Cockatoo typically fly 5 to 15 m above the ground, while Forest Red-tailed Black Cockatoos typically fly within the canopy and lower levels while foraging, and at or just above canopy height when in longer-distance transit such as between foraging, roosting and watering areas. It is considered rare that these species fly more than 10 m above canopy height in these instances (Umwelt 2024, Johnstone 2025) The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, well below the minimum blade height (40m) proposed for the Proposal.
- EPA (2019) also noted that the Carnaby's Cockatoo tends to follow vegetation corridors, actively avoiding cleared and open areas, which is likely applicable to all black cockatoo species found in south-west WA.
- Monitoring at the Yandin Wind Farm has indicated that the breeding population of Carnaby's Cockatoo as close as 3.5 to 4 km from the site has remained stable (Johnstone 2025).
- Carnaby's Cockatoo and Baudin's Cockatoo are considered very capable fliers and are therefore considered capable of avoiding wind turbines on the rare occasions that it flies within the RSA. Forest Red-tailed Black Cockatoo is generally a poorer flier than Carnaby's and Baudin's cockatoos and; therefore; potentially more susceptible to turbine collision (Johnstone 2025).

- There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025b; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, which has no recorded wind farm mortality (Phoenix 2025b).

As discussed in Section 9.6.3, the impacts to black cockatoos associated with turbine strike or barotrauma can be appropriately managed through the implementation of the BBAMP (Appendix N). Visual bird diverters will also be placed along transmission lines and guy wires of permanent met masts to minimise the risk of collision with this infrastructure. On this basis, the Proponent considers that the potential impacts to black cockatoos from the operation of the Proposal can be managed to ensure the Proposal has no significant impact on these species.

Indirect Impacts

The following indirect impacts are considered relevant to black cockatoos:

- Disturbance to movement patterns and behaviour from wind turbines, light, noise and/or vibration (Section 9.6.6).
- Increased predation by feral fauna, including cats and foxes (Section 9.6.7)
- Degradation of habitat as a result of introduction and/or spread of weeds and/or dieback (Section 9.6.9)
- Degradation of habitat as a result of increased risk of bushfires (Section 9.6.10).

Key mitigation measure that will be applied to manage these impacts are outlined in Section 9.5 and the assessment of the significance of these indirect impacts is described in Section 9.6.6, 9.6.7, 9.6.9 and 9.6.10 respectively. In addition, evidence suggests that while black cockatoos may avoid wind turbines, they are generally not affected by noise or light emissions, having been recorded roosting and breeding in proximity to loud activities, such as live firing ranges and verges adjacent to highways (Johnstone 2025).

Based on the above the Proposal is not expected to result in any significant indirect impacts to the black cockatoos.

9.6.13.3. Wood Sandpiper

Habitat Loss

The wetland habitats were the only habitats in the Proposal considered suitable for the Wood Sandpiper (Table 9-4). Given these three habitats are to be completely avoided, no clearing impacts to Wood Sandpiper are anticipated to result from the Proposal.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- The minimal clearing (1.00 ha) of native vegetation
- Avoidance of wetland habitats and any contiguous native vegetation within 50 m

- The rare/occasional occurrence of this species in the Development Envelope, given it is most common in the South West from summer to autumn when the wetland habitats will be largely dried out
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Wood Sandpiper was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Avoiding, the placement of wind turbine infrastructure in proximity to remnant patches of native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang to minimise the risk of collision and disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line and guys wires of permanent met masts to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.4. Osprey

Habitat Loss

The wetland habitats were the only habitats in the Proposal considered suitable for the Osprey (Table 9-4). Given these three habitats are to be completely avoided, no clearing impacts to Osprey are anticipated to result from the Proposal.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Avoidance of wetland habitats and any contiguous native vegetation within 50 m.
- The rare/occasional occurrence of this species in the Development Envelope, given it is unlikely to regularly utilise the supplementary foraging habitat present
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Osprey was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Avoiding, the placement of wind turbine infrastructure in proximity to remnant patches of native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang and associated disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.5. Quenda

Habitat Loss & Fragmentation

The Quenda was considered likely to occur within the Marri-Jarrah-Peppermint woodlands and wetland habitats (Table 9-4). The Proposal will result in the clearing of a maximum of 1.00 ha of Quenda habitat, represented by the Marri-Jarrah-Peppermint habitat, and is committed to avoiding clearing all wetland habitats. Impacts on individual habitat patches are expected to be minimal, as the linear configuration of the Indicative Disturbance Footprint allows for clearing to be distributed across a range of habitat types and fauna habitat patches, with no single habitat or patch of habitat for Quenda being substantially cleared.

Given the above and the retention of 604.26 ha (99.83%) of suitable Quenda habitat across the Development Envelope and the abundance of habitat within adjacent nature reserves, the loss of 1.00 ha of habitat is unlikely to significantly impact the local Quenda population.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Avoidance of wetland habitats and any contiguous native vegetation within 50m
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- Vehicle movements will be restricted to existing access tracks and speed limits will be implemented to minimise the potential for vehicle strike
- To mitigate the risk of entrapment, excavations will be inspected and appropriate fencing and egress points will be installed as detailed in Section 9.5.
- Implementation of a CEMP (Appendix H), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury..

9.6.13.6. Western False Pipistrelle

Habitat Loss

A maximum of 1.00 ha of habitat for the Western False Pipistrelle will be cleared represented by the Marri-Jarrah-Peppermint woodland and/or Open woodland of Peppermint trees (degraded) habitats (Table 9-4). Impacts on individual habitat patches are expected to be minimal, as the linear configuration of the Indicative Disturbance Footprint allows for clearing to be distributed across a range of habitat types and fauna habitat patches, with no single habitat or patch of habitat for Western False Pipistrelle being substantially cleared, except for the unavoidable clearing at Area 3 (0.14 ha of "Degraded" Open woodland of Peppermint tree habitat patch; Figure 9-11).

Given the above, the retention of 350.97 ha (99.71%) of suitable Western False Pipistrelle habitat across the Development Envelope and the abundance of habitat within adjacent nature reserves, the loss of habitat is unlikely to significantly impact the local population.

Turbine Strike and/or Barotrauma

Given its aerial nature, the Western False Pipistrelle is at risk of turbine strike and barotrauma. The species was assigned a Low risk rating in the BBRA (Section 9.6.3). The species was infrequently detected in the Development Envelope, with a low number of calls recorded. While the species' typical flight height was unable to be determined through the desktop assessment, the Western False Pipistrelle is suspected to fly at RSA heights at least occasionally. There is no mortality data available for this species, but there are moderate (10-100) reported mortalities in carcass monitoring at other wind farms for the closely related *Falsistrellus tasmaniensis.*

The BBUS observations suggest that they are typically restricted to remnant vegetation and will only occasionally venture into open paddocks when traversing through remnant patches (Phoenix 2025b). The species is more likely to be abundant in habitat within adjacent nature reserves outside of the Development Envelope. There is the possibility of the occasional loss of individuals; however, this is unlikely to have a significant impact on the local population.

As discussed in Section 9.6.3, the impacts to Western False Pipistrelle associated with turbine strike or barotrauma can be appropriately managed through the implementation of the BBAMP (Appendix N). Key measures will include:

- Lighting will be kept to a minimum to avoid attracting bats and insects to Proposal infrastructure. Specific measures to reduce potential impacts of lighting will include the use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable. Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions.
- Avoiding the placement of wind turbine infrastructure in proximity to remnant native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang.

Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- Nighttime construction activities will be avoided where practicable.
- Lighting minimisation as discussed above under turbine strike and/or barotrauma.
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.7. Masked Owl (southwest)

Habitat Loss

The Masked Owl (southwest) was considered likely to occur within the Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded) and Bluegum plantation habitats (Table 9-4). The Proponent commits to clearing no more than 1.00 ha of habitat for the Masked Owl. The clearing of Bluegum Plantation will be avoided as part of the Proposal (Section 9.6.1). On this basis and given the retention of at least 763.26 ha (99.87%) of habitat within the Development Envelope, the loss of habitat for Masked Owl is not likely to be significant.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- The species may hunt within the Marri-Jarrah Peppermint woodland and Open woodland of Peppermint trees (Degraded) habitats and may transit across the Development Envelope, but are unlikely to utilise the habitats extensively
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Masked Owl (southwest) was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Lighting will be kept to a minimum to avoid interrupting the nocturnal foraging and breeding behaviour of the species. Specific measures to reduce potential impacts of lighting will include the use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable. Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions.
- Avoiding the placement of wind turbine infrastructure in proximity to remnant native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang and minimise strike and disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line and guy wires of permanent met masts to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.8. Peregrine Falcon

Habitat Loss

The Peregrine Falcon was considered likely to occur within all habitats except the Seasonally inundated paperbark woodland. The Proposal will result in the removal of a maximum of 1.00 ha of Peregrine

Falcon habitat that is represented by native vegetation (Marri-Jarrah-Peppermint Woodland and/or Open woodland of Peppermint trees [Degraded]). The Proposal has been designed to utilise mostly previously cleared agriculture land, which although considered habitat, is unlikely to be of high value to the species. Given the species is known to utilise a variety of habitats, there is likely to be a substantial amount of habitat present in proximity to the Development Envelope. On this basis, the loss of Peregrine Falcon habitat is not expected to represent a significant impact to this species.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Peregrine Falcon was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Avoiding the placement of wind turbine infrastructure in proximity to remnant native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang and minimise strike and disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line and guys wires of permanent met masts to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.9. Common Greenshank

Habitat Loss

The Common Greenshank was considered likely to occur within the wetland habitats, Cleared-degraded sumpland habitat and Dams (Table 9-4). The clearing of wetland habitats will be avoided as part of the Proposal. The Proponent commits to clearing no more than 1.00 ha of the Cleared-degraded sumpland habitat. On this basis, the loss of Common Greenshank habitat is not expected to represent a significant impact to the species.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Avoidance of wetlands and any contiguous native vegetation within 50 m
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities

- The likely rare/occasional occurrence of this species in the Development Envelope, given it is only expected to be present within the Development Envelope from late August to September
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Common Greenshank was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Avoiding the placement of wind turbine infrastructure in proximity to remnant native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang and associated disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line and guy wires of permanent met masts to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.10. Short-nosed Snake

Habitat Loss

This species was considered likely to occur in dense vegetation within the wetland habitats in the Development Envelope (Table 9-4). Given all disturbance to wetland habitats is to be avoided during construction, no direct clearing impacts to this species are anticipated.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Avoidance of any contiguous native vegetation within 50 m of wetland habitats
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- Vehicle movements will be restricted to existing access tracks and speed limits will be implemented to minimise the potential for vehicle strike
- To mitigate the risk of entrapment, open excavations will not exceed depths capable of being practically inspected and cleared by fauna handlers at the time of excavation. In addition, excavations will be kept open for minimum time required and inspected twice daily where deeper than 500 mm and open for more than 24 hours. Appropriate fauna egress points will be provided for all borrow pits, water storage dams and dewater settlement basins and fencing will also be installed around water storage dams and dewater settlement basins.
- Implementation of a CEMP (Appendix H, a BMP (Linfire 2025a) and BRMP (Linfire 2025b), as detailed in Section 9.5 to minimise indirect impacts and mortality/injury.

9.6.13.11. Blue-billed Duck

Habitat Loss

This species was considered likely to occur due to the presence of open water within the Seasonally inundated sedgeland (wetland) habitat (Table 9-4). Given all wetland habitats will be avoided, no direct clearing impacts to this species are anticipated.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Avoidance of wetlands and any contiguous native vegetation within 50 m.
- Proposal activities will primarily occur within cleared paddocks away from high value habitat minimising the potential for disturbance from construction and operational activities
- The species is likely to only occasionally use the wetlands present within the Development Envelope and is not expected to be a regular visitor
- Turbine collision and barotrauma resulting in significant impacts is not anticipated, as the Blue-billed Duck was assigned a Negligible risk level in the BBRA (Section 9.6.3)
- Avoiding the placement of wind turbine infrastructure in proximity to remnant native vegetation (minimum of 100 m from the centre point of the turbine) to prevent blade overhang and minimise strike and disruptions to behaviour
- Visual bird diverters will be installed along the Proposal's transmission line and guy wires of permanent met masts to minimise the risk of collision
- Implementation of a CEMP (Appendix H), a BBAMP (Appendix N), a BMP (Linfire 2025a) and BRMP (Linfire 2025b) as detailed in Section 9.5. to minimise indirect impacts and mortality/injury.

9.6.13.12. South-western Brush-tailed Phascogale

The South-western Brush-tailed Phascogale was considered likely to occur within the Marri-Jarrah-Peppermint woodland habitat (Table 9-4). A maximum of 1.00 ha of South-western Brush-tailed Phascogale habitat will be cleared to facilitate the Proposal. Impacts on individual habitat patches are expected to be minimal, as the linear configuration of the Indicative Disturbance Footprint allows for clearing to be distributed across a range of habitat types and fauna habitat patches, with no single habitat or patch of habitat for South-western Brush-tailed Phascogale habitat being substantially cleared.

The clearing of 1.00 ha of South-western Brush-tailed Phascogale habitat is unlikely to be considered significant, particularly given the retention of at least 251.93 ha (99.60%) within the Development Envelope and the abundance of suitable dry sclerophyll forest habitat present within adjacent national parks.

Mortality/Injury and Indirect Impacts

The Proposal is not expected to lead to significant mortality, injury and/or indirect impacts to this species due to the following:

- The Proposal's location within a highly disturbed landscape
- Minimal clearing (1.00 ha) of native vegetation
- Given its largely arboreal nature, the species is unlikely to utilise isolated remnants within the Development Envelope, potential for disturbance from construction and operational activities
- Implementation of a CEMP (Appendix H), a BMP (Linfire 2025a), BRMP (Linfire 2025b) as detailed in Section 9.5. to minimise indirect impacts and mortality/injury.

9.7. Environmental Outcomes

The Proposal is not anticipated to have any significant residual impacts on terrestrial fauna due to the following:

- The Proposal will clear no more than 1.00 ha of habitat represented by native vegetation, including the following species-specific habitat values:
    - A maximum of 0.5 ha of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat
    - A maximum of 1.00 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat.
- The Proposal will avoid clearing:
    - All wetland habitat and any contiguous native vegetation within 50 m.
    - All potential and suitable breeding trees for black cockatoos and any contiguous native vegetation within 10 m
    - All High quality Western Ringtail Possum habitat.
- The Proposal will clear approximately 100.72 ha of non-native Low quality foraging habitat (e.g. cleared paddocks/pasture) for Carnaby's Black Cockatoo.
- The potential for fauna habitat fragmentation is minimal given the highly modified nature of the Development Envelope, the utilisation of existing cleared areas and tracks, and the commitment to limit the width of clearing for all internal access roads to 5-6 m, where they pass through a Western Ringtail Possum habitat patch.
- The risk of loss or injury to fauna individuals and degradation of fauna habitat as a result of construction related activities is considered to be minor and will be minimised through the implementation of the Proposal's CEMP (Appendix H), a Dieback Management Plan (where required), an ASSDMP (Appendix B), a BMP (Linfire 2025a) and BRMP (Linfire 2025b).
- While the risk of turbine strike and/or barotrauma on birds and bats was largely assessed as being Negligible to Low for all species, excepting Forest Red-tailed Black Cockatoo assessed as being at Moderate risk, the implementation of adaptive management approach as detailed in the preliminary BBAMP (Appendix N), will ensure that the Proposal does not have a significant impact on any bird and bat species.
- Substantial disturbance to fauna movement patterns and behaviour from wind turbine movement, light, noise and/or vibration is not anticipated and will be minimised through the implementation of the CEMP (Appendix H) and BBAMP (Appendix N).
- There will be negligible impacts to wetland GDEs, and aquatic fauna that may inhabit them, as a result of the minor, localised and temporary construction dewatering, noting drawdown will be managed in accordance with an ASSDMP (Appendix B) so as not to exceed the natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at any GDE location.
- Impacts to fauna habitat due to altered hydrological regimes will be minimal.

The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Terrestrial Fauna factor to *"protect terrestrial fauna so that biological diversity and ecological integrity are maintained".*

10. Social Surroundings

10.1. EPA Environmental Factor Objective

The EPA's objective for the Social Surroundings environmental factor is *"to protect social surroundings from significant harm"* (EPA 2023a).

Social surroundings are a part of the environment and are considered in EIA where there is a "clear direct link between a proposal or scheme's impact on the physical or biological surroundings and the subsequent effect on a person's aesthetic, cultural, economic or other social surroundings" (EPA 2023a).

10.2. Relevant Policy and Guidance

Relevant policy and guidance documents for Social Surroundings and how they have been considered for this Proposal are summarised in Table 10-1.

Table 10-1: Policy and Guidance for Social Surroundings

Policy / Guidance	Consideration
Aboriginal Heritage Act 1972	This Act has been considered in the development of the Proposal and this RSD.
Environmental Protection (Noise) Regulations 1997	These regulations and guidance have been considered in the impact assessment for noise amenity.
Wind Farms Environmental Noise Guidelines (SA EPA 2021)	
Environmental Factor Guideline: Social Surroundings (EPA 2023a)	The information provided in this section addresses the 'considerations for environmental impact assessment' outlined within the guideline.
Technical Guidance: Environmental Impact Assessment of Social Surroundings – Aboriginal Cultural Heritage (EPA 2023c)	These guidelines have been used to inform the requirements of the impact assessment for Aboriginal cultural heritage.
Cultural Heritage Due Diligence Guidelines (DPLH 2013)	
Visual Landscape Planning in Western Australia: A Manual for Evaluation Assessment, Siting and Design (WAPC 2007)	These guidelines have been used to inform the requirements of the impact assessment for visual and landscape amenity.
Guidelines for Landscape and Visual Impact Assessment, Third Edition (Landscape Institute 2013 as cited in GHD 2025b)	
The Visual Landscape Character Types of Western Australia (CALM 1994)	
Draft National Wind Farm Development Guidelines (EPHC 2010)	This guideline has been used to inform the requirements of the impact assessment for shadow flicker and Electromagnetic Interference (EMI).
Position Statement: Renewable Energy Facilities (WAPC 2020)	This guideline has been used to inform the requirements of the impact assessment for amenity, noise, aviation.
Civil Aviation Safety Regulations 1998	These documents have been used to the inform the requirements of the impact assessment for aviation.
National Airspace Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers (DITRDCA 2012)	
Social Impact Assessment Guideline (Queensland Government 2018)	These guidelines have been used to inform the requirements of the impact assessment for social values.

Policy / Guidance	Consideration
Social Impact Assessment Guideline and Technical Supplement (DPHI 2023 as cited in Place ID 2025)	
Social Impact Assessment Guidance for Assessing and Managing the Social Impacts of Projects (IAIA 2015)	
Transport Impact Assessment Guidelines Volume 4 – Individual Developments (TIA Guidelines; WAPC 2016)	This guideline has been used to inform the requirements of the impact assessment for traffic.
State Planning Policy 2.0: Environment and Natural Resources Policy (WAPC 2003a)	These State and Local Government planning policies, schemes and strategies have been considered in the impact assessment for social and cultural value relevant to the Proposal.
Government of Western Australia, State Planning Strategy 2050 (WAPC 2014)	
State Planning Policy No 2.6 State Coastal Planning Policy (WAPC 2013)	
Augusta-Walpole Coastal Strategy (WAPC 2009)	
Scott Coastal Plain – A Strategy for a Sustainable Future (DPIRD 2001)	
State Planning Policy 6.1 Leeuwin-Naturaliste Ridge Policy (WAPC 2019b)	
Shire of Augusta Margaret River Local Planning Strategy (DPLH 2022a)	
Shire of Augusta Margaret River Local Planning Scheme 1 (DPLH 2024)	
Draft Shire of Augusta Margaret River Local Planning Scheme No 2 (Shire of AMR 2024)	
Shire of Nannup Local Planning Strategy (Edge Planning & Property 2018)	
Shire of Nannup Local Planning Scheme No 4 (DPLH 2022b)	

10.3. Receiving Environment

10.3.1. Consultation and Studies

The Proponent has undertaken dedicated consultation with relevant stakeholders throughout the design of the Proposal to inform this assessment. The key concerns identified with regard to Social Surroundings are outlined in Table 10-2.

Potential benefits highlighted by the community during engagements include:

- Community benefit fund
- Increased renewable energy in the energy system
- Participation in the energy transition.

Consultation outcomes have been used to inform the studies listed in Table 10-2. Consultation regarding the Proposal more broadly is detailed in Section 4.

Table 10-2: Key Social Surroundings Concerns Identified

Key Issues/Concerns Raised	Relevant Environmental Outcome and Section
Risks to flora, vegetation and fauna.	The potential impacts of the Proposal to these values are described and assessed in Section 7 Inland Waters and Section 8: Flora and Vegetation, Section 9: Terrestrial Fauna including details of the proposed mitigation strategy. Key mitigation measures include: • Clearing of native vegetation will be limited to a maximum extent of 1 ha • All known locations of Threatened and Priority flora individuals will be avoided • All Scott River Ironstone TEC will be avoided • No clearing of potential black cockatoo nesting trees • Clearing of no more than 0.5 ha of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat • Clearing of no more than 1.00 ha of black cockatoo foraging habitat, including a maximum of 0.5 ha of moderate to high quality foraging habitat • Wind turbines will be placed a minimum of 100 m from patches of native vegetation (from the centre point of the turbine) to prevent blade overhang • The minimum lower blade tip height has been increased from 25 m to 40 m above ground level to avoid impacts to low flying bird and bat species • Foundations for turbines, communication towers and meteorological masts will be designed to limit dewatering and excavation requirements by including two primary (partial and above ground) and one secondary (below ground) foundation options (Section 2.2.1) • Dewatering will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDEs • Drawdown will occur to a maximum of 2 mbgl at the perimeter of each foundation and will not exceed 0.1 m beyond 100 m from any dewatering location • An ASSDMP will be developed to manage the potential impacts to surface water and groundwater during construction of the Proposal • A CEMP (SynergyRED 2025; Appendix H) has been prepared to manage potential environmental impacts during the construction phase of the Proposal • A BBAMP (Appendix N) will be implemented during commissioning and operation of the Proposal to minimise and monitor loss or injury to fauna.
Increased fire risk.	The Proposal is not expected to result in any significant increase in fire risk or restrict access for emergency services (Section 10.6.3.3).
Exposure of ASS.	The Proposal is not expected to result in any significant impacts to environmental or social values as a result of the exposure of PASS (Sections 10.6.1 and 10.6.3.2). Further details are provided in Section 6 (Terrestrial Environmental Quality) and Section 7 (Inland Waters).
Health concerns from exposure to noise, infrasound, shadow flicker and radiation.	The Proposal is not expected to result in any impact from infrasound. The proposal is not expected to result in any significant impact to the local community as a result of exposure to noise or shadow flicker (Section 10.6.4). The NHMRC (NHMRC 2015) concludes there is no consistent evidence that wind farms cause adverse health effects in humans. The evidence that does exist suggests that the level of extremely low-frequency electromagnetic radiation close to wind farms is less than average levels

Key Issues/Concerns Raised	Relevant Environmental Outcome and Section
	measured inside and outside of suburban homes (NHMRC 2015). As such the Proposal is not considered to present an exposure risk to harmful radiation. Low-frequency noise and infrasound from wind farms is similar to noise from many other natural and human-made sources (NHMRC 2015 [153]). It is unlikely that there would be any noise disturbance to people at distances of more than 1,500m from a wind turbine (NHMRC 2015 [153]).
Impacts to the rural amenity of Scott River.	The Proposal will result in changes to the visual amenity of the landscape, although the significance of this change will vary greatly depending on the individual viewer's sensitivity to acceptance of change (Section 10.6.2). No significant impacts as a result of noise, light or shadow flicker are expected (Section 10.6.4).
Impact on tourism.	The Proposal is not expected to result in any significant impacts to tourism (Section 10.6.3.1).
Impacts to property prices.	It is understood that the effect of the Proposal on the value of properties is a key concern for the community. This is not an environmental impact and therefore not addressed within this RSD. However, it is noted that the Proposal will not have an impact to soil fertility or agricultural land use of surrounding properties. Therefore, the impact to property prices will be limited to prospective buyers' sensitivity to and acceptance of visual change relative to ordinary land valuation factors. Factors such as income generating potential, scarcity of available land and location, which the Proposal will not have any detrimental impacts on.
Erosion of turbine blades resulting in microplastic or other contamination of waterways and neighbouring farmland.	Wind turbine blades have the potential to degrade over time and result in the release of materials such as microplastics into the surrounding environment. A study found that the yearly mass of plastic produced from the erosion of wind turbine blades was an order of magnitude lower than that released by footwear, and three orders of magnitude lower than that released by tyres (Mishnaevsky et al. 2024). Given the use of modern turbine design, erosion of blades is not anticipated to result in any significant contamination of the surrounding environment.
Recyclability of wind turbines.	In accordance with the Decommissioning Plan (Appendix C), infrastructure materials and components such as steel, conductors, switches and transformers will be reused, sold as scrap, recycled or repurposed, where possible. The Proponent has observed recent success in the decommissioning of the Ten Mile Lagoon and Nine Mile Beach wind farms in Esperance, where 465 t (97% by weight) of the windfarm was recycled or reused.

Table 10-3: Social Surroundings Studies

Survey	Study Area, Type & Timing*	Consistency with Guidance
Beenup Wind Farm: Shadow Flicker and Blade Glint Assessment (DNV 2025b) **Appendix O**	**Area:** Development Envelope and surrounding sensitive receptor locations **Type:** Desktop shadow flicker assessment **Timing:** April 2025	The assessment was conducted with consideration for the *Draft National Wind Farm Development Guidelines* (Draft National Guidelines; EPHC 2010).
Beenup Wind Farm: EMI Assessment (DNV 2025a) **Appendix P**	**Area:** Development Envelope and dwellings within 5 km **Type:** Desktop Electromagnetic interference (EMI) assessment **Timing:** June 2025	The assessment was conducted with consideration for the *Draft National Wind Farm Development Guidelines* (Draft National Guidelines; EPHC 2010).
Aviation Impact Assessment: Beenup Wind Farm (Aviation Projects 2025) **Appendix Q**	**Area:** Development Envelope and surrounding aerodromes within 30 nm **Type:** Desktop aviation impact assessment **Timing:** April 2025	The assessment was undertaken in accordance with the following: • Civil Aviation Safety Regulations 1998 • National Airspace Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers (DITRDCA 2012) • Position Statement: Renewable Energy Facilities (DPLH 2020).
SynergyRED Scott River Wind Farm Feasibility: Social Values Assessment (Place.ID 2025) **Appendix R**	**Area:** Local and broader (community) **Type:** Desktop assessment, public digital survey, in-depth interviews and analysis of survey results **Timing:** Digital Survey and interviews - March-April 2024 46% of assessment respondents identified as 'WA/Interstate' residents.	The assessment was undertaken with consideration for the following: • Environmental Factor Guideline: Social Surroundings (EPA 2023a) • Position Statement: Renewable Energy Facilities (DPLH 2020) • *Social Impact Assessment Guideline* (Queensland Government 2018) • Social Impact Assessment Guideline and Technical Supplement (DPHI 2023 as cited in Place.ID 2025) • Social Impact Assessment Guidance for Assessing and Managing the Social Impacts of Projects (IAIA 2015).
Proposed Wind Farm at Scott River: Noise Impact Assessment (GHD 2025a) **Appendix S**	**Area:** Development Envelope and surrounding noise receptor locations **Type:** Baseline noise monitoring, noise modelling and assessment against relevant criteria against State regulations and SA guideline criteria **Timing:** Noise survey – December 2023 – May 2024	The assessment considered the following regulations and guidelines: • Environmental Protection (Noise) Regulations 1997 • Wind Farms Environmental Noise Guidelines (SA EPA 2021) • Position Statement: Renewable Energy Facilities (WAPC 2020).

Survey	Study Area, Type & Timing*	Consistency with Guidance
Proposed Wind Farm – Archaeological and Ethnographic Heritage Survey – Draft Report (AHA Logic 2024)	**Area:** Development Envelope and surrounds **Type:** Desktop assessment and Ethnographic and Archaeological Site Avoidance Heritage Survey **Timing:** Survey - January–February 2024	The survey was undertaken with consideration for the *Cultural Heritage Due Diligence Guidelines* (DPLH 2013) and in general accordance with Noongar Standard Heritage Agreement.
Proposed Wind Farm - Scott River: Landscape and Visual Impact Assessment (GHD 2025b) **Appendix T**	**Area:** Development Envelope and surrounding sensitive receptor locations **Type:** Landscape and visual impact assessment including viewshed analysis and photomontages **Timing:** Site inspection – March and August 2024	There is no Australian guidance specific to the assessment of landscape and visual impacts. The assessment included a review of the following documents: • Visual Landscape Planning in Western Australia: A Manual for Evaluation, Assessment, Siting and Design (WAPC 2007) • Guidelines for Landscape and Visual Impact Assessment, Third Edition (Landscape Institute 2013 as cited in GHD 2025b) • Environmental Factor Guideline: Social Surroundings (EPA 2023a) • Position Statement: Renewable Energy Facilities (WAPC 2020). The assessment also included a review of other State legislation and planning policies and local planning documents.

*Timing refers to the timing of any field work associated with the survey. If no field work was undertaken timing relates to the date of the desktop assessment

10.3.2. Land Use

The Development Envelope occurs on freehold land with multiple landowners and is zoned 'General Agriculture' under LPS1. The majority (2,476 ha, 69%) of the Development Envelope is currently used for agricultural purposes (i.e. cleared areas, roads tracks, farmland etc). The remainder comprises remnant vegetation or water (1,108 ha, 31% and 12 ha, less than 1% respectively). Land use surrounding the Development Envelope includes townsites, agriculture, tourism, national parks, nature reserves and State forests. The Development Envelope is adjacent to Chester and Pagett Nature Reserve to the east and Scott National Park to the west.

Brockman Highway is considered important regional distributor in proximity to the Development Envelope (GHD 2024). Scott River Road is also considered a locally important local distributor road given it is the only road route in and out of East Augusta.

Table 10-4 describes the key land uses and features within 30 km of the Development Envelope (GHD 2025b).

Table 10-4: Key Land Uses and Features Surrounding the Development Envelope

Name	Description	Approximate Distance from Development Envelope
Augusta	The Augusta townsite is located 322 km south of Perth. Population - approximately 6,600 people (ABS 2021a).	15 km south-west
Margaret River	Margaret River is the largest of the Shire of Augusta Margaret River's towns. Population - approximately 10,200 people (ABS 2021c).	30 km north-west
Karridale	A small township on the Bussell Highway, approximately 14 km north of Augusta.	17 km west
Kudardup	This locality includes a small settlement on the Bussell Highway, approximately 6 km north of Augusta.	13 km west
Witchcliffe	A small town on the Bussell Highway, approximately 10 km south of Margaret River.	23 km north-west
Molloy Island	Molloy Island is approximately 320 km south of Perth. Population - approximately 163 people (ABS 2021d).	5 km west
East Augusta	East Augusta is a small townsite located approximately 322 km south of Perth. Population - approximately 41 people (ABS 2021b).	11 km south-west
Blackwood River (Goorbilyup Buerle)	The Blackwood River (Goorbilyup Buerle) is used recreationally for boating, camping, kayaking and bushwalking (GHD 2025b). The river spans from the south-west to the north-east of the Development Envelope. It is a registered Aboriginal heritage site, important and significant for its relationship with ethnographic values (see Section 10.3.3.1).	4 km west
Cape Leeuwin Lighthouse	The Cape Leeuwin Lighthouse occurs at the most south-westerly point of Australia. It was constructed in 1895 and remains a working lighthouse. The lighthouse is a popular tourist attraction, with approximately 120,000 visitors per annum (Sealite 2024).	19 km south-west
Cape to Cape Track	The Cape to Cape Track is a long-distance trail which spans 123 km along the Leeuwin-Naturaliste Ridge from the Cape Naturaliste Lighthouse to the Cape Leeuwin Lighthouse.	19 km west
Caves Road	Caves Road stretches from Cape Naturaliste to Cape Leeuwin. The road is a tourist attraction, providing views of pastureland, vineyards, olive	13 km west

Name	Description	Approximate Distance from Development Envelope
	groves and the Karri trees of Boranup Forest (Tourism Western Australia 2024).	
Ellis Street – Dead Finish Walk Trail	The Dead Finish Walk Trail is located within the town centre of Augusta. The walk includes scenic locations and is a popular whale watching spot given the migration patterns of Humpback whales and the use of Flinders Bay as a nursery ground for Southern Right Whales (Whale Watch Western Australia 2024).	12 km south-west
Farmland and agriculture	Farming and agriculture is a prominent land use within and in proximity of the Development Envelope (GHD 2025b). Land is typically used for dairy, beef, sheep, horticulture, grapes, nuts, avocados and olives (Shire of Augusta Margaret River 2021 as cited in GHD 2025b). The Development Envelope also contains plantations of Pine and Blue Gums.	Within and surrounding
Flinders Bay Settlement and Beach	Flinders Bay is popular for swimming with tourists and local residents (GHD 2025b). Historically, it was a settlement of coastal shacks in the interwar period.	12 km south-west
Hardy Inlet	The Hardy Inlet is considered a key visual feature of Augusta (GHD 2025b). The inlet is a tourist location and used recreationally for fishing, swimming, boating, kayaking, houseboating, bird watching and walking.	9 km south-west
Leeuwin Naturaliste Ridge	The Leeuwin Naturaliste Ridge includes caves formed approximately one million years ago, the Boranup Forest and Hamelin Bay Beach.	19 km west
Scott River	The Scott River is used recreationally. It is a tributary of the Blackwood River (Goorbilyup Buerle). It is a lodged Aboriginal heritage site, important for its ethnographic values and cultural significance.	1 km south

10.3.3. Aboriginal Cultural Heritage

The Development Envelope is located within the South West Boojarah Indigenous Land Use Agreement Area (Figure 10-1). The South West Boojarah group includes Aboriginal people from the Wardandi and Bibulmun/Piblemen Noongar language groups.

The South West Boojarah People are represented by the prescribed body corporate, Karri Karrak Aboriginal Corporation (KKAC). The Proponent has entered into a Noongar Standard Heritage Agreement (NSHA) with KKAC on behalf of South West Boojarah People. The NSHA outlines the processes for conducting Aboriginal heritage surveys and assessments.

An Ethnographic and Archaeological Site Avoidance Heritage Survey has been conducted within areas of potential disturbance (AHA Logic 2024). The scope of this survey was to identify and confirm the presence of any Aboriginal sites and broader cultural values, assess the potential for any harm to such sites and values as a result of the Proposal, and provide recommendations to avoid and minimise any impacts.

10.3.3.1. Aboriginal Heritage Sites

One registered Aboriginal site and one lodged Aboriginal place intersect the Development Envelope, as identified through a search of the DPLH Aboriginal Cultural Heritage Information System database (ACHIS; AHA Logic; Figure 10-1):

- Blackwood River (Registered site ID: 20434): Creation/Dreaming Narrative
- Scott River (Lodged place ID: 22928): Creation/Dreaming Narrative, water source.

The Blackwood River registered site (ID: 20434) is the registration of the Blackwood River / Goorbilyup Buerle waterway, including its bed, banks and tributaries, associated with the activities and residence of the Waugal or Mardjit. The Blackwood River / Goorbilyup Buerle is important and significant for its relationship with ethnographic values (AHA Logic 2024). The Development Envelope intersects three small tributaries of the Blackwood River / Goorbilyup Buerle.

The Scott River lodged place (ID: 22928) is the extent of the Scott River, which shares the same ethnographic values and cultural significance as the Blackwood River / Goorbilyup Buerle (AHA Logic 2024). The Development Envelope intersects with three small tributaries of the Scott River.

The Development Envelope was revised to avoid another lodged place to the south of the Development Envelope, namely the Scott River Road Ochre Deposit lodged place (ID: 22926).

The field survey did not identify any new Aboriginal archaeological or ethnographic sites within the Development Envelope (AHA Logic 2024).

10.3.3.2. Other Cultural Values

An osprey was observed hunting within the Development Envelope during the field survey and the KKAC representatives requested that this species, its habitat and hunting areas be considered during future studies for the Proposal (AHA Logic 2024).

The Ethnographic and Archaeological Site Avoidance Heritage Survey also confirmed that (AHA Logic 2024):

- All country is important to South West Boojarah People in a general sense, and country (in the Aboriginal sense of the word) shares an inseparable connection to culture
- Healthy country is important and impacts to the environment should be avoided and minimised wherever possible
- The Blackwood River / Goorbilyup Buerle and the Scott River are important and significant cultural heritage sites.

10.3.4. European Heritage

The Shire of Augusta Margaret River was one of the first areas in WA settled by Europeans more than 180 years ago (GHD 2025b).

A number of State registered heritage places occur within 30 km of the Development Envelope, including Cape Leeuwin Water Wheel, Cape Leeuwin Lighthouse and Quarters, Memorial HMAS Nizam, Davies Park and Foundry Chimney, Margaret River Hotel, Margaret River Old Hospital Complex, Jalbarragup Bridge (ruin) and Darnell's General Store, Witchcliffe (DPLH 2025). No State registered heritage places are directly adjacent to, or intersect, the Development Envelope.

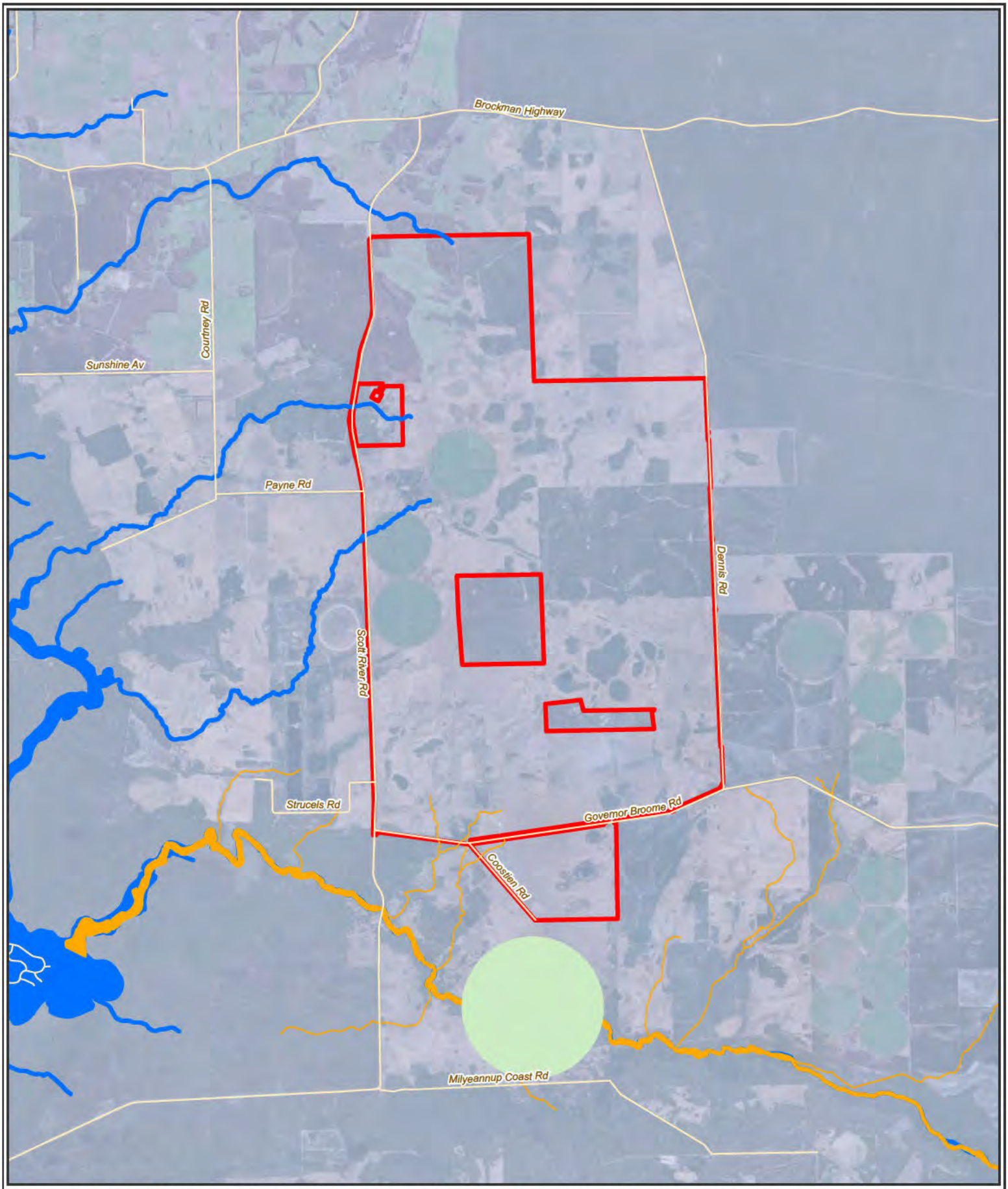

Figure 10-1: Aboriginal Heritage Values within and Surrounding the Development Envelope

Development Envelope

Roads

South West Boojarah #2 Indigenous Land Use Agreement

Aboriginal Heritage Values

Blackwood River (Registered site ID: 20434)

Scott River (Lodged place ID: 22928)

Scott River Road Ochre Deposit (Lodged place ID: 22926)

0 0.5 1 2

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/25/2025

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10.3.5. Local Community

The Development Envelope is located within the Shire of Augusta Margaret River. The Shire has a population of approximately 16,791, which is expected to grow to approximately 25,000 people by 2026 (DPLH 2022, as cited in GHD 2025b).

This Shire includes the townsites of Margaret River, Augusta and Cowaramup and the settlements of Gracetown, Karridale, Kudardup and Witchcliffe. The region also includes a number of rural localities; those within 20 km of the Development Envelope include Scott River, Scott River East, Alexandra Bridge, Boranup, Courtenay, Darradup, Deepdene, East Augusta, Forest Grove, Hamelin Bay, Jalbarragup, Leeuwin, Molloy Island, Nillup, Rosa Glen, Schroeder, and Warner Glen.

A Social Values Assessment Report (Place.ID 2025, Appendix R) was undertaken to understand what is important to the community and explore what benefits and impacts the Proposal could have in the surrounding communities. The assessment included stakeholder engagement and a publicly accessible digital survey. Key social values that the local community identified during this assessment and engagement include (Place.ID 2025):

- Water values such as rivers, wetlands and swamps
- Unique bird life
- Forest and national parks
- Environmental conservation and restoration of cleared land
- Peace and quiet
- Visual amenity of the clouds, horizon and sky
- Agricultural production and history
- Aboriginal history and culture
- Access to remote areas, community and networks
- Local employment opportunities
- Tourism and visitor enjoyment.

10.3.6. Visual Amenity

A Landscape and Visual Impact Assessment (LVIA; GHD 2025b; Appendix T) was undertaken to assess the likely impact of the Proposal's wind turbines on landscape character and visual amenity within and surrounding the Development Envelope. The LVIA included the identification of the pre-development character, amenity of landscape and locations of identified sensitive visual receptors relevant to the Proposal.

10.3.7. Existing Landscape and Visual Conditions

10.3.7.1. Landform, Topography and Hydrology

The terrain surrounding the Development Envelope is varied, comprising almost flat to gently undulating plains, rounded hills, valleys, exposed slopes, rugged cliffs and ridges (GHD 2025b). Nearby watercourses include the Blackwood River / Goorbilyup Buerle (approximately 4 km to the west and 9 km north of the Development Envelope), Scott River (approximately 1 km south of the Development Envelope), Margaret River / Wooditjup Bilya (approximately 27 km north of the Development Envelope) and Mowen River (approximately 25 km north of the Development Envelope). Blackwood River / Goorbilyup Buerle and Scott River have tributaries within the Development Envelope (Figure 10-1).

10.3.7.2. Vegetation

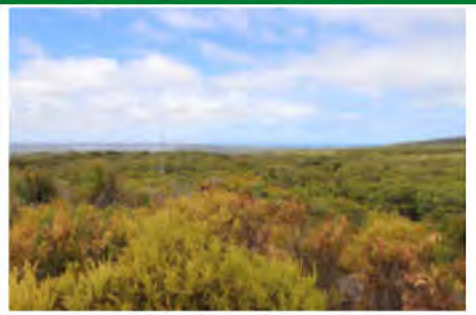
Vegetation surrounding the Development Envelope is varied, with cleared agricultural land (irrigated and unirrigated) interspersed with coastal heathland and rushes, woodland, low forest, open forest and plantations (GHD 2025b). Native vegetation covers approximately 19% of the Development Envelope, occurring mainly as remnant patches within farmland and roadside corridors (Phoenix 2025c). Vegetation within the Development Envelope is described in the LVIA by six broad categories (Phoenix 2025c):

- Myrtaceae dominated shrublands over sedgelands
- Mixed Proteaceae/Fabaceae/Myrtaceae dominated shrublands over tall sedgelands
- Paperbark (*Melaleuca* spp.) woodland swamps over rushlands/sedgelands
- Modified landscapes, including plantations and Peppermint over pastures
- Jarrah (*Eucalyptus marginata* subsp. *marginata*) woodlands and forests over mixed shrublands over tall sedgelands
- Jarrah-Marri (*Corymbia calophylla*) woodlands and forests over mixed shrublands over tall sedgelands.

10.3.7.3. Landscape Character Units

The LVIA included the identification of Landscape Character Units (LCUs) within and surrounding the Development Envelope (GHD 2025b). LCUs are classified based on homogenous patterns of identified characteristics of the landscape such as landform, land use, hydrology and vegetation. It includes the identification of socio-cultural, aesthetic and ecological values of the landscape. The LVIA assessment identified four LCUs based on a review of the site context and the *Department of Conservation and Land Management* (CALM; 1994) *Landscape Character Types of Western Australia* (GHD 2025b). Table 10-5 provides a summary of each identified LCU and representative photographs. The location of the identified LCUs is shown on Figure 10-2.

Table 10-5: Landscape Character Units Relevant to the Proposal (GHD 2025b)

Landscape Character Unit	Distinguishing Features	Representative Photographs	
LCU1: Leeuwin Naturaliste Coast	• Topography consists of a central ridgeline, uneven beaches, towering sea cliffs and valleys, and beyond the ridge an almost flat to gently undulating plain. • Much of this LCU encompasses Leeuwin Naturaliste National Park and State Forest. Vegetation includes wind-pruned coastal heathland, stunted Jarrah Marri forest and towering Karri. • Set out in a typical grid pattern, Augusta town centre lies adjacent to Hardy Inlet and is oriented to take advantage of the views across the inlet from the typical building type of one or two storey commercial and residential properties. • The local community has strong links to the marine and inlet environment, which are important natural assets that support the local fishing and tourism sectors.		
			
			

Landscape Character Unit	Distinguishing Features	Representative Photographs	
LCU2: Scott Coastal Plains	• Topography consists of the Southern Ocean coastline. This includes vertical cliffs, horizontal sandy plains and gently curving beaches. This secluded coastal dune system fronts a low-lying wetland corridor and low rounded hills. • The wetland corridor includes seasonal swamps, wetlands and the Scott River in addition to Swan Lakes and Lake Gingilup. • This LCU includes the residential settlement of East Augusta. A small settlement of one to two storey dwellings. The Hardy Inlet has numerous jetties housing small boats used by residents to access Augusta town centre. • Flora, fauna and landscape conservation is a significant land use of this LCU as it encompasses Scott National Park and Gingilup Swamps Nature Reserve, with privately owned land primarily cleared for farming.		
			
			

Landscape Character Unit	Distinguishing Features	Representative Photographs	
LCU3: Darling Uplands	• A deeply dissected landscape featuring rolling hills, V-shaped river valleys and extensive areas of Jarrah, Marri and Karri forest. • This LCU consists of the Margaret River / Wooditjup Bilya and tributaries of the Blackwood River / Goorbilyup Buerle and their foreshores are registered Aboriginal heritage sites. • Farming and agriculture (including viticulture) and the timber industry are prevalent, with family farms being quintessential to the way of life within this LCU.		
			
			

Landscape Character Unit	Distinguishing Features	Representative Photographs	
LCU4: Blackwood River and Hardy Inlet Riparian Corridor	• This LCU consists of the Blackwood River / Goorbilyup Buerle and Hardy Inlet, which are Aboriginal heritage sites. • Hardy Inlet is open to the Southern Ocean, via Flinders Bay. The Blackwood River / Goorbilyup Buerle discharges into the north-eastern end of the inlet. • 70% of lower Blackwood land use consists of State forest or conservation estate. • Fringing vegetation is largely in excellent condition. • Recreational pursuits such as kayaking, boating and camping alongside the Blackwood River / Goorbilyup Buerle are popular pastimes for local residents, tourists and visitors. • Ellis Street Jetty primarily serves as the boat access from East Augusta, a regular form of transport.		
			

Landscape Character Unit	Distinguishing Features	Representative Photographs	
			

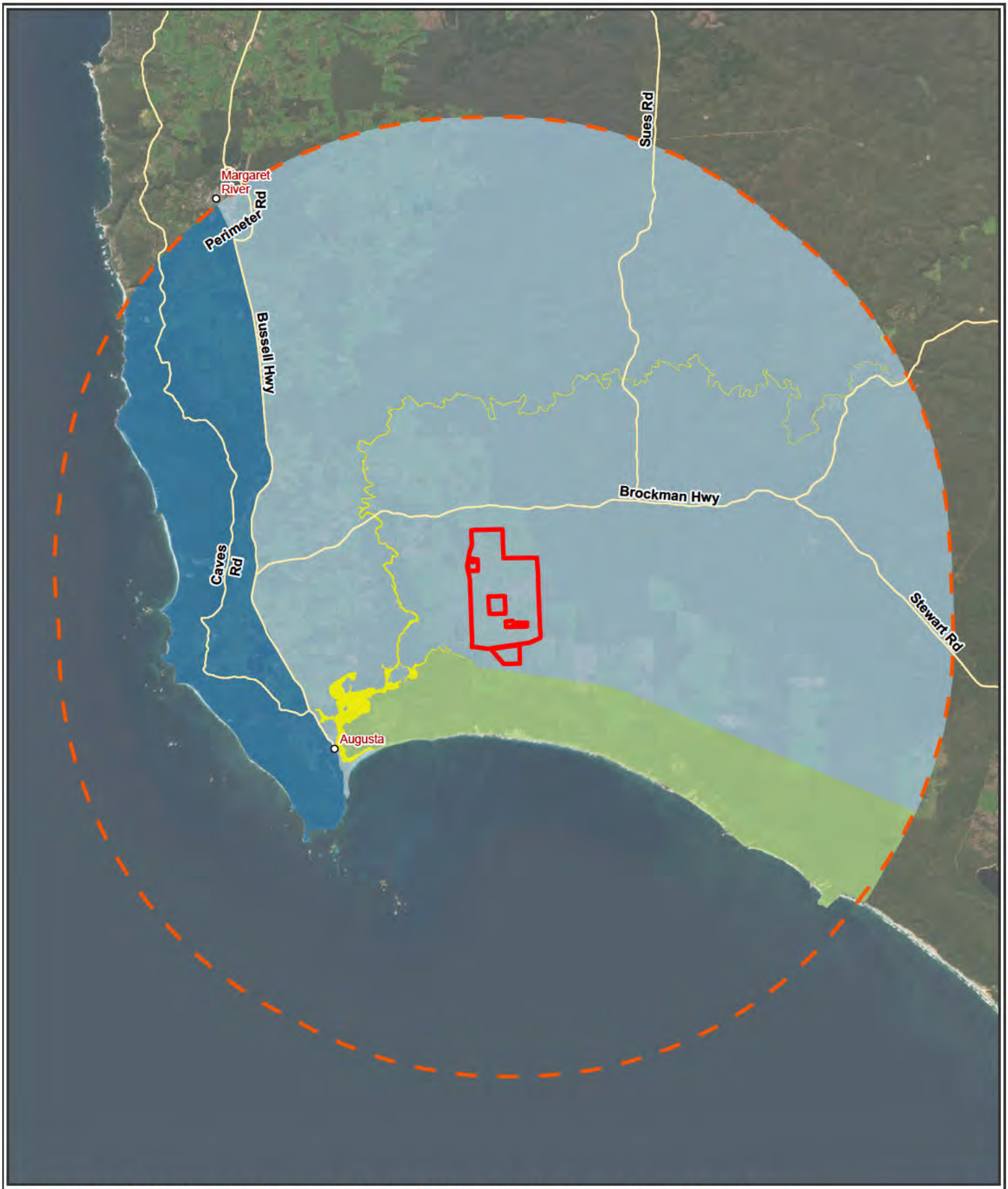


Figure 10-2: Landscape Character Units Relevant to the Development Envelope

Development Envelope
Wind Farm Development Envelope 30 km Buffer
Towns
State Road

Landscape Character Units
Darling Uplands
Leeuwin Naturaliste Coast
Scott Coastal Plains
Blackwood River and Hardy Inlet Riparian Corridor

0 3 6 12
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 8/29/2025

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10.3.7.4. Sensitive Visual Receptors

The LVIA assessment identified twelve key sensitive visual receptors relevant to the Proposal (GHD 2025b). The sensitive visual receptors were identified based on the type of the receptor and their proximity to the Development Envelope. Table 10-6 lists the sensitive visual receptors and their locations are depicted on Figure 10-3.

Table 10-6: Sensitive Visual Receptors Relevant to the Proposal

Viewpoint Reference	Sensitive Visual Receptor	Location	Proximity to Development Envelope (km)
VP01	Augusta Hotel	Blackwood Avenue, Augusta	12.4 km south-west
VP02	Augusta Residential	Hurford Place, Augusta	11.6 km south-west
VP03	Hillview Road Lookout	Lawrence Road, Augusta	16.6 km south-west
VP04	Adjacent to Molloy Island	Howe Road, Kudardup	5.5 km west
VP05	Scott River Road	Scott River Road, Scott River	Within Development Envelope
VP06	Warner Glen Road	Warner Glen Road, Forest Grove	14.7 km north-west
VP07	Brockman Highway	Brockman Highway, Schroeder	2.5 km north-west
VP08	Karridale Residential	Sawmill Loop, Karridale	14.7 km west
VP09	Glenarty Road	Glenarty Road, Karridale	9.7 km west
VP10	Albany Terrace Beach Access	Albany Terrace, Augusta	12.4 km south-west
VP11	Flinders Bay Jetty	Davies Road, Augusta	14.0 km south-west
VP12	Colourpatch / Seine Bay	Albany Terrace, Augusta	12.4 km south-west

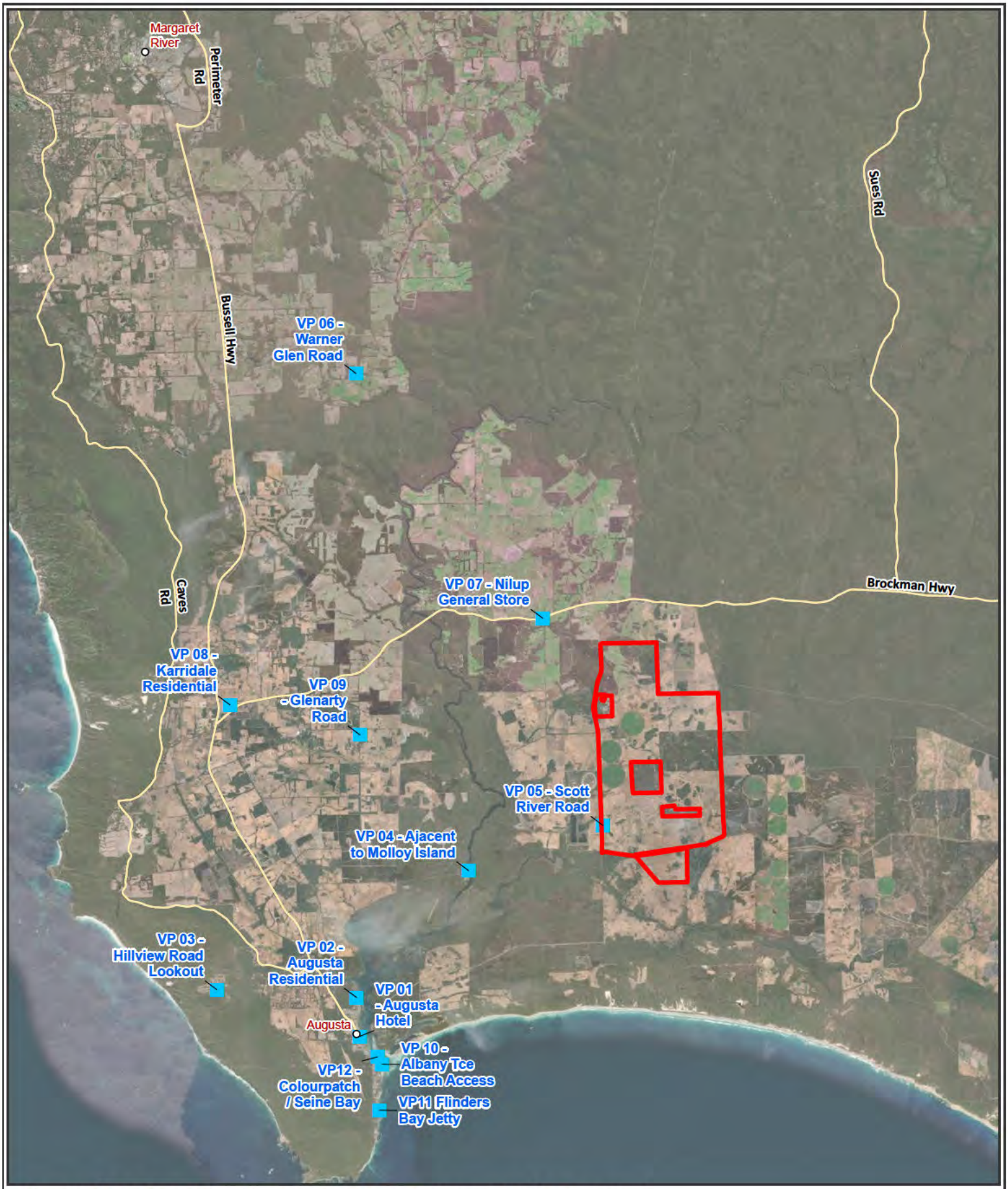

Figure 10-3: Sensitive Visual Receptors Relevant to the Proposal

Development Envelope

Sensitive Visual Receptors

Towns

Main Roads

State Road

0 2.5 5 10

Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 8/29/2025

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10.3.8. Noise

A noise impact assessment was undertaken for the Proposal to predict and assess the impact of noise during operation of the wind turbine generators (WTGs) and associated substation at sensitive receptor locations (GHD 2025a, Appendix S). Noise during construction will be limited to concrete pumping, plant and equipment movements, including cranes, trucks and agitators, which generate intermittent noise during setup and operation. Any noise impacts associated with construction activities are expected to be minimal due to the localised, temporary and short timeframe of construction; therefore, a noise impact assessment for construction activities was not conducted.

Noise production during operations of the WTGs can be categorised into two groups (GHD 2025a):

- Mechanical noise. Sources of mechanical noise include the gearbox, cooling fans, generator, auxiliary equipment, yaw drives and brakes (when applied)
- Aerodynamic noise. Aerodynamic noise refers to the passage of air over the turbine blades and generally increases with rotor speed.

Aerodynamic noise is considered the more dominant source of noise emissions from WTGs. Noise from the substation is associated with mechanical noise from the two 132 kV transformers.

There are two types of noise receptors relevant to the Proposal:

- Noise sensitive receptor: a building or dwelling used for residential or accommodation purposes which are categorised as either:
    - Involved noise sensitive receptor: a noise sensitive receptor in a parcel of land that will accommodate part of the wind farm development
    - Not-involved noise sensitive receptor: a noise sensitive receptor in a parcel of land that will not accommodate any part of the wind farm development.
- Non-sensitive noise receptor: a building not used for residential or accommodation purposes (e.g. a shed or commercial premises).

Noise receptors identified within 5 km of the Development Envelope are presented in Figure 10-4, of which 29 are noise sensitive receptors (two involved noise sensitive receptors and 27 not-involved noise sensitive receptors, Table 10-7) and five are non-sensitive noise receptors (R11, R12, R25, R26 and R27), which will not be used for residential or accommodation purposes once the Proposal is constructed. Non-sensitive noise receptors have not been considered in the noise impact assessment.

Potential impacts of infrasound is a concern that has been raised by the local community. Infrasound was a potential impact associated with older designs of WTGs where blades were situated downwind of the main wind turbine tower, resulting in an infrasound effect as blades cut through the turbulence generated at the downwind side of the main tower (GHD 2025a). Modern WTGs, including those proposed by the Proponent, are designed to have the blades upwind of the main tower which when combined with improved blade design, has resulted in infrasound not being a major characteristic of modern wind farms. On this basis, infrasound is not discussed further in this assessment.

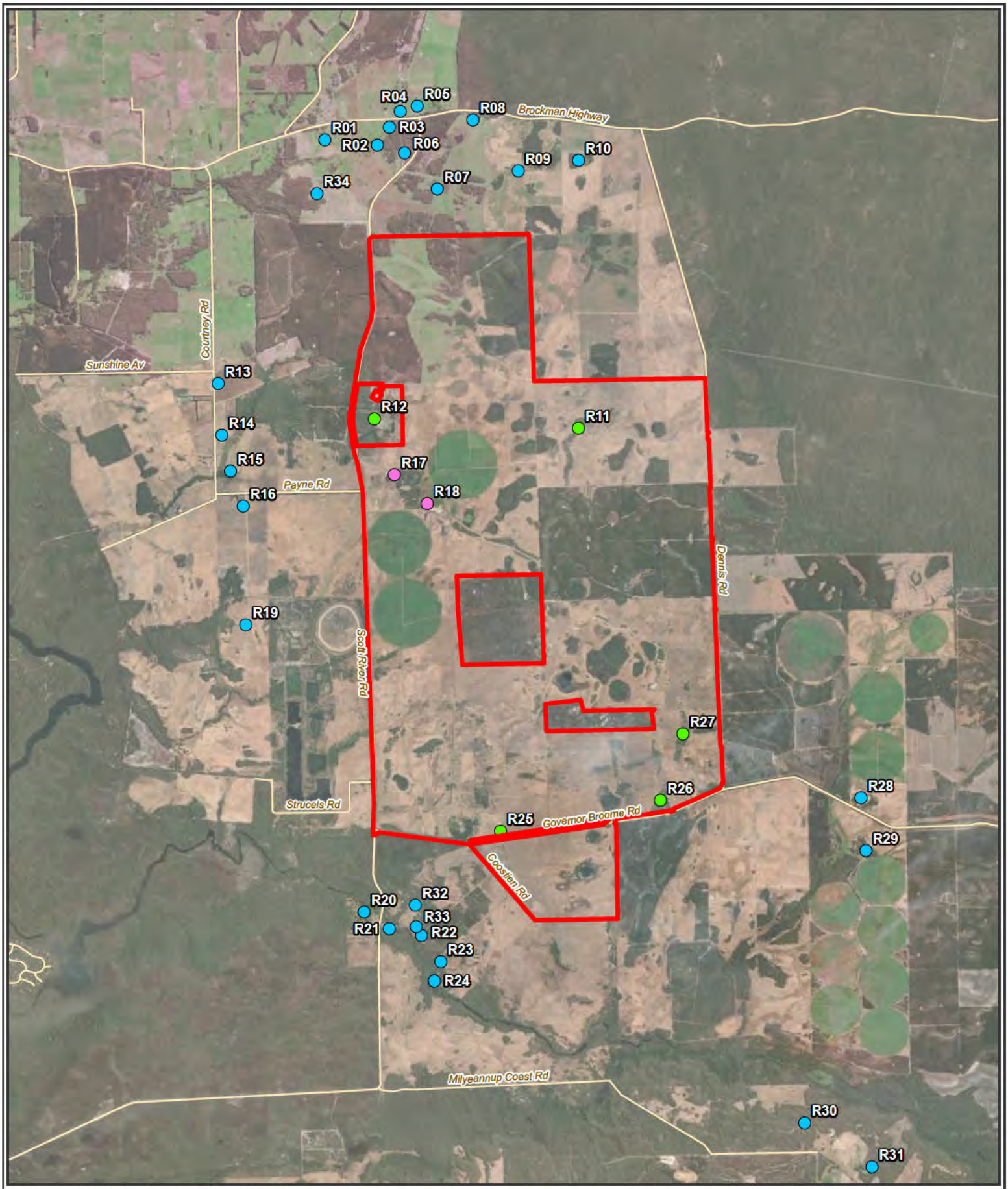

Figure 10-4: Sensitive Noise Receptors Relevant to the Proposal

Development Envelope

Roads

Noise Receptor Type

- Non-sensitive Noise Receptor
- Involved Noise Sensitive Receptor
- Not-involved Noise Sensitive Receptor

0 0.5 1 2

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/12/2025

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10.3.8.1. Noise Assessment Criteria

Noise emissions from the Proposal were assessed against a dual set of criteria (GHD 2025a, Table 10-7):

- The primary noise criteria were based on the *Environmental Protection (Noise) Regulations 1997* (the WA Noise Regulations)
- Secondary noise criteria were derived using baseline noise monitoring results and the South Australia Environment Protection Authority's (SA EPA) *Wind Farms Environmental Noise Guidelines* (SA Guidelines; SA EPA 2021).

Substation noise emissions were assessed against the WA Noise Regulations only, as per Table 10-8.

Table 10-7: Criteria for Assessing Noise from the Proposal's WTGs (GHD 2025a)

Noise Sensitive Receptor	Reference of Noise Criteria	Hub Height Wind Speed (dB(A))							
		4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s
Involved noise sensitive receptor									
R17, R18	WA Noise Regulations^	40	40	40	40	40	40	40	40
	SA Guidelines#	45	45	45	45	45	45	45	45
Not-involved noise sensitive receptor									
R01, R02, R03, R04, R05, R06, R07, R08, R09, R10, R34	WA Noise Regulations	35	35	35	35	35	35	35	35
	SA Guidelines	35	36	38	39	40	40	39	41
R20, R21, R22, R23, R24, R32, R33	WA Noise Regulations	35	35	35	35	35	35	35	35
	SA Guidelines	35	35	36	36	37	37	37	39
R28, R29, R30, R31	WA Noise Regulations	35	35	35	35	35	35	35	35
	SA Guidelines	35	36	37	37	37	37	37	38
R14, R15, R16, R19	WA Noise Regulations	35	35	35	35	35	35	35	35
	SA Guidelines	35	35	35	35	35	35	35	36
R13	WA Noise Regulations	35	35	35	35	35	35	35	35
	SA Guidelines	35	35	36	36	37	37	37	38

^R17 and R18 are involved noise sensitive receptors (i.e. have participating landowners) for which 40 dB(A) has been used, on advice from DWER. #R17 and R18 are involved noise sensitive receptors, the SA Guideline criteria of 45 dB(A) for an involved noise sensitive receptor has been used.

Table 10-8: Criteria for Assessing Noise from the Proposal's Substation – WA Noise Regulations (GHD 2025a)

Type of Premises Receiving Noise	Time of Day	Assigned Noise Level (dB(A))		
		L_{A10}	L_{A1}	L_{AMAX}
Noise sensitive premises: Highly sensitive area	7:00am – 7:00pm Monday to Saturday	45	55	65
	9:00am – 7:00pm Sunday and Public Holidays	40	50	65
	7:00pm – 10:00pm all days	40	50	55
	10:00pm – 7am Monday to Saturday 10:00pm – 9:00am Sunday and Public Holidays	35	45	55
Noise sensitive premises: Any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

10.3.9. Electromagnetic Interference

Wind turbines have the potential to result in electromagnetic interference through interactions with point-to-point microwave telecommunications. This includes potential for interruptions to radio and television broadcasts and mobile phone coverage. All services which rely on microwave or radio frequency electromagnetic waves will herein be broadly referred to as 'radiocommunications'.

A preliminary Electromagnetic Interference (EMI) Assessment (DNV 2025a; Appendix S) was undertaken to assess the potential for interference with radiocommunications of the Proposal to 33 dwellings within 5 km of the Development Envelope, of which 13 are 'involved dwellings, that is, dwellings belonging to landowners with property intersected by the Development Envelope or otherwise involved with the Proposal as part of an agreement.

To assess potential EMI impacts, the preliminary EMI Assessment identified all radiocommunications towers within 75 km of the Development Envelope and assessed the licences attach to each tower (DNC 2025a). There are 289 radiocommunication towers located within 75 km of the Development Envelope, two of which occur within 2 km and are operated by Western Australian Police, Telstra, Optus, TPG and Western Power (DNV 2025a). Other services with potential to be impacted by the Proposal include mobile phones, wireless internet, broadcast radio and television, satellite television and internet, meteorological radars, trigonometrical stations and citizen's band (CB) radio.

10.3.10. Shadow Flicker and Blade Glint

Shadow flicker refers to the fluctuating levels of light caused by a moving object. In the context of the Proposal, shadow flicker refers to the intermittent shadowing resulting from rotating wind turbine blades passing between the sun and the observer. The effect of shadow flicker is most noticeable from inside a dwelling where the flicker is seen through a window (DNV 2025b). The likelihood of shadow flicker impacting a dwelling, and the duration of the impact, is dependent on multiple factors including the distance and direction between the turbine and the dwelling, weather conditions, position of the sun, turbine height and blade diameter and wind direction (DNV 2025b).

Blade glint refers to light which may be reflected off the surface of a wind turbine blade. Glint is dependent on several factors including the orientation of the nacelle, angle of the blade, angle of the sun and reflectiveness of the surface of the blades. Both blade glint and shadow flicker have potential to cause annoyance to people in the nearby dwellings (DNV 2025b).

A Shadow Flicker and Blade Glint Assessment was undertaken to assess the potential for shadow flicker and blade glint to occur as a result of the Proposal (DNV 2025b, Appendix O). Blade glint is not considered an issue for the Proposal, as the turbine blade surface will be coated with a non-reflective paint (DNV 2025b). On this basis, blade glint is not considered a relevant impact from the Proposal and will not be discussed further in this assessment.

Twenty-five receptors (dwellings) were considered in the shadow flicker assessment (Figure 10-5; DNV 2025b). Another nine dwellings were considered unlikely to be impacted by shadow flicker at intensities considered sufficient to cause annoyance, given their distance from the Proposal's turbines and were therefore excluded from the assessment. Of the 25 dwellings considered, six are considered 'involved' receptors, four of which have agreed with the Proponent such that the dwelling will not be used for residential or accommodation purposes on construction of the Proposal (Figure 10-5, Table 10-9). These four dwellings (R11, R25, R26, R27) were therefore not considered sensitive receptors and are not considered further in this assessment, leaving 21 receptors considered for assessment.

Table 10-9: Sensitive Shadow Receptors Relevant to the Proposal

Sensitive Shadow Receptor (Dwelling) ID	Receptor Type^	Distance to Nearest Turbine (m)
R1	Non-involved	2,560
R2	Non-involved	2,216
R3	Non-involved	2,454
R6	Non-involved	2,069
R7	Non- Involved	1,600
R9	Non-involved	2,378
R12*	Non-involved	949
R13	Non-involved	2,433
R14	Non-Involved	2,604
R17	Involved	1,715
R18	Involved	1,794
R19	Non-Involved	2,319
R20	Non-involved	2,006
R21	Non-involved	2,000
R22	Non-involved	1,775

Sensitive Shadow Receptor (Dwelling) ID	Receptor Type^	Distance to Nearest Turbine (m)
R23	Non-involved	1,798
R24	Non-involved	2,000
R28	Non-involved	2,421
R32	Non-involved	1,513
R33	Non-involved	1,804
R34	Non-involved	1,981

^It is noted that the number of involved and non-involved receptors do not align with DNV (2025b). Three involved receptors (R7, R14 and R19) have been reclassified to non-involved as they occur outside of the Development Envelope.
* Note that although R12 was considered a "dwelling" in DNV 2025b, R12 operates as a commercial premise and so is not a sensitive receptor.

10.3.10.1. Shadow Flicker Assessment Criterion

The Draft National Wind Farm Development Guidelines (Draft National Guidelines, EPHC 2010) recommend that the modelled theoretical shadow flicker duration of any moderate level of intensity or above at any dwelling should not exceed 30 hours per year, and that the actual or measured shadow flicker duration should not exceed 10 hours per year. This criterion has been applied in the assessment of shadow flicker at all dwellings.

10.3.11. Aviation

An Aviation Impact Assessment (Aviation Projects 2025, Appendix Q) was undertaken to ensure no impact to existing aviation operations, such as the Royal Flying Doctors Service or aerial firefighting, as a result of the Proposal.

The assessment concluded that the wind turbines associated with the Proposal will not result in incompatible intrusions or compromise the safety of existing airports or associated navigation and communication facilities (Aviation Projects 2025). As such, the potential impacts of the Proposal on aviation are not discussed further in this assessment.

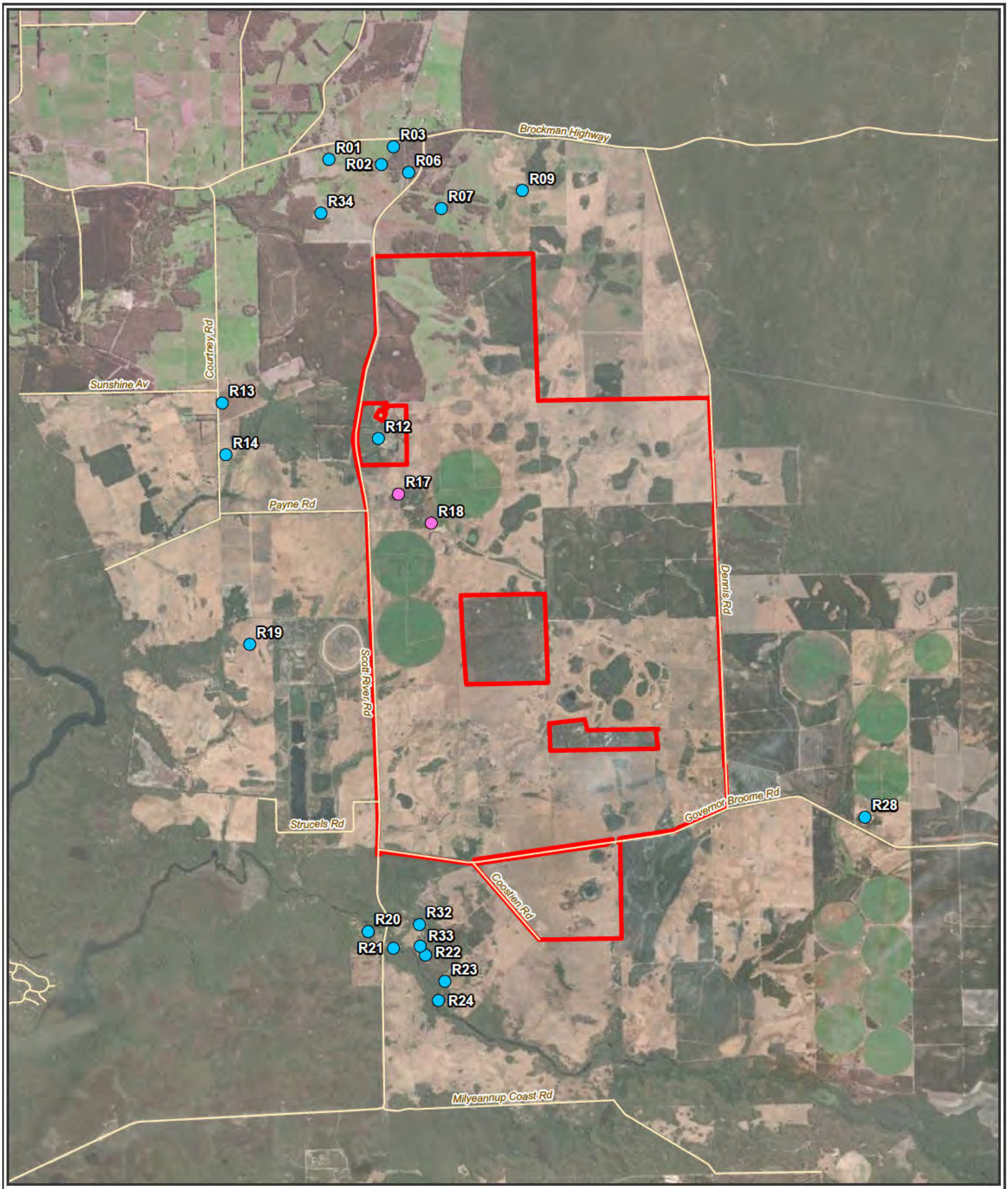

Figure 10-5: Sensitive Shadow Receptors Relevant to the Proposal

Development Envelope

Roads

Sensitive Shadow Receptor Type

- Not-involved
- Involved

0 0.5 1 2

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/22/2025

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10.4. Potential Environmental Impacts

The potential impacts of the Proposal on social surroundings values prior to mitigation being applied have been identified as:

- Impacts to Aboriginal heritage sites or cultural values through:
    - Ground disturbance associated with the construction of the Proposal which may cause the loss of or damage to Registered Aboriginal heritage sites, lodged Aboriginal heritage places or cultural values
    - Changes to surface water flows, groundwater levels and water quality which may impact the Blackwood River / Goorbilyup Buerle or Scott River.
- Impacts to landscape and visual amenity due to the placement of wind turbines and other proposal infrastructure
- Altered socio-economic outcomes for the local community including:
    - Impacts to tourism and employment
    - Impacts to agricultural land use
    - Impacts on infrastructure, services and roads.
- Reduce local amenity as a result of:
    - Light emissions
    - Noise emissions
    - Shadow flicker
    - Dust emissions.

Biological values such as wetlands, swamps, bird life and conservation significant flora, vegetation and fauna are also important social values and a key concern to the local community. Potential impacts of the Proposal to these values are described and assessed in Section 7: Inland Waters, Section 8: Flora and Vegetation and Section 9: Terrestrial Fauna; therefore, the assessment of the impacts to these biological values are not detailed further within this section.

10.5. Mitigation

The Proponent has applied the mitigation hierarchy during the design of the Proposal to reduce potential impacts to social surroundings values as far as practicable.

Specific mitigation and management measures proposed to be implemented by the Proponent are discussed below and detailed in Table 10-10.

10.5.1. Cultural Heritage

The Proposal has been designed to completely avoid direct impacts to the Blackwood River / Goorbilyup Buerle registered heritage site.

The Proposal has currently been designed to avoid direct impacts to Scott River, a lodged Aboriginal heritage site. However, the Proponent is investigating the use of an existing farm track within the Development Envelope which intersects a small tributary of the river, to avoid clearing native vegetation

(Section 8.6.1). This option will not be progressed without consultation with KKAC, and any authorisation required under the AH Act.

10.5.2. Acid Sulfate Soils, Groundwater and Surface Water

A key concern identified by the local community is the risk of PASS resulting in significant impacts to soil fertility and future land use. Due to the presence of PASS within the Development Envelope (Section 6.3.6), the Proponent commits to the preparation and implementation of an ASSDMP prepared in accordance with relevant guidance. A Preliminary ASSDMP has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP, which will be developed following completion of detailed site investigations and detailed design prior to construction of the Proposal (PTG 2025; Appendix B). The ASSDMP is expected to be a condition of DA approval.

Turbine and other tower foundations have also been designed to limit the excavation of PASS and dewatering requirements, while achieving the necessary mass and stability (Section 2.2.1; Figure 2-3).

The specific foundation option chosen for each turbine/mast/tower location will be determined based on detailed site investigation and revised modelling to ensure that any proposed dewatering or excavation would not result in significant impacts to soil, surface water or groundwater quality as a result of PASS exposure. Dewatering will be managed to ensure drawdown does not exceed 2 mbgl at the perimeter of each foundation and 0.1 m beyond 100 m from any dewatering location. Below ground foundations will only be used where it confirmed that the proposed turbine/mast/tower location would not require dewatering. The management of PASS is discussed further in Section 6: Terrestrial Environmental Quality and Section 7: Inland Waters.

Table 10-10: Application of the Mitigation Hierarchy for Potential Impacts to Social Surroundings

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impact
Loss or damage of Aboriginal heritage sites	• The Proposal has been designed to avoid direct impacts to Blackwood River / Goorbilyup Buerle.	• The Proposal has been designed to avoid direct impacts to Scott River. Any impact to tributaries of this river within the Development Envelope would require consultation with KKAC and relevant authorisation under the AH Act. • As per the CEMP, should potential artefacts or remains be uncovered during construction, all works will cease immediately and a 'no work zone' will be established around the sites until it is assessed by appropriate specialists. • Indirect impacts to the Blackwood and Scott rivers will be minimised. Detailed management measures are provided in Section 7: Inland Waters. Key measures to be outlined in the CEMP and ASSDMP include: - No clearing of any native vegetation within 50 m of any lodged heritage place or registered heritage site - Hazardous materials will be appropriately contained to prevent mobilisation into waterways - No direct/indirect disposal of dewater into wetlands or rivers. - Dewatering will be discharged to infiltration basins, with appropriate testing and monitoring in accordance with the ASSDMP - Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable	N/A	Potential for minor, localised and temporary impacts to the water quality of the small tributaries of the Blackwood River / Goorbilyup Buerle and Scott River within the Development Envelope. The assessment and significance of this residual impact is detailed in Section 10.6.1.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impact
Reduced landscape and visual amenity through the placement of infrastructure	• Wind turbine blades will be coated in a non-reflective paint to avoid blade glint.	• The Proposal has been designed to avoid impacts to native vegetation as much as possible, with impacts limited to the clearing of 1 ha of native remnant vegetation. • Wind turbines will be uniform in colour, design and size. • Non-reflective materials and muted colours will be used to reduce visibility at distance. • Existing farm tracks will be utilised as much as practicable, and all access roads will be maintained in an unsealed condition to blend with surrounding rural setting. • Landowners and adjacent neighbours will be engaged to discuss screening and landscaping to mitigate any visual impacts.	N/A	Altered landscape and visual amenity from sensitive receptors. The assessment and significance of this residual impact is detailed in Section 10.6.2.
Altered socio-economic outcomes for the local community – land use	N/A	• The Indicative Disturbance Footprint has been designed to limit impacts on land use, including the utilisation of existing farm tracks as much as practicable, and alignment of new tracks along fence lines/ edge of paddocks where practicable. • Alternative turbine foundations will be utilised to avoid, and otherwise minimise PASS disturbance and dewatering (Section 6.6 and Section 7.6). • A Preliminary ASSDMP (Appendix B) has been developed to inform the management measures for PASS to be undertaken during construction of the Proposal. These measures will be implemented into a detailed ASSDMP following finalisation of infrastructure design and layout. Key measures are outlined in Section 6 (Terrestrial Environmental Quality) and Section 7 (Inland Waters). • Construction activities will be temporary and short term (approximately 18 – 24 months). • The Proponent will continue to engage and work with landowners to mitigate and manage construction and operational impacts.	N/A	Potential for temporary impacts during construction. No ongoing residual impacts expected. The assessment and significance of this residual impact is detailed in Section 10.6.3.

Altered socio-economic outcomes for the local community – tourism, infrastructure, services and roads	• Detailed design will consider adjustment of turbine locations or the relocation, reconstruction or modification of communication infrastructure to ensure no EMI as a result of the Proposal.	**Tourism** • An accommodation strategy will be developed to identify suitable workforce accommodation with consideration of local impacts on housing and tourist accommodation. • A public viewing area will be included within the Proposal to cater for the wind farm as a tourist attraction. This will include informative signage about wind as a renewable energy source and allow visitors to observe the turbines. **Infrastructure, Services and Roads** • Detailed design will consider adjustment of turbine locations or the relocation, reconstruction or modification of communication infrastructure to ensure no EMI as a result of the Proposal • A Traffic Management Plan will be implemented during the construction of the Proposal. The Traffic Management Plan will include the following management measures to minimise traffic safety impacts and disruptions to local road users: - Implement traffic control including detours and signage - Advertise road closures/disruptions to the local community - Minimise conflicting traffic schedules with stock movements, feed deliveries etc. as much as practicable. • A Bushfire Management Plan (BMP; Linfire 2025a) and Bushfire Risk Management Plan (BRMP; Linfire 2025b) will be implemented during construction and operation of the Proposal. This will include the following key management measures: - Establishment of non-vegetated areas and asset protection zones - All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system - All buildings and vehicles will be fitted with first response fire equipment - Adhering to local government fire restrictions, including daily checks of fire danger ratings	N/A	No EMI as a result of the Proposal. Altered socio-economic outcomes for the local community. The assessment and significance of this residual impact is detailed in Section 10.6.3.3.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impact
		- Emergency services will have full access to the Development Envelope and water tanks for emergency response inside or outside of the Development Envelope. • Implementation of a community benefit fund, that would start in the same year as construction and continue through the operational life of the Proposal.		
Reduced amenity – increased light	N/A	• Nighttime construction activities will be avoided where practicable. • Lighting will be minimised to that necessary for safe construction and operation of the Proposal (e.g. use of directional lighting, hoods or sensor lighting). • Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions.	N/A	Minor increase in light emissions. The assessment and significance of this residual impact is detailed in Section 10.6.4.1.
Reduced amenity – increased noise	N/A	• The Indicative Disturbance Footprint has been designed to ensure compliance with noise regulations at all existing dwellings. • Turbines will be regularly maintained to ensure noise emissions are not adversely impacted by turbine wear. • An operational noise management plan will be developed and implemented for the wind farm and include noise monitoring.	N/A	Minor increase in noise levels. The assessment and significance of this residual impact is detailed in Section 10.6.4.2.
Reduced amenity – shadow flicker	N/A	• Landowners and adjacent neighbours will be engaged to discuss screening and landscaping to minimise visual impacts of shadow flicker.	N/A	No significant shadow flicker impacts. The assessment and significance of this residual impact is detailed in Section 10.6.4.3.

Potential Impact	Avoidance	Minimisation	Rehabilitation	Residual Impact
Reduced amenity – dust emissions	N/A	• Dust management measures will be implemented in accordance with the CEMP. Measures will include (but not be limited to) implementation of: - Dust suppression techniques during construction, such as water carts - Speed limits on unsealed roads/tracks - Progressive clearing, and rehabilitation of temporary disturbance areas.	• Progressive rehabilitation will be undertaken of temporarily disturbed areas, reducing the potential for dust emissions.	Minor increase in dust emissions during construction. The assessment and significance of this residual impact is detailed in Section 10.6.4.4.

10.6. Assessment and Significance of Residual Impacts

10.6.1. Aboriginal Cultural Heritage

The Blackwood River / Goorbilyup Buerle and Scott River tributaries that intersect the Development Envelope are important and significant cultural heritage sites for the South West Boojarah People (AHA Logic 2024).

The Proposal will not result in any direct impacts to the Blackwood River / Goorbilyup Buerle registered Aboriginal heritage site, and the Proposal has currently been designed to avoid direct impacts to Scott River, a lodged Aboriginal heritage site. However, the Proponent is investigating the potential to utilise an existing farm track which intersects a small tributary of the river, as an alternative to the currently proposed access track. The current proposed access track requires a small area (0.01 ha) of native vegetation that provides habitat for conservation significant species to be cleared (see Section 8 and Section 9). The alternative option will not be progressed without consultation with KKAC and any relevant authorisations required under the AH Act.

A comprehensive impact assessment for the waterways relevant to the Proposal is provided in Section 7 (Inland Waters). The assessment found that the potential indirect impacts from the Proposal to waterways include minor and localised changes to surface water flow patterns and changes to quality of surface water and/or groundwater, resulting from contamination, erosion, sedimentation or excavation and exposure of PASS.

Changes to surface water flow and depth as a result of Proposal infrastructure are expected to be minimal, given that infrastructure will not be located within any waterways and no key streams are proposed to be diverted. The Proponent will implement mitigation measures during construction and operation to minimise the potential impacts. This will include:

- Scheduling civil construction activities, specifically activities that require excavation, to occur during the dry season where practicable
- Utilising drainage control methods (e.g. drains and culverts) in flood-prone areas
- Appropriately containing hazardous materials to prevent mobilisation
- Discharging dewater effluent into infiltration basins rather than into waterways
- No dewatering will occur for the construction of borrow pits
- Implementation of a CEMP to ensure the maintenance of surface water regimes, which will include monitoring and contingency measures.

The potential for exposure of PASS to impact the quality of the Blackwood or Scott Rivers has been minimised through Proposal design. The Proponent considers that potential impacts of PASS disturbance during construction can be appropriately managed through the implementation of an ASSDMP, which will be prepared in accordance with relevant guidance and the Preliminary ASSDMP (Appendix B), and is expected to be a condition of the DA approval (Section 3.3). This is discussed in further detail in Section 6 (Terrestrial Environmental Quality) and Section 7 (Inland Waters).

Based on the above, the Proponent considers that potential impacts to the Blackwood and Scott Rivers will be minor, temporary and localised, occurring during construction of the Proposal only, and are able to be managed through implementation of the CEMP and ASSDMP, and will not result in a significant residual impact to important cultural heritage sites within and surrounding the Development Envelope.

10.6.2. Landscape and Visual Amenity

The installation of wind turbines within the rural agricultural landscape will unavoidably alter the existing landscape character and result in visual impacts. The proposed turbines will be variably visible from a range of locations, each to a different extent (GHD 2025b).

Table 10-11 provides a summary of the assessment of impacts to visual amenity from each of the LCUs (GHD 2025b). The significance of impacts was determined based on the LCU sensitivity to change and the estimated magnitude of change. The LVIA assessment determined that LCU1, LCU2 and LCU3 would have a high-moderate impact rating and LCU4 would have a moderate impact rating as a result of the Proposal (GHD 2025b).

Table 10-11: Summary of Visual Impact Assessment (GHD 2025b)

LCU	Title	Sensitivity to Change	Magnitude of Change	Significance of Impact	Summary of Impact
LCU1	Leeuwin Naturaliste Ridge	High	Moderate	High-moderate	LCU1 has a high-moderate impact rating due to the LCU having a high sensitivity to change relating to Leeuwin Naturaliste Ridge, a landscape of high quality, and the Proposal resulting in a moderate magnitude of change as it is likely to have discernible changes in the landscape character due to partial loss of, or change to elements, features or characteristics of the landscape.
LCU2	Scott Coastal Plain	High	Moderate	High-moderate	LCU2 Scott Coastal Plain has a high-moderate impact rating due to the LCU having a high sensitivity to change relating to the Southern Ocean coastline, an area of high scenic values, and numerous designated areas which include highly diverse flora and fauna species, and the Proposal resulting in a moderate magnitude of change as it is likely to have discernible changes in the landscape that would be out of scale with the landscape character and at odds with the local pattern of the landform.
LCU3	Darling Uplands	High	Moderate	High-moderate	LCU3 Darling Uplands has a high-moderate impact rating due to the LCU having a high sensitivity to change relating to the importance of the drainage features, national parks and residential areas within a dissected landscape, and the Proposal resulting in a moderate magnitude of change as it will likely have discernible changes to the landscape that would impact the landscape character.
LCU4	Blackwood River and Hardy Inlet Riparian Corridor	High	Low	Moderate	LCU4 Blackwood River and Hardy Inlet Riparian Corridor has a moderate impact rating due to the LCU having a high sensitivity to change due to the values of the local community; however, the magnitude of changes is considered low as the Proposal is only likely to be visible from specific confined locations.

Table 10-12 provides a summary of the assessment of impacts to visual amenity from each of the 12 sensitive receptor locations (GHD 2025b). The significance of the predicted impact was determined based on the sensitive receptor's sensitivity to change and the estimated magnitude of change and was assessed as moderate to high at all sensitive receptors except for Karridale Residential (VP08), which is not expected to be significantly impacted by changes to visual amenity.

Visual impacts associated with construction are considered to be short term (approximately 2 years) with operational impacts considered permanent. The overall visual impact of the Proposal will vary greatly depending on the individual viewer's sensitivity to, and acceptance of, change. For example, the Albany Wind Farm is known to have had positive impacts on Albany (Place.ID 2025), where it has created a unique sense of place and a positive tourism asset. In addition, the LVIA has been undertaken on a 'worst-case scenario' basis, modelling the maximum number (20 turbines), at maximum height (250 m) and all turbines rotated to face sensitive receptors across the Development Envelope.

The Proposal includes the development of a public viewing area of the wind farm which will allow visitors to observe the turbines and will provide information about renewable energy. The aim is to encourage similar positive outcomes to the Albany Wind Farm, creating a new aspect to the sense of place for the local community and adding a positive tourism asset.

The Proponent has designed the layout of the turbines within the Development Envelope to minimise clearing of native vegetation as much as possible, ensuring that existing remnant vegetation remains to maintain the rural landscape character and shield turbines in the landscape, where possible.

Based on the above, although the Proposal will have an impact on visual amenity the significance of this impact will vary greatly depending on the individual viewer's sensitivity to and acceptance of change. The Proponent will continue to investigate opportunities to minimise the visual impact and will continue to engage with stakeholders during detailed design of the Proposal.

Table 10-12: Summary of Visual Impact Assessment (GHD 2025b)

View Point	Title	Sensitivity to Change	Magnitude of Change	Significance of Impact	Summary of Impact	Representative Photo*
VP01	Augusta Hotel	High	High	High	VP01 has a high impact rating due to the viewpoint having a high sensitivity to change relating to the value of the scenic, elevated long and wide views across Hardy Inlet and East Augusta towards the Proposal. A high magnitude of change is likely due to the substantial and obvious effect on the existing view, permanently altering the characteristics and diminishing the perceived quality of that view.	Plate 10-1 Plate 10-2
VP02	Augusta Residential	High	Moderate	High-moderate	VP02 has a high-moderate impact rating due to the viewpoint having a high sensitivity to change relating to the value of the scenic, elevated and wide views that include the water body of Hardy Inlet towards the Proposal. A moderate magnitude of change is expected due to the discernible change to the characteristics of the existing view.	Plate 10-3 Plate 10-4
VP03	Hillview Road Lookout	High	Low	Moderate	VP03 has a moderate impact rating due to the viewpoint having a high sensitivity to change relating to the landscape value of the Leeuwin-Naturaliste ridge and the long, wide-ranging, elevated views and scenic landscape, encompassing the Proposal. This is expected to result in a low magnitude of change as the turbines will likely be visible as only a small portion of a much wider view and may not be considered uncharacteristic within the existing landscape.	Plate 10-5 Plate 10-6
VP04	Adjacent to Molloy Island	High	Moderate	High-moderate	VP04 has a high-moderate impact rating due to the viewpoint having a high sensitivity to change relating to its value as a conservation and scenic area used for recreation. The Proposal is anticipated to result in a moderate magnitude of change as it is likely to have an adverse effect on the left side of the view, out of scale with the existing view.	Plate 10-7 Plate 10-8
VP05	Scott River Road	High	High	High	VP05 has a high impact rating due to the viewpoint having a high sensitivity to change relating to residents travelling to and from work being close to the Proposal and having long viewing periods of the Proposal area. The Proposal is expected to result in a high magnitude of change as it is likely to have substantial and obvious effect on the existing view, diminishing the perceived quality.	Plate 10-9 Plate 10-10
VP06	Warner Glen Road	High	Low	Moderate	VP06 has a moderate impact rating due to the viewpoint having a high sensitivity to change relating to the road having wide scenic views across the rural landscape from an elevated vantage point and users of the road (residents, recreational users and tourists) having prolonged views of the Proposal. The Proposal is predicted to result in a low magnitude of change as the turbines are not considered out of character with the existing view, sitting just above the tree canopy in the background.	Plate 10-11 Plate 10-12
VP07	Brockman Highway	High	Moderate	High-moderate	VP07 has a high-moderate impact rating due to the viewpoint having a high sensitivity to change relating to highway contributing to the natural and rural landscape amenity and being used by local residents, agricultural workers, heavy haul vehicles and tourists. The Proposal is expected to result in a moderate magnitude of change as it is likely to effect a discernible change to the characteristics of the view and be out of scale with the existing view.	Plate 10-13 Plate 10-14
VP08	Karridale Residential	Moderate	Negligible	Negligible	VP08 has a negligible impact rating due to the viewpoint having a moderate sensitivity to change given that residents with long viewing periods of the Proposal are screened and at a distance. The Proposal is anticipated to result in a negligible magnitude of change as the change is considered imperceptible due to little or no loss of or change to the elements, features or characteristics of the view.	Plate 10-15 Plate 10-16
VP09	Glenarty Road	High	Moderate	High-moderate	VP09 has a high-moderate impact rating due to the viewpoint having a high sensitivity to change relating to the road providing scenic and rural views from an elevated position. The Proposal is considered likely to result in a moderate magnitude of change as is expected to result in a discernible effect on the characteristics of the view and be out of scale with the existing view.	Plate 10-17 Plate 10-18
VP10	Albany Terrace Beach Access	High	High	High	VP10 has a high impact rating due to the viewpoint having a high sensitivity to change related to it being a coastal vantage point with long scenic views of the Southern Ocean, Blackwood River / Goorbilyup Buerle mouth and coastal zone of Scott Coastal Plain. The Proposal is assessed as likely to result in a high magnitude of the change as it is anticipated to permanently alter the otherwise undeveloped rugged coastal view and dimmish the perceived quality.	Plate 10-19 Plate 10-20
VP11	Flinders Bay Jetty	High	High	High	VP11 has a high impact rating due to the viewpoint having a high sensitivity of change related to it being a coastal vantage point that includes long scenic views of the Southern Ocean and coastal zone of Scott Coastal Plain. The Proposal is predicted to result in a high magnitude of change as it is likely to permanently alter the otherwise undeveloped view across the Southern Ocean and diminish the perceived quality of the view.	Plate 10-21 Plate 10-22
VP12	Colourpatch / Seine Bay	High	Moderate	High-moderate	VP12 has a high-moderate impact rating due to the viewpoint having a high sensitivity of change relating to the long scenic views of the landscape being highly valued by the community, recreational users and tourists. The Proposal is expected to result in a moderate magnitude of change as it is likely to result in a discernible change to the right side of the view that would be out of scale with the existing view.	Plate 10-23 Plate 10-24

*Additional representative photos are provided in Appendix T including those with red overlays.



Plate 10-1: Existing View from VP01 (August Hotel)



Plate 10-2: View from VP01 (Augusta Hotel) with Proposal



Plate 10-3: Existing View from VP02 (Augusta Residential)



Plate 10-4: View from VP02 (Augusta Residential) with Proposal



Plate 10-5: Existing View from VP03 (Hillview Road Lookout)



Plate 10-6: View from VP03 (Hillview Road Lookout) with Proposal



Plate 10-7: Existing View from VP04 (Adjacent to Molloy Island)



Plate 10-8: View from VP04 (Adjacent to Molloy Island) with Proposal



Plate 10-9: Existing View from VP05 (Scott River Road)



Plate 10-10: View from VP05 (Scott River Road) with Proposal



Plate 10-11: Existing View from VP06 (Warner Glen Road)



Plate 10-12: View from VP06 (Warner Glen Road) with Proposal



Plate 10-13: Existing View from VP07 (Brockman Highway)



Plate 10-14: View from VP07 (Brockman Highway) with Proposal



Plate 10-15: Existing View from VP08 (Karridale Residential)



Plate 10-16: View from VP08 (Karridale Residential) with Proposal – Red Overlay



Plate 10-17: Existing View from VP09 (Glenarty Road)



Plate 10-18: View from VP09 (Glenarty Road) with Proposal



Plate 10-19: Existing View from VP10 (Albany Terrace Beach Access)



Plate 10-20: View from VP10 (Albany Terrace Beach Access) with Proposal



Plate 10-21: Existing View from VP11 (Flinders Bay Jetty)



Plate 10-22: View from VP11 (Flinders Bay Jetty) with Proposal



Plate 10-23: Existing View from VP12 (Colourpatch / Seine Bay)



Plate 10-24: View from VP12 (Colourpatch / Seine Bay) with Proposal

10.6.3. Socio-Economic Outcomes for the Local Community

10.6.3.1. Tourism and Employment

The Proposal includes the development of a public viewing area of the wind farm which will allow visitors to observe the turbines and will provide information about renewable energy. Visitors may include schools, people with special interest groups (e.g. environmental, scientific, creative) and other tourists to the area. This will result in a positive net benefit to the local community, creating a tourism asset and an opportunity for active community participation in the Proposal (Place.ID 2025).

The Proposal will create a number of jobs, primarily during the construction phase with an anticipated peak construction workforce of 150 people over an 18 to 24 month period. During operations, the Proposal will require approximately five full time staff who reside locally for wind farm maintenance activities, landowner liaison, environmental management and safety. The Proponent will develop a procurement strategy with a focus on maximising local employment opportunities creating a positive outcome with regards to increased employment opportunities for the local community.

Pressure on local accommodation resulting from the Proposals construction workforce has been raised as a concern by the local community (Place.ID 2025). While the construction workforce will be accommodated locally it is not expected to significantly strain the availability of local accommodation to the extent that local tourism is impacted, given the estimated peak of 150 personnel. The Proponent considers that the Proposal will positively contribute to the local economy during the construction period.

10.6.3.2. Agricultural Land Use

The Proposal has been designed to limit impacts to biodiversity, including native vegetation, fauna habitat and waterways, by locating the Development Envelope on land largely cleared for agricultural development. Impacts to the productivity of the agricultural lands is an important consideration of the Proposal and a concern highlighted by the local community (Place.ID 2025).

The Proposal may result in temporary land access restrictions during construction. Restriction will be minimised as much as possible, and the Proponent will communicate with relevant landowners and other stakeholders to ensure alternative access arrangements can be made where required.

The Proposal is not expected to significantly impact the production potential of existing farmland within the Development Envelope, given the small infrastructure footprint, continued access for cropping/grazing within a short distance of a turbine (typically 40 - 70 m) and the upgrades to many internal access roads which will benefit the relevant landowners. Wind farms and productive agriculture have a well-established track record of land use compatibility and can provide a consistent and steady income for farmers in addition to agriculture.

PASS also has the potential to impact productivity by affecting the soil fertility, and groundwater and surface water quality. An ASSDMP will be developed to manage the potential risks to the environment during construction of the Proposal. As the infrastructure and design layout has not yet been finalised, a Preliminary ASSDMP (Appendix B) has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP to be developed prior to construction of the Proposal.

Turbine and other mast/tower foundations have also been designed to limit dewatering requirements and the volume of PASS disturbed. Three potential foundation designs (two primary, one secondary) have been included as part of the Proposal (see Section 2.2.1), with the two primary foundation options (above ground and partially above ground foundations) minimising the amount of PASS proposed to be

excavated (as detailed in Section 6) and associated dewatering requirements (as detailed in Section 7). The specific foundation option chosen for each turbine/mast/tower location will be determined based on detailed site investigation and revised modelling to ensure there will be no significant impact to soil, groundwater or surface water quality. Further detail on PASS risk and management is provided in Section 6 (Terrestrial Environmental Quality) and Section 7 (Inland Waters).

At the end of life of the wind farm, the Proponent will decommission and rehabilitate the Development Envelope to a state agreed upon with the landowners, in accordance with the Decommissioning Plan (Appendix C) and in any event to a state suitable for the prevailing agricultural land use. This may include regrading, topsoil replacement and revegetation. The Proponent will ensure engagement with landowners is ongoing throughout the planning, decommissioning and rehabilitation process to understand preferences for removal or retention of Proposal infrastructure (such as fencing, storage facilities and roads).

Based on the above it is expected that the Proposal will have limited negative impacts to agricultural development within the region and may provide a benefit in terms of financial sustainability for farming operations.

10.6.3.3. Infrastructure, Services and Roads

Electromagnetic Interference

Results of the preliminary EMI assessment indicate that without mitigation there is potential for the Proposal to result in minor EMI impacts (DNV 2025a).

Based on the indicative layout three turbines are within the diffraction exclusion zones of the point-to-point links operated by Telstra. If required, turbine locations will be adjusted and/or communication infrastructure will be relocated, reconstructed or modified to ensure no impacts associated with EMI to these links.

The Proposal may also interfere with point-to-area style services such as mobile phone signals, radio broadcasting, and terrestrial television broadcasting, particularly in areas with existing poor or marginal signal coverage. Mobile phone signal coverage by Telstra, Optus and Vodafone/TPG are generally available throughout most of the Development Envelope, and therefore these providers are unlikely to experience interference from EMI. Dwellings within approximately 5-10 km of the Proposal are within interference zones calculated for the Augusta and Bunbury television broadcast transmitters. Dwellings that are currently receiving weak signals from these transmitters may experience additional interference with their services. If interference to any of these point-to-area style services is experienced, a range of management options are available, including:

- Mobile phones- Increase signal strength from affected tower or alternative towers, or the installation of an additional tower
- Radio Broadcasting - Installation of higher-quality antenna at affected dwelling and/or move antenna to a new location
- Television broadcasting - Re-alignment of antenna at affected dwelling to existing tower, re-direction of antenna to alternative tower, installation more directional or higher gain antenna, change location of antenna, installation of cable or satellite television or installation of relay transmitter.

One dwelling within 5 km of the Development Envelope may experience interference to geostationary satellites which transmit both international and national programs. For the same dwelling, interference is also possible to signals from the National Broadband Network (NBN) Sky Muster satellite. If these

services are being used and if interference to these are experienced, a range of management option could be implemented including redirecting satellite dish to alternative satellite, install larger or higher-quality satellite dish, or change location or height of the satellite dish. Potential EMI impacts on other services considered in the assessment, including trigonometrical stations, survey marks, and CB radio, are not expected, or are considered to be minor (DNV 2025a).

The Proponent will continue to engage with providers (including Telstra and Western Power) and other relevant stakeholders to develop suitable mitigation measures, if required, to ensure minimal disruption to electromagnetic signals.

On this basis, the Proposal is not expected to result in significant impact to communications infrastructure as a result of EMI.

10.6.3.4. Traffic

The Proposal will result in an increase to existing traffic volumes within and around the Development Envelope during the 18-24 month construction phase. Once operational, traffic associated with the Proposal will be limited to occasional maintenance vehicles which may occur a few times a year and is not expected to significantly impact the local community (Shawmac 2024). As such, this assessment focuses on the construction phase of the Proposal.

During construction, the peak hour traffic generation is expected to be an average of 28 and maximum of 53 vehicles per hour (Shawmac 2024). According to the TIA Guidelines, this is considered a low to moderate impact and can be accommodated within the existing road network capacity (WAPC 2016; Shawmac 2024). Notably peak periods of Proposal traffic are anticipated in the morning and late afternoon which is outside the existing peak traffic period along Brockman Highway around midday. The crash history for the roads surrounding the Development Envelope is low, indicating that there is no major safety issue with the road network (Shawmac 2024). Given the low to moderate increased traffic as a result of the Proposal and the limited time period that traffic will increase, the Proposal is not expected to result in a significant increase in the risk of vehicle collisions.

The impacts of traffic on local industries and communities will be minimised during construction through the implementation of a Traffic Management Plan. The Proponent will ensure that any traffic disruptions such as road closures and detours are communicated to the local community with sufficient forewarning. It is expected that the increased traffic volumes during the construction phase of the Proposal can be managed to ensure that there are no significant impacts to the community or other industries utilising the transport route.

10.6.3.5. Bushfire

The potential for the Proposal to result in increased risk of fire and impacts to fire-fighting airplane access is a community concern (Place.ID 2025). The Development Envelope is designated as a bushfire prone area (DFES 2024), with the continuous native vegetation in the surrounding forests presenting the highest bushfire risk in the local area (Linfire 2025b). During consultation, members of the community and local fire brigade raised concerns regarding fire plane access to the Development Envelope and water storage on site.

Fire hazards associated with wind farms can include electrical hazards (power surges, hot surfaces, lightning strike), chemical hazards (leakage of oils and other flammables), increased fire spread due to air flow or falling debris (including turbine blades), obstruction of aerial firefighting access and landscape hazards (ignition within the wind farm facility or external ignition of infrastructure from radiant heat or embers) (Linfire 2025b). However, as noted by the Australasian Fire and Emergency Services Authorities

Council, the likelihood of turbine fires is considered to be low given appropriate protection measures are applied (Linfire 2025b).

The risk of fire associated with the Proposal will be managed through the implementation of a BMP (Linfire 2025a) and BRMP (Linfire 2025b). Vegetation will be maintained around all infrastructure to reduce bushfire risk, including the implementation of non-vegetated and asset protection zones around the base of each wind turbine. All wind turbines will be fitted with an automatic fire detection and alarm system, as well as an automatic fire suppression system. In the event of a turbine fire, the affected turbine will automatically shut down. Turbines will also have the capability to be remotely shut down and de-energised in the event of bushfire. The fire detection and alarm system will include notification to relevant personnel, such as wind farm staff, DFES, the local fire brigade and/or neighbouring landowners. In accordance with the BMP (Linfire 2025a), the Proposal will be:

- Equipped with a mobile fire trailer (or similar approved device) which the Proponent must ensure is maintained and ready for use, by emergency services, at all times during bushfire season, including ensuring a full water tank and pump fuel tank
- Provide water for managing fire by emergency services, currently proposed to be stored in three clearly signposted 45 kL firewater tanks across the site.

The Proponent will ensure that access to the Development Envelope and water tanks is available to emergency services at any time. Wind turbines can also be paused remotely in the unlikely event of a fire, to enable aerial firefighters to access the area, should the pilot deem it safe to do so.

In addition to this, wind farms can reduce the bushfire risk through:

- Improved private access roads, allowing better access for emergency services in case of fire and providing additional firebreaks
- Having full time operational staff on site, meaning more eyes and ears on the ground to spot bush fires early
- Attracting lightning strikes during thunderstorms (rather than hitting the ground and vegetation), with strikes safely managed by their built-in protection systems (AFESCA 2018)
- Installing remote monitoring systems to notify personnel if a fire is detected
- Providing dedicated water tanks at the wind farm which can be used in the event of a fire.

10.6.4. Reduced Amenity

10.6.4.1. Light

The installation of aviation hazard lighting on wind turbines has the potential to result in visual impacts at nighttime. The Proponent understands that the dark sky is a valued attribute of the rural landscape. While current aviation assessment has not identified a requirement for turbine lighting. Aviation lighting will only be installed if required by the approving authorities, the Proponent will work with aviation and emergency services to assess alternative lighting solutions that enhance aviation safety without impacting the surrounding environment. In this instance, mitigation measures will be implemented to reduce the impacts of aviation hazard lighting as much as possible, including:

- Installation of aviation lighting on the minimum number of turbines required for safety purposes.
- Use of the lowest candela intensity permitted for safety purposes
- Construction of wind turbines from non-reflective material.

There are no existing flight paths over the Development Envelope. As such, turbine lighting would only be triggered in emergency situations and for a short duration.

Some lighting may be required during construction of the Proposal. Nighttime construction activities will be avoided where possible, and lighting will be limited to that required for safety purposes. The minimum intensity and number of lights will be used.

Lighting will also be required on supporting infrastructure including substations and facility buildings during operations. Due to the low height of this infrastructure, it is not expected to result in significant impacts to the visual amenity of the landscape.

Based on the above lighting from the Proposal is not expected to result in a significant impact to sensitive receptors or the character of the landscape.

10.6.4.2. Noise

Noise levels have been estimated at all identified noise sensitive receptors relevant to the Proposal (GHD 2025a). These estimates have been based on all WTGs operating at the same time and at various wind speeds.

The noise impact assessment considered the predicted noise levels of the Proposal's WTGs against the WA Noise Regulations and background noise monitoring against the SA Guidelines (Section 10.3.8). The predicted noise levels during WTG operation are below both sets of assessment criteria for all noise sensitive receptors. The predicted noise levels from WTGs are presented in Table 10-13 and noise contours are shown on Figure 10-6 .

The results of the noise impact assessment found that received noise levels at noise sensitive receptors from the substation is expected to be more than 20 dB lower than noise from the WTGs (GHD 2025a). As such, the substation is not expected to result in noticeable noise levels at the noise sensitive receptors.

An Operational Noise Management Plan will be developed and implemented. This will include the requirement for noise monitoring to be undertaken to ensure that levels are not greater than those predicted. If exceedances are recorded, contingency measures will be implemented. On this basis, the Proposal is not expected to result in significant impacts to local noise receptors.

Table 10-13: Predicted Nosie Levels (dB(A)) of the Proposal Assessed Against WA Noise Regulations and SA Guidelines (SA EPA 2021)

Noise Sensitive Receptor	Predicted Noise Level (dB(A)) at Each Wind Speed																								Compliance	
	4 m/s			5 m/s			6 m/s			7 m/s			8 m/s			9 m/s			10 m/s			11 m/s				
	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	L_{Aeq} 10 min	WA Criteria	SA Criteria	WA Criteria	SA Criteria
R01	16	35	35	18	35	36	21	35	38	24	35	39	26	35	40	27	35	40	28	35	39	28	35	41	Yes	Yes
R02	16	35	35	18	35	36	21	35	38	24	35	39	26	35	40	28	35	40	28	35	39	28	35	41	Yes	Yes
R03	15	35	35	17	35	36	20	35	38	23	35	39	25	35	40	27	35	40	27	35	39	27	35	41	Yes	Yes
R04	14	35	35	16	35	36	19	35	38	22	35	39	24	35	40	26	35	40	26	35	39	26	35	41	Yes	Yes
R05	15	35	35	17	35	36	20	35	38	23	35	39	25	35	40	27	35	40	27	35	39	27	35	41	Yes	Yes
R06	16	35	35	19	35	36	22	35	38	25	35	39	26	35	40	28	35	40	28	35	39	28	35	41	Yes	Yes
R07	19	35	35	21	35	36	25	35	38	28	35	39	30	35	40	31	35	40	32	35	39	32	35	41	Yes	Yes
R08	15	35	35	17	35	36	21	35	38	24	35	39	25	35	40	27	35	40	27	35	39	27	35	41	Yes	Yes
R09	17	35	35	19	35	36	22	35	38	25	35	39	27	35	40	28	35	40	29	35	39	29	35	41	Yes	Yes
R10	15	35	35	17	35	36	21	35	38	23	35	39	25	35	40	27	35	40	27	35	39	27	35	41	Yes	Yes
R13	16	35	35	19	35	35	22	35	36	25	35	36	27	35	37	29	35	37	29	35	37	29	35	38	Yes	Yes
R14	16	35	35	19	35	35	22	35	35	25	35	35	27	35	35	28	35	35	29	35	35	29	35	36	Yes	Yes
R15	16	35	35	18	35	35	21	35	35	24	35	35	26	35	35	28	35	35	28	35	35	28	35	36	Yes	Yes
R16	16	35	35	19	35	35	22	35	35	25	35	35	26	35	35	28	35	35	28	35	35	28	35	36	Yes	Yes
R17 (involved)	21	40	45	24	40	45	27	40	45	30	40	45	32	40	45	34	40	45	34	40	45	34	40	45	Yes	Yes
R18 (involved)	22	40	45	24	40	45	27	40	45	30	40	45	32	40	45	34	40	45	34	40	45	34	40	45	Yes	Yes
R19	18	35	35	21	35	35	24	35	35	27	35	35	29	35	35	30	35	35	31	35	35	30	35	36	Yes	Yes
R20	20	35	35	23	35	35	26	35	36	29	35	36	31	35	37	33	35	37	33	35	37	33	35	39	Yes	Yes
R21	21	35	35	23	35	35	27	35	36	30	35	36	31	35	37	33	35	37	33	35	37	33	35	39	Yes	Yes
R22	21	35	35	23	35	35	27	35	36	30	35	36	31	35	37	33	35	37	33	35	37	33	35	39	Yes	Yes
R23	21	35	35	23	35	35	27	35	36	29	35	36	31	35	37	33	35	37	33	35	37	33	35	39	Yes	Yes
R24	19	35	35	22	35	35	25	35	36	28	35	36	30	35	37	31	35	37	32	35	37	32	35	39	Yes	Yes
R28	18	35	35	20	35	36	23	35	37	26	35	37	28	35	37	29	35	37	30	35	37	30	35	38	Yes	Yes
R29	17	35	35	19	35	36	22	35	37	25	35	37	27	35	37	28	35	37	29	35	37	29	35	38	Yes	Yes
R30	11	35	35	13	35	36	16	35	37	19	35	37	21	35	37	22	35	37	23	35	37	23	35	38	Yes	Yes
R31	9	35	35	12	35	36	14	35	37	17	35	37	19	35	37	20	35	37	21	35	37	21	35	38	Yes	Yes
R32	22	35	35	25	35	35	28	35	36	31	35	36	33	35	37	34	35	37	35	35	37	35	35	39	Yes	Yes
R33	21	35	35	23	35	35	26	35	36	29	35	36	31	35	37	33	35	37	33	35	37	33	35	39	Yes	Yes
R34	17	35	35	19	35	36	22	35	38	25	35	39	27	35	40	29	35	40	29	35	39	29	35	41	Yes	Yes

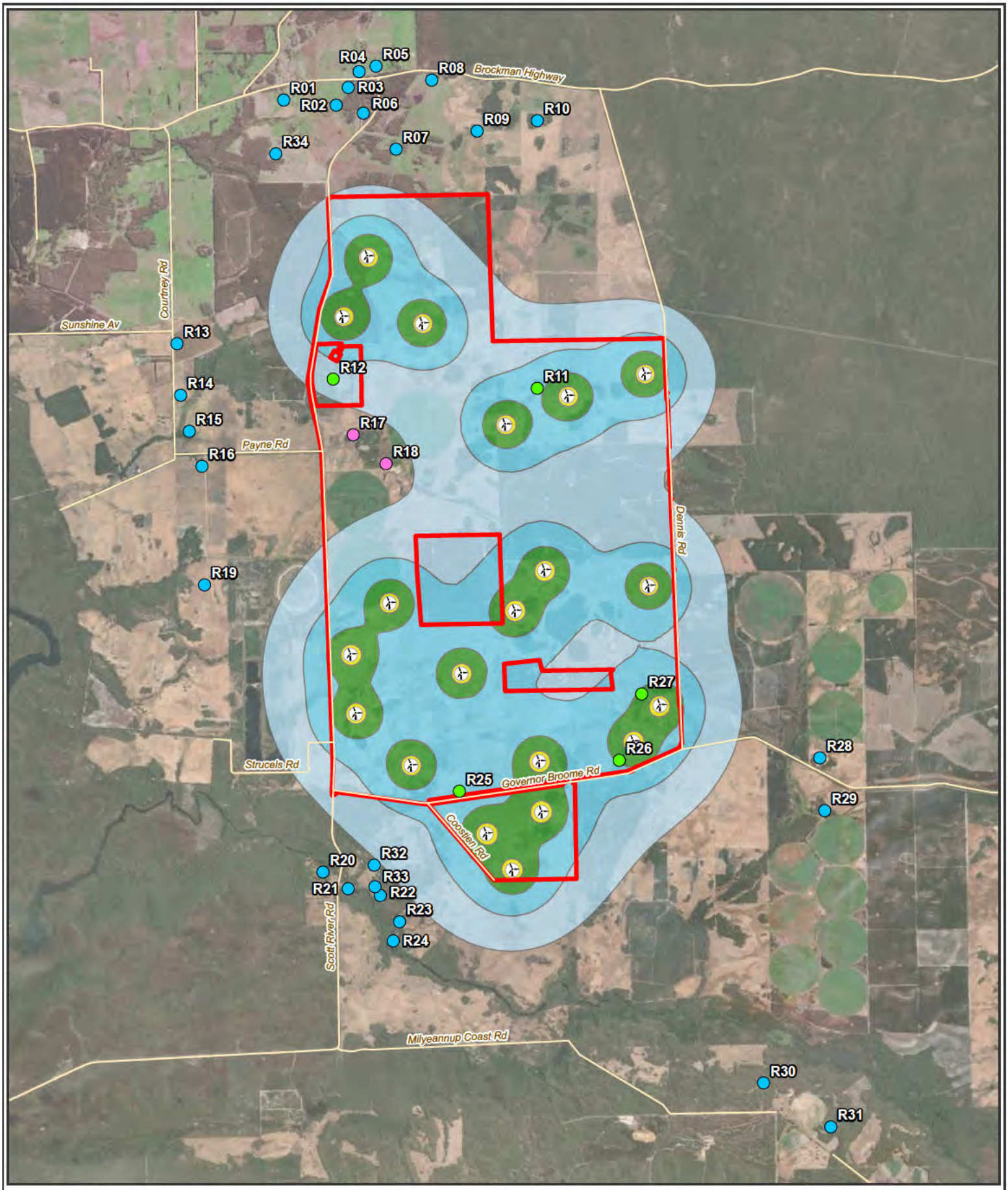

Figure 10-6: Predicted Noise Levels (dB(A)) of the Proposal at Noise Sensitive Receptors During 10 m/s Wind Speeds

Wind Turbine
Roads
Development Envelope

Noise Receptors
- Non-sensitive Noise Receptor
- Involved Noise Sensitive Receptor
- Not-involved Noise Sensitive Receptor

Noise Contours (dB, LAeq, 10 min)
- 35-40
- 40-45
- 45-50
- 50-55

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/12/2025

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

10.6.4.3. Shadow Flicker

Two of the 21 dwellings assessed were predicted to experience shadow flicker of a moderate level of intensity or above based on their distance from the wind turbines being less than 1,720 m (10 times the rotor diameter) (Table 10-14, DNV 2025b). One of the two dwellings (R12) was estimated to experience a moderate or above shadow flicker intensity for a duration above the recommended theoretical limit of 30 hours per year (Table 10-14). This theoretical assessment represents a 'worst-case scenario', assuming clear skies and blades orientated towards the receptor. For the remaining dwellings:

- Twelve were considered to experience a low level of intensity of shadow flicker based on their distance from the wind turbines being more than 1,720 m (10 times the rotor diameter) and less than 2,580 m (15 times the rotor diameter). The duration of moderate or above shadow flicker expected at these receptors is therefore expected to be zero.
- Seven were considered to have no shadow flicker based on their relation to the turbines and orientation of the sun.

In accordance with the Draft National Wind Farm Guidelines (EPHC 2010) revised modelling was undertaken to account for real-world conditions such as cloud cover and turbine operation and confirm actual shadow flicker duration is less than the recommenced predicted limit of 10 hours per year for R12 and R32 (Table 10-14). Modelling of actual shadow flicker has confirmed compliance with Draft National Wind Farm Guidelines (EPHC 2010), on this basis the Proposal is not expected to result in significant shadow flicker impact on any dwelling.

Table 10-14: Predicted Theoretical and Actual Moderate or Above Shadow Flicker Intensity Duration

Sensitive Shadow Receptor (Dwelling) ID	Receptor Type	Theoretical Annual Shadow Flicker Duration				Predicted Actual Annual Shadow Flicker Duration**			
		At Dwelling (hr/yr)		Max within 50 m (hr/yr)		At Dwelling (hr/yr)		Max within 50 m (hr/yr)	
		2 m*	6 m*	2 m*	6 m*	2 m*	6 m*	2 m*	6 m*
Recommended duration limits (hr/yr)		30	30	30	30	10	10	10	10
R12~	Non-involved	33.0	32.6	35.1	34.4	5.9	5.8	6.1	6.0
R32	Non-involved	12.1	12.0	12.8	12.8	2.5	2.4	2.6	2.6

Note: All other dwellings are predicted to experience zero moderate or above shadow flicker. Bold text represents exceedance of the recommended duration limits.

~ Note that although R12 was considered a "dwelling" in DNV 2025b, R12 operates as a commercial premise and so is not a sensitive receptor.

*In the absence of detailed dwelling information, shadow flicker has been calculated as heights of 2 m, to represent ground floor windows, and 6 m, to represent second floor windows.

**Considers likely reductions in shadow flicker duration due to cloud cover and turbine orientation in accordance with the Draft National Wind Farm Guidelines (EPHC 2010).

10.6.4.4. Dust

Localised, short-term increases in dust emissions are expected to occur during construction of the Proposal associated with land clearing and vehicle and machinery movements. Minimal dust is considered to occur during operation of the Proposal. Impacts of dust deposition will be managed through the implementation of standard dust management measures including dust suppression (such as water carts) and implementation of speed limits on unsealed roads/tracks. Progressive clearing, as well as the progressive rehabilitation of temporarily cleared areas will also assist in minimising the potential for dust emissions during construction. The Proponent considers that any impacts from dust will be localised to within and immediately surrounding the Development Envelope and will be short term during construction of the Proposal. No significant impacts to the amenity of the landscape are expected.

10.7. Environmental Outcomes

No significant impacts to social surroundings values are expected as a result of the Proposal. In consideration of the proposed avoidance and mitigation measures, the environmental outcomes of the Proposal for the Social Surroundings environmental factor are:

- No direct impacts to the Blackwood River / Goorbilyup Buerle and no direct impact to the Scott River without the relevant consultation with KKAC and any necessary authorisations under the AH Act
- Indirect Impacts to small tributaries of Blackwood River / Goorbilyup Buerle and Scott River because of altered surface hydrological regimes or water quality will be minor, temporary and localised
- Moderate to high impact to LCU and the visual amenity at 11 of the 12 sensitive receptors as a result of visible wind turbines
- Creation of a tourism asset and opportunity for active community participation in the Proposal and the creation of local employment opportunities
- No significant impact to productivity of agricultural land as a result of the Proposal
- No significant impact from EMI
- Minor and temporary impact of increased traffic to the local community and industries during construction
- Minor increase in risk of accidental bushfires, however minor decrease in risk of lightening caused bushfire
- Minor increase in light emissions
- Noise emissions will be compliant with the WA Noise Regulations at all non-involved noise sensitive receptors
- Low impact of shadow flicker, compliant with Draft National Wind Farm Guidelines (EPHC 2010)
- Minor, short term increase in dust emissions during construction.

Impacts will be managed through the implementation of management plans throughout construction and operation, including a CEMP, ASSDMP, Traffic Management Plan, Operational Noise Management Plan, BMP and BRMP. The Proponent considers that the Proposal can be implemented to meet the EPA's objective for the Social Surroundings environmental factor "*to protect social surroundings from significant harm*".

11. Holistic Impact Assessment

In addition to the consideration of impacts associated with the Proposal and the application of the mitigation hierarchy to individual environmental factors, the EPA also requires Proponents to consider the impact of their proposal on the environment as a whole (EPA 2024). The environment is a complex system of connections and interactions, and while an effect on a particular factor(s) may be minor when considered in isolation, its impact across these interconnections may result in a significant impact which requires assessment.

The EPA defines the holistic impacts as the "Connections and interactions between impacts, and the overall impact of the proposal on the environment as a whole" (EPA 2024). The Proponent has sought to understand the environment as a whole, using information derived from technical surveys and investigations on the environment (Sections 6 to 10), and the views and concerns raised through consultation with relevant stakeholders (Section 4).

11.1. Connections and Interactions between Environmental Factors

The environmental surveys and studies undertaken for the Proposal have considered and assessed potential local and regional impacts. The results of these surveys have informed the Proposal impact assessment and mitigation measures. While the Proposal's predicted outcomes have been considered independently in relation to the environmental principles and the EPA's environmental objectives for each preliminary environmental factor, the Proponent recognises the complex linkages between all factors including Social Surroundings, Inland Waters, Flora and Vegetation, Terrestrial Fauna and Terrestrial Environmental Quality as illustrated in Figure 11-1.

In the South West, as in other regions, important cultural and heritage values often coincide with elements of the environment that support high visual and social amenity, botanical diversity and fauna habitat values. Therefore, additional combined environmental effects may become significant and require additional mitigation.

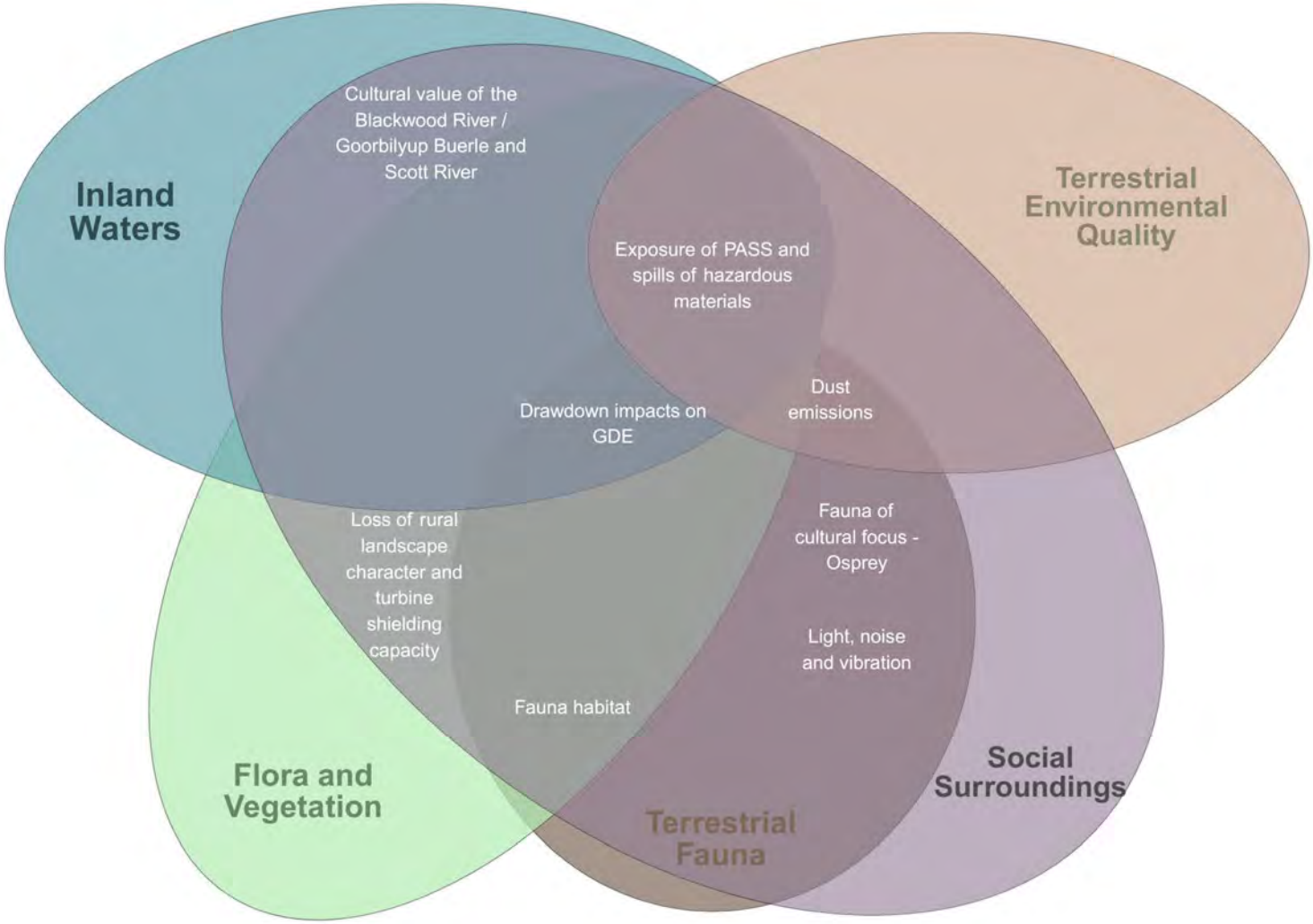

Figure 11-1: Holistic View of Links between Environmental Factors and Values

11.2. Consideration of Holistic Effects

This section provides information on the Proposal's effects on the environment as a whole to determine whether any additional considerations for assessment arise. For this holistic assessment, the following considerations have been applied:

1. Where an impact(s) has been completely avoided, it will not contribute to holistic environmental effects and does not require consideration
2. Where there are multiple overlapping minor impacts, or a minor impact affects multiple values and has been assessed as insignificant in the context of an individual factor, these may require further holistic consideration, and
3. The environmental principles of intergenerational equity, and conservation of biological diversity and ecological integrity are considered the most relevant and have been a foundation when considering potential significance of the holistic effect of the Proposal.

Where holistic effects on the environment have been identified, their potential impacts to the environment as a whole have been considered in accordance with Section 4.1 of the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2024).

Table 11-1 presents the likely pathways for these holistic effects as it relates to the implementation of the Proposal and sets out the mitigation measures and outcomes across the interconnected factors. Where the Proponent considers there is potential for a combined impact, these pathways have been given further holistic consideration.

Table 11-1: Consideration of Holistic Impacts Across Interconnecting Key Environmental Factors

Land			Water	People	Mitigation	Environmental Outcomes	Holistic Consideration
Flora & Vegetation	Terrestrial Fauna	TEQ	Inland Waters	Social Surroundings			
Land disturbance as a result of clearing and bulk earthworks							
• Soil acidification and/or toxicity due to disturbance of PASS. • Soil erosion due to ground disturbing activities impacting soil, flora and fauna • Introduction and or spread of weeds and/or dieback. • Loss of conservation significant flora and fauna during clearing. • Loss and fragmentation of native vegetation and fauna habitat. • Degradation of vegetation and habitat (particularly GDEs), associated with changes in hydrological regime and reduced soil, surface and ground water quality.			• Disturbance of PASS resulting in acidification and/or toxicity of surface water and groundwater • Reduced quality of surface water and/or groundwater due to erosion or sedimentation or mobilisation of nutrients from ground disturbing activities. • Temporary groundwater drawdown due to penetration of an aquitard causing excessive leakage from the Superficial Aquifer.	• Loss or impact to Aboriginal heritage site or lodged place (Blackwood River / Goorbilyup Buerle or Scott River). • Altered socio-economic outcomes for the local community as a result of impacts to agricultural land use.	• The Indicative Disturbance Footprint has been developed to first avoid then minimise the clearing of native vegetation and disturbance of PASS as far as practicable, including, avoiding clearing of all Threatened and Priority flora individuals, potential nesting trees for black cockatoos, Scott River Ironstone TEC and wetland habitats (including contiguous native vegetation within 50 m) and minimising impacts from soil erosion and sedimentation. • During clearing of the 0.03 ha of Moderate quality Western Ringtail Possum habitat, a fauna spotter will be available on-site to spot and respond to any Western Ringtail Possum individuals encountered within the clearing area. • Clearing will occur in a slow, progressive manner, towards native vegetation to allow fauna to move into adjacent habitat. • The Proposal has been designed to avoid direct impacts to Blackwood River / Goorbilyup Buerle and Scott River. Any impacts to tributaries of Scott River within the Development Envelope would require consultation with KKAC and relevant authorisation under the AH Act. • Should potential artefacts or remains be uncovered during excavation, all works will cease immediately and a 'no work zone' will be established around the sites until it is assessed by appropriate specialists. • The wind farm layout has been designed to avoid the placement of wind turbines in proximity (minimum of 100 m from the centre point of the turbine) to native vegetation. Therefore, the majority of land disturbance and earthworks will be located a substantial distance from native vegetation and high value fauna habitat. • Ground disturbance adjacent to waterbodies, including wetlands and waterways, will be delayed as long as possible to minimise potential for sedimentation. • Use of alternative turbine foundations (Section 2.2.1.1) to minimise the requirement to excavate beyond the ferricrete or clay layers of the aquitard. • A CEMP (Appendix H) will be implemented during construction of the Proposal. This will include management measures to minimise impacts from clearing, prevent fauna entrapment, erosion management measures, weed control measures, feral fauna management, vehicle restrictions and the degradation of vegetation and habitat • A detailed ASSDMP will be prepared and implemented following completion of detailed site investigations and revised modelling, to be informed by the Preliminary ASSDMP (Appendix B) and will include measures to manage the disturbance of PASS.	• Clearing of a maximum of 1.00 ha of remnant native vegetation/fauna habitat represented by native vegetation • Potential introduction and/or spread of weeds and/or dieback. • Potential for minor and localised impacts to soil and water quality as a result of erosion, sedimentation or mobilisation of nutrients during construction. • Minor increase in fragmentation of native vegetation and fauna habitat • Potential loss of conservation significant fauna. • Potential for minor, temporary and localised impacts to soil and water quality as a result of PASS disturbance during construction. • Penetration of an aquitard that would lead to excessive leakage for the Superficial Aquifer is unlikely.	The likely environmental outcomes as a result of land disturbance from clearing, or bulk earthworks are relatively minor when considered in isolation. The Proponent considers that given the implementation of multifaceted mitigation measures and management plans there is also minimal potential that land disturbance results in a significant combined impact when considered holistically across interconnected factors. On this basis, holistic impacts due to land disturbance are not considered further.
Dust emissions during construction and operation							
• Degradation of native vegetation and fauna habitat from dust	N/A		• Impacts to landscape and visual amenity as result of dust emissions.		• Dust management measures will be implemented in accordance with the CEMP. Measures will include: - Dust suppression techniques during construction, such as water carts - Speed limits on unsealed roads/tracks - Progressive clearing, and rehabilitation of temporary disturbance areas. • Land temporarily disturbed during construction (e.g. for laydown areas and concrete batching plant) will be rehabilitated to the original land use or to a post closure land use agreed with the landowners to minimise dust emissions.	• Localised short-term increase in fugitive dust emissions during construction.	The likely environmental outcomes as a result of the generation of dust during construction and operation of the Proposal are relatively minor when considered in isolation. The Proponent considers that given the implementation of multifaceted mitigation measures and management plans there is also minimal potential that dust emissions generated by the Proposal will result in a significant combined impact when considered

Land			Water	People	Mitigation	Environmental Outcomes	Holistic Consideration
Flora & Vegetation	Terrestrial Fauna	TEQ	Inland Waters	Social Surroundings			
							holistically across interconnected factors. On this basis, holistic impacts due to dust emissions are not considered further.
Groundwater drawdown associated with construction dewatering							
• Degradation of GDE (GDV and wetlands) as a result of groundwater drawdown. • Degradation of GDE, associated with acidification and/or toxicity of surface and ground water.			• Temporary groundwater drawdown due to dewatering for construction • Degradation of groundwater quality as a result of groundwater drawdown, including draw in of the adjacent Beenup Mine acid mine plume.	• Impacts to Aboriginal heritage site/lodged heritage place (Blackwood River / Goorbilyup Buerle or Scott River). • Reduced water security for surrounding bore users.	• The Proposal has been designed to avoid direct impacts to Blackwood River / Goorbilyup Buerle and Scott River. Any impacts to tributaries of Scott River the Development Envelope would require consultation with KKAC and relevant authorisation under the AH Act. • Transmission poles and towers will utilise concrete caisson (bored concrete) foundations, so dewatering is not required • Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable • Dewatering will be minimised, managed and monitored in accordance with a detailed ASSDMP to be informed by the Preliminary ASSDMP (Appendix B), to ensure that drawdown does not present an unacceptable impact on the environment. This will be achieved through: - Application of the following drawdown limits: - Maximum drawdown of 2.0 mbgl at the perimeter of each foundation - Drawdown will not exceed 0.1 m beyond 100 m from any dewatering location - Drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE. • Use of alternative turbine foundations (Section 2.2.1.1). • No dewatering effluent will be disposed of, directly or indirectly, to wetlands or rivers. • Strategic disposal of dewater to, and location of, infiltration basins / trenches around the point of extraction to minimise the cone of depression. • Dewatering will be temporary, with the primary foundation (partially above ground) requiring dewatering for approximately 33 days. • No dewatering will occur for the construction of borrow pits. Borrow pits will be constructed above the water table. • Application of other management strategies as required (e.g. sheet piling).	• No impacts to the health of GDE (wetlands/GDV) as a result of dewatering during construction. • No direct or indirect impacts to the Blackwood River / Goorbilyup Buerle or Scott River. Potential for minor temporary and localised drawdown during construction • No interaction with the Beenup Mineral Sands acid mine plume is expected. • No significant effect on bore productivity is expected.	The likely environmental outcomes as a result of dewatering are relatively minor when considered in isolation. The Proponent considers that given the implementation of multifaceted mitigation measures and management plans there is also minimal potential that groundwater drawdown and dewatering results in a significant combined impact when considered holistically across interconnected factors. On this basis, holistic impacts due to groundwater drawdown and dewatering are not considered further.
Construction and operation of infrastructure							
• Loss or injury to fauna from collision with vehicles, machinery, turbines and transmission infrastructure. • Changes to fauna behaviour from wind turbine movements, noise, vibration and light • Increased competition or predation by feral fauna • Degradation of vegetation and habitat associated with changes in hydrological regime • Degradation of soil, vegetation and habitat due to the accidental loss or spills of hydrocarbons and other hazardous materials • Degradation of vegetation and fauna habitat from increased risk of bushfires			• Accidental loss or spills of hydrocarbons and other hazardous materials resulting in surface and groundwater contamination. • Changes to surface hydrological regimes due to Proposal infrastructure. • Changes to groundwater flow due to Proposal infrastructure.	• Reduction of landscape and visual amenity from noise and light emissions and shadow flicker. • Altered socio-economic outcomes for the local community as a result of impacts to recreation and tourism. • Altered socio-economic outcomes for the local community as a result of impacts on infrastructure, services and roads as a result of EMI, increased traffic or increased risk of accidental bushfires. • Altered socio-economic outcomes for the local community as a result of impacts to agricultural land use.	• Construction activities will be temporary and short term (approximately 18-24 months). • All temporary construction infrastructure (e.g., laydown areas and concrete batching plant) will be located within areas of existing disturbance, reducing clearing. • The Proposal has been designed to avoid direct impacts to Blackwood River / Goorbilyup Buerle and Scott River. Any impacts to tributaries of Scott River the Development Envelope would require consultation with KKAC and relevant authorisation under the AH Act. • Use of alternative turbine foundations (Section 2.2.1.1) to minimise changes to groundwater flow • The following design considerations will avoid and minimise impacts to visual amenity: - Wind turbine blades will be coated in a non-reflective paint to avoid blade glint.	• No direct impacts to the Blackwood River / Goorbilyup Buerle and no direct impact to the Scott River without the relevant consultation with KKAC and any necessary authorisations under the AH Act. • Indirect Impacts to small tributaries of Blackwood River / Goorbilyup Buerle and Scott River because of altered surface hydrological regimes or water quality will be minor, temporary and localised. • Potential loss or injury to fauna from collision with vehicles, machinery, turbines and transmission infrastructure. • Minor alterations to birds and bats movement patterns and behaviour from	The likely environmental outcomes as a result of construction and operation of infrastructure are relatively minor when considered in isolation. The Proponent considers that given the implementation of multifaceted mitigation measures and management plans there is also minimal potential that the construction and operation of Proposal infrastructure results in a significant combined impact when considered holistically across interconnected factors. On this basis, holistic impacts due to the construction and operation

Land			Water	People	Mitigation	Environmental Outcomes	Holistic Consideration
Flora & Vegetation	Terrestrial Fauna	TEQ	Inland Waters	Social Surroundings			
					- The Proposal has been designed to avoid impacts to native vegetation as much as possible, with impacts limited to the clearing of 1 ha of native remnant vegetation. - Wind turbines will be uniform in colour, design and size. - Non-reflective materials and muted colours will be used to reduce visibility at distance. - Existing farm tracks will be utilised as much as practicable, and all access roads will be maintained in an unsealed condition to blend with surrounding rural setting. - Landowners and adjacent neighbours will be engaged to discuss screening and landscaping to mitigate any visual impacts. • A Bushfire Management Plan (BMP; Linfire 2025a) and Bushfire Risk Management Plan (BRMP; Linfire 2025b) will be implemented during construction and operation of the Proposal. • A CEMP (Appendix H) will be implemented during construction of the Proposal. This will include key management measures for restricting vehicle movement, feral fauna attraction, accidental spills of hazardous materials and lighting minimisation measures. • A BBAMP (Appendix N) will be implemented during commissioning and operation of the Proposal. This will include adaptive management measures and monitoring requirements to minimise the loss or injury to birds and bats and light minimisation measures to avoid the attraction of birds and bats to turbines. • A Traffic Management Plan will be implemented during construction of the Proposal to minimise traffic safety impacts and disruptions to local road users. • An operational noise management plan will be developed and implemented for the wind farm • The Indicative Disturbance Footprint has been designed to ensure compliance with noise regulations at all existing dwellings. • Nighttime construction activities will be avoided where practicable. • Turbines will be regularly maintained to ensure noise emissions are not adversely impacted by turbine wear. • The Proponent will implement measures to minimise changes to surface hydrological regimes including: - Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable. - Modification of existing drainage infrastructure will be avoided, where possible, unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors. - Drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion. - Flow velocities will be maintained below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. - Design and construction works will ensure that local grading and excavation areas do not create areas of pooled water. - Exposed soils will be vegetated or covered (e.g. with rock or synthetic liners) in disturbed areas where surface water flow velocities exceed 1 m/s and remain below 2 m/s.	wind turbine movement, light, noise and/or vibration. • Potential for an increased abundance of feral fauna • Noise emissions will be compliant with the WA Noise Regulations at all non-involved noise sensitive receptors • Minor increase in light emissions. • Low impact of shadow flicker. • Impacts to vegetation, fauna habitat and soil and water quality as a result of the accidental loss or spill of hazardous materials will be minor. • Impacts to soil quality as a result of the disturbance of PASS will be minor and limited to the Development Envelope. • Minor increase in risk of accidental bushfires • Minor and localised impact to surface and groundwater flows as a result of Proposal infrastructure. • Moderate to high impact to LCU and the visual amenity at 11 of the 12 sensitive receptors as a result of visible wind turbines	of infrastructure are not considered further.

11.3. Conclusion

The Proposal's environmental impacts extend beyond individual factors and therefore the Proponent has undertaken a holistic evaluation to consider the combined and interconnecting effects across land, water, and people.

As per Table 11-1, all potential combined impacts were assessed as having a relatively minor impact, with the exception of impacts to visual amenity. However, as discussed in Section 10.6.2, this impact will vary greatly depending on the individual viewer and the Proponent will continue to investigate opportunities to minimise the visual impact of the Proposal.

Based on the above, the Proponent considers that the proposed mitigation measures will be effective in limiting both isolated and combined environmental impacts to minimal levels, mitigating the need for additional holistic mitigation.

12. Cumulative Impact Assessment

The purpose of this chapter is to evaluate the potential cumulative impacts that may result from implementing the Proposal.

Cumulative impacts are defined as the successive, incremental and interactive impacts on the environment of a proposal with one or more, past, present and reasonably foreseeable future activities (EPA 2024).

Specifically, this chapter will:

- Identify the environmental factors that need to be considered in the cumulative impact assessment
- Explain the methodology and screening process used to assess potential cumulative impacts
- Determine whether the Proposal could contribute to a significant cumulative effect on any environmental factor.

12.1. Local Impact Area

The environmental factors considered in this cumulative impact assessment are Flora and Vegetation, Terrestrial Fauna, Terrestrial Environmental Quality, Inland Waters and Social Surroundings.

The Proposal is located in the South West of Western Australia, within the Shire of Augusta-Margaret River. The surrounding landscape has been historically extensively cleared and is now primarily utilised for agricultural activities. The impact of this historical clearing and present agricultural activities is assumed to have been captured in the description of the receiving environment for the relevant EPA factors and forms the basis for this impact assessment. No substantial future agricultural development is expected within the region and therefore the cumulative impact associated with this historical and present agricultural clearing is not considered in this cumulative impact assessment.

A Local Impact Area (LIA) has been determined to assess the cumulative impact of the Proposal and other existing and reasonably foreseeable projects. The LIA encompasses the regional extents of environmental values at a broader resolution than that of each individual project. As such the LIA incorporates the following environmental values, that occur within 50 km of the Proposal:

- Pre-European Vegetation Associations
- Land Systems
- Beenup and Scott sub catchments, and Lower Blackwood Estuarine Reach
- The Superficial and Leederville aquifers.

A visual representation of the LIA is provided in Figure 12-1.

12.2. Existing and Reasonably Foreseeable Projects in the Local Impact Area

The EPA (2024a) defines reasonably foreseeable future activities as "third party (or Proponent) activities that are already approved, are in a government approvals process or are otherwise reasonably likely to proceed:

- For proposals assessed at the level of environmental review – at the time an Environmental Review Document for a proposal is accepted
- For proposals assessed at the level of assessment on referral information - at the time the final referral or required additional information is accepted
- Existing activities that are reasonably expected to be ongoing."

Although the Local Impact Area has experienced considerable historical agricultural clearing, due to data availability constraints, projects considered in the LIA are limited to those with EP Act and EPBC Act approvals, including:

- Projects assessed under Part IV of the EP Act
- Clearing Permits issued under Part V of the EP Act, with revoked, surrendered and withdrawn Clearing Permits excluded
- Projects assessed under Part 9 of the EPBC Act.

A desktop review identified eight existing or reasonably foreseeable projects within 50 km of the Proposal that have identified significant impacts to Environmental Factors associated with this Proposal. The relevant projects and their potential cumulative impacts to each key environmental factor are outlined below in Table 12-1 and shown within the LIA in Figure 12-1. Each projects entire development envelope was utilised to calculate cumulative impacts in accordance with the precautionary principle. Although visual impacts are key concern for the Proposal, none of the projects identified were assessed for visual impacts, hence these impacts are not discussed on a cumulative scale. In addition, given the absence of additional wind farms within the LIA, cumulative impacts to birds and bats as a result of turbine strike or barotrauma have not been assessed cumulatively.

The Milyeannup Wind Farm was also identified as a project within the LIA that was assessed under Part 9 of the EPBC Act. As discussed in Section 2.4.2, this project will not go ahead and the current Proposal provides an alternative renewable energy development option, with significantly less environmental impacts. As such, the Milyeannup Wind Farm has not been considered in cumulative impact calculations.

Table 12-1: Cumulative Impacts of Existing or Reasonably Foreseeable Projects in Proximity to the Proposal

Project	Approximate Distance (km) and direction from Proposal	Year of Approval	Relevant Key Environmental Factors	Development Envelope extent (ha)
EPA Significant Proposal				
Riverslea Subdivision*	29.1 km north-west	2007	Inland Waters	58.2
Yoongarillup Mineral Sands Project	46.7 km north	2016	Terrestrial Fauna	139.1
Margaret River Water Supply Upgrade*	26.2 north-west	1991	Terrestrial Fauna, Inland Waters, Social Surroundings	26.7
Heavy Mineral Sands Mine Beenup, Shire of	Directly adjacent to Proposal	1991	Terrestrial Fauna, and Inland Waters	336.2

Project	Approximate Distance (km) and direction from Proposal	Year of Approval	Relevant Key Environmental Factors	Development Envelope extent (ha)
Augusta-Margaret River*				
EPBC Act Referrals				
Lot 32 Tom Cullity Drive, Wilyabrup	31.5 km north-west	2022	Flora and Vegetation, Listed threatened species and communities; Terrestrial Fauna	40.1
Vlam Road Gravel Pit, Vlam Road, Karridale, WA	16.0 km north-west	2014	Listed threatened species and communities; Terrestrial Fauna	13.5
Flat Rock Boating Facility	14.5 km south-west	2011	Listed threatened species and communities; Flora and Vegetation	5.9
Clearing Permits				
Clearing Permits within 50 km of the Proposal (288 clearing permits)	Not applicable	-	Flora and Vegetation	1,777.0

*These significant proposals were assessed prior to current environmental factors, up to date factors have been identified from approvals documentation.

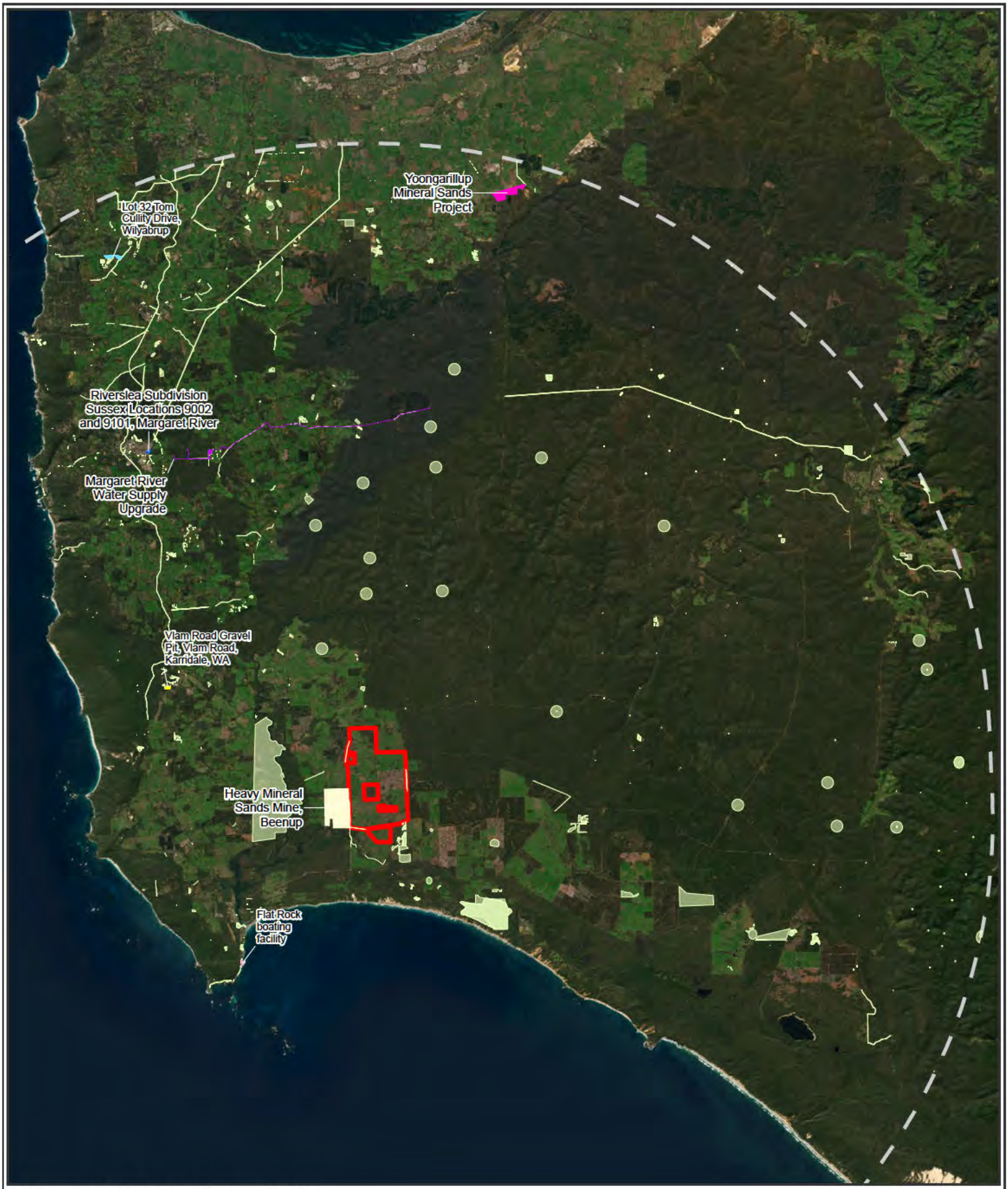

Figure 12-1: Local Impact Area

Development Envelope
50 km buffer
Clearing Permits within 50 km of the Proposal

EPA Significant Proposal
Heavy Mineral Sands Mine, Beenup
Margaret River Water Supply Upgrade
Riverslea Subdivision Sussex Locations 9002 and 9101, Margaret River
Yoongarillup Mineral Sands Project

EPBC Act Referrals
Flat Rock boating facility
Lot 32 Tom Cullity Drive, Wilyabrup
Vlam Road Gravel Pit, Vlam Road, Karridale, WA

0 4 8 16
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 8/20/2025

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12.3. Cumulative Impacts

The Proposal has potential to contribute to the following cumulative impacts:

- Cumulative loss of regionally significant vegetation (Flora and Vegetation)
- Cumulative loss of locally and regionally significant terrestrial fauna habitat (Terrestrial Fauna)
- Cumulative degradation of soil landscape systems (Terrestrial Environmental Quality)
- Cumulative loss or degradation of hydrological catchments (Inland Waters)
- Cumulative reduction and acidification of groundwater in regional aquifers (Inland Waters)
- Cumulative impacts on the socio-economic outcomes for the local community and amenity (Social Surroundings).

12.3.1. Cumulative Loss of Regionally Significant Vegetation

Pre-European Beard (2013) VAs have been utilised as a proxy to calculate the cumulative impacts of native vegetation clearing within the LIA. As the extent of disturbance associated with these VAs was not always publicly available for each project, spatial estimates of vegetation occurrence occurring within each project development envelope was calculated, with assumed clearance of the entire development envelope to be conservative.

It is assumed that vegetation clearing undertaken prior to 2018 has been captured in the native vegetation statistics published in 2018 (GoWA 2019). Therefore, projects assessed under Part IV of the EP Act and Part 9 of the EPBC Act implemented prior to 2018 are assumed to be reflected in the receiving environment and have not been included in the cumulative assessment.

The National Objectives and Targets for Biodiversity Conservation (Commonwealth of Australia 2001) includes a target to avoid the clearance of existing vegetation with a pre-European extent of below 30%. This target is reiterated by the EPA (2008). All VAs that occur within the Development Envelope are above this 30% threshold (Section 8.3.2.3).

The Proposal will result in minimal clearing within the current mapped extent of VAs within the LIA, with a maximum proposed clearing limit of 1.00 ha of native vegetation. Given the linear configuration of the Indicative Disturbance Footprint this clearing is likely to occur within multiple VAs within the Development Envelope.

The approximate loss of mapped pre-European VAs within the LIA based on the cumulative disturbance, as well as the maximum proposed clearing of each VA is presented in Table 12-2. The estimated cumulative impact on VAs within the LIA is anticipated to total 4,361.97 ha, with the majority of clearing within VA 3 (3,622.63 ha, approximately 75% of its pre-European extent remaining within the LIA). Following implementation of the Proposal, only 23.86% of the pre-European extent of VA 973 will remain within the LIA. However, this is not expected to represent a significant cumulative impact given the abundance of VA 973 within the Warren and Jarrah bioregions will remain at 59.87% of its pre-European extent, if the entire maximum proposed clearing (1.00 ha) occurred within this VA (see Section 8.3.2.3). Based on the maximum proposed clearing, at a regional scale, the Proposal will contribute to minimal clearing within the current mapped extent (DPIRD 2019) of each VA.

Clearing will also be minimised as much as possible within VA 1137 given it has been reduced by approximately 67.82% from its original extent in the LIA. In the unlikely event all potential native vegetation clearing (1.00 ha) disturbed only VA 1137, 32.08% would remain intact within the LIA (i.e. an increase in loss of 0.10%, resulting in 68.92% of its original extent being lost). In addition, the extent

within the Warren and Jarrah bioregions will remain at 32.00% of its pre-European extent if the entire maximum proposed clearing (1.00 ha) occurred within this VA (see Section 8.6.1). Given there are no projects within the LIA that intersect VA 1137, cumulative impacts to this VA are expected to be negligible.

On the basis of the above, any potential cumulative impact to native vegetation is not anticipated to be significant.

Table 12-2: Proposed Cumulative Clearing of Pre-European Vegetation Associations (ha)

Cumulative Clearing	VA 973	VA 975	VA 27	VA 51	VA 3	VA 14	VA 949	VA 1134	VA 1137
Pre-European extent within LIA	25.06	3,911.26	22,293.32	19,852.07	334,429.29	924.60	1,865.82	8,649.84	1,079.65
Current extent within LIA	6.98	3,314.13	8,125.40	11,121.09	254,684.73	836.88	621.40	7,134.20	347.40
Maximum clearing under this Proposal*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Clearing under past, present and reasonably foreseeable future activities									
Lot 32 Tom Cullity Drive, Wilyabrup	0.00	0.00	0.00	0.00	40.06	0.00	0.00	0.00	0.00
Clearing Permits within 50 km of the Proposal	0.00	121.16	0.00	547.03	3581.57	0.00	3.47	59.68	0.00
Maximum Total Cumulative Clearing within LIA (ha)	1.00	122.16	1.00	548.03	3,622.63	1.00	4.47	60.68	1.00
Extent Remaining within LIA (ha) (% of Pre-European extent)	5.98 (23.86)	3,191.97 (81.61)	8,124.4 (36.44)	10,573.06 (53.26)	251,062.1 (75.07)	835.88 (90.40)	616.93 (33.06)	7,073.52 (81.78)	346.40 (32.08)

*This is considered to be a worst-case scenario, as given the linear configuration of the Indicative Disturbance Footprint the maximum of 1 ha of clearing is likely to occur within multiple VAs within the Development Envelope

12.3.2. Cumulative Loss of Locally and Regionally Significant Terrestrial Fauna Habitat and the Cumulative Degradation of Soil Landscape Systems

Broad scale fauna habitat mapping has been completed within the Development Envelope but is unavailable for existing or reasonably foreseeable projects within the LIA. Regional scale land system mapping by DPIRD (2022) allows for assessment of cumulative impacts on broad landscape units as a surrogate for more detailed fauna habitat mapping. In addition, cumulative impacts on Terrestrial Environmental Quality can also be considered in this manner, in relation to the degradation of soil landscape systems, from pathways including the exposure of PASS and contamination. Where possible, the assessment has considered impacts based on the clearing footprints of each project. Where footprints were not publicly available, the entire development envelope has been assumed to be cleared to be conservative. The impacts associated with the Proposal have been determined based on the Indicative Disturbance Footprint. The cumulative loss of land systems is presented in Table 12-3.

All conservation significant fauna species that occur or are likely to occur within the Development Envelope may also be affected by existing or reasonably foreseeable projects. Retaining habitat where possible will minimise the impact on conservation significant fauna within the area.

The estimated cumulative impact on land systems impacted by the Proposal is anticipated to total approximately 1,395.92 ha. Based on the Indicative Disturbance Footprint, the Proposal's contribution is approximately 106.61 ha (8.46% of total impacts).

The cumulative impacts on land systems are minor, with the highest loss being approximately 679.18 ha from the Scott River Plain System (Table 12-3). Although the entire extent of the Indicative Disturbance Footprint occurs within the Scott River Plain System (Table 12-3), the Proposal includes flexibility to refine the Indicative Disturbance Footprint within the Development Envelope during detailed design. Therefore, the Scott River Plain System may not be impacted by the Proposal to this entire extent and impacts to the Nillup Plain System may occur. A substantial proportion (697.05 ha, 55.30%) of impacts to land systems are associated with the historic Beenup Mineral Sands Mine, now closed and rehabilitated to establish wetlands and native vegetation. As such, the fauna habitat and soil values are expected to have been largely reestablished at this project. Therefore, on a cumulative scale, the actual impacts to land systems are likely to be significantly less than the perceived impact outlined in Table 12-3.

Approximately 3,490.24 ha of fauna habitat will be retained within the Development Envelope comprising native and highly modified habitats. The Proposal will result in minimal clearing of habitats represented by native vegetation, with a maximum proposed clearing limit of 1.00 ha of native vegetation. Furthermore, the land systems used as a proxy for fauna habitat extend throughout the Warren and Southern Jarrah Forest bioregions and the species associated with the Proposal are known to occur throughout the region. For example, nearby there is higher quality and extensive habitat for black cockatoos and Western Ringtail Possums within conservation areas such as national parks in proximity to the Proposal. On this basis, the cumulative impacts to terrestrial fauna habitat and soil landscape systems from the Proposal are not expected to be significant at a local or regional scale.

Table 12-3: Proposed Cumulative Clearing of Land Systems Based on the Indicative Disturbance Footprint

Cumulative Clearing	Nillup Plain System	Scott River Plain System
Extent within LIA (ha)	53,427.23	63,345.66
Disturbance proposed under this Proposal (ha)	0.00	106.61
Clearing under past, present and reasonably foreseeable future activities		
Riverslea Subdivision	0.00	0.00
Yoongarllup Mineral Sands Project	0.00	0.00
Margaret River Water Supply Upgrade	0.00	0.00
Heavy Mineral Sands Mine Beenup, Shire of Augusta-Margaret River	124.48	572.57
Lot 32 Tom Cullity Drive, Wilyabrup	0.00	0.00
Vlam Road Gravel Pit, Vlam Road, Karridale, WA	0.00	0.00
Flat Rock Boating Facility	0.00	0.00
Clearing Permits within 50 km of the Proposal	456.87	0.00
Total Cumulative Disturbance (ha)	581.35	679.18
Extent Remaining (ha) (%)	52,845.88 (98.91)	62,666.48 (98.93)

12.3.3. Cumulative Loss or Degradation of Hydrological Catchments

Mapping of sub catchment boundaries across WA has been published by DWER (DWER 2018a). This dataset allows for the quantification of cumulative impacts of projects on hydrological sub catchments that intersect the Proposal. Where possible, the assessment has considered impacts based on the clearing footprints of each project. Where footprints were not publicly available, the entire development envelope has been assumed to be cleared to be conservative. The impacts associated with the Proposal have been determined based on the Indicative Disturbance Footprint. The cumulative loss of hydrological catchments is presented in Table 12-4.

The total estimated cumulative reduction of the Beenup sub catchment from the Proposal and existing projects within the LIA is 1,021.20 ha, with 40.69% remaining. Although this impact appears significant, a substantial amount (1007.88 ha, 98.70% of impacts) is associated with the historic Beenup Mineral Sands Mine. Given hydrological values are likely to have been reestablished across most of this rehabilitated site, the actual impacts to hydrological catchments are likely to be significantly less than the perceived impact outlined in Table 12-4.

The total estimated cumulative reduction of the Scott sub catchment from the Proposal and existing projects that occur within the LIA is 3,250.02 ha, with 95.37% remaining. The total estimated cumulative reduction of the Lower Blackwood Estuarine Reach sub catchment from the Proposal and existing projects that occur within the LIA is 1,817.15, with 89.98% remaining. The cumulative impacts to these sub catchments are considered minor as they are extensive throughout the LIA.

On the basis of the above, the cumulative impacts to hydrological catchments within the Development Envelope are not expected to be significant.

Table 12-4: Proposed Cumulative Loss or Degradation of Hydrological Catchments

Cumulative Clearing	Beenup Sub catchment	Scott Sub catchment	Lower Blackwood Estuarine Reach
Extent within LIA (ha)	1,721.69	70,243.87	18,353.48
Extent potentially impacted under this Proposal (ha)	12.83	72.22	21.56
Clearing under past, present and reasonably foreseeable future activities			
Riverslea Subdivision	0.00	0.00	0.00
Yoongarllup Mineral Sands Project	0.00	0.00	0.00
Margaret River Water Supply Upgrade	0.00	0.00	0.00
Heavy Mineral Sands Mine Beenup, Shire of Augusta-Margaret River	1007.88	164.78	0.00
Lot 32 Tom Cullity Drive, Wilyabrup	0.00	0.00	0.00
Vlam Road Gravel Pit, Vlam Road, Karridale, WA		0.00	0.00
Flat Rock Boating Facility	0.00	0.00	0.00
Clearing Permits within 50 km of the Proposal	0.49	3,013.02	1,817.15
Total Cumulative Impact (ha)	**1,021.20**	**3,250.02**	**1,838.71**
Extent Remaining (ha) (%)	**700.49 (40.69)**	**66,993.85 (95.37)**	**16,514.77 (89.98)**

12.3.4. Cumulative Reduction and Acidification of Groundwater in Regional Aquifers

The Proposal is not expected to result in any significant cumulative effects to the Superficial or Leederville aquifer and associated values (e.g. GDEs and aquatic fauna), given groundwater drawdown associated with the construction of turbine/mast/tower foundations is expected to be temporary, shallow and localised in nature.

A total of 24 registered groundwater bores occur within 500 m of the Development Envelope (Stantec 2025b. A large proportion of the Development Envelope and surrounding areas also intersect Groundwater Management Zone 7, which has restricted water use from the Superficial and Leederville aquifers with no new water allocation, bores or excavations permitted to be constructed within the management zone boundary other than exempt uses, monitoring, replacement of existing bores or remediation (Stantec 2025b).

Given the restricted use of groundwater associated with a large extent of the local area and that impacts associated with groundwater drawdown from the Proposal are expected to be minor and temporary and will be managed in accordance with a detailed ASSDMP which will be informed by a Preliminary ASSDMP (PTG 2025; Appendix B), the Proposal is not expected to significantly contribute to existing groundwater drawdown related effects on the Superficial and Leederville aquifers and their values.

On the basis of the above, the cumulative impacts to regional aquifers are not expected to be significant.

12.3.5. Cumulative Impacts on the Socio-economic Outcomes for the Local Community and Amenity

The Proposal is expected to result in a minor and temporary impact of increased traffic to the local community and industries particularly during construction, as well as a minor increase in light, dust and noise emissions.

Impacts to social surroundings including the generation of noise and dust emissions, pressure on local accommodation and traffic safety impacts were raised during the assessment of the Margaret River Water Supply Upgrade. Like the Proposal, these impacts were considered minor and temporary, with most impacts limited to the construction phase of the project, assumed to have been completed decades ago as the Margaret River Water Supply Upgrade was approved in 1991. The remaining projects identified within the LIA were not assessed for impacts to the local community or amenity.

On the basis of the above, the Proposal is not expected to significantly contribute to impacts on the socio-economic outcomes for the local community and amenity.

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Appendix A Proposed Wind Farm in Scott River: Surface Water and Hydrogeological Assessment

Appendix B Proposed Wind Farm in Scott River Preliminary Acid Sulfate Soils and Dewatering Management Plan

Appendix C Wind Farm in Scott River Preliminary Decommissioning Plan

Appendix D Beenup Wind Farm: OSOM Route Study

Appendix E Desktop Assessment of Subterranean Fauna for a proposed wind farm in Scott River, Western Australia

Appendix F Proposed Wind Farm in Scott River, Western Australia Greenhouse Gas Assessment Summary Report

Appendix G Proposed Wind Farm in Scott River: Preliminary Geotechnical and Baseline Contamination Report

Appendix H Preliminary Construction Environmental Management Plan

Appendix I Detailed flora and vegetation survey for a Proposed Wind Farm in Scott River

Appendix J Wind Farm in Scott River - Ecological Gap Survey

Appendix K Basic and Targeted vertebrate fauna survey for a Proposed Wind Farm in Scott River

Appendix L Bird and Bat Risk Assessment for a Proposed Wind Farm in Scott River – Level Two investigation

Appendix M Desktop Assessment of Short Range Endemic Fauna for a Proposed Wind Farm in Scott River – Western Australia

Appendix N Proposed Wind Farm in Scott River Preliminary Bird and Bat Adaptive Management Plan

Appendix O Beenup Wind Farm Shadow Flicker and Blade Glint Assessment

Appendix P Beenup Wind Farm EMI Assessment

Appendix Q Aviation Impact Assessment: Beenup Wind Farm

Appendix R SynergyRED Scott River Wind Farm Feasibility: Social Values Assessment

Appendix S Proposed Wind Farm at Scott River: Noise Impact Assessment

Appendix T Proposed Wind Farm - Scott River: Landscape and Visual Impact Assessment

Attachment 5

Bushfire Management Plan

Bushfire management plan /statement addressing the bushfire protection criteria coversheet

Site address: Various Lots, Scott River Road, Scott River

Site visit: Yes ☑ No ☐

Date of site visit (if applicable): Day 12 & 13 Month June Year 2024

Report author or reviewer: Linden Wears

WA BPAD accreditation level (please circle):

Not accredited ☐ Level 1 BAL assessor ☐ Level 2 practitioner ☐ Level 3 practitioner ☑

If accredited please provide the following.

BPAD accreditation number: 19809 Accreditation expiry: Month June Year 2026

Bushfire management plan version number: Rev 0

Bushfire management plan date: Day 27 Month March Year 2025

If one or more of the following are selected, then these should be automatically referred to DFES	YES	NO
Strategic planning is required to address SPP 3.7 and the Guidelines	☐	☑
The application is a vulnerable land use	☐	☑

None of the Above ☑

If one or more of the following are selected, and the decision-maker requires input form DFES, then the application can be referred.	YES	NO
The BAL rating has been calculated by a method other than Method 1 as prescribed by AS 3959	☐	☑
An outcomes-based approach has been submitted to demonstrate compliance with the bushfire protection criteria	☐	☑

None of the Above ☑

Note: If a subdivision or development application meets all the acceptable solutions and does not otherwise trigger a referral as listed above, seeking advice from DFES on SPP 3.7 or other matters is at the discretion of the decision-maker.

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer 

Date 27 March 2025

Scott River Wind Farm

Scott River Road, Scott River

Bushfire Management Plan

Date: 27 March 2025

Prepared For: Synergy Renewable Energy Developments Pty Ltd

Linfire Ref: 20231220334SYN-BMP-001_0

Linfire Consultancy

ABN: 577 930 47299

Revision	Issue Date	Revision Description	Approved By
0	27 Mar 2025	Issued for Approval	Linden Wears (Level 3 BPAD 19809)

Disclaimer and Limitation

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2. errors or omissions in this report except where grossly negligent; and the proponent expressly acknowledges that they have been made aware of this exclusion and that such exclusion of liability is reasonable in all the circumstances.

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Fire is an unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire. The mitigation strategies contained in this Bushfire Management Plan (BMP) are considered to be prudent minimum standards only, based on the standards prescribed by relevant authorities. It is expressly stated that Linfire do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Linfire has no control. If the proponent becomes concerned about changing factors then either a review of the existing BMP, or a new BMP, should be requested. Linfire accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report and its supporting material by any third party.

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1.0 Proposal details

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is seeking to lodge a development application (DA) for a new wind farm across a number of lots (the wind farm development boundary) in Scott River approximately 15 km north-east of Augusta, in the Shire of Augusta-Margaret River (the Shire).

The proposed wind farm development (see Figure 1) will require the installation of the following infrastructure:

- ***New Building/s***
  - At least one Operations and Maintenance (O&M) building
  - Potential for 1 or 2 other smaller buildings
- ***Wind turbine generators***
  - 20 turbines
  - All turbines are to have fire detection, alarm and suppression systems
- ***132 kV transmission line***
  - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation
  - Consisting of above-ground towers, poles and electrical lines
  - To be designed and constructed to Western Power specifications
- ***33 kV distribution lines***
  - Reticulated from each turbine to substation, preferably through use of underground cables.
  - If ground conditions are unsuitable for underground cables, portions of these 33 kV lines may need to be above-ground.
- ***High voltage substation***
  - To be designed and constructed to relevant Australian Standards
  - Expected to contain infrastructure such as main transformer, STATCOM, switchroom, NSP room, harmonic filters, back-up generator/auxiliary supply.
- ***Internal access driveways***
  - Upgraded internal driveway access to the proposed buildings and substation
  - Internal access driveways throughout the wind farm to all turbines, from various site access points
- ***Firewater tanks***

The make/model of wind turbines has not been finalised (is still under review), however the following information has been provided regarding the anticipated products:

- Maximum tip height of 250 metres (hub height up to164 m with blade length of up to 90 m)
- Turbines are steel tower casings to ground level, with fibreglass/aluminium/steel blades

All of the following buildings and infrastructure for the wind farm, will be sited within a nominated wind farm building envelope:

- O&M building
- Any other required wind farm buildings

- Any firewater tanks required for the buildings

Regarding onsite personnel, once operational, the following is expected:

- Occupant numbers likely to be 2 to 4 staff, 5 days a week (business hours)
- There will be at least one on-call technician allocated to the facility for all other times

During the construction phase, the following is also likely to be required:

- Site Offices
- Concrete Batching Plant
- Laydown Areas

These are currently proposed just to the south of the wind farm building and substation envelopes, and it is assumed that following completion of construction, these will be allowed to return to their current grassland state.

1.2 Site description

1.2.1 Overall Wind Farm

The proposed wind farm extends over a number of existing lots as follows (see Figure 2 and 3):

- Lot 4269 on Plan 209300, Courtenay
- Lot 6 (No 527) Scott River Road, Courtenay
- Lot 4266 on Plan 208480, Courtenay
- Lot 4152 (No 599) Scott River Road, Scott River
- Lot 100 on Plan 038071, Scott River
- Lot 4261 on Plan 208478, Scott River
- Lot 4260 (No 119) Governor Broome Road, Scott River
- Lot 4263 on Plan 208478, Scott River
- Lot 1 (No 399) Governor Broome Road, Scott River
- Lot 4154 on Plan 207769, Scott River

All the lots nominated above are currently zoned as “General Agriculture” under the local Shire planning scheme, and have been largely cleared of native vegetation and used by private landholders for agricultural purposes. The only exception to this is Lot 4269 in the north-western part of the wind farm development boundary, which currently contains existing timber plantations, which are relatively mature and while they are expected to be harvested in coming years, the exact timing is not confirmed.

There are several other lots located adjacent to the development boundary worthy of note:

- Lot 2 on Diagram 090280, Courtenay
  - Contains the existing Beenup substation
- Lot 4265 (No 598) Dennis Road, Scott River
  - Contains existing privately owned timber plantation
- Lot 101 on Plan 038071, Scott River
  - Currently identified as a DBCA Lands of Interest (Register No. 2555/700), and potentially a future nature reserve.
- Lot 4924 on Plan 217962, Scott River
  - Crown Reserve 42377
  - Zoned under local Shire planning scheme as “National Parks and Nature

Reserves”
- Flora reserve

Surrounding the development boundary:

- To the east is Dennis Road, with
  - Agricultural land and timber plantation further to the east of Lots 1 and 4263, and
  - Pagett Nature Reserve and Chester Nature Reserve further east and north-east of Lot 4266.
- To the north of Lots 4266 and 4269 are existing agricultural lots largely cleared of vegetation, other than isolated forest plots, with Brockman Highway and South Blackwood State Forest further north.
- To the west is Scott River Road, with largely cleared agricultural land further west other than some existing timber plantation in the north-west and the rehabilitated Beenup mineral sands mine between Strucels Road and Payne Road. The Blackwood River located approximately 4-5 km further west of the wind farm.
- To the south is primarily cleared agricultural land, with some forest and scrub vegetation south of Lot 4260 and Governor- Broome Road, which fringes the Scott River.

Public road access to the wind farm is via Brockman Highway to the north, with Scott River Road, Governor Broome Road and Dennis Road forming a loop road arrangement around the perimeter of much of the development boundary (see Figure 2). The only other public road near the wind farm is Coostien Road, which is an existing dead-end public road providing access to lots south of the Governor Broome Road.

Public road access from the wind farm is as follows:

- Brockman Highway extends:
  - west to eventually connect to Bussel Highway at Karridale (17 km west), where travel is possible south to Augusta (15 km south of intersection) and north to Margaret River (30 km north of intersection)
  - east to Nannup (approximately 55 km away)
- Governor Broome Road provides access along the southern boundary and extends 12 km east of the wind farm to connect to Milyennup Coast Road, where travel can be undertaken 13 km north to connect to Stewart Road and Brockman Highway and on to Nannup.
- Scott River Road provides public road access along the western wind farm development boundary and connects to Brockman Highway in the north, and also extends further south past Governor Broome Road, to East Augusta, as a long dead-end road.

Vehicular access within the various lots comprising the wind farm, is currently via existing unsealed farm tracks, which provide access from a number of existing entrance gates along the public road network, into the lots.

There is no known reticulated town main water supply currently provided to any lots within the wind farm development boundary, nor are there any existing street hydrants.

1.2.2 Proposed Buildings

The nominated wind farm development boundary includes the lots detailed previously in Section 1.2.1, however it is noted that it is only the proposed buildings located entirely in the wind farm building and substation envelopes (the wind farm building extent) sited in the north-east corner of Lot 4261 (see Figure 4) that trigger assessment against current bushfire policy as detailed in Section 1.3.

All other buildings associated with the project (e.g. site offices) will be required only for the construction phase, and will be decommissioned following operation of the wind farm.

1.3 Purpose

The entire wind farm development boundary is designated as bushfire prone (Area 2) on the *Map of Bush Fire Prone Areas* (DFES 2024; see Plate 1 and Plate 2). As the proposed building and substation envelopes are surrounded by unmanaged grassland, any pre-development BAL impact would be expected to be BAL-40 or greater without any management measures (i.e. Asset Protection Zones), which triggers the requirement to assess the proposal against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

Given the renewable energy infrastructure (e.g. wind turbines) are not considered "habitable buildings" as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn't triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the WA Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4* (the CFA Guidelines; CFA, 2023) from Victorian fire brigade, currently provides the best design guidance, albeit rationalised for WA context. It is noted that the CFA Guidelines currently has no formal status in WA, however it is understood DFES are currently in the process of drafting their own version of the CFA Guidelines, and while the timing of this is unconfirmed, the content is expected to broadly align with concepts detailed by the CFA.

It is noted that the Shire of Augusta-Margaret River has a Local Planning Policy for renewable energy developments, namely *LPP 23 (Renewable Energy Systems)* dated March 2021, for the expressed purpose of guiding proponents, landowners and the community as to the requirements for such developments. It is noted that there is little guidance provided relating to structural or bushfire risk management for these renewable energy developments, other than stating that a *"fire management plan"* may be required *"where planning approval is sought for large renewable energy systems"*.

Based on the above:

- This BMP demonstrates compliance for the proposed permanent buildings against SPP 3.7 and the WA Guidelines;
- A Bushfire Risk Management Plan (BRMP) that accompanies this BMP, assesses the level of compliance of the proposed renewable infrastructure, against the relevant model requirements of the CFA Guidelines, to demonstrate the bushfire risk has been appropriately managed.
- The preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

This Bushfire Management Plan (BMP) has been prepared to address requirements for DA's under SPP 3.7 Policy Measure 7.1 (ii), Section 2.2 the WA Guidelines, in addition to Section 7 relating to Commercial/Industrial developments, including:

- The identification of any environmental, biodiversity or conservation values on the subject site(s).
    - Where relevant, details on how the clearing of native vegetation specifically for bushfire mitigation to achieve the bushfire protection measures, can be avoided through the use of siting and design measures.
    - Where the clearing of native vegetation cannot be avoided, details on how the proposal will minimise the clearing are to be provided.
- A BAL Contour Map or BAL assessment.
- The identification of any bushfire hazard issues arising from the assessment.

- Assessment against Bushfire Protection Criteria 7 (Development – Commercial and Industrial) demonstrating compliance of the following for proposed buildings:
    - Siting of all buildings in BAL-29 or lower, including provision of suitably sized Asset Protection Zones (APZ's; low fuel zones around buildings).
    - Justification of any native vegetation clearing to implement the APZ
    - Siting of all hazardous, flammable and/or combustible materials in BAL-29 or lower, and appropriate protection from radiant heat impact.
    - Provision of compliant vehicular access
    - Provision of suitable firewater supply.
- Summarise the bushfire management measures for the renewable energy infrastructure from the BRMP.

The focus of this BMP is to demonstrate compliance of the proposed buildings contained within the building and substation envelopes, with SPP 3.7 and the WA Guidelines, accompanied by a summary of the bushfire management measures for the renewable energy infrastructure derived from the project BRMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

1.4 Other plans/reports

There are no known bushfire reports or assessments that have been prepared previously for the wind farm development area.

Linfire has prepared a Bushfire Risk Management Plan (Linfire 2025) detailing the level of compliance of the proposed renewable infrastructure, against the CFA Guidelines. The resultant bushfire management measures from the BRMP, have been incorporated into Section 5.2 of the BMP, to provide a collated summary of all risk management measures required for the proposed development. The BRMP should be read in conjunction within this BMP.

The following environmental reports have been prepared for the project:

- *Detailed flora and vegetation survey for a Proposed Wind Farm in Scott* River, prepared by Phoenix Environmental Services dated February 2025.

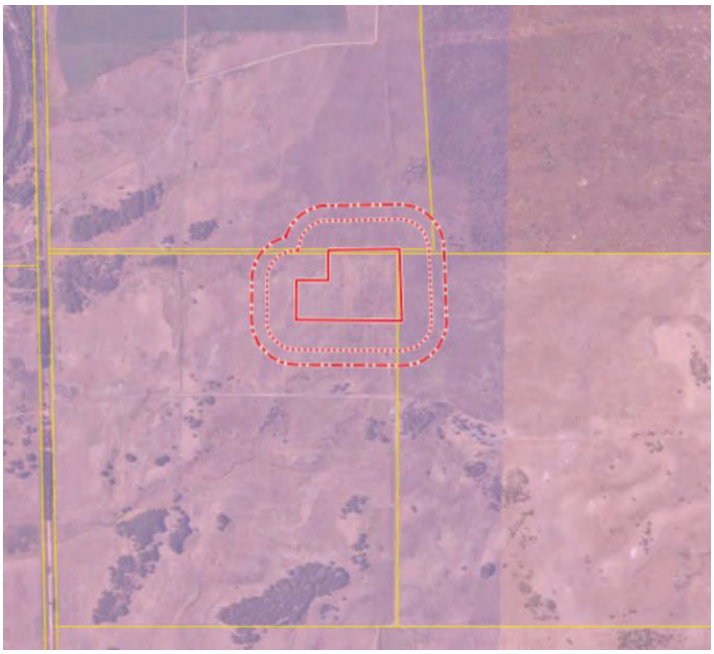


Plate 1: Map of Bush Fire Prone Areas – Proposed Buildings (DFES 2024)

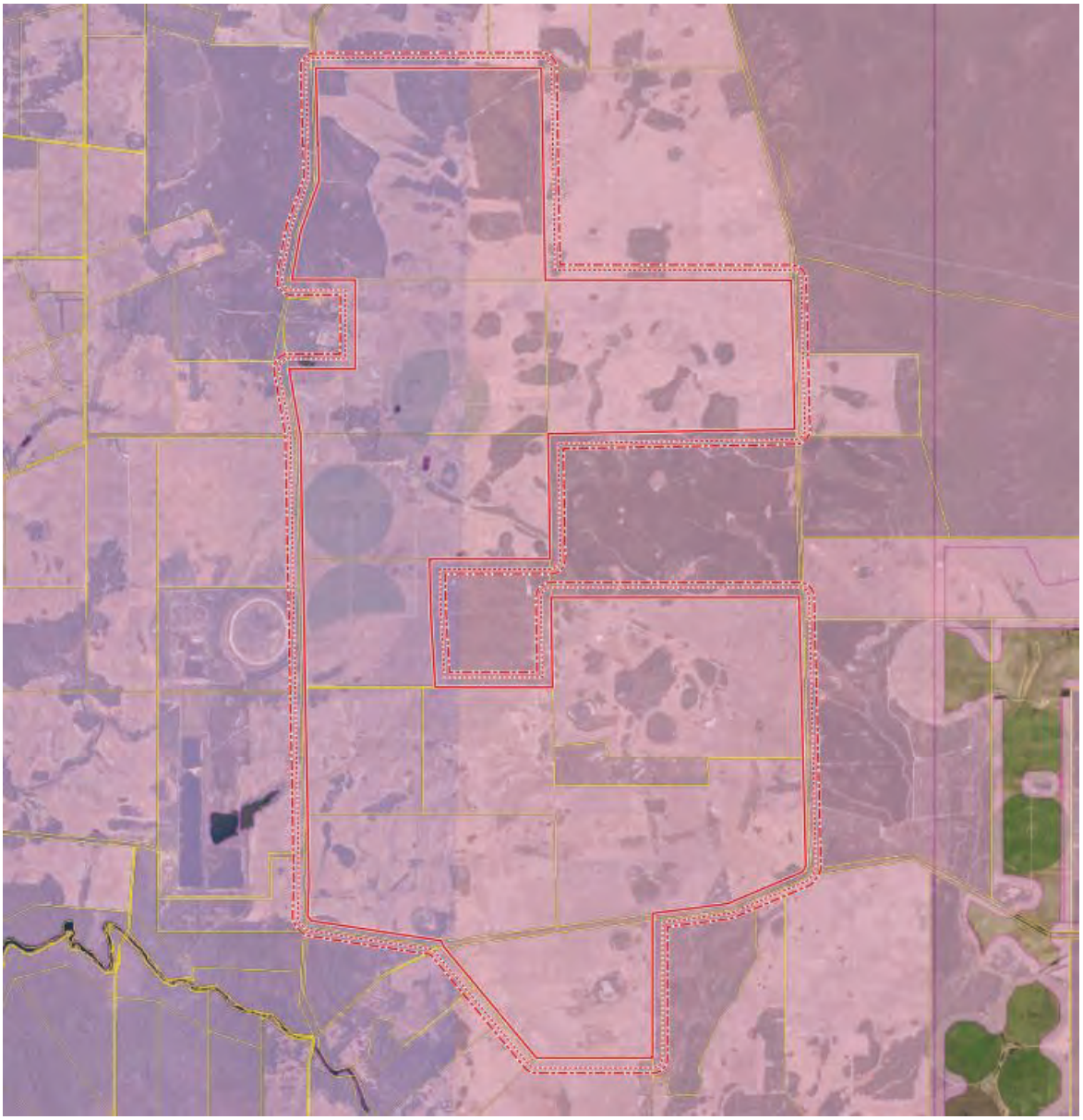


Plate 2: Map of Bush Fire Prone Areas – Overall Wind Farm Development Area (DFES 2024)

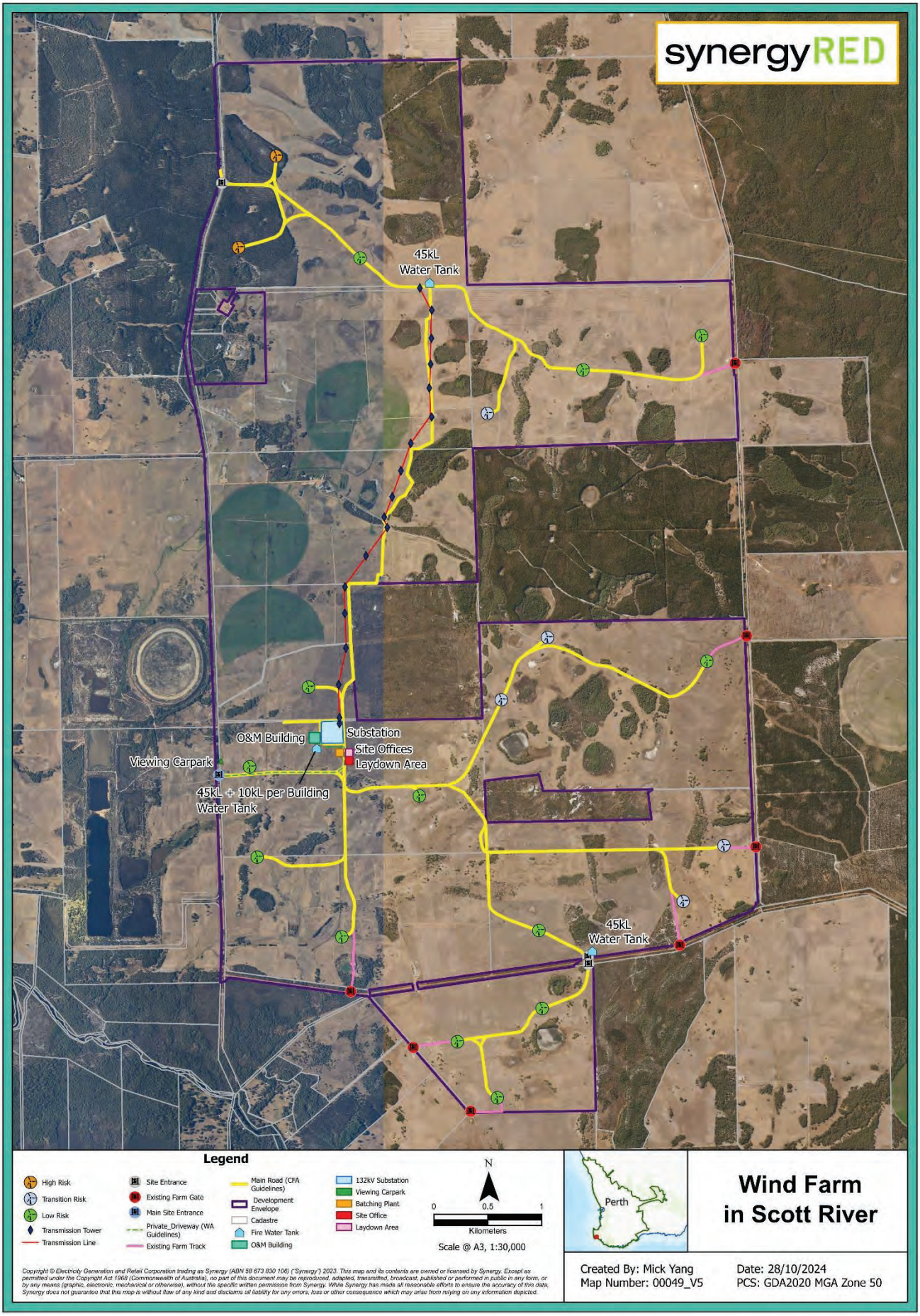
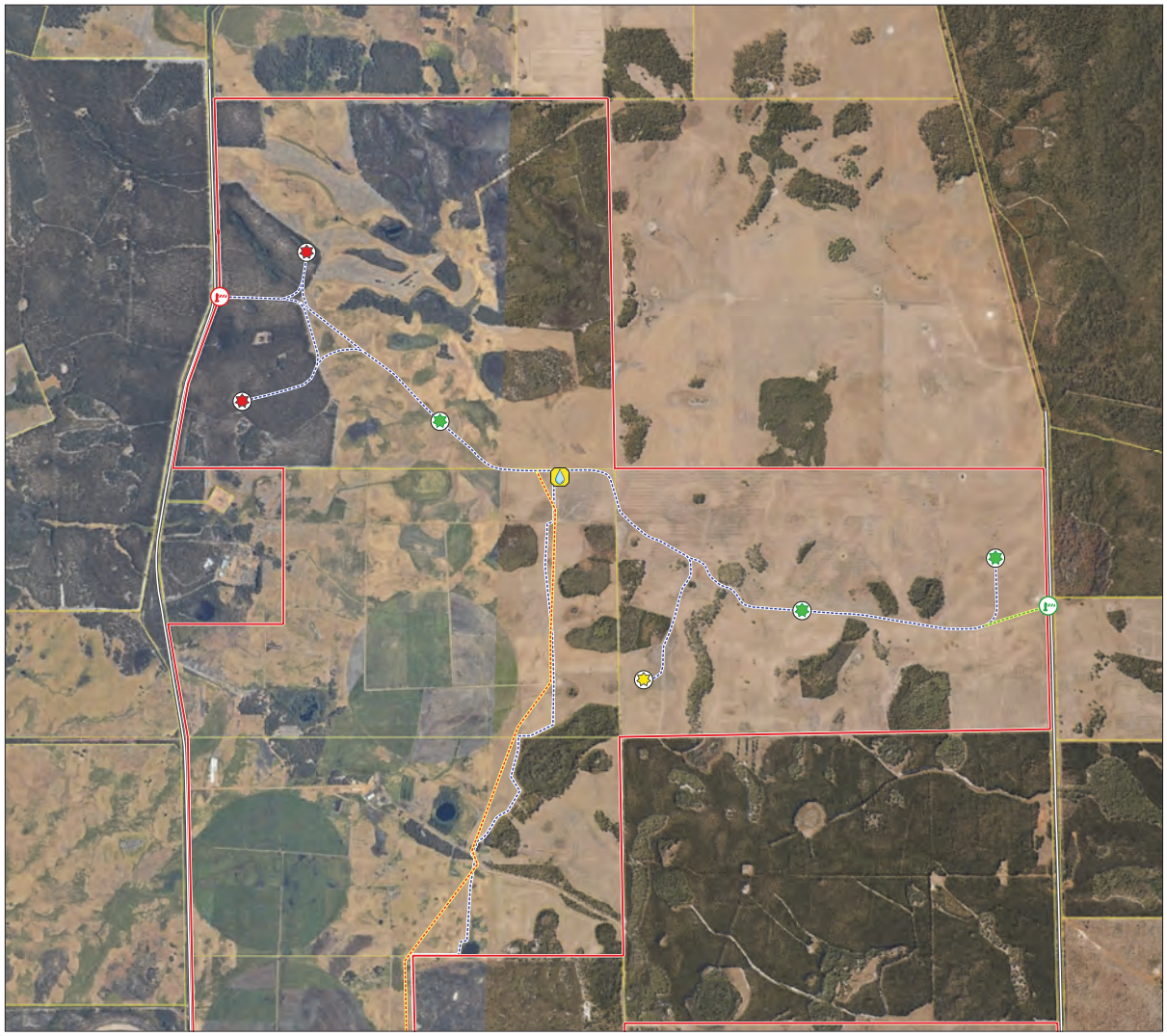


Figure 1: Overall Development Plan

LINFIRE



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Cadastre

Scale 1:20,800

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 2: Site Overview - North (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Building/Substation Envelopes
- Wind Farm Development Boundary
- Cadastre

Scale 1:20,800

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 3: Site Overview - South (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Wind Turbine (Low Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per building)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Building/Substation Envelopes
- Wind Farm Building Extent
- 100m
- 150m
- Cadastre

Scale 1:6,700

0 100 200 300 Metres

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Scott River Wind Farm, Scott River Road

Figure 4: Site Overview (Proposed Building and Substation Envelope)

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2.0 Environmental considerations

2.1 Native vegetation - modification and clearing

Most of the proposed development is to be sited in existing grassland areas, however there is expected to be some vegetation clearing required to accommodate the proposal.

Linfire assumes that all relevant environmental and heritage studies and all required environmental and heritage approvals will be obtained prior to commencing any on-site vegetation modification or clearing required to construct the development or implement the onsite Asset Protection Zones. Should any constraints be identified as part of the environmental or heritage studies that would prevent vegetation clearing or modification, the design is to be tailored to ensure the implementation of compliant APZs can be achieved.

2.2 Revegetation / Landscape Plans

No revegetation is proposed as part of the proposal.

All nominated Asset Protection Zones are to comply with APZ Standards from the WA Guidelines (refer to Appendix 2), with any other landscaping (if any) and vegetation management (outside of nominated APZs) to be low threat vegetation and managed gardens in accordance with AS 3959—2018 Clause 2.2.3.2 (f) (see Appendix 3).

3.0 Bushfire assessment results

3.1 Assessment inputs

As mentioned in Section 1.2, the overall development includes all the lots included in the proposed wind farm, however it is noted that the proposed buildings that trigger assessment against SPP 3.7 and the WA Guidelines will only be sited within the wind farm building and substation envelopes in the north-east corner of Lot 4261 (see Figure 4). Given the scope of this BMP is limited to the permanent buildings, the vegetation and BAL contour mapping is mostly focussed on that around the proposed building and substation envelopes.

While the renewable infrastructure is not required to achieve target BAL ratings, thus not required to have BAL contour mapping, Linfire has provided high-level vegetation mapping in the project BRMP to inform the discussion regarding the turbine siting and associated vegetation modification and management.

3.1.1 Vegetation classification

Linfire assessed classified vegetation and exclusions within 150 m of the wind farm building extent area through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions following proposed development works, are contained in Appendix 1 and Table 1, and depicted on Figure 5.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed to the south-east of the building and substation envelopes, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state.

3.1.2 Effective slope

Linfire assessed effective slope under classified vegetation through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with AS 3959. Results were cross-referenced with Landgate 5 m contour data and are depicted in Table 1 and Figure 5.

Site observations indicate that land is undulating, with elevation decreasing from the north of the wind farm, to the south-west. Effective slope near the building and substation enveloped has been assessed as downslope 0°-5° given the relatively gentle slope.

3.1.3 Summary of inputs

Table 1 summarises the anticipated post-development vegetation classifications and exclusions within 150 m of the proposed wind farm building and substation envelopes, following completion of development works and implementation of Asset Protection Zones. The post-development vegetation classifications/exclusions and effective slope are illustrated on Figure 5.

Table 1: Post-development vegetation classifications/exclusions and effective slope (within 150 m of building and substation envelopes only)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height. Included areas of proposed construction infrastructure (site

Vegetation plot	Vegetation classification	Effective slope	Comments
			office, concrete batching plant, laydown area), which are assumed to return to grassland state following decommissioning.
2	Class C Shrubland	Downslope >0–5°	Shrubland vegetation (<2 m high) within Lot 101. This vegetation is further than 100 m from the proposed building and substation envelopes, and could be excluded under Clause 2.2.3.2 (a).
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land to be modified to low threat vegetation as part of proposed development within building and substation envelopes and associated APZs.



Legend

- Photo Location
- Contours
- Transmission Line
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Building/Substation Envelopes
- Wind Farm Building Extent
- 100m
- 150m
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- C. Shrubland
- G. Grassland
- Modified to non vegetated and low threat

Scale 1:2,500

0 40 80 120 Metres

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Figure 5: Post-Development Vegetation and Effective Slope (Proposed Building and Substation Envelope)

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3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

Linfire has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the wind farm building extent (see Figure 6 and 8). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 rating
- vegetation classification
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed future development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts.

The BAL contours are based on:

- the vegetation classifications and effective slope observed at the time of inspection
- the anticipated post-development vegetation based on proposed on-site clearing extent, and resultant vegetation exclusions and separation distances, achieved to implement the proposed development including APZ's.

The results of the BAL contour assessment are detailed in Table 2 and illustrated in Figure 6, with the highest BAL rating to any proposed buildings being BAL–29.

Table 2: BAL contour assessment results (to proposed buildings and substation envelopes)

	Method 1 BAL determination			
Plot	**Vegetation classification**	**Effective slope**	**Separation distance**	**Highest BAL**
1	Class G Grassland	Downslope >0–5°	9 m	BAL–29
2	Class C Shrubland	Downslope >0–5°	>100 m	BAL–Low
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A

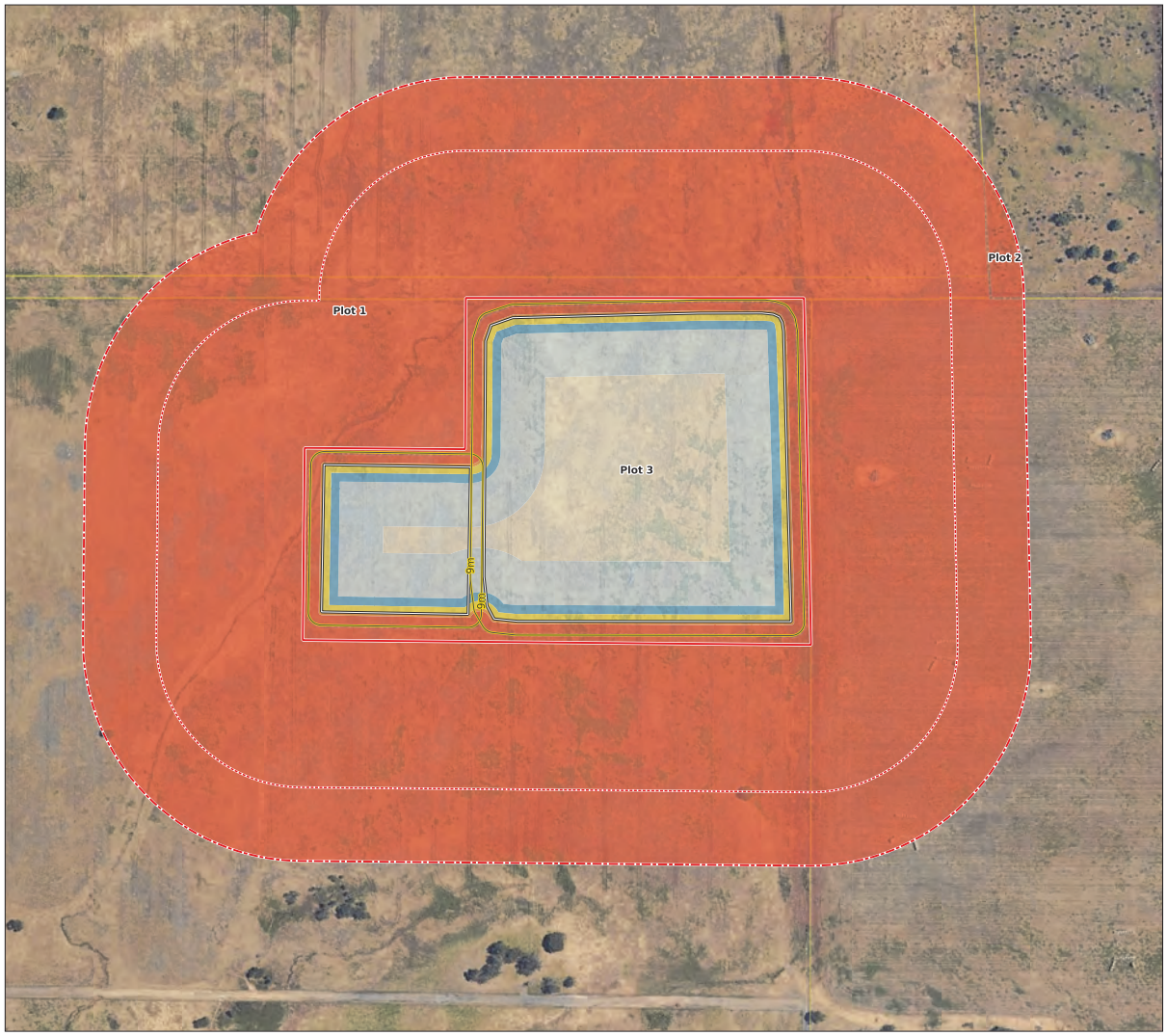
Table 3 lists the BAL applicable to the habitable buildings within the proposed development.

Table 3: BAL applicable to buildings and substation envelope

Building / element	Initial BAL	APZ	Revised BAL
Building Envelope (including O&M building and firewater tank within envelope)	BAL–FZ	9 m wide APZ extending from the external perimeter of the Building Envelope. All land within the Building Envelope is to be non-vegetated land and/or managed low threat vegetation throughout the entire area. Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing	BAL-29 to BAL-12.5

Building / element	Initial BAL	APZ	Revised BAL
		the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.	
Substation Envelope	BAL–FZ	9 m wide APZ extending from the external perimeter of the Building Envelope. All land within the Substation Envelope is to be entirely non-vegetated land. Alternatively, targeted 9 m APZs could be established around all proposed buildings within the substation envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.	BAL-29 to BAL-Low

Should there be any changes in development design or classified vegetation extent that results in a modified BAL outcome, then the BAL contours will need to be reassessed.



Legend

- Building/Substation Envelopes
- Wind Farm Building Extent
- 100m
- 150m
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

Scale 1:2,500

0 40 80 120 Metres

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Figure 6: BAL Contour Map (Proposed Building and Substation Envelope)

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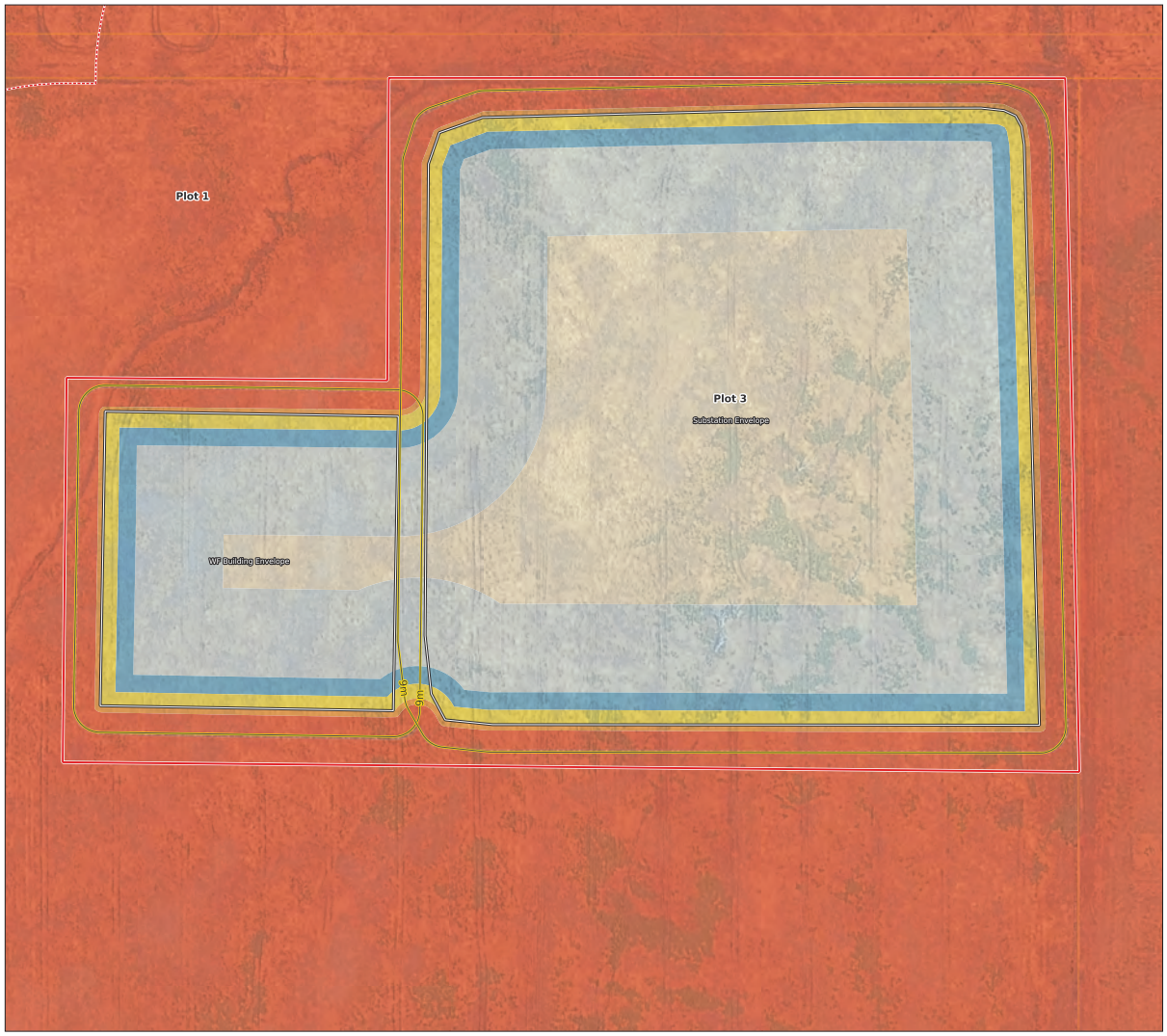

Legend

- Building/Substation Envelopes
- Wind Farm Building Extent
- 100m
- 150m
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

Scale 1:1,200

0 20 40 60 Metres

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Figure 6: BAL Contour Map - zoom (Proposed Building and Substation Envelope)

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4.0 Identification of bushfire hazard issues

4.1 Bushfire context

The overall wind farm development area contains, and is surrounded by, unmanaged vegetation in all directions, with extended fire runs available through mostly grassland vegetation, in addition to more discrete plots of shrubland, scrub and forest vegetation. The potential bushfire impact on the proposed buildings would be primarily from grassland fire, with the nearest non-grassland vegetation located approximately 130 m to the north-east. The fire runs from all directions could be kilometres long, with few natural or man-made features that currently exist near the proposed wind farm which would prevent bushfire behaviour reaching steady-state conditions. On this basis, the potential threat of fully developed bushfires to the proposed buildings could come from any direction.

Further review of the bushfire hazard to the renewable infrastructure is detailed in the BRMP (Linfire, 2025) that accompanies this BMP.

4.2 Bushfire hazard issues

Examination of the environmental considerations (Section 2.0) and the bushfire risk assessment (Section 3.0) has identified the following bushfire hazard issues:

1. Based on the existing extent of vegetation outside proposed buildings and roads, the proposed habitable buildings would have an initial BAL of BAL-FZ. Onsite vegetation modification and management will be required to ensure sufficient separation between proposed buildings and unmanaged vegetation, to limit the impact of bushfires on the development and prevent ignition and spread of a fire from proposed infrastructure.
2. Ensuring sufficient internal vehicular access to the proposed development, to enable egress by onsite staff, but as importantly, providing sufficient access to the infrastructure to enable attending bushfire fighting appliances to control or suppress any fires.
3. Ensuring access to bushfire fighting water supply, to limit the travel time to water supplies for appliance refills.
4. The proposed development contains renewable energy infrastructure, a separate BRMP has been prepared to demonstrate compliance with the CFA Guidelines (refer to Linfire 2025).

4.3 Bushfire safety strategy

The following bushfire safety strategy is proposed to demonstrate compliance with the Bushfire Protection Criteria of the WA Guidelines and address the bushfire hazards identified above:

1. Create sufficient separation between buildings from surrounding classified vegetation by establishing suitably sized APZs to achieve a compliant rating of BAL-29 or less.
2. Provide compliant vehicular access to the proposed building and substation envelopes, from the surrounding public road network, to enable occupant egress and to facilitate firefighter access.
3. Provide a secure bushfire fighting water supply, including use of firewater storage tanks to enable refill of bushfire fighting appliances.
4. Incorporate the bushfire risk management measures for the proposed renewables infrastructure detailed in the project BRMP, including appropriate bushfire emergency management procedures, into this BMP.

Based on the above, Linfire considers the bushfire hazards within and adjacent to wind farm building extent and the associated risks, are manageable through standard management responses outlined in the WA Guidelines and AS 3959. These responses will be factored into proposed development as early as possible to ensure an effective and compliant bushfire management outcome is achieved for protection of future life, property and environmental assets.

5.0 Bushfire management measures

The following bushfire management measures, informed by the compliance assessment in this BMP and the project BRMP for renewable energy infrastructure (Linfire, 2025), and are required to be implemented as part of the development and increase the level of bushfire risk mitigation across the site. Where possible, the management measures have been depicted on Figure 7 for building and substation Envelopes, with Figure 8 and Figure 9 displaying those for the renewable energy infrastructure.

5.1 Vegetation management

In order to manage the bushfire risk to the development, sufficient separation is to be provided between proposed buildings and infrastructure, and unmanaged vegetation, including the following requirements:

- Asset Protection Zones (APZs) around the perimeter of the following:
  - the nominated building envelope
  - the substation envelope (with the envelope to be a non-vegetated zone)
  - each firewater tank
- A non-vegetated zone (NVZ) and APZ around each wind turbine base
- Managed low threat vegetation within nominated building envelope
- Non-vegetated land within substation

Further information on vegetation management is provided in the sections below.

5.1.1 Asset Protection Zones and Non-Vegetated Zones (Building & Substation Envelope)

In order to ensure sufficient separation is maintained between proposed buildings and substation, and surrounding unmanaged vegetation, the following APZs will be required:

- A 9 m wide APZ, is to be established around the perimeter of the nominated building envelope to achieve BAL-29 or lower on all buildings and firewater tanks within the envelope.
- A 9 m wide APZ, is to be established around the perimeter of the substation, to achieve BAL-29 or lower on this infrastructure.
  - In order to limit the chance of electrical faults in the substation from igniting a bushfire, all other land within the nominated substation envelope is to be established as a Non-Vegetated Zone, consisting entirely of non-vegetated elements.

Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.

All APZs can be either non-vegetated or managed low threat landscaping established in accordance with the APZ standards from the WA Guidelines (see Appendix 2) and AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3), however would preferably be non-vegetated where possible.

The NVZ in the substation envelope is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for “firebreaks” from CFA Guidelines as follows:

- Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
- Free of vegetation and obstructions at all times.
- No combustible plant or equipment.

All nominated APZs and NVZs are to be implemented by the Proponent, who is also responsible for the regular ongoing management to ensure compliance in perpetuity, especially during bushfire season.

5.1.2 Asset Protection Zones and Non-Vegetated Zones (Turbines)

In order to ensure sufficient separation is maintained between proposed renewable energy infrastructure, and surrounding unmanaged vegetation, the following APZs will be required:

- NVZ and APZ is to be established around the perimeter of each of the wind turbine base on the following basis (see turbine risk ratings depicted on Figure 8 and Figure 9):

  Low-Risk Turbine Site

  - ***A turbine is considered to be in a low-risk environment when it is sited further than 300 m from "continuous" non-grassland vegetation.***
  - If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
    - ***10 m NVZ around base of turbine tower***

  Transition Risk Turbine Site

  - ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
    - ***closer than 300 m to "continuous" non-grassland vegetation, (but not within this non-grassland vegetation) or***
    - ***within "non-continuous" non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
  - If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:
    - ***10 m NVZ around base of turbine tower; and***
    - ***20 m APZ outside the 10 m NVZ***

  High-Risk Turbine Site

  - ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within "continuous" non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
  - If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
    - ***10 m NVZ around base of turbine tower***
    - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- Should turbines be relocated:
  - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
  - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of forest and grassland may be both high-risk and transition risk). In these instances, we propose that:
    - The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
    - the NVZ/APZ for the highest risk category is applied entirely around the turbine.

- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for “firebreaks” from CFA Guidelines as follows:
    - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
    - Free of vegetation and obstructions at all times.
    - No combustible plant or equipment.
- The Asset Protection Zone (APZ) is to comply with the APZ standards from the WA bushfire Guidelines (see Appendix 2).

All NVZ and APZs are to be implemented by the Proponent, who is also responsible for the regular ongoing management during bushfire season to ensure compliance for the life of the wind farm.

5.1.3 Asset Protection Zones (Renewable Energy Infrastructure - Firewater Tanks)

In addition to the firewater tank for the future buildings, additional firewater is proposed for the renewable energy infrastructure (see Section 5.3.2 below).

All proposed firewater tanks are to be sited in areas of BAL-29 or lower, to be achieved as follows:

- Sited within the wind farm building envelope within an area of BAL-29 or lower, or
- Have an appropriately sized APZ established and maintained around the perimeter of the tank and suction connection, to achieve BAL-29 or lower.
    - Based on current tank locations in grassland, this would be a 9 m wide APZ

The APZs can be either non-vegetated or managed low threat vegetation, established in accordance with the APZ standards from the WA Guidelines (see Appendix 2) and AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3).

The APZs are to be established and maintained for the life of the project by the Proponent.

5.2 Vehicular access

5.2.1 Vehicular access – Buildings

The internal driveway accessing the future buildings in the nominated building and substation envelopes, is to comply with the requirements of Acceptable Solution A3.1 of the WA Guidelines, including the following:

- Comply with the requirements in Appendix B.3 Table 10, Column 5 (see Appendix 4 requirements for Area 2)
- Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 200m that increase the overall driveway width to no less than 6 m wide.
- Provide compliant turnarounds (see Appendix 4 requirements for Area 2) or loop roads within 30 m of each permanent building
- Provide access to the firewater tanks (or tank suction connection) in accordance with Acceptable Solution A4.1 of the WA Guidelines, to enable attending fire appliances to refill, and provide hardstand adjacent to tank suction connection and sufficient locations for fire appliance turnaround.
- All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m.
    - If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.

The Proponent is responsible for the construction and ongoing management of internal driveways.

5.2.2 Vehicular access – Renewable Energy Infrastructure

The internal driveway network accessing the renewable energy infrastructure is to comply with the requirements of CFA Guidelines as follows:

- The following site entrances are to be established for the facility:
  - Main site entrance from Scott River Road, near the proposed building and substation envelopes
  - Three additional site entrances as follows:
    - One on Scott River Road, approximately 5.5 km north of the main entrance.
    - Two on Governor Broome Road, providing access to turbines to the north and south of the public road.
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
  - Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 600m that increase the overall driveway width to no less than 6 m wide.
  - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
  - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to within 4 m of the tank suction point for each proposed firewater tank.
- All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m.
  - If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.
- Emergency Information Book and Signage (see Section 5.6) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.

The internal wind farm access driveways, site entrances, gates and signage are to be constructed and maintained by the Proponent in perpetuity (or for the life of the wind farm).

5.3 Firewater supply

5.3.1 Firewater – Buildings

Bushfire fighting water supply for proposed buildings in the nominated building and substation envelopes, is to be from static firewater tank/s as follows:

- The tank is to have no less than 10 kL per building (including those within the substation envelope).
- This firewater tank for the buildings, can either be collocated or combined with, the 45 kL firewater tank at the wind farm building envelope, required for the wind turbines (see Section 5.3.2)

The firewater tank within the building envelope is to comply with the relevant technical requirements from the WA Guidelines (see Appendix 5) and the requirements from the CFA Guidelines including:

- Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
- The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (e.g. wind turbines etc.).
- The hard-suction point must be positioned within 4 m to a hardstand area or internal driveway, and protected from mechanical damage where necessary, and provide a clear access for emergency services personnel.

The firewater tank is to be sited within the building envelope to ensure it is an area of BAL-29 or lower.

The firewater tank is to be installed, filled and maintained for the life of the project by the Proponent.

5.3.2 Firewater – Renewable Energy Infrastructure

Bushfire fighting water supply for proposed renewable energy infrastructure, primarily the wind turbines, is to comply with the requirements of CFA Guidelines as follows:

- Installation of the following firewater tanks around the site to provide 135 kL of turbine firewater capacity:
    - One (1No) 45 kL firewater tank in the northern part of the site, at an intersection of the internal driveways and the termination of the transmission line.
    - One (1No) 45 kL firewater tank in the southern part of the site, at an intersection of the internal driveways to a number of turbines.
    - In addition to the two turbine firewater tanks above, either a standalone 45 kL firewater tank is to be installed in the wind farm building envelope, for wind turbine firewater in the local area, or the 45 kL should be added to the building firewater tank.
- While the firewater tank locations above represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- The turbine firewater tanks will comply with the standards from the WA bushfire Guidelines, including the following from the CFA Guidelines:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - Firewater tanks are to be at least 10 m from wind turbines
    - The hard suction point must be within 4 m of a driveway or hardstand
- Emergency Information Book and Signage (see Section 5.6) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- All firewater tanks outside the wind farm building envelope, in their currently nominated locations, will have a 9 m wide APZ around the perimeter, to achieve BAL-29 or lower.

The firewater tanks, and associated APZs, are to be constructed, filled and maintained for the life of the project by the Proponent.

5.3.3 Provision of mobile fire trailer

A mobile fire trailer (or similar approved) is required to enable wind farm staff to:

- have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
- provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire

This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.

As a minimum, the fire trailier (or similar approved) should have:

- No less than 1000 L tank
- Fire pump and hose reel
- Mounted on trailer or ute to enable easy transport around the site.
    - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).

The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

5.4 Renewable Energy Infrastructure Design, Construction, Installation & Commissioning

The following measures are required for the proposed renewable energy infrastructure to manage the risk of fires.

5.4.1 Wind Turbines

5.4.1.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.
- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel onsite, or offsite monitoring, so notification to wind farm personnel (including on-call technician), DFES and local fire brigade, and nearby landowners/farmers can be provided.

5.4.1.2 Operational Status Monitoring and Control of Turbines

- Appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
    - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both onsite and remotely offsite.
- Operational control of turbines should be able to be conducted onsite and offsite, to enable remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
    - It is expected that any fault/s resulting in operation outside tolerable limits,

would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

5.4.1.3 Turbine Shutdown

- All wind turbines are to be configured to automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely (i.e. offsite).
    - The intent is that in the event of a turbine fire, only the affected turbine would automatically shut-down.
- All wind turbines are to be able to be remotely shut-down in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]), if required.

5.4.1.4 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

5.4.2 Substation

- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards.

5.4.3 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per Western Powers own standards.

5.4.4 Construction and Commissioning Requirements

The proposed facility will need to incorporate these general requirements during the construction and commissioning stages, to manage the risk of onsite fire and bushfire from the development:

- Ensure an emergency communication system is provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for dangerous goods as per relevant Australian Standards.
- Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days
- Ensure tight ignition source control, including hot works and restriction of smoking to

prescribed areas.

- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the construction management plan (or other relevant document) for the construction and commissioning phase of the facility to address risk of onsite fire and bushfire.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 5.7.

5.5 Renewable Energy Infrastructure Operation and Maintenance

The following shall be conducted as part of ongoing operation and maintenance phases:

- Ensure ongoing compliance with the endorsed BMP is achieved, especially during bushfire season
- Develop, implement and review Emergency Information Book and Signage (see Section 5.6) for attending emergency services personnel.
- Develop, implement and review the emergency management plan (see Section 5.8)
- Regular and ongoing inspection and auditing is to be conducted by the Proponent, with any routine maintenance and any required repair activities to be conducted for all infrastructure, equipment, vehicles and fire detection and suppression systems at the facility.
- Ensure all Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and requirements detailed in Section 5.9.

5.6 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at each nominated site entrance to the wind farm, with any plans or information books provided in a weatherproof container.

The Emergency Information Book and/or signage is intended to provide emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- Details of any emergency equipment, including the type and location of fire and gas detection systems.
- Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for

dangerous goods stored on-site.

- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire)

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

5.7 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 5.6) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

5.8 Emergency Management Plan

The Proponent is to develop an emergency management plan for the facility, which comprehensively details the procedures for preparing for, and responding to, hazards to the facility, including the following for off-site bushfire, and on-site fire, emergencies:

- Facility details including key contacts and technical support during an emergency, site plan, details of renewable energy infrastructure, details of fire and emergency systems, and a manifest of dangerous goods.
    - The identified risks and hazards associated with the renewable energy infrastructure, such as onsite fire and bushfires.
    - Detail preparedness and pre-emptive actions to address the above hazards, including the following for onsite infrastructure fires and bushfire:
        - Ongoing compliance with the approved BMP and BRMP.
        - Ensuring ongoing maintenance of all buildings, fire and communication systems.
        - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
        - Modifying Site Activities (based on Forecast FDR and TFB/HVMB).
        - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, and understanding the decision-making triggers.
    - Detail emergency response procedures to address to all identified hazards (including for onsite infrastructure fires and bushfire).
    - For a bushfire emergency, the response should include the following:
        - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
        - Conducting early offsite evacuation of all staff away from the bushfire if safe to do so (preferred response), ideally to Geraldton, however Dongara, Mingenew

or Mullewa may also be considered in order to travel away from approaching bushfire.

- Essential staff should only remain onsite if directed by authorised DFES/local fire brigade personnel.

- Conduct facility shutdown, If safe to do so prior to staff evacuation:
  - Conduct remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
  - Ensure all other buildings and plant are properly secured.
  - Ensure all vehicular access routes are open and available for use.
  - Ensure all fire and communications systems are ready for use.
- If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place in the O&M building.
  - It is noted that this building is not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.

- Response to onsite fire, including turbine fire, is to include:
  - Immediately notify DFES to enable a rapid turnout, and relevant wind farm personnel
  - Immediately shutdown and deenergise any turbine/s on fire, and any other relevant turbines
  - If safe to do so, trained wind farm personnel to conduct first attack response on any spot fires with mobile fire trailer, until DFES arrival.
  - Notify wind farm landowners and relevant neighbouring landowners.

The emergency management plan is to be reviewed regularly, and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

The above is a high-level summary, with further specific detail on the requirements of the emergency management plan relating to bushfire and onsite infrastructure fire is provided in Appendix 7.

5.9 Dangerous Goods

While not currently planned, should the wind farm facility propose significant quantities of dangerous goods onsite such that the storage and use of these could potentially increase the risk of fire ignition at the proposed development, the Proponent will be required to:

- Ensure they are sited in areas of BAL-29 or lower as a minimum, and protected from bushfire impact, with the final siting and bushfire risk management to be reviewed by an accredited bushfire practitioner.
- Ensure there are strict controls on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation, codes, and relevant Australian Standards.
- Restrictions on hot works and electrical equipment within any on-site hazardous areas.

5.10 Building construction standards

Bushfire construction provisions of the National Construction Code require that buildings comply with the A 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building.

The proposed buildings will not be Class 1, 2 or 3, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement for proposed buildings to meet the construction requirements of AS 3959.

5.11 Compliance with annual firebreak notice

The Proponent is to comply with the current Shire of Augusta-Margaret River annual firebreak notice as amended (refer to Appendix 6). The firebreak notice provides requirements for perimeter firebreaks for lots, plantations and vineyard/orchards, APZs, and restricted and prohibited burning periods. The firebreak notice also provides enforcability to the Bushfire Management Plan, as it notes that properties with approved BMPs, must comply with their requirements.

Given the proposed wind farm is sited across small portions of a number of existing lots, most provisions of the firebreak notice will not directly apply to the proposed development, however the following is applicable:

- All proposed wind farm development and bushfire management measures should not interfere with the ability of the landowner/s to comply with the requirements of the firebreak notice, including perimeter firebreaks around lots and plantations.
- APZs and driveway access is to be provided to buildings, and maintained year-round.
- Gutters and rooftops are to be kept free of debris during bushfire season.
- Comply with Restricted and Prohibited Burning Periods, between the dates nominated in the firebreak notice.
- Comply with all Total Fire Ban and Harvest and Vehicle Movement Ban days as declared.



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Wind Turbine (Low Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per building)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Building/Substation Envelopes
- Wind Farm Building Extent
- Cadastre
- Asset Protection Zone

Classified Vegetation

- Modified to non vegetated and low threat

Scale 1:4,200

0 60 120 180 Metres

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Scott River Wind Farm, Scott River Road

Figure 7: Bushfire Management Measures (Proposed Building and Substation Envelope)

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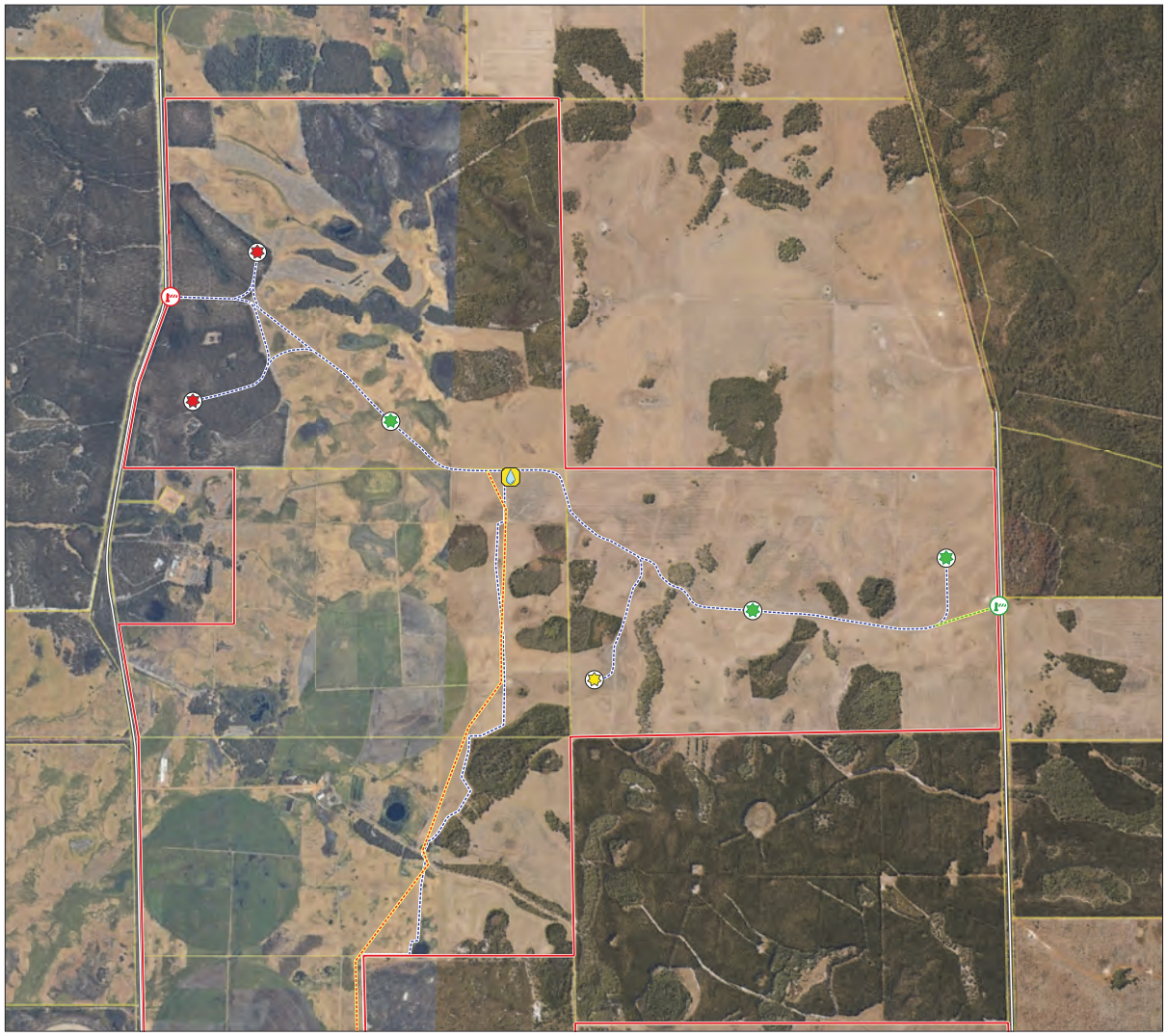

Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Cadastre
- Asset Protection Zone

Scale 1:20,800

0 300 600 900 Metres

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Figure 8: Bushfire Management Measures - Renewable Energy Infrastructure (North)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Building/Substation Envelopes
- Wind Farm Development Boundary
- Cadastre
- Asset Protection Zone

Scale 1:20,800

0 300 600 900 Metres

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Figure 9: Bushfire Management Measures - Renewable Energy Infrastructure (South)

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6.0 Assessment against the bushfire protection criteria

6.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 4.

Table 4: Compliance with Bushfire Protection Criteria 7 (Development – Commercial and Industrial) of the WA Guidelines

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
Element 1: Location			
Not Applicable	Area 1: Not Applicable Area 2: Not Applicable	**Not Applicable**	Not Applicable
Element 2: Siting and Design			
Outcome O2 Ensure siting and design solutions: • manage or mitigate the bushfire risk to people, property and infrastructure; and • avoid, or where unavoidable, minimises the clearing of native vegetation	A2.1a Siting and Design Every habitable building achieves radiant heat impact not exceeding 29 kW/m² (BAL-29). A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m² (BAL-40 or BAL-FZ) The siting of a commercial or industrial habitable building, with a radiant heat impact exceeding 29 kW/m2 (BAL-40 or BAL-FZ) should only be considered where: • the lot was created prior to December 2015; and • there are demonstrated site characteristics and/or biodiversity or conservation values that prevent the achievement of a radiant heat impact not exceeding 29 kW/m2 (BAL-29); and • it is demonstrated that the reduction of the building footprint or a redesign to manage or mitigate the risk, is not practical or appropriate. If the provision of an APZ in accordance with Acceptable Solution A2.2 cannot be achieved, then the vegetation immediately surrounding the building is to be managed as defendable space in accordance with Appendix B.2, Table 9 – APZ technical requirements.	**Acceptable Solution** **Not Applicable**	A2.1a Siting and Design The BAL contour map (see Figure 6) demonstrates that following completion of development including implementation of all nominated APZs and low threat vegetation: • The nominated building envelope will be compliantly sited in areas of BAL-29 or less. • The substation envelope will also be sited in areas of BAL-29 or less. Based on the BAL mapping, it has been demonstrated that the site has capacity to ensure all proposed permanent buildings (and the associated firewater tank) can be sited in BAL-29 or lower, and on this basis, compliance with A2.1a is achieved. Should any habitable building be required other than that nominated above, the required siting shall be assessed by an accredited bushfire practitioner. A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m² (BAL-40 or BAL-FZ) Not applicable as all proposed buildings will be sited in BAL-29 or lower.

	A2.2 Asset Protection Zone (APZ)
	Where a habitable building cannot be wholly within an area with a radiant heat impact not exceeding 29 kW/m² (BAL-29) in its predevelopment state, an APZ is to be provided and meet the following requirements:
	Width: the APZ is to be measured from any external wall or supporting post or column of the building, and of sufficient size to ensure the radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29) to any part of the building, in all circumstances.
	Location: the APZ is to be contained solely within the boundaries of the lot, except in instances where:
	• the vegetation on the adjoining lot(s) is, and will continue to be, low threat as per Clause 2.2.3.2 of AS 3959 or the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme, on an ongoing basis in perpetuity; or
	• the adjoining land is and will remain in perpetuity, non-vegetated
	Management: the APZ is managed in accordance with the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme.
		Acceptable Solution	On completion of development, sufficient separation between habitable buildings and unmanaged post-development vegetation will be provided by:
			• 9 m wide APZ around the perimeter of the nominated building envelope.
			  ◦ All other land within the nominated envelope is to be either non-vegetated or managed low threat vegetation. The preference is that this area is kept as non-vegetated as possible.
			  ◦ Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.
			• 9 m wide APZ around the perimeter of the nominated substation envelope.
			  ◦ All other land within the nominated substation envelope is to be non-vegetated elements.
			The proposed APZs and vegetation management are to be implemented and maintained by the Proponent in accordance with APZ standards from the WA Guidelines (see Appendix 2), AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3) and the Shire's firebreak (see Appendix 6).
			In addition to the requirements above for habitable buildings proposed as part of this development, the BRMP that accompanies this BMP also nominates additional vegetation modification and management requirements for the renewable energy infrastructure, which are

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
			summarised in Section 5.0.
	A2.3 Clearing of native vegetation The development avoids, or where unavoidable, minimises the clearing of native vegetation.	**Acceptable Solution**	The APZs around proposed buildings are limited to BAL-29, which limits any clearing associated with the bushfire risk management. Additionally, the proposed buildings are sited in existing grassland areas (i.e. paddocks), where the implementation of APZs is likely to only require clearing or regular slashing of grassland.
	A2.4 Storage of hazardous, flammable and/or combustible materials Where a proposed land use will include the storage of hazardous, flammable and/or combustible materials as part of its ongoing day to day operations, the materials are to be stored in an area that: • is subject to a radiant heat impact not exceeding 29 kW/m2 (BAL-29); • is non-combustible and shields the materials to reduce their exposure to radiant heat from the bushfire to levels significantly lower than 29 kW/m^2 and prevents the entry of debris and embers; and limits to the degree necessary and practical, the escape of sources of ignition from the stored materials into bushfire prone vegetation.	**Not Applicable**	There are no significant quantities of hazardous, flammable or combustible materials associated with the proposed development. Notwithstanding, if any significant quantities of hazardous, flammable and/or combustible materials are introduced to the development, they should be sited in areas of BAL-29 or lower as a minimum and protected from bushfire impact, with the final siting and bushfire risk management to be reviewed by an accredited bushfire practitioner.
Element 3: Vehicular access			
Outcome O3 Ensure the design and capacity of vehicular access and egress provide: • for efficient and effective evacuation to a suitable destination(s) and/or • as a contingency measure for vulnerable land uses, an on-site shelter, where demonstrated appropriate, as a last resort option.	A3.1 Private Driveway There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).	**Acceptable Solution**	Given there is no existing reticulated town main water supply in the local area, the internal driveway accessing the nominated building envelope is to comply with the requirements of A3.1, including the following: • Comply with the requirements in Appendix B.3 Table 10, Column 5 (see Appendix 4) • Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 200m that increase the overall driveway width to no less than 6 m wide. • Provide compliant turnarounds (see Appendix 4) or loop roads within 30 m of each permanent building • Provide access to the firewater tanks (or tank suction connection) in accordance with A4.1, to enable attending fire appliances to refill, and provide hardstand adjacent to tank suction connection and sufficient locations for fire appliance turnaround. • All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m. The Proponent is responsible for the construction and ongoing management of internal driveways. In addition to the requirements above for access to the building envelope, the project BRMP that accompanies this BMP also nominates additional internal vehicular access arrangement for the renewable energy infrastructure, which are summarised in Section 5.0.
Element 4: Water			
Outcome O4 Ensure that sufficient water is available to enable people, property and infrastructure to be defended from bushfire.	A4.1 Water Supply Where a reticulated water supply is existing or proposed, a hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these specifications cannot be met, a water tank(s) should be provided in accordance with the requirements of Appendix A.4, Table 11 – Water supply dedicated for bushfire firefighting.	**Acceptable Solution**	Given there is no nearby reticulated town main water supply or street hydrants, the bushfire fighting water supply for the future habitable buildings will need to be from static firewater tank/s as follows: • The tank is to have no less than 10 kL per building (including those within the substation envelope). • This firewater tank for the buildings, can either be collocated or combined with, the 45 kL firewater tank at the wind farm building envelope, required for the wind turbines (see Section 5.3.2) The firewater tank within the building envelope is to comply with the relevant technical requirements from the WA Guidelines (see Appendix 5) and the requirements from the CFA Guidelines including:

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
			• Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (e.g. wind turbines etc.). • The hard-suction point must be positioned within 4 m to a hardstand area or internal driveway, and protected from mechanical damage where necessary, and provide a clear access for emergency services personnel. The firewater tank is to be sited within the building envelope to ensure it is an area of BAL-29 or lower. The firewater tank is to be installed, filled and maintained for the life of the project by the Proponent. In addition to the requirements above for firewater to the building envelope, the project BRMP that accompanies this BMP also nominates additional firewater tanks around the overall wind farm for the renewable energy infrastructure, which are summarised in Section 5.0.

7.0 Responsibilities for implementation and management of the bushfire measures

Implementation of the BMP and BRMP applies to the Proponent to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 5 to drive implementation of all bushfire management works associated with this project.

Table 5: Responsibilities for implementation and management of the bushfire measures

No.	Implementation action
	Proponent (Building & Substation Envelope) - prior to building occupation
1	Establish APZs and NVZ at the building and substation envelopes and the firewater tank, in accordance with the dimensions and standards detailed in Section 5.1.1 of the BMP.
2	Construct the internal driveway from the main site entrance to the wind farm building and substation envelopes, in accordance with the dimensions and standards detailed in Section 5.2.1 of the BMP. Construct the main site entrance gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Install the static firewater tank for the building and substation envelopes in accordance with the requirements detailed in Section 5.3.1 and relevant Australian Standards.
4	Should a significant quantity of Dangerous Goods be proposed as part of development, comply with all relevant Dangerous Goods legislation, codes and relevant Australian Standards, and the additional requirements detailed in Section 5.9 of the BMP.
5	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
	Proponent (Renewable Energy Infrastructure) - prior to commissioning and facility occupation
1	Establish NVZs and APZs around all nominated renewable energy infrastructure (turbines, substation) and associated firewater tanks, in accordance with the dimensions and standards detailed in Sections 5.1.2 and 5.1.3 of the BMP.
2	Construct the internal driveway network to the renewable energy infrastructure (turbines) and associated firewater tanks, in accordance with the dimensions and standards detailed in Section 5.2.2 of the BMP. Construct the site entrance gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Install the nominated static firewater tanks for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3.2 of the BMP and relevant Australian Standards.
4	Provide a mobile fire trailer for the wind farm in accordance with the requirements detailed in Section 5.3.3 of the BMP.
5	Incorporate all the renewable energy infrastructure design, construction, installation and commissioning requirements detailed in Section 5.4 of the BMP for the facility. • Turbine automatic fire detection, alarm and suppression • Operational status monitoring and control of turbines • Turbine shutdown • Aerial Notification and Marking • Substation and Transmission Line design and construction • Construction and Commissioning requirements
6	Prepare and install the Emergency Information Book and signage in accordance with the requirements of Section 5.6 of the BMP.

No.	Implementation action
7	Conduct the emergency services familiarisation site visit, in accordance with the requirements of Section 5.7 of the BMP.
8	Develop and implement the site emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.8 of the BMP
9	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
Proponent (Building & Substation Envelope) – ongoing	
1	Maintain APZs and NVZ at the building and substation envelopes and the firewater tank, in accordance with the dimensions and standards detailed in Section 5.1.1 of the BMP.
2	Maintain the internal driveway from the main site entrance to the wind farm building and substation envelopes, in accordance with the dimensions and standards detailed in Section 5.2.1 of the BMP.
3	Install the static firewater tank for the building and substation envelopes in accordance with the requirements detailed in Section 5.3.1 and relevant Australian Standards. Ensure the firewater tank remains filled at all times, especially during bushfire season.
4	Review whether there are any introduced Dangerous Goods to the wind farm, and comply with all relevant Dangerous Goods legislation, codes and relevant Australian Standards, and the additional requirements detailed in Section 5.9 of the BMP.
5	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
Proponent (Renewable Energy Infrastructure) – ongoing	
1	Maintain the NVZs and APZs around all nominated renewable energy infrastructure (turbines, substation) and associated firewater tanks, in accordance with the dimensions and standards detailed in Sections 5.1.2 and 5.1.3 of the BMP.
2	Maintain the internal driveway network to the renewable energy infrastructure (turbines) and associated firewater tanks, in accordance with the dimensions and standards detailed in Section 5.2.2 of the BMP.
3	Maintain the static firewater tanks for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3.2 of the BMP and relevant Australian Standards. Ensure the firewater tanks remains filled at all times, especially during bushfire season.
4	Maintain the mobile fire trailer for the wind farm in accordance with the requirements detailed in Section 5.3.3 of the BMP. Ensure the water and fuel tanks remain filled at all times, especially during bushfire season.
5	Undertake the ongoing operation and maintenance requirements for the renewable energy infrastructure as detailed in Section 5.5 of the BMP for the facility, including: • Ongoing compliance with the endorsed BMP • Regular and ongoing inspection and auditing • Conducting routine maintenance and any required repair activities for all infrastructure, equipment, vehicles and fire detection and suppression systems.
6	Review, and if required update, the Emergency Information Book and signage in accordance with the requirements of Section 5.6 of the BMP.
7	Continue the emergency services familiarisation visits, in accordance with the requirements of Section 5.7 of the BMP.
8	Review, and if required updated, the site emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.8 of the BMP
9	Conduct ongoing review of the project Bushfire Risk Management Plan (BRMP), to ensure it still accurately reflects the risks posed by the development.

No.	Implementation action
10	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.

8.0 References

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Linfire 2025, *Bushfire Risk Management Plan (Renewable Energy): Scott River Wind Farm*, Linfire Consultancy, Perth.

Western Australian Planning Commission (WAPC) 2024, *State Planning Policy 3.7: Bushfire*, November 2024, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2024, *Planning for Bushfire Guidelines*, November 2024, Western Australian Planning Commission, Perth.

Appendix 1 Vegetation plot photos and description



Photo ID: 1a

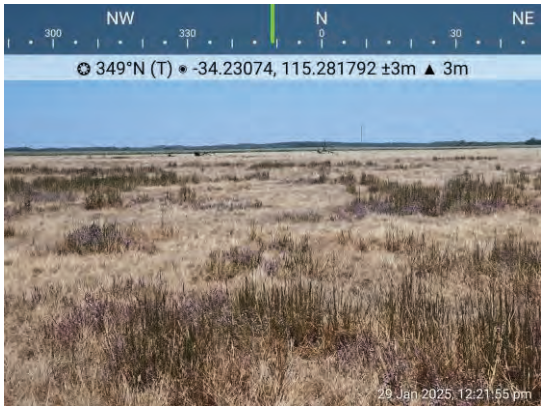


Photo ID: 1b



Photo ID: 1c



Photo ID: 1d



Photo ID: 1e



Photo ID: 1f

Plot number	Plot 1 (some in foreground to be modified to Plot 3)
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height

Appendix 2 APZ standards (from WA Guidelines)

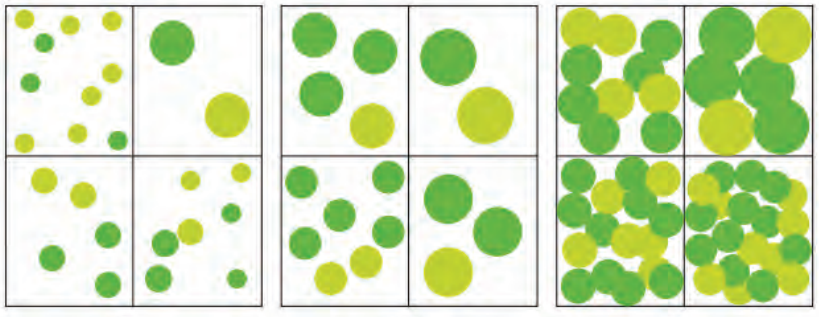
An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defendable space and reducing the potential for direct flame contact, radiant heat exposure and ember attack. The APZ allows emergency services access and provides an area for firefighters and home-owners to defend their property.

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

Vegetation management within an APZ should provide defendable space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined below.

Table 9: Asset Protection Zone Technical Requirements

- **Trees* (> 6 metres in height)**
  - Trunks at maturity should be a minimum distance of six metres from all elevations of the building.
  - Branches at maturity should not touch or overhang a building or powerline.
  - Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation.
  - Canopy cover within the APZ should be <15 per cent of the total APZ area.
  - Tree canopies at maturity should be at least 5 metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.



- **Shrub* and Scrub* (0.5 metres to 6 metres in height)**
  - Should not be located under trees or within three metres of buildings.
  - Should not be planted in clumps >5 square metres in area.
  - Clumps should be separated from each other and any exposed window or door by at least 10 metres.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height)**
  - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load'.
  - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **Grass**
  - Grass should be maintained at a height of 100 millimetres or less, at all times.
  - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.

Table 9: Asset Protection Zone Technical Requirements

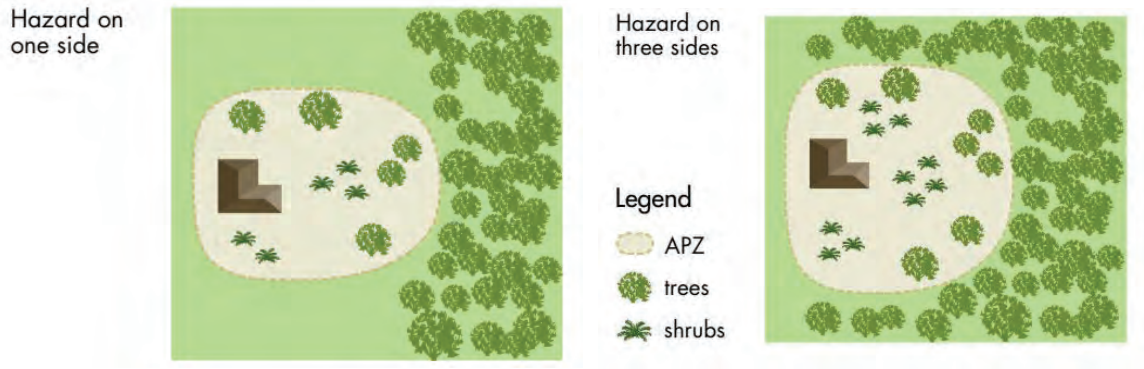
- **Fine Fuel load (combustible dead vegetation mater <6 mm in thickness)****
  - Should be managed and removed on a regular basis to be maintained as low threat vegetation.
  - Should be maintained at <2 tonnes per hectare (on average).
  - Mulches should be non-combustible such as stone, gravel, shells, rock or crushed mineral earth or wood mulch >5 millimetres in thickness.
- **Defendable Space**
  - Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **LPG Cylinders**
  - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.
  - The pressure relief valve should point away from the house.
  - No flammable material within six metres from the front of the valve.
  - Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

*** Fine fuel load:*

- *is the combustible, dead or dry vegetation matter on the ground, near ground, or elevated. Fine fuel includes grass, leaves, bark and twigs less than six millimetres in diameter that ignite readily and are burnt rapidly when dry.*
- *Fine fuel should be maintained at less than 2t/ha (100gm/m^2 equates to 1t/ha).*
  - *To estimate a fuel load (in t/ha), collect the dry fine fuel from a representative one square meter and weigh (in grams using kitchen scales) and multiply the weight by 0.01.*

Figure 25: Design of an Asset Protection Zone



B.2.2 Designing an Asset Protection Zone

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed

space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

An APZ should provide the greatest level of vegetation management within at least three metres of a habitable building, to ensure adequate unobstructed defendable space for emergency services to operate. This area should contain minimal vegetation and be free of combustible materials and obstructions. Within the remainder of the APZ, planting of vegetation can increase as you move farther away from the building.

The placement of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material will break up fuel continuity and reduce the likelihood of vegetation within an APZ supporting a bushfire. It is important to consider the plant density and final structure and form of plants in their mature state.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation to create horizontal and vertical separations between the retained vegetation.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, shells, rock and crushed mineral earth is encouraged. Very fine or light mulch (such as shredded pine bark, pine needles, or poplar woodchips) less than five millimeters in diameter should be avoided. It is recommended that wood mulch is used in garden beds or areas where the moisture level is higher by regular irrigation, and these areas are separated with non-combustible elements, such as pathways and open spaces.

Incorporation of landscaping features, such as masonry feature walls, can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged within an APZ

B2.3 Management of an Asset Protection Zone

Ongoing maintenance of an APZ is usually enforced through a condition of a development approval, which should refer to Table 9 APZ technical requirements within this Appendix.

In addition to regular maintenance of an APZ, further bushfire protection can be provided by:

- ensuring gutters are free from vegetation
- installing gutter guards or plugs
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps
- trimming and removing dead plants or leaf litter
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank
- following the requirements of the relevant local government firebreak notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. Embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building.

Best practice recommends objects within the APZ are moved away from the building prior to any

bushfire event.

Objects may include, but are not limited to:

- door mats
- outdoor furniture
- potted plants
- shade sails or umbrellas
- plastic garbage bins
- firewood stacks
- flammable sculptures
- playground equipment and children's toys.

B2.4 Plant Flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- **Fire resistant** – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- **Fire-retardant** – plants that can absorb more of the heat of the approaching bushfire without burning, compared to more flammable plants.
- **Fire wise** – plants that have been identified and selected based on their low flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire-retardant plant species that suit the environmental characteristics of an area.

When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;
- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Appendix 3 Low Threat Vegetation (AS 3959 Clause 2.2.3.2)

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

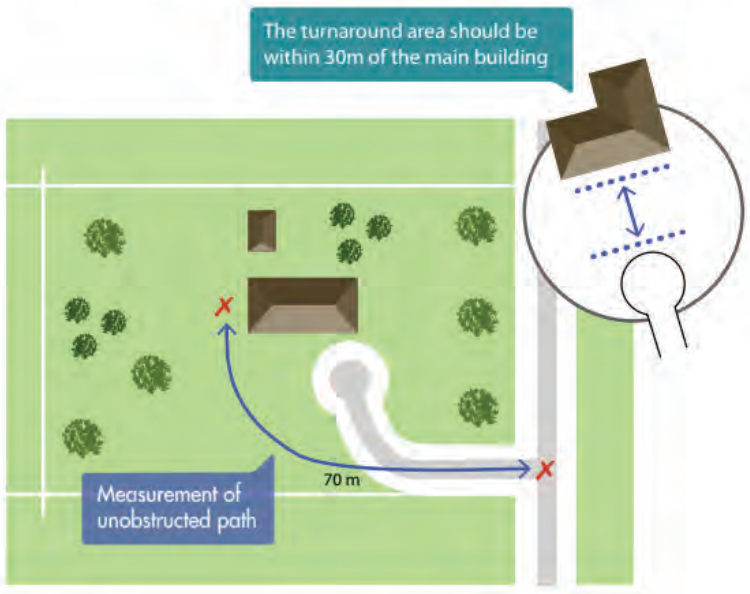
(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

Appendix 4 Vehicular access technical standards of the WA Guidelines

Private driveways
Acceptable Solution A3.1
There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres • (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).
Explanatory note B3.8
Emergency services vehicles typically operate from the street frontage in areas serviced by reticulated water and where the distance from the public road to the farthest part of the habitable building is no greater than 70 metres. In the event the habitable building cannot be reached by hose reel from the public road, emergency services vehicles will need to gain access via the driveway to the property. Emergency services vehicles will also need to gain access to the property where access to water is provided by onsite water tanks. In these situations, the driveway and battle-axe access leg (if applicable) will need to be wide enough for access by an emergency services vehicle and a vehicle to evacuate. It is acceptable for a private driveway to have a carriageway width of four metres with a traversable verge of one metre on either side of the carriageway. Turn-around areas (**Figure 38**) should be available for conventional two-wheel drive vehicles and type 3.4 fire appliances and should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Figure 38: Design requirements for a private driveway where required 

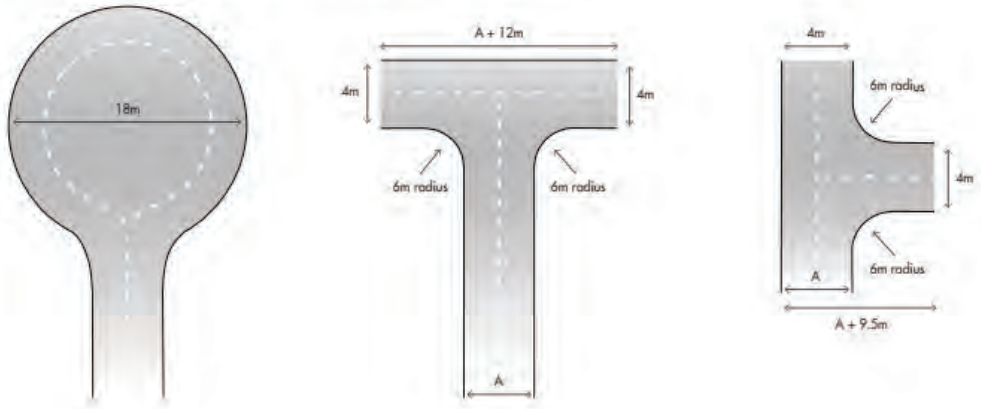
Private driveways
Figure 30: Design requirements for a turn-around area 

Table 10: Vehicular access technical requirements

	1		2		3		4		5	
TECHNICAL REQUIREMENTS	**PERIMETER ROADS**		**PUBLIC ROADS**		**EMERGENCY ACCESS WAY[3]**		**FIRE SERVICE ACCESS ROUTE[3]**		**BATTLE-AXE & PRIVATE DRIVEWAYS[1]**	
MAP OF BUSH FIRE PRONE AREAS DESIGNATION	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**
Minimum horizontal clearance (metres)	12	8	See note 5		10	6	10	6	6	
Minimum vertical clearance (metres)	4.5									
Minimum weight capacity (tonnes)	15									
Maximum grade unsealed road[2]	See note 5		See note 5		1:10 (10% or 6°)					
Maximum grade sealed road[2,4]					1:7 (14.3% or 8°)					
Maximum average grade sealed road					1:10 (10% or 6°)					
Minimum inner radius of road curves (metres)					8.5					

Notes:

[1] Driveways and battle-axe legs to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision where not required to comply with the widths in this Appendix or the Guidelines.

[2] Dips must have no more than a 1 in 8 (12.5% - 7.1 degrees) entry and exit angle.

[3] To have crossfalls between 3 per cent and 6 per cent.

[4] For sealed roads only the maximum grade of no more than 1 in 5 (20 per cent) (11.3 degrees) for no more than 50 metres is permissible, except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed.

[5] As outlined in the Institute of Public Works Engineering Australasia (IPWEA) subdivision guidelines, Liveable Neighbourhoods, Austroads Standards Main Roads standard, supplement, policy or guideline and/or any applicable or relevant local government standard or policy.

Appendix 5 Water technical standards of the WA Guidelines

Appendix B.4 – Water Supply
B4.1 Construction and Design Technical requirements
• An above-ground tank and associated stand should be constructed of non-combustible material. • Below-ground tanks should have a 200 millimetres diameter access hole to allow tankers or emergency services vehicles to refill direct from the tank, with the outlet location clearly marked on the surface. • Above and below ground tanks may need to comply with AS/NZS 3500.1:2018. • An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. • Where an outlet for an emergency services vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply. B4.1.1 Pipes and Fittings All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire hazard and be in accordance with the applicable section below, unless otherwise specified by the local government. B4.1.2 Fittings for above-ground water tanks • Commercial land uses: 125mm Storz fitting; or • Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or • Standalone water tanks: 50mm male camlock coupling with full flow valve; or • Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires. B4.1.3 Remote outlets In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.
B4.2 Use of Water Supply
• The combination of drinking water and water for firefighting purposes is not recommended, as stagnant water may alter the quality of the drinking water and the emergency services, by law, may not be able to take water from the water supply to suppress a bushfire. • Combining drinking water and water for firefighting purposes is contrary to provisions within clause 4.2.3 of AS/ NZS 3500.1:2021
B4.3 Independent Water and Power Supply
• Water tank/s are to be provided in accordance with Table 11, Water supply dedicated for bushfire firefighting purposes.
B4.5 Location of Water Tanks and Hydrants
• Surrounding vegetation should be considered when locating a water tank. • Avoid locations where the tank will be situated underneath existing vegetation or where vegetation will grow against or overhang the tank, (Figure 39). Where a tank is on the bushfire hazard side of a building, sufficient shielding for the protection of firefighters should be provided. In addition to the tank location, the fitting should be positioned and/or shielded from the bushfire hazard to allow access by emergency services.

Appendix B.4 – Water Supply

Figure 39: A good and bad example of landscaping around a water tank



Table 11: Water supply dedicated for bushfire firefighting purposes

SECTIONS FROM THE PLANNING FOR BUSHFIRE GUIDELINES					
SECTION 5[2] STRUCTURE PLANS AND SUBDIVISION APPLICATIONS		**SECTION 6[2] DEVELOPMENT – RESIDENTIAL**	**SECTION 7[2] DEVELOPMENT – COMMERCIAL & INDUSTRIAL**	**SECTION 8[2] – DEVELOPMENT – VULNERABLE LAND USES**	
One additional lot	10,000 litre water tank per lot	10,000 litre water tank per habitable building	For each habitable building - 10,000 litre per 1,500 m^2 of floor space up to 50,000 litre. Provided in a water tank	Camping ground	At the discretion of the local government
Three to 24 lots	10,000 litre water tank per lot[1] **or** 50,000 litre strategic water tank				
25 lots or more	50,000 litre per 25 lots or part thereof, provided as a strategic water tank(s) **and/or** 10,000 litre water tank per lot			Other vulnerable land uses	For each habitable building - 10,000 litre per 500 m^2 of floor space up to 50,000 litre. Provided in a water tank

Notes:

[1] Evidence that the identified water supply amounts in either column denoted is to be provided at the relevant planning stage.

[2] where more than one habitable building is proposed, strategic water tanks are to be provided in accordance with Section 5 requirements and at the discretion of the Local Government.

Appendix 6 Shire of Augusta-Margaret River Firebreak Notice

Shire of Augusta Margaret River

FIREBREAK NOTICE 2024-2025

BUSH FIRES ACT 1954
The following Notice is hereby given to all owners and/or occupiers of land within the Shire of Augusta Margaret River.

PURSUANT to the powers contained in Section 33 of the *Bush Fires Act 1954,* you are hereby required and therefore ordered by the local government to carry out fire prevention work in accordance with the requirements of this Notice, on or before **30 November 2024,** and maintain the requirements up to and including **12 May 2025**, except for APZs which must be maintained all year round.

Inspections, appointments, education, and compliance
Owners and occupiers who would like an early inspection by appointment, for reasons including biosecurity, locked gates, and dangerous animals, or for an explanation on the requirements of this Notice, should contact Rangers as soon as possible and by no later than **1 November 2024**. Where inspections by appointment are not requested, Rangers are appointed as Bush Fire Control Officers with the power to enter land under the *Bush Fires Act 1954* and will be inspecting properties for compliance without further notice from **1 December 2024**.

People who do not comply with this Notice or a Variation to this Notice may be issued with an infringement Notice ($250) or prosecuted with a penalty up to $5,000. The Shire of Augusta Margaret River may carry out the required work on the land at the cost of the owner/occupier.

Requirements of landowners and occupiers:
1. All landowners/occupiers must comply with the requirements in **Part A** of this Notice.
2. Owners/occupiers of Residential lots 4000m^2 and under must comply with the requirements of **Part A** and **Part B**.
3. Owners/occupiers of Residential and Rural/Residential lots 4001m^2 and over must comply with the requirements of **Part A** and **Part C**.
4. Owners/occupiers of Rural lots (excluding Plantations, Vineyards, Orchards, and Groves) must comply with the requirements of **Part A** and **Part D**.
5. Owners/occupiers of Plantations, Vineyards, Orchards, and Groves must comply with the requirements of **Part A** and **Part E** or **F,** depending upon the land use.

Definitions of terms referred to in Parts A, B, C, D, E and F of this Notice
Asset Protection Zone (APZ) - means an area of low fuel load within 20 metres from the external walls of any habitable building.
Habitable Building - means any building people reside in and any other building within 6m of that building, but excludes a water tank.
Flammable Material - means accumulated fuel such as dry grass, leaf litter, twigs, branches, trash, dead trees, firewood, stored fuels, that can be easily ignited or is likely to catch fire and burn. It includes any other thing deemed by an authorised officer to be likely to catch fire but excludes living trees, growing bushes, and plants in gardens and/or lawns under cultivation.
Bushfire Management Plan (BMP) - means a plan prepared specifically for a property in satisfaction of a development approval or subdivision condition.
Driveway/Access Way - means the access route from a road reserve to a habitable building.
Firebreak - means an area of land that has been cleared of all trees, bushes, grasses, and any other object or thing which may be flammable, leaving a bare surface to a width specified under the requirements in Parts A, B, C or D with a 4 metre high vertical clearance.
Trafficable - means a firm, stable surface capable of allowing a 4WD fire appliance to enter, exit and turn any corner (10 metre radius) without reversing.
Variation - means an individual property-specific Firebreak Notice served by the Shire on an owner under s33(2) of the *Bush Fires Act 1954*.

Clearing permits and exemptions
Property owners that clear vegetation in compliance with this Notice will be exempt from the requirement to seek approvals or permits. Owners should attempt to minimise environmental impacts as much as possible and should contact the Shire if they believe that clearing beyond the requirements in this Notice are necessary to reduce fire risks or if they are aware of any protected flora or fauna. **Owners who clear beyond the requirements in this Notice without approval may be subject to prosecution.**

Variations to the requirements of this Notice
Where compliance with the Notice is not practical due to environmental considerations or site-specific constraints such as topography, water course or steep gradients, owners may apply to the Shire of Augusta Margaret River for a **Variation to the Notice**. Variations must provide an alternative means of meeting the objectives of the Notice, including bushfire risk mitigation and property access, considering site-specific constraints and advantages and not all properties will be able to accommodate Variations. Applications must be completed on the approved form, available upon request or downloaded via the Shire's website. Applications for a Variation must be submitted **before 1 November 2024 or after 1 May 2025**.

Part A - Requirements applying to all properties in the district of Augusta Margaret River:

1. Asset Protection Zone (APZ) - The fuel loading (flammable material) in the APZ is to be reduced and maintained to less than 2 tonnes per hectare. Trees must not be closer than 2 metres to a building, and trees must not overhang a building within 4 metres of the external roof. **APZ requirements apply to all properties (excluding Vacant lots), regardless of size, and must be maintained all year round**. (Note: Numerous online resources assist in identifying excessive fuel loading and ideal APZ standards. Rangers can also visit outside of inspection periods to provide property-specific advice.)

2. Bushfire Management Plan (BMP) - properties subject to an approved BMP must comply with the requirements of their BMP in addition to the requirements of this Notice. (Note: At the discretion of the Shire, Variations may be issued that exempt some owners from compliance with requirements in this Notice where they are meeting alternate methods and requirements for compliance in an approved Bushfire Management Plan.)

3. Driveway/Access Way - any property with a habitable building must have a driveway/access way that is a minimum of 4 metres wide up to a maximum of 6 metres wide with a minimum 4 metre vertical clearance and a turnaround area to allow emergency vehicles to access buildings on a property and exit. There must be no encroachment into the driveway by any vegetation (living or dead) or any other object, this includes gates, which if installed, must open the entire trafficable width of the driveway.

4. Firebreak - 2 metre wide firebreaks are required around all piles of garden refuse and/or wood stacks, fuel and fodder.

5. Gutters and Rooftops - All gutters and roofs must be free of excessive twigs, leaves, and plant material.

Part B - Additional requirements applying to Vacant lots 4000m^2 and under:

1. Vacant cleared land - grasses maintained by means of slashing/mowing/grazing to less than 10cm in height. Slashed/mowed grasses are to be removed from the lot.

Part C - Additional requirements applying to Residential/Rural Residential lots 4001m^2 and over:

1. Firebreak - 3 metre wide trafficable firebreaks must be maintained within 10 metres of all boundaries.
2. Vacant cleared land - grasses maintained by means of slashing/mowing/grazing to less than 10cm in height.

Part D - Additional requirements applying to Rural lots (excluding Plantations, Vineyards, Orchards, and Groves):

1. Firebreak - 3 metre wide trafficable firebreak must be maintained within 100 metres of a boundary that abuts a road reserve. Where land is actively grazed or maintained to less than 10cm, the firebreak within 100 metres of a boundary that abuts a road reserve may be reduced to 2 metres.
2. Grasses to be maintained – slashed/mowed/grazed to less than 10cm in height.

Part E - Additional requirements applying to Plantations:

1. Firebreak - 10 metre wide mineral earth firebreak around each cell or block. 3 metres must be trafficable.
2. Grasses to be maintained - slashed/mowed/grazed to less than 10cm in height.

Part F - Additional requirements applying to Vineyards, Orchards, and Groves:

1. Firebreak - 5 metre wide mineral earth firebreak around each cell or block. 3 metres must be trafficable.
2. Grasses to be maintained - slashed/mowed/grazed to less than 10cm in height.

Appendix 7 Bushfire Emergency Management Plan Requirements

The Proponent is to develop an emergency management plan for the facility, which comprehensively details the procedures for preparing for, and responding to, hazards to the facility, including the following for off-site bushfire, and on-site fire, emergencies:

- Facility details including:
  - Facility description, including infrastructure details, operations, number of personnel, and operating hours.
  - Up-to-date contact details for facility personnel, and any relevant off-site personnel that could provide technical support during an emergency including contact information for 24/7/365 specialist technical support for the renewable energy infrastructure.
  - Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
  - The following wind turbine details and plans are to be provided:
    - Schematics and technical data for wind turbines, including the number installed on-site, and internal fire systems.
    - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
    - The shutdown and/or isolation procedures if the turbines are involved in fire or emergency incident, and appropriate personnel contact details to verify that the turbine has been shutdown and de-energised during emergencies.
  - Details of any emergency resources, including fire detection and suppression systems and equipment; gas detection; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid.
  - A manifest of dangerous goods (if required under the applicable Dangerous Goods legislation and codes, and relevant Australian Standards), including Safety Data Sheets (SDS).
- The identified risks and hazards associated with the renewable energy infrastructure, including but not limited to:
  - Electrical faults and renewable energy infrastructure fire,
  - Bushfire
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:

  - Ongoing compliance with the approved BMP and BRMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
  - Ensuring ongoing maintenance of all buildings, especially the onsite O&M building.
  - Ensuring ongoing maintenance of all fire and communication systems.
  - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
  - Modifying Site Activities (based on Forecast FDR, TFB and/or HVMB)
  - Monitoring DFES Bushfire Emergency Warnings (and/or bushfire activity within 50km of the facility, during bushfire season, and understanding decision-making triggers.
- Detail emergency response procedures to address the nominated hazards, including for:
  - Bushfire and
  - Onsite fire in renewable energy infrastructure

Bushfire preparedness and pre-emptive activities

Year-round (with focus on the month prior to bushfire season)

- Ensure ongoing compliance with endorsed BMP including:
  - Vegetation management must be conducted as per the BMP including maintenance of APZs and NVZs.
  - Gutters, roof surfaces and valleys, kerbs, traps, sumps, bunds, drains, rooves or any other accumulation points for leaf litter, dry vegetation, or any other combustible materials must be cleared, and the debris removed from site.
  - Extraneous or unnecessary materials (fuel loads) must be removed from site (e.g. dilapidated/stored vehicles, plant or equipment; excess fuel/chemicals; any combustible waste materials).
- Bushfire preparedness housekeeping inspections:
  - Ensure all vehicle site access points, including emergency access points, are clear and accessible.
  - Ensure that all fire protection systems and equipment is unobstructed, in service and performing optimally.
- Fire detection, alarm and suppression systems, and any other communication and emergency equipment must be maintained in accordance with relevant codes and standards, and be in effective working order at all times
  - Any defects, faults or matters affecting the performance of systems must be identified through routine testing and servicing, with any maintenance activities and rectifications to be closed-out prior to bushfire season.
- Ensure Emergency Information Book and signage is up to date with the latest information, especially key contact names and phone numbers, as detailed in Section 5.6.
- Ensure local fire brigade is engaged on an ongoing basis, to ensure they are familiar with the site layout, specific hazards and fire detection and suppression systems as detailed in Section 5.7.
- Ensure the wind farm has registered with the Shire of Augusta-Margaret River for SMS

notifications for Harvest Vehicle Movement Bans (HVMB).

During the bushfire season

Monitor Forecast Fire Danger Rating (FDR) and Total Fire Ban Days (TFB)

- A nominated person/role is to be responsible for identifying, responding to and communicating the Fire Danger Rating, ideally four days ahead:
  - http://www.bom.gov.au/wa/forecasts/fire-danger-ratings.shtml [4 day FDR forecast] or
  - https://www.emergency.wa.gov.au/index.html#firedangerratings [current/next day FDR]
  - https://www.emergency.wa.gov.au/#totalfirebans [Total Fire Ban]
- This information must be communicated to everyone likely to be present on-site, and relevant off-site personnel.
- Undertake any modification of site activities based on forecast FDR or TFB (see below).

Modifying Site Activities (based on Forecast FDR and TFB)

- ***Moderate FDR or No Rating***
  - No specific daily monitoring or actions unless conditions change.
- ***High FDR***
  - Alert all site personnel and visitors of bushfire risk
  - No specific daily monitoring but remain vigilant to potential bushfires through visual checks, occasional check of online resources for emergency warnings and bushfires in the local area.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Extreme FDR***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for site shutdown and offsite evacuation, if required.
  - Conduct regularly visual checks throughout the day
  - Regularly check online resources for emergency warnings and bushfires in the local area.
  - Consider minimisation of site personnel and visitation requiring travel to and from the facility, as well as non-essential activities and high-risk maintenance activities.
  - Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Catastrophic FDR and TFB declared days***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for rapid site shutdown and offsite evacuation, if required
  - Conduct hourly visual checks throughout the day

- Conduct hourly check online resources for emergency warnings and bushfires in the local area.
- Postpone non-essential activities or high-risk maintenance activities at the facility.
- Minimise site personnel and visitation to only essential personnel.
- Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
- Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- Comply with all Total Fire Ban requirements including:
  - no fire or flames allowed in the open air
  - no open fires for the purpose of cooking or camping are allowed
  - no 'hot work' such as metal work, grinding, welding, soldering, gas cutting or similar is allowed unless a formal exemption has been obtained
  - no use of chainsaws, plant or grass trimmers or lawn mowers in bushland areas
  - no other activities that may start a fire
  - ensure equipment or machinery is mechanically sound
  - ensure all reasonable precautions are taken to prevent a bushfire igniting, including postponing any activity that could result in a bushfire ignition.

Monitoring and Modifying Site Activities (based on HVMB)

- Nominated personnel are to monitor for SMS warnings from the Shire for declared Harvest Vehicle Movement Bans (HVMB).
- If declared, comply with all HVMB requirements of the Shire, which typically including no:
  - Operation or movement of internal combustion engines (motor bikes, quad bikes, excavators, chain saws, ride on mowers, generators, plant equipment) used off-road in bushland or paddocks.
  - Undertaking 'hot works' such as welding, grinding or activity that may cause a spark or ignition unless an exemption issued by Department of Fire & Emergency Service (DFES) for essential services work on a total fire ban day.
  - Fire or flames allowed in the open air
  - Cooking outside in the open air using an open fire (this includes under verandas and patios)
  - Harvesting

Bushfire Monitoring, Triggers and Decision-Making

Bushfire Monitoring

Bushfire monitoring involves the identification of the DFES Bushfire Emergency Warnings (ADVICE, WATCH & ACT AND EMERGENCY) and/or bushfire activity within 50km of the facility, through the use of the Emergency WA website app (https://www.emergency.wa.gov.au/), or ABC local radio.

- ***If ADVICE warning or bushfire is within 25 km – 50 km of the site***
  - Liaise with the DFES if fire travelling toward the site.

- Consider reducing numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel).
- Make preparations to shutdown facility and conduct offsite evacuation procedures, depending on bushfire location and direction of spread, including:
  - Prepare for potential remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
  - Ensure onsite O&M building is properly prepared for onsite shelter, should it be required.
  - Ensure all other buildings and plant are properly secured.
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire and communications systems are ready for use.
- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

- ***If WATCH & ACT warning or bushfire is within 10 km – 25 km of the site***
  - Liaise with the DFES if fire travelling toward the site.
  - Prepare or commence shutdown facility, depending on bushfire location and direction of spread, including:
    - Prepare for potential remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
    - Ensure onsite O&M building is properly prepared for onsite shelter, should it be required.
    - Ensure all other buildings and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Prepare or commence offsite evacuation procedures depending on bushfire location and direction of spread, including:
    - Early reduction of numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location, if safe to do so, otherwise they are to remain onsite.
      - Ensure relocation of all wind farm personnel to the offsite safer location ahead of any bushfire impact on road network (including smoke impact).
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.
- ***If EMERGENCY warning or if bushfire is <10km or impact is imminent:***
  - Liaise with the DFES.
  - If safe to do so, commence or conduct facility shutdown depending on bushfire location and direction of spread, ideally in consultation with authorised DFES personnel (where possible), including:
    - Prepare to conduct remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
    - Ensure onsite O&M building is properly prepared for onsite shelter,

should it be required.
    - Ensure all other buildings and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Urgently undertake offsite evacuation procedures (if safe to do so) depending on bushfire location and direction of spread, including:
    - Relocate all site personnel and visitors to nominated offsite safer location ahead of any bushfire impact on road network.
  - If unsafe to evacuate offsite, urgently commence onsite shelter in place procedures including:
    - Prepare onsite O&M building for onsite shelter
    - Relocate all site personnel and visitors to the O&M building on conduct all shelter in place actions.
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

Offsite Evacuation and Onsite Shelter-in-Place Procedures

Ahead of deciding to evacuate offsite or remain onsite to shelter-in-place (which is the last resort response if unsafe to evacuate offsite), the following should be conducted:

- Assess the bushfire situation:
  - Review available information to determine bushfire location, direction and speed of travel
  - Determine if there are any DFES Bushfire Warnings issued
  - Contact and liaise with DFES for further information and guidance
  - Make a decision whether it is safe to evacuate to nominated offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel), or whether it is safer to shelter onsite in the O&M building (which should be a last resort action only).
  - Advise DFES of the decision, if possible.

Offsite Evacuation (and Facility Shutdown)

- Assemble all site personnel and visitors at the O&M control building
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) and evacuate to nominated offsite safer location.
  - Ensure sufficient transport is available for all personnel to travel to nominated offsite safer location with sufficient fuel to travel 100 km, water, fire extinguishers (if possible)
- Conduct facility shutdown actions (if sufficient time) including
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other buildings and plant are properly secured.
- Brief evacuees on offsite evacuation particulars including:
  - Confirm the offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel)
  - The evacuation route to travel to the off-site safer location
  - The need to travel in convoys in case of vehicle failure

    - Where possible, the final evacuating personnel should leave in 2 vehicles.
- Monitor the leaving of site and arrival at nominated offsite safer location, and if anyone is missing, notify DFES immediately.

Onsite Shelter-in-place (and Facility Shutdown) – Last Resort Action Only

- Assemble all site personnel and visitors at the onsite O&M building
    - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) but remain onsite to shelter in place.
- Prepare onsite O&M building for shelter
    - Check the perimeter of building and put away all external combustible items and any loose items that could be projectiles
    - Close all doors and windows
    - Ensure all firefighting, emergency communication equipment and first aid supplies are available and ready for use, including positioning the mobile fire trailer in an accessible location adjacent to the O&M building.
    - Ensure all internal access routes within the building are open to enable people move to the available spaces
    - If installed, ensure any evaporative air-conditioning (HVAC) can be easily shutdown ahead of the fire impact. If possible, keep the water running and turn off the fan, otherwise shutdown completely.
    - Begin storing water for drinking (in containers) and review food stores
    - Consider collecting any blankets and fire extinguishers from other buildings
    - Soak towels and rugs in water and lay them along the inside of external doorways or block any other gaps for embers or smoke
- Conduct facility shutdown actions (if sufficient time and safe to do so) including
    - Ensure all vehicular access routes are open and available for use.
    - Ensure all fire systems are ready for use.
    - Ensure all other buildings and plant are properly secured.
- As bushfire impacts the facility:
    - All occupants are to be at the O&M building
    - Immediately before the fire arrives, wet down building, decks and landscaping close to the building. Turn off evaporative air-conditioning if not already done.
    - Ensure occupants get down low to limit exposure to smoke and drink plenty of water to avoid becoming dehydrated.
    - Regularly inspect the condition of the building including:
        - Regular inspection of the inside of the building, including the roof space for sparks and embers, and extinguish where possible and safe to do so.
        - If safe to do so, organise for regular patrols of the outside of the building to check for any signs of bushfire ignition and extinguish where possible and safe to do so. Those conducting the patrols are to wear appropriate PPE.
- Stay inside while the fire front is passing and don't leave until advised by DFES or local fire brigade (or decided by Chief Fire Warden) that the fire is no longer a threat or offsite evacuation can be safely conducted.
- If the building catches fire and/or conditions inside become unbearable:

    - Leave through the door furthest from the approaching fire
    - Relocate all occupants away from the fire or previously burned land.
- Once the fire has passed, and approval is provided to leave the building:
    - Go outside and extinguish any fires on the building or in adjacent landscaping.
    - Regularly inspect the inside and outside of the building for several hours.
    - Do not approach the renewable energy infrastructure (turbines, substation, transmission lines) until advised by DFES.

Onsite Renewable Energy Infrastructure Fire Response

The emergency response to any onsite fire in renewable energy infrastructure (especially turbines), is to include the following:

- Immediately notify of onsite fire, including location:
    - DFES and local fire brigade to enable rapid onsite turnout.
    - Relevant wind farm personnel
    - Landowners
- Immediately shutdown and deenergise any turbine/s on fire, and any other relevant turbines
- If possible, ensure relevant vehicular access routes are open and available, to enable attending firefighters to gain access to the O&M building and relevant turbine/s.
- Ensure all fire and communications systems are ready for use.
- If safe to do so, conduct first attack response on any spot fires with mobile fire trailer, until DFES arrival.
- Ensure attending firefighters have access to any relevant wind farm personnel (onsite or offsite) for specialist technical advice.

Emergency Management Plan Review, Training and Exercises

The emergency management plan is to be reviewed regularly as follows:

- At least annually to ensure currency and effectiveness
- Following any changes to the risk on-site pertaining to site infrastructure and operations
- After any activation of the plan or incident involving notification to the emergency services.
- After emergency exercises.

In addition to the review of the emergency management plan, it is critical to regularly train relevant staff and conduct exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. It also presents an opportunity to test the effectiveness of the plan and refine as required.

- Training should be conducted annually prior to bushfire season, as a minimum, and also at the commencement of employment.
- Exercises should be conducted annually prior to bushfire season, as a minimum, but ideally on a regular basis.

Scott River Wind Farm

Scott River Road, Scott River

Bushfire Risk Management Plan (Renewable Energy)

Date: 27 March 2025

Prepared For: Synergy Renewable Energy Developments Pty Ltd

Linfire Ref: 20231220334SYN-BRMP-002_0

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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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0	27 Mar 2025	Issued for Approval	Linden Wears (Level 3 BPAD 19809)

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Fire is an unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire. The mitigation strategies contained in this Bushfire Risk Management Plan (BRMP) are considered to be prudent minimum standards only, based on the standards prescribed by relevant authorities. It is expressly stated that Linfire do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

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1.0 Introduction

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is seeking to lodge a development application (DA) for a new wind farm across a number of lots in Scott River (the wind farm development boundary) approximately 15 km north-east of Augusta, in the Shire of Augusta-Margaret River.

The proposed development will require the installation of the following infrastructure:

- New building/s (within nominated wind farm building envelope)
- 20 wind turbine generators
- 132 kV transmission line (above-ground)
    - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation.
    - Consisting of above-ground towers, poles and electrical lines
    - To be designed and constructed to Western Power specifications
- 33 kV distribution lines
    - Reticulated from each turbine to substation, preferably through use of underground cables, but could be above-ground if ground conditions are unsuitable for underground cables
- High voltage substation
- Internal access driveways providing access to proposed buildings, turbines and firewater tanks.
- Firewater tanks

A plan of the proposed wind farm is provided on Figures 1, 2, 3 and 4 in the project Bushfire Management Plan, which includes the location of proposed wind turbines, transmission lines, building and substation envelopes, driveways and firewater tanks.

Regarding onsite personnel, once operational, the following is expected:

- Occupant numbers likely to be 2 to 4 staff, 5 days a week (business hours)
- There will be at least one on-call technician allocated to the facility for all other times

Further information on the existing site is provided in the project BMP, namely Section 1.2.

As detailed in Section 1.4, this BRMP has been prepared to assess the proposed renewable infrastructure against the relevant the Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities, to demonstrate the bushfire risk associated with this infrastructure has been appropriately managed. This differs to the purpose of the project BMP which is to demonstrate compliance for habitable buildings against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

1.2 Relevant Legislation and Guidance

- State Planning Policy 3.7: Bushfire (SPP 3.7) and the Planning for Bushfire Guidelines (the WA Guidelines).
- WAPC Position Statement: Renewable energy facilities, 2020
- Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities v4, 2023
- Building Code of Australia / National Construction Codes (BCA/NCC)

- AS 3959 Construction of Buildings in Bushfire Prone Areas
- AS/NZS ISO 31000:20018 Risk management – Guidelines
- Australian Disaster Resilience - National Emergency Risk Assessment Guidelines (NERAG) 2020.
- AS 3745-2010 Planning for Emergencies in Facilities
- Dangerous Goods Safety Act 2004
- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (the Regulations)
- Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail.

1.3 Regulatory Context

The entire wind farm development extent is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2024), due to native vegetation located within 100 m of the site which triggers bushfire planning requirements under *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

A Bushfire Management Plan (Linfire 2025) has been prepared to accompany the development application, as per SPP 3.7 Policy Measure 7(ii), given the proposed permanent buildings are sited in a designated bushfire prone area and would have a pre-development rating of BAL-40/FZ. The BMP demonstrates how the proposed buildings will comply with bushfire protection criteria of the WA Guidelines.

Given the renewable energy infrastructure (e.g. wind turbines) are not considered “habitable buildings” as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn’t triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4* (CFA; 2023; CFA Design Guidelines) from Victoria fire brigade, is the best publication to demonstrate compliance with at this stage, albeit rationalised for WA context.

Under the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007*, the operator may also be required to complete a separate risk assessment that addresses risks other than bushfire for the proposed development and the associated Dangerous Goods, should the development trigger the need to do so, although it is noted that there isn’t significant quantities of any Dangerous Goods proposed at the facility.

Some high-level information from the following has been provided in the subsections below, regarding the following guidance documents with respect to renewable energy infrastructure bushfire risk management:

- CFA Design Guidelines for Renewable Energy Facilities
- WAPC Position Statement: Renewable Energy Facilities
- Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

1.3.1 CFA Design Guidelines for Renewable Energy Facilities

This guidance material developed by the CFA for renewable energy facilities, namely their publication *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA 2023), requires that a Risk Management Plan is to be developed for renewable energy facilities which includes the following:

- Description of the risks and hazards at the facility to and from the facility and related infrastructure.

- Detail the following:
    - The location of the renewable energy infrastructure on-site and in the landscape.
    - Emergency vehicle access to and within the facility that:
        - Includes site access points of a number suitable to the size and hazard of the facility
        - Provides access to renewable energy infrastructure, substations and fire service infrastructure.
    - Firefighting water supply for the facility.
    - Asset Protection Zone/s of 10m or greater, based on radiant heat flux (output) as an ignition source:
        - Around the perimeter of the facility.
        - Between any landscape buffer/vegetation screening and renewable energy infrastructure.
    - The separation distance, based on radiant heat flux (output) as an ignition source, between:
        - Renewable energy infrastructure, buildings/structures, and vegetation.
        - All other controls for the management of on and off-site hazards and risks at the facility (including all proposed safety and protective systems).
- Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.
- Form the basis for the design of the facility

While the facility Risk Management Plan is to address both onsite fires within renewable energy infrastructure and bushfires, this BRMP provides this relevant information detailed above for the bushfire-related risk to (and from) the proposed development.

The CFA Guidelines is organised with a number of sections as follows, each section containing guidance and what it terms “Model Requirements” for all renewable energy facilities as well as specific measures for wind, solar, battery energy storage (BESS) and substation/electric line infrastructure:

- Fire Risk Management
- Facility Location
- Facility Design
- Facility Construction and Commissioning
- Facility Operation
- Emergency Planning

A summary of the CFA Guidelines sections (relevant to this project) is provided in the compliance assessment on Table 2 in Section 4.0.

1.3.2 WAPC Position Statement: Renewable Energy Facilities

WAPC have released a Position Statement on renewable energy facilities, in which they note the following with respect to bushfire risk management:

- Renewable energy facilities in Western Australia are principally wind turbine and solar array systems.
- The objectives of this position statement include facilitate appropriate development of

renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas

- Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an 'extreme' bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
- A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended.
    - The APZ should be managed in a low threat state, in accordance with the Guidelines.

This BRMP will aim to comply with the WAPC Position Statement as much as practical.

1.3.3 Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

In 2012, the Shire of Augusta-Margaret River released LPP 23 relating to Renewable Energy Systems which they amended in March 2021. LPP 23 provides guidance on the appropriate location, scale and design of wind and/or solar energy systems in the Shire. There is no specific guidance relating to bushfire compliance or risk management, other than stating that a *"fire management plan"* may be required *"where planning approval is sought large renewable energy systems"*.

The preparation of this BRMP and the project BMP, is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

1.4 Purpose

The focus of this BRMP is to apply and demonstrate compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Guidelines, with summary of the derived bushfire management measures from this BRMP included in the project BMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

Additionally, the preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

2.0 Renewable Energy Assets and Hazard Analysis

2.1 Onsite Renewable Energy Assets

The proposed development is expected to include the following onsite renewable energy infrastructure:

- ***Wind turbine generators***
  - 20 turbines
  - Maximum tip height of 250 metres (hub height up to 164 m with blade length of up to 90 m)
  - Turbines are steel tower casings to ground level, with fibreglass/aluminium/steel blades
  - All turbines are to have fire detection, alarm and suppression systems
- ***High voltage substation***
  - To be designed and constructed to relevant Australian Standards
  - Expected to contain infrastructure such as main transformer, STATCOM, switchroom, NSP room, harmonic filters, back-up generator/auxiliary supply.
- ***132 kV transmission line***
  - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation
  - Consisting of above-ground towers, poles and electrical lines
  - To be designed and constructed to Western Power specifications
- ***33 kV distribution lines***
  - Reticulated from each turbine to substation, preferably through use of underground cables.
  - If ground conditions are unsuitable for underground cables, portions of these 33 kV lines may need to be above-ground.

2.1.1 Wind Turbine Component Overview

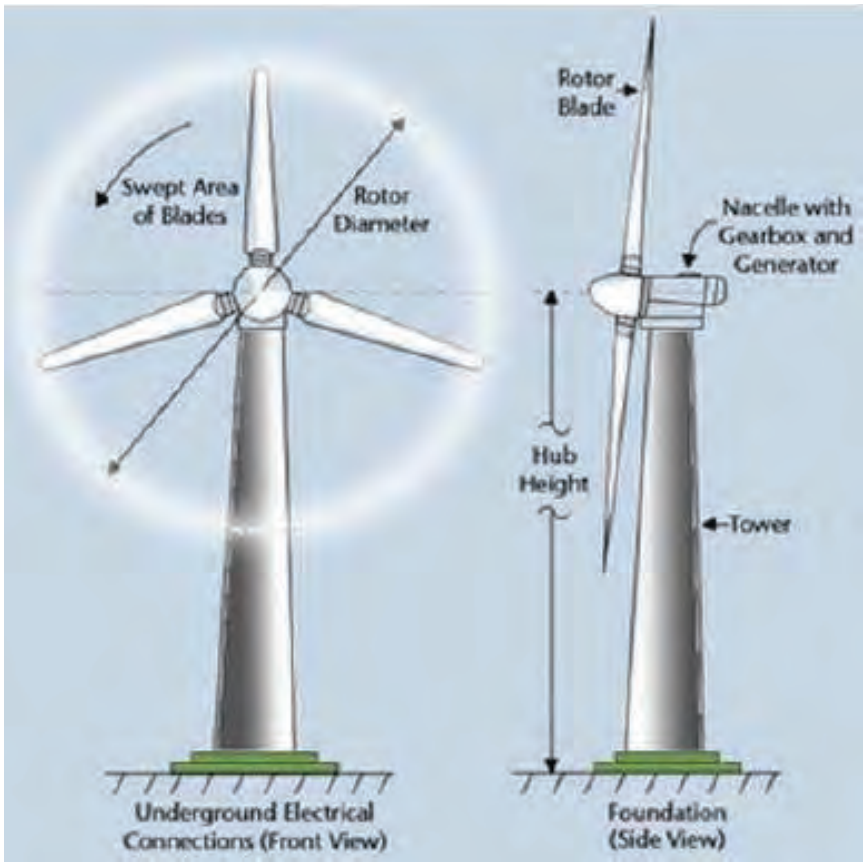
A wind turbine (also known as a wind turbine generator), is a device that converts the kinetic energy of wind into electricity. In simple terms, the turbines blades use the aerodynamic force of the wind (much like an aeroplane) to turn a rotor, which spins a generator to produce electricity, which is typically fed into the mains power network as a source of renewable energy.

The horizontal axis wind turbine generators proposed at the wind farm consist of the following elements (see Plate 1):

- Tower
  - The tower supports the structure of the turbine
  - Constructed of steel
- Nacelle
  - The nacelle sits on top the tower, and houses the key mechanical elements: the gear box, generator, shaft and brake.
  - Typically constructed of metal, fibreglass or composite materials
- Hub
  - The turbine blades fit into the hub that is connected to the turbine's main shaft.
  - Typically of metal construction.
- Blades
  - Three blades located on top of the turbine, which connect to the turbine hub.

- When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin.
- The blade construction is generally proprietary, however typically the blade core structure mostly balsa wood or foam, with the outer shell generally fibreglass or composite material.

- Drivetrain
  - Rotor
    - The blades and hub together form the turbine's rotor.
  - Main bearing
    - The main bearing supports the rotating low-speed shaft and reduces friction between moving parts so that the forces from the rotor don't damage the shaft.
  - Shafts (low-speed and high-speed)
    - The low-speed shaft connects the rotor and hub to the gearbox
    - The high-speed shaft connects from the gearbox to the generator
  - Gearbox
    - The gearbox connects the main (low-speed) shaft to the high-speed shaft, thereby converting the low-speed incoming rotation to high-speed rotation required by the generator to produce electricity.
  - Generator
    - The generator, which is driven by the gearbox, houses copper windings that turn through a magnetic field to produce electricity.
  - The majority of the drive train components are metal, but there are a number of lubricants also contained in this system.
- Rotor Brake and Lock
  - A rotor brake keeps the rotor from turning after it's been shut down. Once the turbine blades are stopped by the controller, the brake keeps the turbine blades from moving.
  - The system typically consists of a friction disc brake that is often hydraulically activated.
  - In addition to the rotor brake, a rotor lock (or locking bolt) is required to manually fix the rotor in place for maintenance.
- Yaw System
  - The yaw drive rotates the nacelle on upwind turbines to keep them facing the wind when wind direction changes. The yaw motors power the yaw drive to make this happen.
  - Downwind turbines don’t require a yaw drive because the wind manually blows the rotor away from it.
- Controller
  - The controller manages the starting and stopping of the turbine, usually based on wind speed (i.e. sufficient wind to start and shutting off at excessive wind speeds).
  - Contains a number of sensors and a control system, to continuously monitor wind speed, direction, turbine performance, and other vital parameters.
  - This system adjusts the blade pitch and other aspects to optimize power generation while ensuring safe operation within wind speed limits.



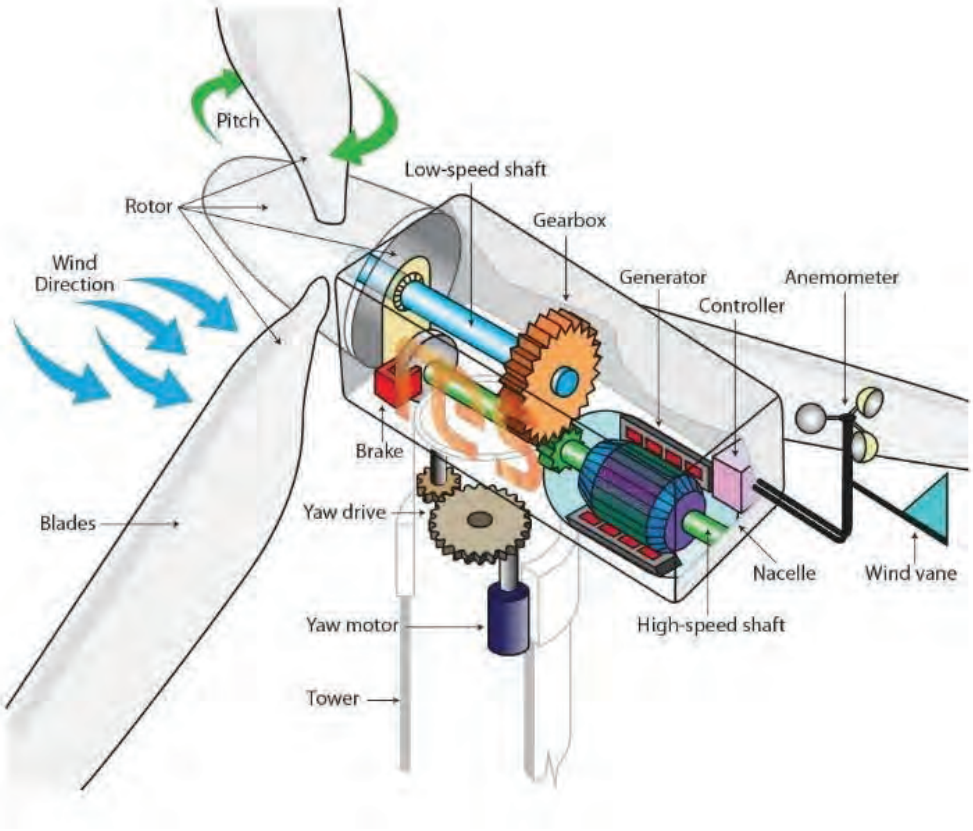


Plate 1: Wind Turbine Components

2.2 Wind Farm Site Description

A detailed description of the wind farm site is provided in Section 1.2.1 of the project BMP, with a brief summary provided below:

- The proposed wind farm extends over a number of existing lots as detailed in the BMP
- All the lots have been largely cleared of native vegetation and used by private landholders for agricultural purposes.
    - The only exception to this is Lot 4269 in the north-western part of the wind farm, which currently contains existing timber plantations, which are relatively mature and while they are expected to be harvested in coming years, the exact timing is not confirmed.
- Other lots located adjacent to the development boundary worthy of note include:
    - Lot 2 on Diagram 090280, Courtenay
        - Contains the existing Beenup substation
    - Lot 4265 (No 598) Dennis Road, Scott River
        - Contains existing privately owned timber plantation
    - Lot 101 on Plan 038071, Scott River
        - Currently identified as a DBCA Lands of Interest (Register No. 2555/700), and potentially a future nature reserve.
    - Lot 4924 on Plan 217962, Scott River
        - Crown Reserve 42377
        - Zoned under local Shire planning scheme as “National Parks and Nature Reserves”
        - Flora reserve
- Surrounding the wind farm boundary:
    - To the east of Dennis Road is agricultural land and timber plantation and Pagett Nature Reserve and Chester Nature Reserve.
    - To the north of Lots 4266 and 4269 are existing agricultural lots largely cleared of vegetation, other than isolated forest plots, with Brockman Highway and South Blackwood State Forest further north.
    - To the west is Scott River Road, with largely cleared agricultural land further west other than some existing timber plantation in the north-west.
    - To the south is primarily cleared agricultural land, with some forest and scrub vegetation south of Lot 4260 and Governor- Broome Road, which fringes the Scott River.

Public road access to the wind farm is via:

- Brockman Highway from the north, which extends west to eventually connect to Bussel Highway at Karridale (17 km west), and east to Nannup (approximately 55 km away)
- Scott River Road, Governor Broome Road and Dennis Road forming a loop road arrangement around the perimeter of much of the wind farm.
    - Governor-Broome Road extends 12 km east of the wind farm to connect to Milyennup Coast Road, where travel can be undertaken 13 km north to connect to Stewart Road and Brockman Highway and on to Nannup.
- The only other public road near the wind farm is Coostien Road, which is an existing dead-end public road providing access to lots south of the Governor Broome Road.

Vehicular access within the various wind farm lots is currently via existing unsealed farm tracks, which provide access from a number of existing entrance gates along the public road network, into the lots.

There is no known reticulated town main water supply currently provided to any lots within the wind

farm development boundary, nor is there any existing street hydrants.

2.3 Bushfire Hazard

The proposed development is to be located across a number of existing rural land holdings, which have largely been cleared of vegetation for agricultural purposes and is now mostly grassland, with only Lot 4269 in the north-west of the wind farm, containing blue gum plantation. This plantation is likely to be harvested in the future, but the timing is not confirmed so it will be assumed it is uncleared for this assessment.

Surrounding the wind farm lots is mostly a combination of rural land holdings largely cleared of vegetation, timber plantations, and areas of remnant native vegetation within land holdings but also in State Forest and Nature Reserves. The most notable bushfire hazard is to the east and north of the wind farm, where continuous forest vegetation exists within Pagett Nature Reserve, South Blackwood State Forest and Blackwood National Park, that extends to Nannup and beyond. Vegetation in other directions is typically more fragmented by agricultural development, with tracts of forest along the Blackwood River to the west of the wind farm and coastal scrub and forest to the south, presenting the only other significant bushfire hazards in the local area.

2.3.1 Bushfire Hazard Assessment

As the renewable energy infrastructure is not required to achieve target BAL ratings as per the CFA Guidelines, there is no specific requirement to provide BAL contour mapping. The CFA Guidelines do provide some high-level guidance on separation of turbines from unmanaged vegetation, so on that basis, vegetation and effective slope mapping using the AS 3959 site assessment methodology has been undertaken for the wind turbine site to inform the discussion and compliance assessment with CFA Guidelines.

2.3.2 Vegetation classification and effective slope

Linfire assessed classified vegetation, exclusions and effective slope within 150 m of the wind farm development boundary through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 1 and Table 1, and depicted on Figure 1 and Figure 2. Effective slope results were cross-referenced with Landgate 5 m contour data and are depicted in Table 1, and depicted on Figure 1 and Figure 2.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed to the south-east of the building and substation envelopes, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state.

Site observations indicate that land is undulating, with elevation decreasing from the north of the wind farm to the south-west. The effective slope for the remainder of the classified vegetation further than 150 m from the building and substation envelopes is not technically required, however has been provided to give some guidance of the general slope in the areas around the turbines which is almost always downslope 0°-5°.

The mapping has been conducted at a relatively broad scale, to provide some indication regarding the proximity of proposed renewable energy infrastructure, to continuous non-grassland vegetation.

2.3.3 Summary of inputs

Table 1 summarises the vegetation classifications and exclusions within 150 m of the proposed wind farm. The post-development vegetation classifications/exclusions and effective slope are illustrated

on Figure 1.

Table 1: Vegetation classifications/exclusions and effective slope (within 150 m of wind farm site)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height throughout much of the wind farm site, cleared of vegetation for agricultural purposes.
2	Class C Shrubland	Downslope >0–5°	Shrubland vegetation (<2 m high), primarily within Lot 4924 and small plots in Lot 101.
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land to be modified to low threat vegetation as part of proposed development within building and substation envelopes and associated APZs.
4	Class D Scrub	Downslope >0–5°	Plots of scrub vegetation (2 m to 6 m high) typically as isolated plots throughout the wind farm site.
5	Class A Forest	Downslope >0–5°	Multi-layered forest vegetation with trees >6m high, typically occurring as isolated plots within agricultural land and along roads, but as larger more continuous plots in plantations (until harvest) and retained native vegetation within surrounding nature reserves.
6	Class B Woodland	Downslope >0–5°	Trees >6m high, well-spaced with grassy or grazed understorey, typically occurring as isolated plots within agricultural land.
7	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing public roads.

2.3.4 Bushfire Hazard Summary

The wind farm itself is comprised mostly of agricultural land, largely previously cleared of native vegetation other than isolated plots of retained shrubland, scrub and forest vegetation. The only significant plots of non-grassland vegetation within the wind farm site, are the timber plantations in the north.

Outside the wind farm site, the greatest bushfire threat to the site exists to the north, north-east and east of the site, where extended fire runs tens of kilometres long are possible through continuous forest vegetation within National Parks, State Forest and Nature Reserves, capable of creating landscape-scale bushfire behaviour. While the greatest bushfire threat to the development is from those directions, bushfire is capable of spreading toward the wind farm from any other direction over significant distances, which could also develop to steady-state bushfire behaviour.

Given the majority of proposed renewable energy infrastructure is located in the agricultural grassland areas, where any bushfire impact would be limited to grassfire behaviour with a very quick residence time, producing a brief exposure to elevated radiant heat, supplemented with some ember

attack from surrounding forest vegetation. The greatest potential bushfire impact will be on the two turbines proposed in the plantation in the north-west of the site, where surrounding forest vegetation could result in elevated radiant heat, potential flame impingement and ember attack on these turbines, if the risk is unmanaged.



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Figure 1: Vegetation and Effective Slope - North (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Building/Substation Envelopes
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,800

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 2: Vegetation and Effective Slope - South (Overall Wind Farm)

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2.4 Wind Farm Hazard and Risk Analysis

The CFA Guidelines notes that fire hazards at wind energy facilities may include the following:

- Electrical hazards, such as wind turbine electrical faults; power surges; hot surfaces; lightning strike
- Chemical hazards, such as the leakage of oils and lubricants within the turbine/ancillary equipment
- Potential fire spread, due to air flow impact or falling debris from fire-impacted turbines
- Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers or radiant heat
- Falling blades
- Wind turbines as a potential obstruction for aerial firefighting

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed turbines, and the ability for significant turbine fires to ignite a bushfire.

2.4.1 Wind Farm Fires in Australia

While there haven't been many significant fire events at wind farms in Australia (either ignited by wind turbines, or impacted by bushfire), or at least not many publicly reported, review of those reported fires do provide a useful tool to review potential risks, as well as the relevant learnings from such events. Below is a summary of several that have occurred and reported upon in the past 10 years.

2.4.1.1 Cape Nelson Wind Farm, Victoria (June 2024)

- Cape Nelson is a 195 megawatt (MW) wind farm in the Portland area of Victoria, that was constructed in 2009 and is owned by Pacific Blue.
- The wind farm site is home to native coastal Mallee scrub.
- The wind turbine fire occurred at the top of the turbine at approximately 8pm, and occurred in a Senvion MM82 turbine, which has a hub height of 69 metres and a maximum blade tip height of 110 metres.
- The fire destroyed the turbine and resulted in a blade falling off the turbine, and others expected to follow. Firefighters were called to the scene and allowed the turbine to burn out as there was nothing the firefighters could do to suppress the turbine fire.
- The Fire Rescue Victoria commander noted that:
    - This fire is the first in the Portland area since wind farms started to be built around 20 years ago
    - The rarity of wind turbine blazes mean they aren't a big fire risk.
- There were no reported injuries from the fire.

2.4.1.2 Clements Gap Wind Farm, South Australia (February 2024)

- Clements Gap Wind Farm was one of the first wind farms in South Australia, being constructed in 2010, and had 27 of the Suzlon S88 turbines.
- Smoke from the turbine was spotted by a maintenance crew at 8:30am, and emergency services were alerted at about 8.50am.
- The fire destroyed the wind turbine and ignited a grassfire underneath it due to debris from the turbine. The resultant fire turbine burnt about 30 hectares of grassland, with no one injured in the incident.
    - The Country Fire Service (CFS) created an exclusion zone around the wind turbine to enable firefighters are staying on top of spot fires created by falling debris, while remaining clear from the turbine collapse zones.

- The CFS noted that:
    - Wind turbine fires are uncommon, but can occur including in South Australia the previous year.

2.4.1.3 *Waterloo Wind Farm, South Australia (January 2017)*

- A bushfire started on a paddock near the Waterloo Wind Farm in South Australia. The fire quickly spread through the area due to gusty westerly and north-westerly winds, and including into area the wind farm was located.
    - The exact cause of the fire was never reported, but is not believed to be ignited by the Vestas wind turbines or any wind farm operations.
    - The fire burned approximately 50 hectares before it was controlled (around 2.45p the next day), including land beneath turbines as the northern end of the wind farm.
    - There had been no reported loss of structures but it was not clear what, if any, damage had been caused to turbines at the wind farm.
    - There were no reported injuries to any people.
- The bushfire was reported by a local farmer to the CFS just prior to 2pm, with the firefighting and wind turbine actions including the following:
    - CFS deployed water bombers to fire and requested that a number of turbines be shut down.
        - By 2.17pm, the wind farm operations had paused 18 wind turbines.
        - CFS also made contact with the wind farm General Manager to obtain approval for decisions relating to wind farm operations as much as required, including requesting that the turbines be paused and shut down remotely by applying their brakes.
    - CFS also requested that where safe to do so, all access gates within the wind farm site be opened to enable the CFS quick access to respond and manage the incident, without restrictions.
    - CFS worked to halt the fire advance with multiple runs of water bombing and ground-based firefighting, with fixed-wing water bombers able to manoeuvre through the turbines to target the grass fire and were followed by ground crew.
    - At 3.15 pm, CFS deemed it safe enough for the onsite crew to attend six of the paused wind turbines, to apply the brakes and set the blades in ‘rabbit ear position’, further assisting aircraft to pass through the turbines to continue water bombing.
    - The wind farm’s access tracks worked as a fire break and without these the CFS believes the fire would have likely spread further, creating a much bigger incident.
    - The turbine’s footings, with their clear line of site, were used by crews to coordinate air and ground crew actions.
    - Firefighting continued through the afternoon and, by 6 pm, the CFS approved the re-start of the turbines located outside of the fire ground area.

2.4.2 Wind Farm Fire Risk

The Australasian Fire and Emergency Services Authorities Council (AFAC) released a position paper titled *Wind Farms and Bushfire Operations* (AFAC, 2018) with the expressed intent to “*provide guidance relating to planning for bushfire prevention, preparedness, response and recovery operations in and around existing and planned wind farm facilities*”. This publication rightly stated that wind power is a rapidly expanding form of renewable energy production, and noted that *“…wind farms are not expected to adversely affect fire behaviour, nor create major ignitions risks”*. More

specifically AFAC noted the following:

- ***Ignition caused by wind farm infrastructure or operations***
    - It is possible that turbines can malfunction and start fires within the unit.
    - The above is generally considered a low risk given appropriate protection measures, with automatic shutdown and isolation procedures are generally installed within the turbine system.
    - Operation of winches and machinery during monitoring and maintenance tasks may also lead to ignitions.
- ***Lightning risks***
    - Wind turbines can attract lightning during thunderstorms.
    - If struck by lightning, turbine towers are generally not expected to start fires as they have built-in protection mechanisms.
    - On this basis, it is possible that wind turbines may reduce the risk of bushfires caused by lightning, particularly if turbines are located on a ridge or local high point.
- ***Hazards and firefighting limitations in and around the wind farm facilities***
    - Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers.
        - The bushfire at the Waterloo wind farm demonstrated that if conditions are clear and wind turbines are turned off, wind turbines are clearly visible from aircraft and are not likely to constrain aerial firefighting operations (Clean Energy Council 2017).
            - If wind turbines were not shut down, moving blades and wake turbulence would create significant hazards for low flying aircraft, thus the shutting down of wind turbines, in an emergency situation, is defined in wind farm emergency procedures.
        - However, transmission infrastructure, meteorological towers and guy-ropes were difficult to see (Clean Energy Council 2017) and this infrastructure does have potential to limit the effectiveness of aerial firefighting operations.
            - This can be addressed through appropriate marking of this infrastructure.
    - Access and egress challenges on the ground as well as water supply issues can also create firefighting limitations, if not planned for appropriately.
- ***Bushfire spread within wind farm facilities and impacts on wind farms as critical infrastructure***
    - Wind farms are not expected to adversely affect fire behaviour in their vicinity.
    - Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings.
    - Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event.
    - Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.

2.4.2.1 Learnings from Past Wind Farm Fires

There are number of learning opportunities from the past wind farm fires, which can be used to

inform the bushfire risk management strategy.

With respect to bushfires impacting the wind farm site (such as the Waterloo Wind Farm fire), AFAC noted the following:

- *The wind farm's access roads were beneficial in helping fight the bushfire on the ground and provided an effective firebreak.*
- *The wind farm's turbines did not present a hazard to aerial firefighting and the turbines were clearly visible to the pilots involved in operations. However, transmission infrastructure, transmission lines and meteorological masts were difficult to see by pilots and did pose a safety risk.*
- *Improved communication protocols need to be in place between wind farm operators and fire and land management agencies to direct turbine shut-down procedures in an emergency situation and initiate emergency response plans.*
- *Wind farm operators should ensure that they have the capacity to respond to emergency events.*
- *Wind farm operators should ideally select turbines that can be rapidly shut down to the preferred position.*
- *Additional precautionary measures should be considered to allow for aerial identification of meteorological masts (measurement towers), guy wires and other infrastructure such as transmission lines that are not easily visible from air.*

Additionally, the Clean Energy Council also added the following comments:

- *Ensure aerial-friendly identification and markings for meteorological ("met") masts and guy wires is provided at wind farm locations.*
- *Review and update emergency management plans and protocols with a focus on:*
    - *Communications practices including advising state air-desk (who control aerial firefighting assets)*
    - *On site asset management/operations centre control procedures to pause, brake and 'lock' individual turbines*
    - *Best practice approaches to support aerial and ground-based responses*
    - *Water storage point signage, access track markings and site mapping.*
- *Ensure ongoing and regular engagement with local volunteer organisations and services.*

In addition to the comments above, the following is also noted:

- The considerable cleared areas at the base of turbines (footings and crane pads) provide useful areas for firefighting operations.
- While locking the turbines in the "Y" position is ideal, the CFS reported that the aerial operations were able to occur with the turbines "paused" which is understood to be with the turbines shutdown, but the blades not locked (i.e. turning very slowly).

With respect to turbine fires, the following is noted:

- Both the Victorian and South Australian fire services have noted that turbine fires are a low likelihood event, with very few having occurred.
- Most turbine fires have occurred in old turbines that are likely 20 years old, and which:
    - Have older technology without the and more advanced fault monitoring, detection, etc currently installed in most modern-day turbines in wind farms.
    - Likely lack nacelle suppression systems to control the fire and prevent escalation to an uncontrolled turbine failure event.
- Prevention of an uncontrolled turbine fire or failure event should be seen as the primary

objective to prevent potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.

- Early notification of local fire brigade, nearby farmers/landowners and the wind farm personnel is critical to ensure a rapid and coordinated response.

2.4.3 Likelihood of Wind Farm Fire

As noted by AFAC, the likelihood of turbine fires is considered to be relatively low, and while it is accepted the statistics around fire losses are based on historical estimates and incomplete datasets, the likelihood wind turbine fire per year is generally accepted to be around 1-in-2000, but potentially lower than that (Krcmar, 2020). There are varying levels of resultant damage associated with these fires, which can range from small fire events through to complete burnout of the turbine nacelle, with uncontrolled nacelle fires resulting in significant damage or total turbine loss much of the time.

The likelihood of bushfire impact on wind farms is tied to the potential for bushfires within the wind farm site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.

On the DBCA dataset depicted on Plate 3, it is worth noting:

- A number of the larger fires in the northern part of the site and to the west (on the) are from the 1950's and 1960's, when the landscape may been different and less developed.
- Some of the fires to the north, north-west and west of the subject site within forest vegetation, are prescribed burns within the Nature Reserves and State Forest dating back to the 1970's.

The historical data clearly depicts that while bushfires have occurred in the local area, few have ever spread into the wind farm site. This is likely due to the improved ability to manage the bushfire fires as they spread into the agricultural land from the forest areas due to reduced fire behaviour and increased access for attending firefighters. While there appear to be few historical bushfires within the wind farm site, this BRMP assumes that bushfire impact could occur in the future, and addresses the risk accordingly.

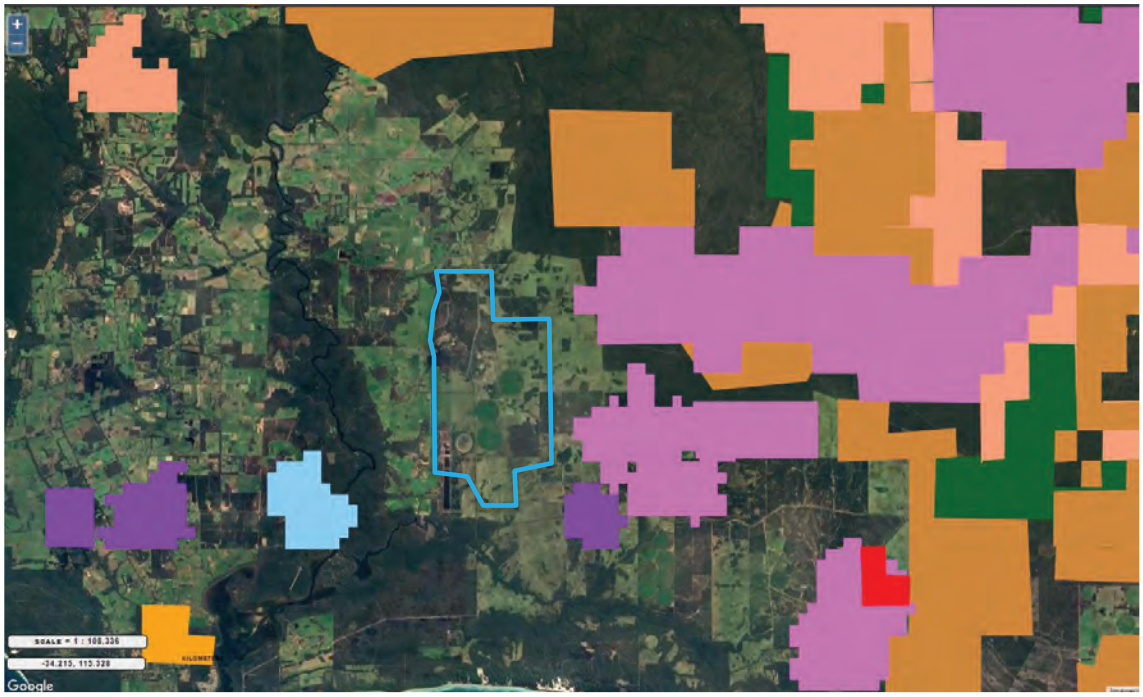

Plate 2: Bushfire History (Firewatch 2025)



Plate 3: Bushfire History (DBCA 2025)

2.5 Bushfire Risk Management Requirements

Based on the analysis of the bushfire hazards and risk associated with wind farms, the following are considered key bushfire risk management requirements to be incorporated into wind farm proposals:

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of wind turbines is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit bushfire escape.
- Provision of appropriate vehicular access to each turbine for emergency services and wind farm operations vehicles, including permitting fire appliance turnaround.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.
- Design and construction of turbines should ensure that the risk of uncontrolled turbine fire or failure events is mitigated, to avoid potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so. This would be expected to include:
    - Remote monitoring of the operational status of the turbines, including any faults, with ability to remotely shutdown and de-energisation of turbine/s.
    - Fire detection, alarm and suppression system to provide early warning of internal fire and automatic response.
- Ensure all infrastructure that could potentially present a risk to pilots and aerial operations (e.g. turbines, meteorological monitoring towers etc) are recorded with relevant aviation authorities and provided with any required markers/lights etc to minimise risk during aerial firefighting operations,
- Ensure sufficient information is available for attending firefighters to assist any fire suppression efforts, including the following:
    - Key emergency contacts including wind farm personnel
    - General site plan including location of buildings and renewable energy infrastructure including transmission towers, meteorological monitoring towers etc.
    - Information on any fire/bushfire risk management measures including Asset Protection Zones, fire detection/suppression systems etc.
    - Firewater access locations, including hydrants, tanks and any other static water supplies suitable for firefighting purposes.
    - Access information including public roads, available entrance/exits, internal vehicular access routes and gates (locked/unlocked)
    - Any safety considerations and procedures
- Provision of mobile firefighting equipment and training for wind farm personnel to manage risk of onsite hot works, and potentially intervene any small ignitions until fire brigade arrive.
- Ensure an emergency management plan is established for the facility addressing all relevant hazards, including bushfires and turbine fires, that includes the following with respect to fire:
    - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations)
    - Limiting any onsite ignition sources or fuel loads
    - Ensure communication protocols are established for contacting DFES, nearby farmers/landowners, and relevant agencies (e.g. Western Power, AEMO etc) to

enable management of emergencies, access to land and shutdown of turbines.

- Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
- Staff training and exercises of emergency management procedures
- Ensure DFES (and local fire brigade) familiarisation with the facility
- Response actions for in the event of bushfire in the local area with focus on:
  - Evacuation of staff offsite
  - Ensuring all onsite wind farm access routes are unlocked and available for attending firefighters.
  - Remote shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) and facility closure, if safe to do so.
- Response actions for onsite turbine ignition or fire including
  - Rapid notification of wind farm personnel (including on-call technician), DFES and nearby landowners/ farmers
  - Remote shutdown and de-energisation of relevant turbine/s
  - Conduct first attack response on spot fires until DFES arrival etc.
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the wind farm or any fire events.

3.0 Bushfire Risk Strategy and Management Measures - Renewable Energy Assets

As detailed in Sections 1.3 and 1.4, the CFA *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA, 2023) are currently seen as the best guidance for renewable energy facilities available at this point in time. The CFA Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

CFA (2023) notes that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).

CFA Guidelines Requirements for Wind Turbines

- ***Turbine Siting and Vegetation Modification***
  - CFA Guidelines recommend siting of turbines in “low-risk environments” which it defines as being in gently undulating grassland with good road access and away from “continuous” non-grassland vegetation (noting the term “continuous is not defined), which are considered “high-risk environments”.
    - The CFA Guidelines don’t preclude siting of renewable infrastructure in “high-risk environments”, but note that strengthened or additional risk mitigation measures will be required.
  - A Non-Vegetated Zone (NVZ) must be established and maintained around the base of wind turbines.
    - In low-risk environments, this is to be 10m wide and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.
  - Where wind turbines are sited in high-risk environments (including timber plantations), strengthened or additional fire risk mitigations will be required as per the stage approach detailed in the CFA Guidelines, with the following recommended:
    - Implementation of an additional Asset Protection Zone (APZ; reduced-fuel zone cleared of trees and scrub [as permitted by authority] and grass to <100mm high in bushfire season) around the base of wind turbines, on the outside perimeter of the NVZ, with width:
      - no less than 20m, or
      - to the envelope of the wind turbine blades.
    - There is no further guidance on how to apply this.

Interpretation Note – Continuous and Non-Continuous Vegetation

- *Given the lack of definition around the term “continuous” vegetation, which is critical to the assessment of what is considered ‘low-risk’ and ‘high-risk’ environments as per CFA Guidelines it is recommend the following broad principles are considered as being “non-continuous” when assessing the siting and vegetation management around turbines:*
  - *Plots of non-grassland vegetation that are sufficiently small and/or isolated from other forest/woodland/scrub vegetation, by either grassland or low*

shrubland, such that the resultant bushfire passing through these plots would not be considered to be a significantly exacerbated or likely to reach steady state, or be uncontrollable by attending firefighters.

- *Consideration is given to the size and location of the plot, proximity to continuous non-grassland vegetation, access to and around the plot (either via roads, tracks or agricultural land).*
- *Examples are plots of paddock trees or isolated plots of forest/woodland/scrub vegetation within paddocks, where a bushfire passing through would not represent a significant escalation in bushfire behaviour, nor produce behaviour that would make the fire uncontrollable attending firefighters, who would be expected to have reasonable access and water supply.*

- ***Vehicular Access***
  - Suitable emergency vehicle access is required to each turbine and building on-site (with number and location of access point to be determined in liaison with fire brigade).
    - Specifications are similar to private driveways from WA Guidelines, but with passing bays permitted every 600 m in lieu of 200 m.
- ***Firewater***
  - At least one static fire water storage tank of at least 45,000L effective capacity at each site entrance
    - Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design (in consultation with fire brigade)
- ***General Design***
  - Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.
  - Wind turbines must be located no less than 300 metres apart.
  - Wind turbines must be provided with automatic shut-down capability, and the ability to be completely disconnected from the power supply in the event of fire.
- ***Emergency Planning***
  - Include measures in Fire Management Plan for attending firefighters and Emergency Plan for onsite personnel
  - Training and Exercises

CFA Guidelines Requirements for Substations

- The entire substation must be surfaced to eliminate all vegetation including grasses.
- Firewater must be provided to cover substations

CFA Guidelines Requirements for Transmission Lines

- Comply with any local electricity supply legislation or guidance prescribing the vegetation clearance requirements for electric lines.

The CFA Guidelines provide the best guidance available to wind farm design at this current point in time, certainly in terms of infrastructure and bushfire risk management. On that basis, this BRMP seeks to apply the Model Requirements, and associated guidance, from the CFA Guidelines, as much as practical to the proposed wind farm.

It is noted that while most management measure relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

Based on the guidance from the review of the assets and hazards in Section 2.0, and informed by the compliance requirements of the CFA Guidelines and the WA Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

The subsections below detail the proposed bushfire risk management measures to be adopted by the project, with a compliance assessment in Section 4.0 demonstrating how these measures align with the principles from the CFA Guidelines.

The risk management measures have also been summarised in the BMP, to provide a comprehensive list of the Proponents bushfire risk management obligations for this project.

3.1 Wind Turbines

3.1.1 Siting and Vegetation Modification and Management

Based on the guidance from the CFA Guidelines, in addition to the interpretation note on "continuous" and "non-continuous" non-grassland vegetation, the following vegetation modification and management philosophy is proposed around the base of the turbines, based on location and proximity to "continuous" non-grassland vegetation.

- Turbines would ideally be separated by at least 300 m from "continuous" non-grassland vegetation on the following basis, in order to minimise vegetation management measures:
    - CFA Guidelines require separation between turbines of 300 m and the maximum Non-Vegetated Zone (NVZ)/Asset Protection Zone (APZ) in high-risk environments is to the blade envelope.
    - The proposed turbines will have a maximum tip height of 250 m, which with a 10% safety margin, if they toppled would be a safe distance of 275 m.
- Given the above, and in the absence of any specific siting guidance, the following turbine risk categories and associated vegetation management measures are to be adopted:

  Low-Risk Turbine Site

    - ***A turbine is considered to be in a low-risk environment when it is sited further than 300 m from "continuous" non-grassland vegetation.***
    - If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
        - ***10 m NVZ around base of turbine tower***
    - While target BAL rating is not specifically required, a 10 m NVZ would achieve BAL-29 at the turbine tower casing.
    - Currently 13 of the 20 proposed wind turbines are assessed as Low Risk, as depicted on Figure 1 and Figure 2.

  Transition Risk Turbine Site

    - ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
        - ***closer than 300 m to "continuous" non-grassland vegetation, (but not within this non-grassland vegetation) or***
        - ***within "non-continuous" non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
    - If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:

- ***10 m NVZ around base of turbine tower; and***
- ***20 m APZ outside the 10 m NVZ***

- While target BAL rating is not specifically required, the 30 m NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, and would generally provide a BAL-19 or BAL-12.5 impact.
  - The Transition Risk category is aimed more at providing greater separation from "non-continuous" non-grassland vegetation when turbines are sited in/near small plots of forest, woodland, scrub or shrubland vegetation, rather than the instances where turbines are still in grassland areas but within 300 m of "continuous" non-grassland vegetation, and the overall 30 m NVZ/APZ is probably greater than required. Notwithstanding, a consistent vegetation management approach is being applied to both occurrences.
- Currently 5 of the 20 proposed wind turbines are assessed as Transition Risk, as depicted on Figure 1 and Figure 2.

<u>High-Risk Turbine Site</u>

- ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within "continuous" non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
- If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
  - ***10 m NVZ around base of turbine tower***
  - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- While target BAL rating is not specifically required, the NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, more likely BAL-12.5.
- Currently 2 of the 20 proposed wind turbines are assessed as High Risk, as depicted on Figure 1 and Figure 2.
  - These 2 turbines are sited in existing timber plantations in the north of the facility, however the timing of harvesting has not yet been determined.
  - The risk to the turbines is likely to be significantly reduced following future harvesting, however given the uncertainty regarding the timing and future use, a High Risk rating has been applied.

- Should turbines be relocated:
  - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
  - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of forest and grassland may be both high-risk and transition risk). In these instances, we propose that:
    - The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
    - the highest risk category is blanketly applied
- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for "firebreaks" from CFA Guidelines as follows:

  - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
  - Free of vegetation and obstructions at all times.
  - No combustible plant or equipment.
- The Asset Protection Zone (APZ) is to comply with the APZ standards from the WA bushfire Guidelines
- All NVZ and APZ around turbines are to be established and maintained by the Proponent during bushfire season, for the life of the wind farm.

3.1.2 Vehicular access to turbines

- The following site entrances are to be established for the facility:
  - Main site entrance from Scott River Road, near the proposed building and substation envelopes
  - Three additional site entrances as follows:
    - One on Scott River Road, approximately 5.5 km north of the main entrance.
    - One on Governor Broome Road, providing access to turbines to the north.
    - One on Governor Broome Road, providing access to turbines to the south.
- All nominated site entrances are be fitted with gates as follows:
  - Provide at least 6m clear horizontal width
  - If locked, any keys are issued to DFES and any local fire brigade.
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
  - Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 600m that increase the overall driveway width to no less than 6 m wide.
  - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
  - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to each proposed firewater tank, with access is to be provided to within 4 m of the tank suction point.
- In addition to the internal wind farm access driveways, there are existing farm tracks and farm gates, also noted on the concept plan, that could be used in a bushfire emergency by attending firefighters.
  - These are shown for information purposes only, and it is noted that these are not being constructed or maintained by the Proponent as part of this project.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
- The internal wind farm access driveways, site entrances, gates and signage are to be

constructed and maintained by the Proponent in perpetuity (or for the life of the wind farm).

3.1.3 Firewater for turbines

- As detailed on Figures 8 and 9 in the BMP, firewater tanks as proposed in the following locations around the wind farm site (following initial consultation with DFES) to provide 135 kL of firewater capacity for the renewable energy infrastructure:
    - One (1No) 45 kL firewater tank in the northern part of the site, at an intersection of the internal driveways and the termination of the transmission line.
    - One (1No) 45 kL firewater tank at the wind farm building envelope, either collocated or combined with the firewater requirements for the proposed buildings.
    - One (1No) 45 kL firewater tank in the southern part of the site, at an intersection of the internal driveways to a number of turbines.
- While the firewater tank locations above represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- All firewater tanks will comply with the standards from the WA bushfire Guidelines, and the following from the CFA Guidelines:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - Firewater tanks are to be at least 10 m from wind turbines
    - The tank suction point must be within 4 m of a driveway or hardstand
- All firewater tanks are to be sited in an area of BAL-29 or lower as follows:
    - Within a BAL-29 or lower area within the wind farm building envelope
    - Where outside the wind farm building envelope, have a 9 m wide APZ around the perimeter of the tank.
- Vehicular access to each firewater tank is to be via proposed internal wind farm driveways.
    - Access is to be provided to within 4 m of the tank suction point.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- The firewater tanks, and associated APZs, are to be constructed and maintained for the life of the project by the Proponent.

3.1.4 General turbine design and emergency management

In addition to the measures detailed above, the following are also required for the proposed turbines to manage the risk of turbine fires.

3.1.4.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.

- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel onsite, or offsite monitoring.
    - A procedure to be incorporated to ensure that activation of the fire detection system results in notification being provided immediately to the following people that there is an onsite turbine fire:
        - Wind farm personnel (including on-call technician),
        - DFES and local fire brigades
        - Nearby landowners/ farmers

3.1.4.2 Operational Status Monitoring and Control of Turbines

- In addition to the fire detection, alarm and suppression systems, appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
    - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both onsite and remotely offsite.
- Operational control of turbines should be able to be conducted onsite and offsite, to enable remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
    - It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

3.1.4.3 Turbine Shutdown and Disconnection from Power

- In addition to turbine operation status monitoring and control, all wind turbines are to be configured to automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely from offsite.
    - The intent is that in the event of a turbine fire, only the affected turbine would automatically shut-down.
- There will also be ability to remotely shut-down and de-energise the turbines in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]).
    - This will result in the turbine blades turning very slowly but not generating any power nor supplying to the grid.

3.1.4.4 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

3.2 Substation

- The substation envelope is proposed to be co-located with wind farm building envelope, which is a location surrounded by grassland vegetation.
- There are several buildings proposed within the substation envelope, and these will comply with the WA Guidelines as follows:
    - Provision of a compliant 9 m wide APZ around the perimeter of the substation

envelope to ensure a rating of BAL-29 or lower is achieved on all substation infrastructure and buildings (e.g. switchroom, NSP building, Statcom building and harmonic filter room)
    - All land within the substation envelope is to be non-vegetated
    - Provision of compliant private driveway access to the substation envelope, from Scott River Road, that is compliant with the private driveway specifications of the WA bushfire Guidelines
    - No specific firewater provided for the substation, however the firewater tanks within the wind farm building envelope, will provide nearby firewater for bushfire fighting around substation.
- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards.

3.3 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per Western Powers own standards.
    - It is noted that the majority of the proposed transmission line is over existing grassland so there is likely to be limited vegetation clearing required for construction or ongoing maintenance.

3.4 Additional Management Measures

In addition to the measures detailed previously for the specific renewable energy infrastructure, the following is also required to manage bushfire risk for the wind farm facility.

3.4.1 Provision of mobile fire trailer

- Provision of a mobile fire trailer (or similar approved) is required to enable wind farm staff to:
    - have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
    - provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire
- This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.
- As a minimum, the fire trailier (or similar approved) should have:
    - No less than 1000 L tank
    - Fire pump and hose reel
    - Mounted on trailer or ute to enable easy transport around the site.
        - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).
- The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

3.4.2 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and

transformers) comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.

- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for dangerous goods as per relevant Australian Standards.
- Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days
- Ensure tight ignition source control, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility which includes:
    - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to
        - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in turbines or substation)
        - Bushfires
    - Emergency procedures for bushfires (adopting similar concepts to those detailed in the BMP for the operational wind farm)
    - Emergency procedures for fires within the renewable energy infrastructure and buildings.
- Provide wind farm mobile fire trailer (or similar approved) prior to commissioning of the turbines.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 3.4.5.

3.4.3 Operation and Maintenance

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 3.4.6 below).
- Ensure the Emergency Information Book and/or signage is appropriately stored at all nominated site entrances, and reviewed on an annual basis (see Section 3.4.4).
- Ensure inspection, maintenance and any required repair activities are conducted for all

renewable energy infrastructure (turbines, substation), associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.

- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements of the BMP.

3.4.4 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at each nominated site entrance to the wind farm, with any plans or information books provided in a weatherproof container.

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- Details of any emergency equipment, including the type and location of fire and gas detection systems.
- Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire)

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

3.4.5 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 3.4.5) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire

brigade.

3.4.6 Emergency Management Plan

An Emergency Management Plan is to be developed for the facility, which comprehensively details the following (noting this plan it to be for all emergencies and not specifically just to bushfire risk management):

- Facility details including technical support during an emergency, site plans, details of emergency resources and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure.
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:
    - Ongoing compliance with approved BMP and BRMP, including ensuring NVZ/APZs are maintained, vehicular access routes and firewater is maintained and available, and conducting regular bushfire housekeeping inspections.
    - Ensuring ongoing maintenance of all fire and communication systems.
    - Determining forecast Fire Danger Rating Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - Modifying Site Activities (based on Forecast FDR and TFB/HVMB) including limiting activities which may introduce bushfire ignition (hot works, unnecessary vehicle movement etc).
    - Monitoring DFES Bushfire Emergency Warnings (and/or bushfire activity within 50 km of the facility, during bushfire season, and the decision-making triggers
- Detail emergency response procedures to address the nominated hazards.
- For a bushfire emergency, the response should include the following
    - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
    - Conducting early offsite evacuation of all staff away from the bushfire if safe to do (preferred response), ideally to Margaret River, however Augusta, Busselton or Nannup may also be considered.
    - If there is insufficient time to safely travel offsite to Margaret River, Augusta, Busselton or Nannup, without being impacted by bushfire, conduct onsite shelter in place in the O&M building.
        - <u>It is noted that this building is not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.</u>
    - If safe to do so prior to staff evacuation,
        - Unlock all access gates and ensure vehicular access routes and firewater tanks within the wind farm, are available for use by attending fire brigade.
        - Physically shutdown the facility including closing doors/windows of any buildings, storing combustible goods inside buildings etc.
        - Conduct shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) remotely from offsite location.
- The response to onsite fire, including involvement of turbines, is to involve:
    - Immediately notify:
        - Relevant wind farm personnel, in addition to DFES and local brigade to ensure a rapid turnout.
        - Any relevant nearby landowners.

- Confirm shutdown and de-energisation of turbine that is on fire.
- Conduct first attack response on spot fires until DFES/ local brigade arrival etc.

The emergency management plan is to be reviewed regularly and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

Further specific detail on the requirements of the emergency management plan is provided in Section 5 of the project BMP.

4.0 CFA Guidelines Compliance Assessment

As detailed previously, the project is applying the Model Requirements from the CFA Guidelines to the renewable energy infrastructure of the project as much as possible as part of the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 3.0, with a compliance assessment of these measures against the Model Requirements of the CFA Guidelines provided below in Table 2.

As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 2: Summary of Renewable Energy Facility requirements relating to bushfire and the development response (CFA, 2023)

CFA Guideline Section	Requirement	Type	Development Response
Section 2: Consultation	***Consulting with CFA*** • Early consultation with DFES, before developing a planning permit application.	***All Facilities***	• The Proponent has liaised with DFES regarding the proposal on several occasions as follows, and sought to incorporate their feedback as much as practical o Initial meeting and proposal presentation on 18th April, 2024 o Preliminary concept plan and bushfire risk management strategy issued to DFES on 15th August 2024 o Meeting held with DFES on 16th August 2024 o Follow-up concept plan and bushfire risk management strategy issued to DFES on 31 October 2024 o Meeting held with DFES on 13th November 2024 o Onsite meeting held with Shire of Augusta Margaret River Community Emergency Services Manager (CESM) on 29th January 2025. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 3: Fire Risk Management	***Risk Management Plan*** • A Risk Management Plan must be developed for the facility, before development starts. *Additional Guidance from CFA Guidelines* • A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	***All Facilities***	• This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the requirements of the CFA Guidelines, and details how the risk has been appropriately managed. • The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the life of the project. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets. o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o NVZ and APZs around renewable energy infrastructure to reduce bushfire impact to moderate levels, especially on the basis that the turbines are non-combustible materials at their base. ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ The concepts for the above are detailed in Section 3.1.1 of this BRMP and summarised in Section 5.1.1 of the project BMP. This involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. o Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight bushfires both within the wind farm site, and also throughout the local area: ▪ The internal driveway network enables attending firefighters to access all proposed turbines and the substation in a bushfire emergency, while also improving access throughout the wind farm site in general and to the surrounding public roads. ▪ The internal driveways and crane pads also provide significant cleared areas within the wind farm site, which in grassland areas, may also be useful in controlling bushfire spread. ▪ The onsite firewater supplies, provide a significant quantity of additional firewater for attending firefighters to refill appliances, without extended travel time. o All turbines will automatically shut-down upon detection of fire in the turbine. o During a bushfire emergency, all turbines can be remotely shut-down from offsite to limit risk to aerial firefighting appliances, from the turbines, as much as possible. o All turbines, monitoring towers are registered with CASA and compliantly marked, to manage risk to aerial firefighting appliances and enable them to move around the wind farm in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	Facility Risk to Landscape • As assessment of the fire risk from the proposed facility to the landscape	***All Facilities***	• The focus on addressing risk to the landscape is primarily through prevention of uncontrolled turbine fire through the provision of the following: o Operational status monitoring, fault monitoring etc, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified. o Fire detection and alarm systems to ensure early notification to wind farm personnel and DFES/local fire brigade and enable early turnout. o Automatic fire suppression system in the nacelle to prevent any ignition events from becoming uncontrolled turbine fires. • The above is supplemented by the provision of NVZ/APZ that are commensurate with the surrounding bushfire hazard. • Ensuring appropriate onsite response capabilities, through provision of: o Emergency Information Book and signage at site access points, to assist firefighter when turning out, aided by DFES/local brigade familiarisation both prior to facility operation and regularly throughout operation as required. o Compliant internal vehicular access and firewater supplies for attending firefighters, o Mobile fire trailer and training, to enable a rapid response by onsite wind farm personnel to address any spot fires until firefighter turnout. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)*** • The provision of NVZ and/or APZ that reduces the potential for fire to enter or leave an area: o Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. o Of a width of at least 10m. • A NVZ must be: o Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. o Free of vegetation and obstructions at all times. o No plant or equipment of any kind is to be stored in fire breaks. *Additional Requirements for Wind Facilities* • The provision of NVZ (and APZ if required) is not required around the perimeter of the wind energy facility, but must be established around the base of each wind turbine. • Where wind turbines are sited in high-risk environments, additional vegetation management must be considered, with the implementation of an additional reduced-fuel zone recommended around the base of wind turbines, abutting the fire break. The reduced fuel zone may be: o No less than 20m, or o To the envelope of the wind turbine blades.	***All Facilities*** ***Wind Energy Facilities***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1.1 and 3.1.3 of this BRMP. o Primarily this involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. o An APZ is also to be established around firewater tanks to achieve BAL-29 or lower. o No perimeter NVZ has been provided for the wind farm, as permitted by the CFA Guidelines. • These vegetation modification and management requirements have been incorporated into Sections 5.1 and 5.3 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Emergency Vehicle Access • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: o Be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. o Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.	***All Facilities*** ***Wind Energy Facilities***	• Vehicular access requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.2 and 3.2 of this BRMP. o Compliant internal driveway access is to be provided from the nominated wind farm site entrances, to each turbine and firewater tank, including turnaround. o The specifications are to comply with the private driveway specifications of the WA bushfire Guidelines, with the only deviation from the WA bushfire Guidelines will be that if the internal wind farm roads are less than 6 m wide, passing bays will be provided every 600 m (6m wide x 20m long) in accordance with the CFA Guidelines. • These vehicular access requirements have been incorporated into Section 5.2 of the project BMP. • ***Based on the above, the proposed of wind farm driveway and site entrances, supplemented by the use of existing public roads, farm roads and entrances, is considered sufficient to provide a flexible vehicular***

CFA Guideline Section	Requirement	Type	Development Response
	o Otherwise comply with the private driveway specifications of the WA bushfire Guidelines o Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Requirements for Wind Facilities* • Construction of a four (4) metre perimeter road is not required for wind energy facilities, however, suitable emergency vehicle access is required to each turbine and building on-site. • Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes.		***access network to, and within the proposed wind farm, for emergency services use in a bushfire emergency.***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines: o The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. o An external water level indicator must be provided to the tank and be visible from the hardstand area. o Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. o Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure • The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. o The hard-suction point must be protected from mechanical damage where necessary. o The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with the private driveway specifications of the WA bushfire Guidelines and at least 6 m wide and 8 m long, must be provided to the hard-suction point. o The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. *Additional Requirements for Wind Facilities* • Fire water storage tanks of at least 45,000L are provided at each site entrance. • Additional fire water storage tanks of at least 45,000L are incorporated in facility design.	***All Facilities*** ***Wind Energy Facilities***	• Firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.3 of this BRMP. o At least 135 kL of firewater is to be provided for the renewable energy infrastructure, currently proposed to be stored in three (3) 45 kL firewater tanks across the site. o These firewater tanks will comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines, supplemented by some requirements from the CFA Guidelines: o Rather than siting the tanks at the wind farm site entrances, signage will be placed at all wind farm site entrances to indicate to attending firefighters the location of the firewater tanks within the wind farm. The siting of the firewater tanks away from site entrances was noted as the preference of the Shire CESM who advised that water theft was a problem from publicly accessible firewater tanks. • These firewater requirements have been incorporated into Section 5.3 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met, other than the siting of the firewater tanks away from site entrances in some instances, however signage will be provided to clearly indicate the location of the firewater tanks in the development.***
	Fire Detection and Suppression Equipment • Suitable fire detection and suppression equipment must be provided: o For on-site buildings and structures, according to the requirements of the National Construction Code. o For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. o For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. o In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	***All Facilities***	***National Construction Code compliance*** • All buildings are to comply with the fire detection and suppression requirements of the NCC. • From a bushfire construction perspective, the NCC requires additional resilience to be added to Class 1, 2, 3, associated 10a and "certain" Class 9 buildings. None of these building classifications are proposed at the facility, however the Proponent may consider voluntary adoption of bushfire construction measures to some buildings. ***Dangerous Goods compliance*** • It is understood that no significant quantities are proposed at the facility, however if this changes in the future, it is expected it will be transported, handled and stored in accordance with relevant Australian Standards and Dangerous Goods legislation.

CFA Guideline Section	Requirement	Type	Development Response
			Portable fire extinguishers • Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards and Synergy requirements: o Each wind turbine o Each building o Substation rooms (e.g. switchroom, control room) o Wind farm vehicles • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Design Specific to Facility Type *Additional Requirements for Wind Facilities* • As wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions, the following design requirements are to be incorporated: o Wind turbines are located no less than 300 metres apart. o Provision of automatic shut-down, and the ability for wind turbines to be completely disconnected from the power supply in the event of fire. o Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA). o Marking of all guy wires and monitoring towers. • Nacelles are equipped with automatic fire detection, alarm, and fire suppression systems.	***Wind Energy Facilities***	***Turbine Siting*** • The wind turbines will all be located further than 300 m from each other. ***Turbine Automatic Shutdown and Disconnection*** • Wind turbines will be automatically shut-down in the event of turbine fire, with the ability to be completely disconnected from the power supply. • There will also be ability to remotely shut-down the turbines in a bushfire event if required ***Installed Weather Monitoring Station Notification*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will advise CASA of all-weather monitoring stations installed as part of the proposed development ***Marking Guy Wires and Monitoring Towers*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will mark all guy wires and monitoring towers installed as part of the proposed development. ***Turbine Fire Systems*** • All turbines are to be fitted with fire detection, alarm and suppression system to provide early warning of internal fire and automatic response • Activation of fire detection systems will be remotely monitored at all times • An emergency management procedure will be incorporated into the wind farm Emergency Management Plan to rapidly notify DFES, wind farm personnel (including on-call technician) and nearby landowners/farmers, of the onsite turbine fire detection or suppression system activation. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 5: Facility Construction and Commissioning	***Emergency Plan (Construction)*** • An Emergency Plan must be developed for the construction and commissioning phase of the facility. *Additional Guidance from CFA Guidelines* • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction. • Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to:	***All Facilities***	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as summarised in Section 3.4.2 of this BRMP. • It is recommended that the bushfire emergency management concepts detailed in the project BMP for the operational wind farm, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	o Electricity and chemical management. o Vegetation management. o Ignition source control, including hot works. o Infrastructure, equipment and vehicle maintenance. o Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).		
Section 6: Facility Operation	***Fire Management Plan*** • A Fire Management Plan must be developed for the facility, in consultation with fire brigade, before development starts. *Additional Guidance from CFA Guidelines* • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: o A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. o Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. o Description of control measures to prevent and reduce the consequences of external fire impacting the facility. o Details of equipment and resources to manage fire at the facility o Policies and procedures that ensure all control measures are appropriate and effective, and remain so. o Procedures for review of the Plan	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and summarised in Section 3.0 of this BRMP. • These bushfire risk management measures for the renewable energy infrastructure have also been summarised in Section 5.0 of the project BMP, including the nomination of responsible entities for implementation and ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Bushfire and Grassfire • If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Guidelines* • Your facility may be at-risk of bushfire if it is: o Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. o Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities	***All Facilities***	• Bushfire preparedness and response actions for the renewable energy infrastructure has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire preparedness and response actions have been incorporated into Section 5.8 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): o Grass must be maintained at or below 100mm in height during the nominated bushfire season. o Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. o Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days	***All Facilities***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1, 3.2 and 3.3 of this BRMP. • These vegetation modification and management requirements have been incorporated into Section 5.1 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Arc Flash Hazard Management • Where required, appropriate demarcation of arc boundaries to at least 10m from PCU arc flash outlet flaps (blow-out panels) must be provided.	***All Facilities***	• Not applicable – no PCU are proposed as part of this project (typically part of Battery Energy Storage Systems). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Facility and System Monitoring • Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or	***All Facilities***	• The proposed wind turbines are to be remotely monitored, both onsite (during business hours) and offsite (at all times), with the following emergency response procedures included in the bushfire emergency management arrangements (documented in the BMP):

CFA Guideline Section	Requirement	Type	Development Response
	equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.		o Turbine fire detection and suppression systems will be remotely monitored at all times, and upon activation, the response procedure is to include immediate notification to DFES, wind farm personnel (including on-call technician) and local landowners/farmers (if required) of potential onsite turbine fire. o The wind turbine will be automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely if required (in consultation with DFES, Western Power, AEMO). • The substation functionality will be monitored by wind farm operator. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Maintenance • Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. • Maintenance must be in line with any relevant Australian Standards, the manufacturer's requirements.	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management requirements, have also been summarised in the project BMP, including the nomination of responsible entities for ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Fire Risk Review • The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. • The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility.	***All Facilities***	• Like any BMP or BRMP, if there are significant changes to the development, they should be reviewed to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 3.4.6 of the BRMP and Section 5.8 (in particular Section 5.8.5) of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: o Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) o Personnel Training o Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Requirements for Wind Facilities* • Any EP for a Wind Energy Facility must include: o Emergency procedures for fires within, and in the vicinity of, wind turbines. o Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Extreme or above days or approach of bushfire/grassfire to the facility. o Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk. o This information must also be provided within the facility's Emergency Information Book. o Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies	***All Facilities***	• Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 3.4.6 of this BRMP. • The bushfire emergency management preparedness and response concepts detailed in Section 5.8 of the project BMP, which cover both proposed buildings and renewable energy infrastructure, are to be incorporated into the overall wind farm Emergency Management Plan. • The additional requirements for Wind Facilities, documented in the CFA Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan • The CFA Guidelines specifically notes that wind turbines should be capable of being stopped in the "Y" pattern o The process for placing the turbines in the "Y" pattern (rabbit ears position) is a manual one, that needs to be conducted by staff within each actual turbine, and climbing up to the nacelle. o Given staff need to be within each turbine, while all turbines will have the capability to be stopped in the "Y" pattern, this is not considered a safe procedure for wind farm staff to undertake in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: o A description of the premises, its infrastructure and operations. o Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire	***All Facilities***	• The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Guidelines and detailed in Sections 3.4.4 and 3.4.5 of this BRMP. • These requirements have been incorporated into Sections 5.6 and 5.7 of the project BMP.

CFA Guideline Section	Requirement	Type	Development Response
	protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. o A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. o Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) o Details of emergency equipment, including the type and location of gas detectors. o Up-to-date contact details for site personnel, regulatory authorities and site neighbours. o Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. o A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade o A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.		• ***Based on the above, all requirements with the CFA Guidelines have been met.***

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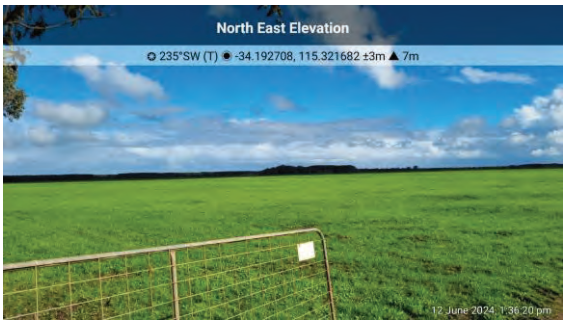
Appendix 1 Vegetation plot photos and description



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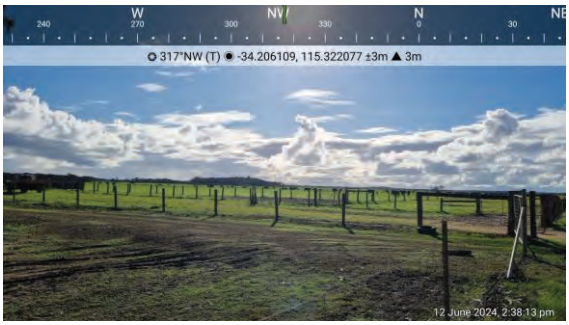

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Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1i



Photo ID: 1j



Photo ID: 1k



Photo ID: 1l



Photo ID: 1m



Photo ID: 1n



Photo ID: 1o



Photo ID: 1p

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1q



Photo ID: 1r



Photo ID: 1s



Photo ID: 1t



Photo ID: 1u



Photo ID: 1v



Photo ID: 1w



Photo ID: 1x

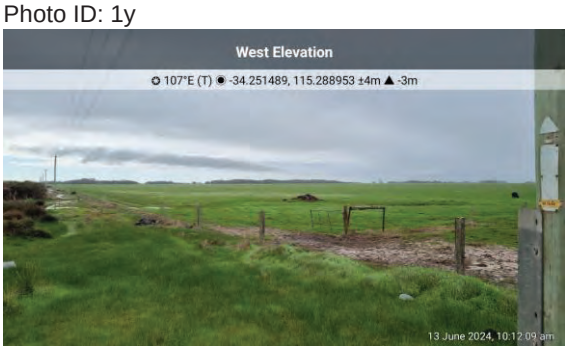
Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1y



Photo ID: 1z



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Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1ag



Photo ID: 1ah



Photo ID: 1ai



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Photo ID: 1am



Photo ID: 1an

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1ao



Photo ID: 1ap



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Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1aw



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Photo ID: 1bb



Photo ID: 1bc



Photo ID: 1bd

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1be



Photo ID: 1bf



Photo ID: 1bg



Photo ID: 1bh



Photo ID: 1bi



Photo ID: 1bj



Photo ID: 1bk



Photo ID: 1bl

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bm



Photo ID: 1bn



Photo ID: 1bo



Photo ID: 1bp



Photo ID: 1bq



Photo ID: 1br



Photo ID: 1bs

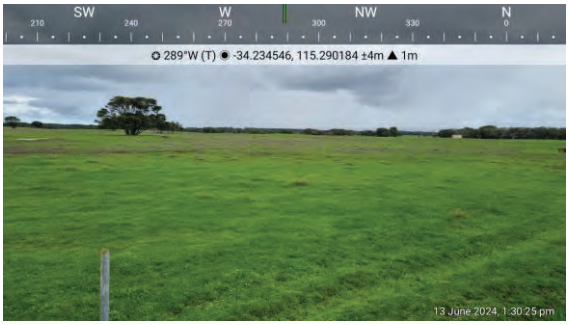


Photo ID: 1bt

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bu



Photo ID: 1bv



Photo ID: 1bw

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 2a



Photo ID: 2b



Photo ID: 2c



Photo ID: 2d



Photo ID: 2e

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 4a



Photo ID: 4b



Photo ID: 4c



Photo ID: 4d



Photo ID: 4e



Photo ID: 4f



Photo ID: 4g



Photo ID: 4h

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4i



Photo ID: 4j



Photo ID: 4k



Photo ID: 4l



Photo ID: 4m



Photo ID: 4n



Photo ID: 4o



Photo ID: 4p

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 4q



Photo ID: 4r



Photo ID: 4s

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c



Photo ID: 5d



Photo ID: 5e



Photo ID: 5f



Photo ID: 5g



Photo ID: 5h

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5i



Photo ID: 5j



Photo ID: 5k



Photo ID: 5l



Photo ID: 5m



Photo ID: 5n



Photo ID: 5o

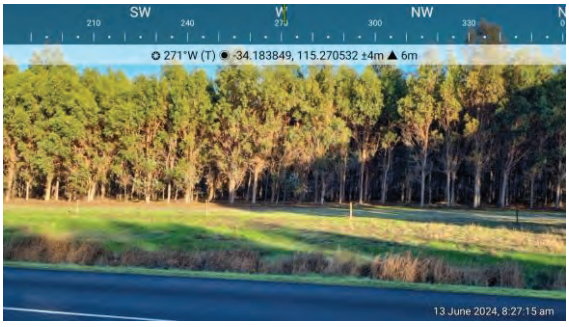


Photo ID: 5p

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5q

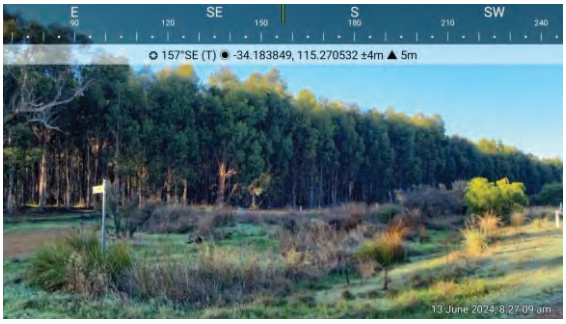


Photo ID: 5r



Photo ID: 5s



Photo ID: 5t



Photo ID: 5u



Photo ID: 5v



Photo ID: 5w



Photo ID: 5x

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5y



Photo ID: 5z

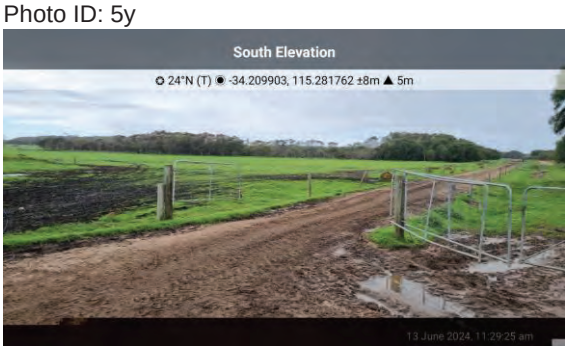


Photo ID: 5aa



Photo ID: 5ab



Photo ID: 5ac



Photo ID: 5ad



Photo ID: 5ae



Photo ID: 5af

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5ag



Photo ID: 5ah

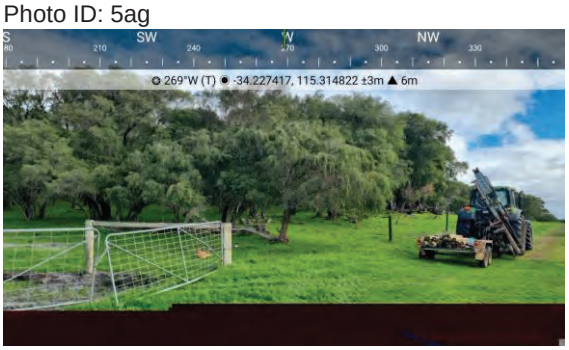


Photo ID: 5ai



Photo ID: 5aj

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 6a



Photo ID: 6b



Photo ID: 6c



Photo ID: 6d



Photo ID: 6e

Plot number	Plot 6
Vegetation classification	Class B Woodland
Description / justification	Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)



Photo ID: 7a

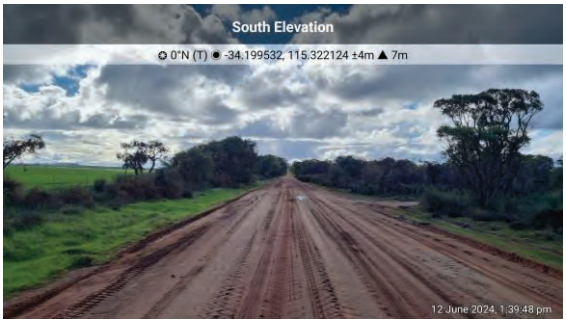


Photo ID: 7b



Photo ID: 7c

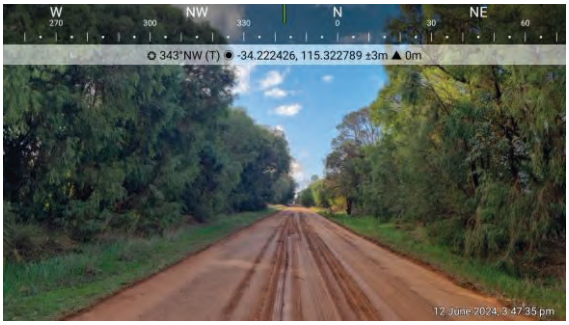


Photo ID: 7d



Photo ID: 7e



Photo ID: 7f



Photo ID: 7g



Photo ID: 7h

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7i



Photo ID: 7j



Photo ID: 7k



Photo ID: 7l



Photo ID: 7m



Photo ID: 7n



Photo ID: 7o



Photo ID: 7p

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7q



Photo ID: 7r



Photo ID: 7s



Photo ID: 7t



Photo ID: 7u



Photo ID: 7v



Photo ID: 7w



Photo ID: 7x

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7y

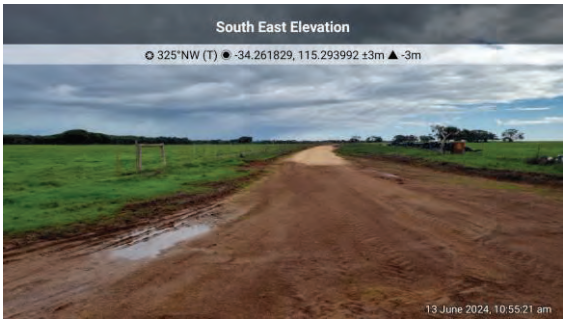
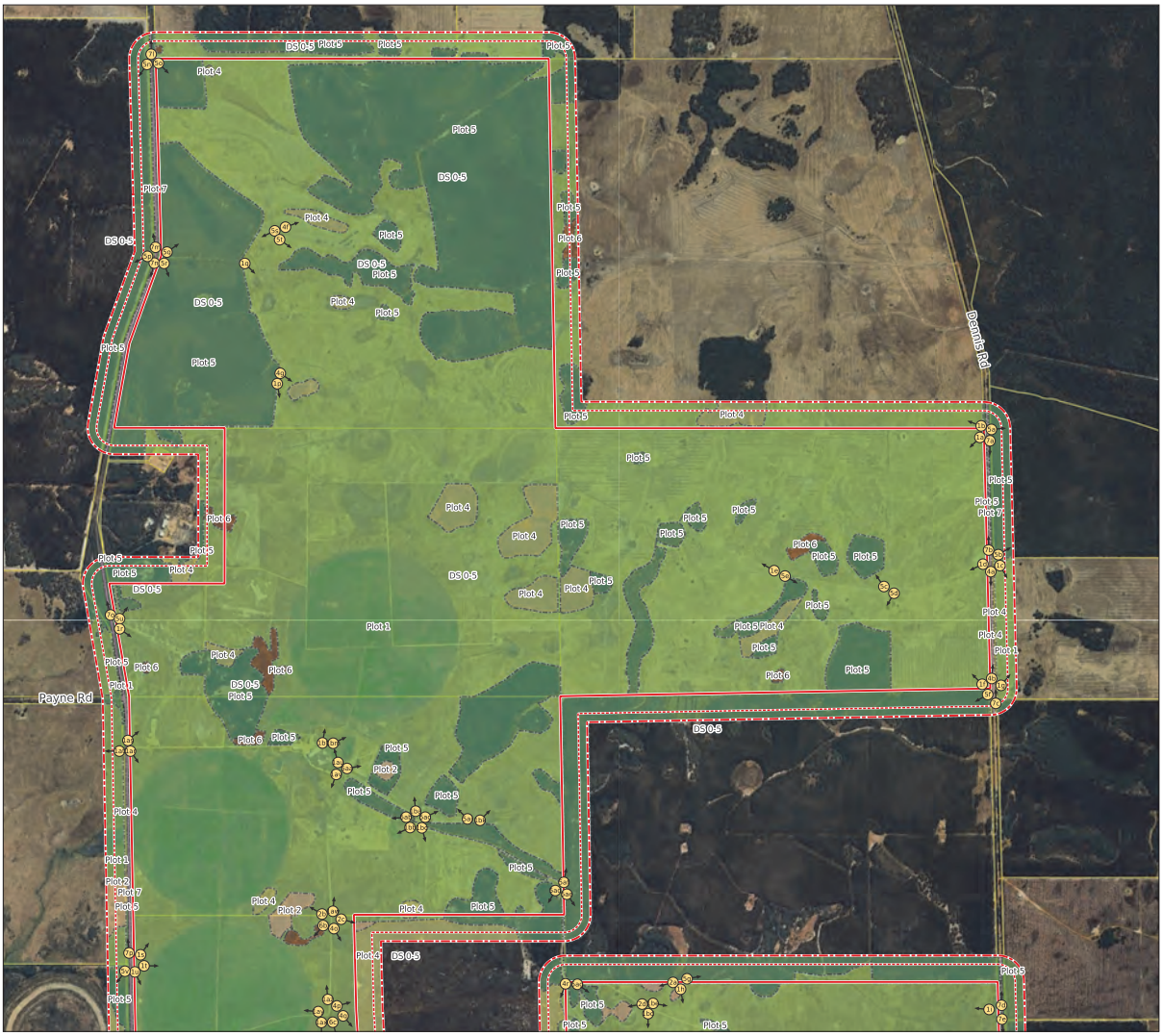


Photo ID: 7z

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Legend

- Photo Location
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - North)

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Legend

- Photo Location
- Building/Substation Envelopes
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - South)

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Attachment 6

Bushfire and Risk Management Plan

Scott River Wind Farm

Scott River Road, Scott River

Bushfire Risk Management Plan (Renewable Energy)

Date: 27 March 2025

Prepared For: Synergy Renewable Energy Developments Pty Ltd

Linfire Ref: 20231220334SYN-BRMP-002_0

Linfire Consultancy

ABN: 577 930 47299

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Revision	Issue Date	Revision Description	Approved By
0	27 Mar 2025	Issued for Approval	Linden Wears (Level 3 BPAD 19809)

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2. errors or omissions in this report except where grossly negligent; and the proponent expressly acknowledges that they have been made aware of this exclusion and that such exclusion of liability is reasonable in all the circumstances.

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Fire is an unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire. The mitigation strategies contained in this Bushfire Risk Management Plan (BRMP) are considered to be prudent minimum standards only, based on the standards prescribed by relevant authorities. It is expressly stated that Linfire do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Linfire has no control. If the proponent becomes concerned about changing factors then either a review of the existing BMP, or a new BMP, should be requested. Linfire accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report and its supporting material by any third party.

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1.0 Introduction

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is seeking to lodge a development application (DA) for a new wind farm across a number of lots in Scott River (the wind farm development boundary) approximately 15 km north-east of Augusta, in the Shire of Augusta-Margaret River.

The proposed development will require the installation of the following infrastructure:

- New building/s (within nominated wind farm building envelope)
- 20 wind turbine generators
- 132 kV transmission line (above-ground)
    - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation.
    - Consisting of above-ground towers, poles and electrical lines
    - To be designed and constructed to Western Power specifications
- 33 kV distribution lines
    - Reticulated from each turbine to substation, preferably through use of underground cables, but could be above-ground if ground conditions are unsuitable for underground cables
- High voltage substation
- Internal access driveways providing access to proposed buildings, turbines and firewater tanks.
- Firewater tanks

A plan of the proposed wind farm is provided on Figures 1, 2, 3 and 4 in the project Bushfire Management Plan, which includes the location of proposed wind turbines, transmission lines, building and substation envelopes, driveways and firewater tanks.

Regarding onsite personnel, once operational, the following is expected:

- Occupant numbers likely to be 2 to 4 staff, 5 days a week (business hours)
- There will be at least one on-call technician allocated to the facility for all other times

Further information on the existing site is provided in the project BMP, namely Section 1.2.

As detailed in Section 1.4, this BRMP has been prepared to assess the proposed renewable infrastructure against the relevant the Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities, to demonstrate the bushfire risk associated with this infrastructure has been appropriately managed. This differs to the purpose of the project BMP which is to demonstrate compliance for habitable buildings against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

1.2 Relevant Legislation and Guidance

- State Planning Policy 3.7: Bushfire (SPP 3.7) and the Planning for Bushfire Guidelines (the WA Guidelines).
- WAPC Position Statement: Renewable energy facilities, 2020
- Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities v4, 2023
- Building Code of Australia / National Construction Codes (BCA/NCC)

- AS 3959 Construction of Buildings in Bushfire Prone Areas
- AS/NZS ISO 31000:20018 Risk management – Guidelines
- Australian Disaster Resilience - National Emergency Risk Assessment Guidelines (NERAG) 2020.
- AS 3745-2010 Planning for Emergencies in Facilities
- Dangerous Goods Safety Act 2004
- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (the Regulations)
- Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail.

1.3 Regulatory Context

The entire wind farm development extent is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2024), due to native vegetation located within 100 m of the site which triggers bushfire planning requirements under *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

A Bushfire Management Plan (Linfire 2025) has been prepared to accompany the development application, as per SPP 3.7 Policy Measure 7(ii), given the proposed permanent buildings are sited in a designated bushfire prone area and would have a pre-development rating of BAL-40/FZ. The BMP demonstrates how the proposed buildings will comply with bushfire protection criteria of the WA Guidelines.

Given the renewable energy infrastructure (e.g. wind turbines) are not considered “habitable buildings” as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn’t triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4* (CFA; 2023; CFA Design Guidelines) from Victoria fire brigade, is the best publication to demonstrate compliance with at this stage, albeit rationalised for WA context.

Under the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007*, the operator may also be required to complete a separate risk assessment that addresses risks other than bushfire for the proposed development and the associated Dangerous Goods, should the development trigger the need to do so, although it is noted that there isn’t significant quantities of any Dangerous Goods proposed at the facility.

Some high-level information from the following has been provided in the subsections below, regarding the following guidance documents with respect to renewable energy infrastructure bushfire risk management:

- CFA Design Guidelines for Renewable Energy Facilities
- WAPC Position Statement: Renewable Energy Facilities
- Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

1.3.1 CFA Design Guidelines for Renewable Energy Facilities

This guidance material developed by the CFA for renewable energy facilities, namely their publication *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA 2023), requires that a Risk Management Plan is to be developed for renewable energy facilities which includes the following:

- Description of the risks and hazards at the facility to and from the facility and related infrastructure.

- Detail the following:
    - The location of the renewable energy infrastructure on-site and in the landscape.
    - Emergency vehicle access to and within the facility that:
        - Includes site access points of a number suitable to the size and hazard of the facility
        - Provides access to renewable energy infrastructure, substations and fire service infrastructure.
    - Firefighting water supply for the facility.
    - Asset Protection Zone/s of 10m or greater, based on radiant heat flux (output) as an ignition source:
        - Around the perimeter of the facility.
        - Between any landscape buffer/vegetation screening and renewable energy infrastructure.
    - The separation distance, based on radiant heat flux (output) as an ignition source, between:
        - Renewable energy infrastructure, buildings/structures, and vegetation.
        - All other controls for the management of on and off-site hazards and risks at the facility (including all proposed safety and protective systems).
- Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.
- Form the basis for the design of the facility

While the facility Risk Management Plan is to address both onsite fires within renewable energy infrastructure and bushfires, this BRMP provides this relevant information detailed above for the bushfire-related risk to (and from) the proposed development.

The CFA Guidelines is organised with a number of sections as follows, each section containing guidance and what it terms “Model Requirements” for all renewable energy facilities as well as specific measures for wind, solar, battery energy storage (BESS) and substation/electric line infrastructure:

- Fire Risk Management
- Facility Location
- Facility Design
- Facility Construction and Commissioning
- Facility Operation
- Emergency Planning

A summary of the CFA Guidelines sections (relevant to this project) is provided in the compliance assessment on Table 2 in Section 4.0.

1.3.2 WAPC Position Statement: Renewable Energy Facilities

WAPC have released a Position Statement on renewable energy facilities, in which they note the following with respect to bushfire risk management:

- Renewable energy facilities in Western Australia are principally wind turbine and solar array systems.
- The objectives of this position statement include facilitate appropriate development of

renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas

- Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an 'extreme' bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
- A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended.
    - The APZ should be managed in a low threat state, in accordance with the Guidelines.

This BRMP will aim to comply with the WAPC Position Statement as much as practical.

1.3.3 Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

In 2012, the Shire of Augusta-Margaret River released LPP 23 relating to Renewable Energy Systems which they amended in March 2021. LPP 23 provides guidance on the appropriate location, scale and design of wind and/or solar energy systems in the Shire. There is no specific guidance relating to bushfire compliance or risk management, other than stating that a *"fire management plan"* may be required *"where planning approval is sought large renewable energy systems"*.

The preparation of this BRMP and the project BMP, is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

1.4 Purpose

The focus of this BRMP is to apply and demonstrate compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Guidelines, with summary of the derived bushfire management measures from this BRMP included in the project BMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

Additionally, the preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

2.0 Renewable Energy Assets and Hazard Analysis

2.1 Onsite Renewable Energy Assets

The proposed development is expected to include the following onsite renewable energy infrastructure:

- ***Wind turbine generators***
  - 20 turbines
  - Maximum tip height of 250 metres (hub height up to 164 m with blade length of up to 90 m)
  - Turbines are steel tower casings to ground level, with fibreglass/aluminium/steel blades
  - All turbines are to have fire detection, alarm and suppression systems
- ***High voltage substation***
  - To be designed and constructed to relevant Australian Standards
  - Expected to contain infrastructure such as main transformer, STATCOM, switchroom, NSP room, harmonic filters, back-up generator/auxiliary supply.
- ***132 kV transmission line***
  - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation
  - Consisting of above-ground towers, poles and electrical lines
  - To be designed and constructed to Western Power specifications
- ***33 kV distribution lines***
  - Reticulated from each turbine to substation, preferably through use of underground cables.
  - If ground conditions are unsuitable for underground cables, portions of these 33 kV lines may need to be above-ground.

2.1.1 Wind Turbine Component Overview

A wind turbine (also known as a wind turbine generator), is a device that converts the kinetic energy of wind into electricity. In simple terms, the turbines blades use the aerodynamic force of the wind (much like an aeroplane) to turn a rotor, which spins a generator to produce electricity, which is typically fed into the mains power network as a source of renewable energy.

The horizontal axis wind turbine generators proposed at the wind farm consist of the following elements (see Plate 1):

- Tower
  - The tower supports the structure of the turbine
  - Constructed of steel
- Nacelle
  - The nacelle sits on top the tower, and houses the key mechanical elements: the gear box, generator, shaft and brake.
  - Typically constructed of metal, fibreglass or composite materials
- Hub
  - The turbine blades fit into the hub that is connected to the turbine's main shaft.
  - Typically of metal construction.
- Blades
  - Three blades located on top of the turbine, which connect to the turbine hub.

- When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin.
- The blade construction is generally proprietary, however typically the blade core structure mostly balsa wood or foam, with the outer shell generally fibreglass or composite material.

- Drivetrain
  - Rotor
    - The blades and hub together form the turbine's rotor.
  - Main bearing
    - The main bearing supports the rotating low-speed shaft and reduces friction between moving parts so that the forces from the rotor don't damage the shaft.
  - Shafts (low-speed and high-speed)
    - The low-speed shaft connects the rotor and hub to the gearbox
    - The high-speed shaft connects from the gearbox to the generator
  - Gearbox
    - The gearbox connects the main (low-speed) shaft to the high-speed shaft, thereby converting the low-speed incoming rotation to high-speed rotation required by the generator to produce electricity.
  - Generator
    - The generator, which is driven by the gearbox, houses copper windings that turn through a magnetic field to produce electricity.
  - The majority of the drive train components are metal, but there are a number of lubricants also contained in this system.
- Rotor Brake and Lock
  - A rotor brake keeps the rotor from turning after it's been shut down. Once the turbine blades are stopped by the controller, the brake keeps the turbine blades from moving.
  - The system typically consists of a friction disc brake that is often hydraulically activated.
  - In addition to the rotor brake, a rotor lock (or locking bolt) is required to manually fix the rotor in place for maintenance.
- Yaw System
  - The yaw drive rotates the nacelle on upwind turbines to keep them facing the wind when wind direction changes. The yaw motors power the yaw drive to make this happen.
  - Downwind turbines don’t require a yaw drive because the wind manually blows the rotor away from it.
- Controller
  - The controller manages the starting and stopping of the turbine, usually based on wind speed (i.e. sufficient wind to start and shutting off at excessive wind speeds).
  - Contains a number of sensors and a control system, to continuously monitor wind speed, direction, turbine performance, and other vital parameters.
  - This system adjusts the blade pitch and other aspects to optimize power generation while ensuring safe operation within wind speed limits.



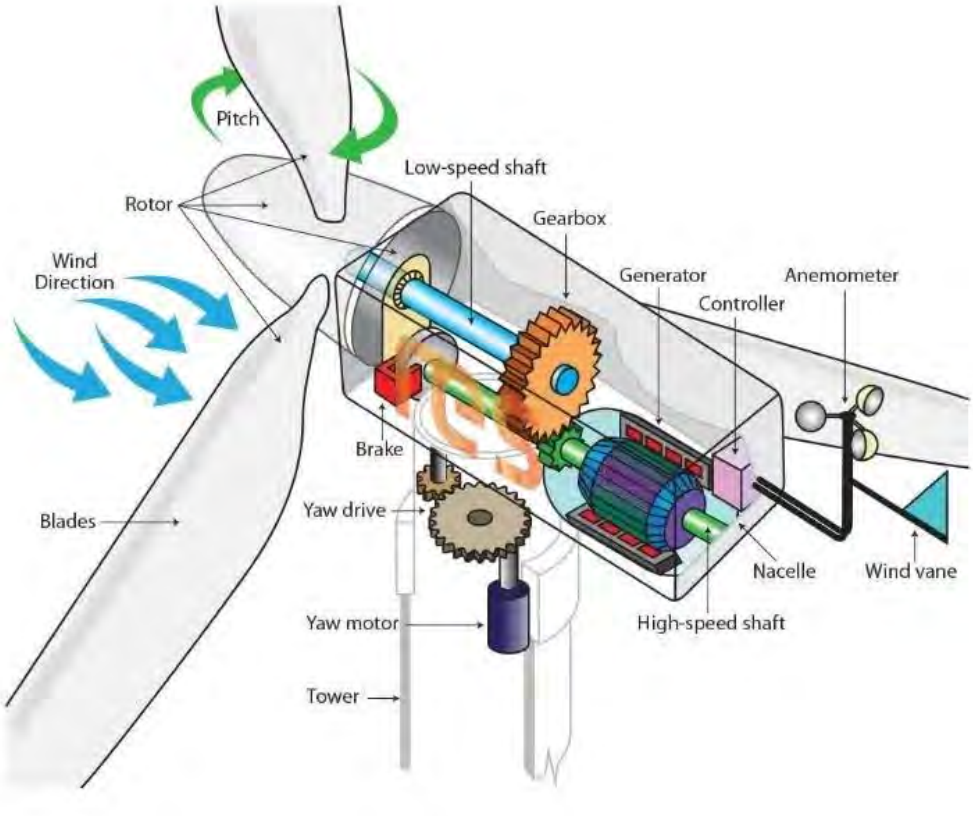

Plate 1: Wind Turbine Components

2.2 Wind Farm Site Description

A detailed description of the wind farm site is provided in Section 1.2.1 of the project BMP, with a brief summary provided below:

- The proposed wind farm extends over a number of existing lots as detailed in the BMP
- All the lots have been largely cleared of native vegetation and used by private landholders for agricultural purposes.
    - The only exception to this is Lot 4269 in the north-western part of the wind farm, which currently contains existing timber plantations, which are relatively mature and while they are expected to be harvested in coming years, the exact timing is not confirmed.
- Other lots located adjacent to the development boundary worthy of note include:
    - Lot 2 on Diagram 090280, Courtenay
        - Contains the existing Beenup substation
    - Lot 4265 (No 598) Dennis Road, Scott River
        - Contains existing privately owned timber plantation
    - Lot 101 on Plan 038071, Scott River
        - Currently identified as a DBCA Lands of Interest (Register No. 2555/700), and potentially a future nature reserve.
    - Lot 4924 on Plan 217962, Scott River
        - Crown Reserve 42377
        - Zoned under local Shire planning scheme as “National Parks and Nature Reserves”
        - Flora reserve
- Surrounding the wind farm boundary:
    - To the east of Dennis Road is agricultural land and timber plantation and Pagett Nature Reserve and Chester Nature Reserve.
    - To the north of Lots 4266 and 4269 are existing agricultural lots largely cleared of vegetation, other than isolated forest plots, with Brockman Highway and South Blackwood State Forest further north.
    - To the west is Scott River Road, with largely cleared agricultural land further west other than some existing timber plantation in the north-west.
    - To the south is primarily cleared agricultural land, with some forest and scrub vegetation south of Lot 4260 and Governor- Broome Road, which fringes the Scott River.

Public road access to the wind farm is via:

- Brockman Highway from the north, which extends west to eventually connect to Bussel Highway at Karridale (17 km west), and east to Nannup (approximately 55 km away)
- Scott River Road, Governor Broome Road and Dennis Road forming a loop road arrangement around the perimeter of much of the wind farm.
    - Governor-Broome Road extends 12 km east of the wind farm to connect to Milyennup Coast Road, where travel can be undertaken 13 km north to connect to Stewart Road and Brockman Highway and on to Nannup.
- The only other public road near the wind farm is Coostien Road, which is an existing dead-end public road providing access to lots south of the Governor Broome Road.

Vehicular access within the various wind farm lots is currently via existing unsealed farm tracks, which provide access from a number of existing entrance gates along the public road network, into the lots.

There is no known reticulated town main water supply currently provided to any lots within the wind

farm development boundary, nor is there any existing street hydrants.

2.3 Bushfire Hazard

The proposed development is to be located across a number of existing rural land holdings, which have largely been cleared of vegetation for agricultural purposes and is now mostly grassland, with only Lot 4269 in the north-west of the wind farm, containing blue gum plantation. This plantation is likely to be harvested in the future, but the timing is not confirmed so it will be assumed it is uncleared for this assessment.

Surrounding the wind farm lots is mostly a combination of rural land holdings largely cleared of vegetation, timber plantations, and areas of remnant native vegetation within land holdings but also in State Forest and Nature Reserves. The most notable bushfire hazard is to the east and north of the wind farm, where continuous forest vegetation exists within Pagett Nature Reserve, South Blackwood State Forest and Blackwood National Park, that extends to Nannup and beyond. Vegetation in other directions is typically more fragmented by agricultural development, with tracts of forest along the Blackwood River to the west of the wind farm and coastal scrub and forest to the south, presenting the only other significant bushfire hazards in the local area.

2.3.1 Bushfire Hazard Assessment

As the renewable energy infrastructure is not required to achieve target BAL ratings as per the CFA Guidelines, there is no specific requirement to provide BAL contour mapping. The CFA Guidelines do provide some high-level guidance on separation of turbines from unmanaged vegetation, so on that basis, vegetation and effective slope mapping using the AS 3959 site assessment methodology has been undertaken for the wind turbine site to inform the discussion and compliance assessment with CFA Guidelines.

2.3.2 Vegetation classification and effective slope

Linfire assessed classified vegetation, exclusions and effective slope within 150 m of the wind farm development boundary through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 1 and Table 1, and depicted on Figure 1 and Figure 2. Effective slope results were cross-referenced with Landgate 5 m contour data and are depicted in Table 1, and depicted on Figure 1 and Figure 2.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed to the south-east of the building and substation envelopes, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state.

Site observations indicate that land is undulating, with elevation decreasing from the north of the wind farm to the south-west. The effective slope for the remainder of the classified vegetation further than 150 m from the building and substation envelopes is not technically required, however has been provided to give some guidance of the general slope in the areas around the turbines which is almost always downslope 0°-5°.

The mapping has been conducted at a relatively broad scale, to provide some indication regarding the proximity of proposed renewable energy infrastructure, to continuous non-grassland vegetation.

2.3.3 Summary of inputs

Table 1 summarises the vegetation classifications and exclusions within 150 m of the proposed wind farm. The post-development vegetation classifications/exclusions and effective slope are illustrated

on Figure 1.

Table 1: Vegetation classifications/exclusions and effective slope (within 150 m of wind farm site)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height throughout much of the wind farm site, cleared of vegetation for agricultural purposes.
2	Class C Shrubland	Downslope >0–5°	Shrubland vegetation (<2 m high), primarily within Lot 4924 and small plots in Lot 101.
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land to be modified to low threat vegetation as part of proposed development within building and substation envelopes and associated APZs.
4	Class D Scrub	Downslope >0–5°	Plots of scrub vegetation (2 m to 6 m high) typically as isolated plots throughout the wind farm site.
5	Class A Forest	Downslope >0–5°	Multi-layered forest vegetation with trees >6m high, typically occurring as isolated plots within agricultural land and along roads, but as larger more continuous plots in plantations (until harvest) and retained native vegetation within surrounding nature reserves.
6	Class B Woodland	Downslope >0–5°	Trees >6m high, well-spaced with grassy or grazed understorey, typically occurring as isolated plots within agricultural land.
7	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing public roads.

2.3.4 Bushfire Hazard Summary

The wind farm itself is comprised mostly of agricultural land, largely previously cleared of native vegetation other than isolated plots of retained shrubland, scrub and forest vegetation. The only significant plots of non-grassland vegetation within the wind farm site, are the timber plantations in the north.

Outside the wind farm site, the greatest bushfire threat to the site exists to the north, north-east and east of the site, where extended fire runs tens of kilometres long are possible through continuous forest vegetation within National Parks, State Forest and Nature Reserves, capable of creating landscape-scale bushfire behaviour. While the greatest bushfire threat to the development is from those directions, bushfire is capable of spreading toward the wind farm from any other direction over significant distances, which could also develop to steady-state bushfire behaviour.

Given the majority of proposed renewable energy infrastructure is located in the agricultural grassland areas, where any bushfire impact would be limited to grassfire behaviour with a very quick residence time, producing a brief exposure to elevated radiant heat, supplemented with some ember

attack from surrounding forest vegetation. The greatest potential bushfire impact will be on the two turbines proposed in the plantation in the north-west of the site, where surrounding forest vegetation could result in elevated radiant heat, potential flame impingement and ember attack on these turbines, if the risk is unmanaged.



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Figure 1: Vegetation and Effective Slope - North (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Building/Substation Envelopes
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Figure 2: Vegetation and Effective Slope - South (Overall Wind Farm)

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2.4 Wind Farm Hazard and Risk Analysis

The CFA Guidelines notes that fire hazards at wind energy facilities may include the following:

- Electrical hazards, such as wind turbine electrical faults; power surges; hot surfaces; lightning strike
- Chemical hazards, such as the leakage of oils and lubricants within the turbine/ancillary equipment
- Potential fire spread, due to air flow impact or falling debris from fire-impacted turbines
- Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers or radiant heat
- Falling blades
- Wind turbines as a potential obstruction for aerial firefighting

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed turbines, and the ability for significant turbine fires to ignite a bushfire.

2.4.1 Wind Farm Fires in Australia

While there haven't been many significant fire events at wind farms in Australia (either ignited by wind turbines, or impacted by bushfire), or at least not many publicly reported, review of those reported fires do provide a useful tool to review potential risks, as well as the relevant learnings from such events. Below is a summary of several that have occurred and reported upon in the past 10 years.

2.4.1.1 Cape Nelson Wind Farm, Victoria (June 2024)

- Cape Nelson is a 195 megawatt (MW) wind farm in the Portland area of Victoria, that was constructed in 2009 and is owned by Pacific Blue.
- The wind farm site is home to native coastal Mallee scrub.
- The wind turbine fire occurred at the top of the turbine at approximately 8pm, and occurred in a Senvion MM82 turbine, which has a hub height of 69 metres and a maximum blade tip height of 110 metres.
- The fire destroyed the turbine and resulted in a blade falling off the turbine, and others expected to follow. Firefighters were called to the scene and allowed the turbine to burn out as there was nothing the firefighters could do to suppress the turbine fire.
- The Fire Rescue Victoria commander noted that:
    - This fire is the first in the Portland area since wind farms started to be built around 20 years ago
    - The rarity of wind turbine blazes mean they aren't a big fire risk.
- There were no reported injuries from the fire.

2.4.1.2 Clements Gap Wind Farm, South Australia (February 2024)

- Clements Gap Wind Farm was one of the first wind farms in South Australia, being constructed in 2010, and had 27 of the Suzlon S88 turbines.
- Smoke from the turbine was spotted by a maintenance crew at 8:30am, and emergency services were alerted at about 8.50am.
- The fire destroyed the wind turbine and ignited a grassfire underneath it due to debris from the turbine. The resultant fire turbine burnt about 30 hectares of grassland, with no one injured in the incident.
    - The Country Fire Service (CFS) created an exclusion zone around the wind turbine to enable firefighters are staying on top of spot fires created by falling debris, while remaining clear from the turbine collapse zones.

- The CFS noted that:
    - Wind turbine fires are uncommon, but can occur including in South Australia the previous year.

2.4.1.3 *Waterloo Wind Farm, South Australia (January 2017)*

- A bushfire started on a paddock near the Waterloo Wind Farm in South Australia. The fire quickly spread through the area due to gusty westerly and north-westerly winds, and including into area the wind farm was located.
    - The exact cause of the fire was never reported, but is not believed to be ignited by the Vestas wind turbines or any wind farm operations.
    - The fire burned approximately 50 hectares before it was controlled (around 2.45p the next day), including land beneath turbines as the northern end of the wind farm.
    - There had been no reported loss of structures but it was not clear what, if any, damage had been caused to turbines at the wind farm.
    - There were no reported injuries to any people.
- The bushfire was reported by a local farmer to the CFS just prior to 2pm, with the firefighting and wind turbine actions including the following:
    - CFS deployed water bombers to fire and requested that a number of turbines be shut down.
        - By 2.17pm, the wind farm operations had paused 18 wind turbines.
        - CFS also made contact with the wind farm General Manager to obtain approval for decisions relating to wind farm operations as much as required, including requesting that the turbines be paused and shut down remotely by applying their brakes.
    - CFS also requested that where safe to do so, all access gates within the wind farm site be opened to enable the CFS quick access to respond and manage the incident, without restrictions.
    - CFS worked to halt the fire advance with multiple runs of water bombing and ground-based firefighting, with fixed-wing water bombers able to manoeuvre through the turbines to target the grass fire and were followed by ground crew.
    - At 3.15 pm, CFS deemed it safe enough for the onsite crew to attend six of the paused wind turbines, to apply the brakes and set the blades in ‘rabbit ear position’, further assisting aircraft to pass through the turbines to continue water bombing.
    - The wind farm’s access tracks worked as a fire break and without these the CFS believes the fire would have likely spread further, creating a much bigger incident.
    - The turbine’s footings, with their clear line of site, were used by crews to coordinate air and ground crew actions.
    - Firefighting continued through the afternoon and, by 6 pm, the CFS approved the re-start of the turbines located outside of the fire ground area.

2.4.2 *Wind Farm Fire Risk*

The Australasian Fire and Emergency Services Authorities Council (AFAC) released a position paper titled *Wind Farms and Bushfire Operations* (AFAC, 2018) with the expressed intent to “*provide guidance relating to planning for bushfire prevention, preparedness, response and recovery operations in and around existing and planned wind farm facilities”*. This publication rightly stated that wind power is a rapidly expanding form of renewable energy production, and noted that *“…wind farms are not expected to adversely affect fire behaviour, nor create major ignitions risks”*. More

specifically AFAC noted the following:

- ***Ignition caused by wind farm infrastructure or operations***
    - It is possible that turbines can malfunction and start fires within the unit.
    - The above is generally considered a low risk given appropriate protection measures, with automatic shutdown and isolation procedures are generally installed within the turbine system.
    - Operation of winches and machinery during monitoring and maintenance tasks may also lead to ignitions.
- ***Lightning risks***
    - Wind turbines can attract lightning during thunderstorms.
    - If struck by lightning, turbine towers are generally not expected to start fires as they have built-in protection mechanisms.
    - On this basis, it is possible that wind turbines may reduce the risk of bushfires caused by lightning, particularly if turbines are located on a ridge or local high point.
- ***Hazards and firefighting limitations in and around the wind farm facilities***
    - Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers.
        - The bushfire at the Waterloo wind farm demonstrated that if conditions are clear and wind turbines are turned off, wind turbines are clearly visible from aircraft and are not likely to constrain aerial firefighting operations (Clean Energy Council 2017).
            - If wind turbines were not shut down, moving blades and wake turbulence would create significant hazards for low flying aircraft, thus the shutting down of wind turbines, in an emergency situation, is defined in wind farm emergency procedures.
        - However, transmission infrastructure, meteorological towers and guy-ropes were difficult to see (Clean Energy Council 2017) and this infrastructure does have potential to limit the effectiveness of aerial firefighting operations.
            - This can be addressed through appropriate marking of this infrastructure.
    - Access and egress challenges on the ground as well as water supply issues can also create firefighting limitations, if not planned for appropriately.
- ***Bushfire spread within wind farm facilities and impacts on wind farms as critical infrastructure***
    - Wind farms are not expected to adversely affect fire behaviour in their vicinity.
    - Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings.
    - Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event.
    - Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.

2.4.2.1 Learnings from Past Wind Farm Fires

There are number of learning opportunities from the past wind farm fires, which can be used to

inform the bushfire risk management strategy.

With respect to bushfires impacting the wind farm site (such as the Waterloo Wind Farm fire), AFAC noted the following:

- *The wind farm's access roads were beneficial in helping fight the bushfire on the ground and provided an effective firebreak.*
- *The wind farm's turbines did not present a hazard to aerial firefighting and the turbines were clearly visible to the pilots involved in operations. However, transmission infrastructure, transmission lines and meteorological masts were difficult to see by pilots and did pose a safety risk.*
- *Improved communication protocols need to be in place between wind farm operators and fire and land management agencies to direct turbine shut-down procedures in an emergency situation and initiate emergency response plans.*
- *Wind farm operators should ensure that they have the capacity to respond to emergency events.*
- *Wind farm operators should ideally select turbines that can be rapidly shut down to the preferred position.*
- *Additional precautionary measures should be considered to allow for aerial identification of meteorological masts (measurement towers), guy wires and other infrastructure such as transmission lines that are not easily visible from air.*

Additionally, the Clean Energy Council also added the following comments:

- *Ensure aerial-friendly identification and markings for meteorological ("met") masts and guy wires is provided at wind farm locations.*
- *Review and update emergency management plans and protocols with a focus on:*
    - *Communications practices including advising state air-desk (who control aerial firefighting assets)*
    - *On site asset management/operations centre control procedures to pause, brake and 'lock' individual turbines*
    - *Best practice approaches to support aerial and ground-based responses*
    - *Water storage point signage, access track markings and site mapping.*
- *Ensure ongoing and regular engagement with local volunteer organisations and services.*

In addition to the comments above, the following is also noted:

- The considerable cleared areas at the base of turbines (footings and crane pads) provide useful areas for firefighting operations.
- While locking the turbines in the "Y" position is ideal, the CFS reported that the aerial operations were able to occur with the turbines "paused" which is understood to be with the turbines shutdown, but the blades not locked (i.e. turning very slowly).

With respect to turbine fires, the following is noted:

- Both the Victorian and South Australian fire services have noted that turbine fires are a low likelihood event, with very few having occurred.
- Most turbine fires have occurred in old turbines that are likely 20 years old, and which:
    - Have older technology without the and more advanced fault monitoring, detection, etc currently installed in most modern-day turbines in wind farms.
    - Likely lack nacelle suppression systems to control the fire and prevent escalation to an uncontrolled turbine failure event.
- Prevention of an uncontrolled turbine fire or failure event should be seen as the primary

objective to prevent potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.

- Early notification of local fire brigade, nearby farmers/landowners and the wind farm personnel is critical to ensure a rapid and coordinated response.

2.4.3 Likelihood of Wind Farm Fire

As noted by AFAC, the likelihood of turbine fires is considered to be relatively low, and while it is accepted the statistics around fire losses are based on historical estimates and incomplete datasets, the likelihood wind turbine fire per year is generally accepted to be around 1-in-2000, but potentially lower than that (Krcmar, 2020). There are varying levels of resultant damage associated with these fires, which can range from small fire events through to complete burnout of the turbine nacelle, with uncontrolled nacelle fires resulting in significant damage or total turbine loss much of the time.

The likelihood of bushfire impact on wind farms is tied to the potential for bushfires within the wind farm site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.

On the DBCA dataset depicted on Plate 3, it is worth noting:

- A number of the larger fires in the northern part of the site and to the west (on the) are from the 1950's and 1960's, when the landscape may been different and less developed.
- Some of the fires to the north, north-west and west of the subject site within forest vegetation, are prescribed burns within the Nature Reserves and State Forest dating back to the 1970's.

The historical data clearly depicts that while bushfires have occurred in the local area, few have ever spread into the wind farm site. This is likely due to the improved ability to manage the bushfire fires as they spread into the agricultural land from the forest areas due to reduced fire behaviour and increased access for attending firefighters. While there appear to be few historical bushfires within the wind farm site, this BRMP assumes that bushfire impact could occur in the future, and addresses the risk accordingly.

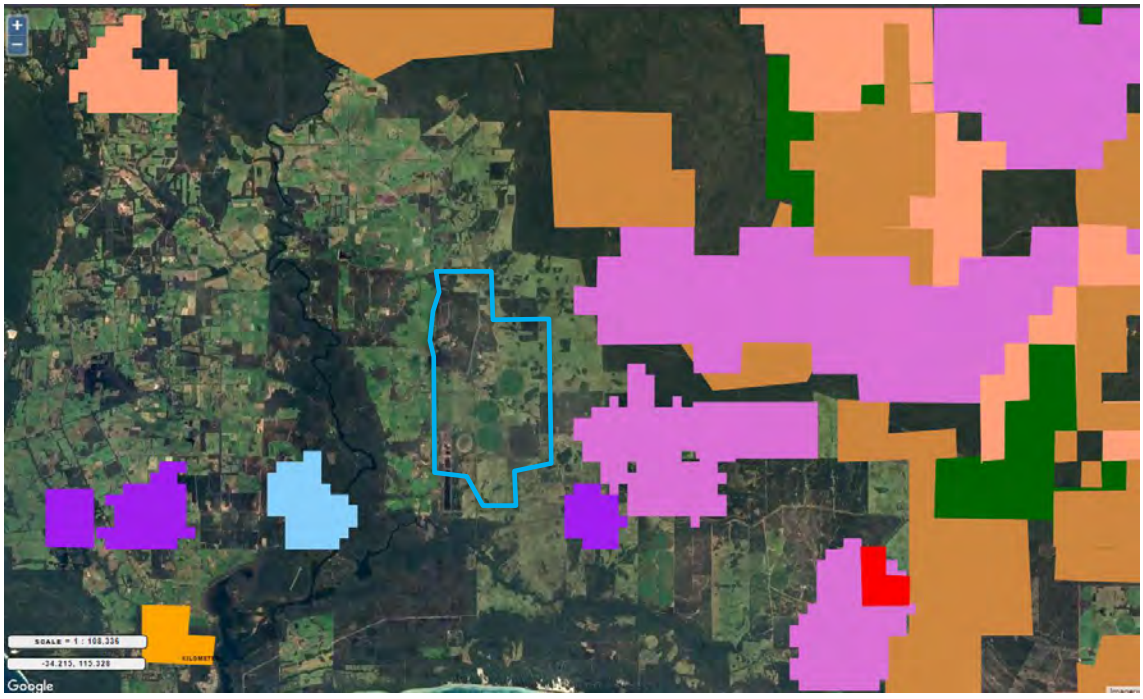

Plate 2: Bushfire History (Firewatch 2025)

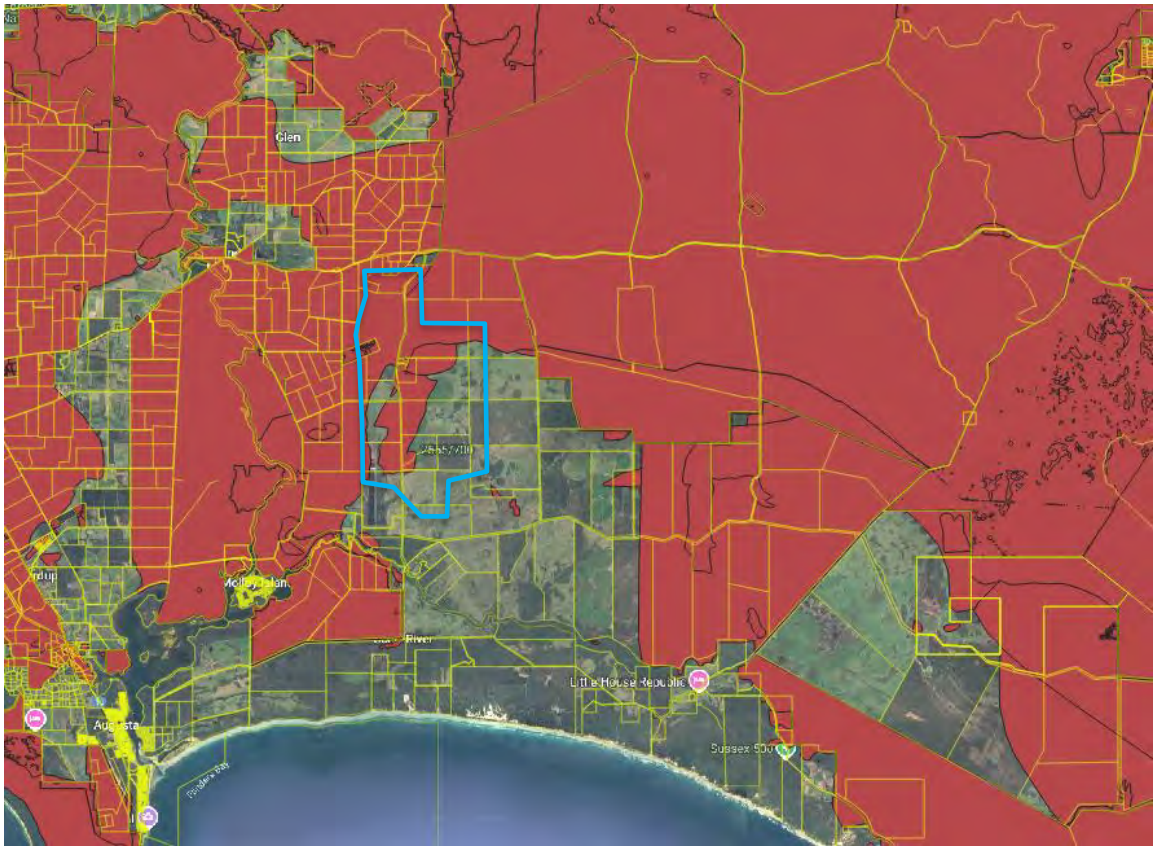

Plate 3: Bushfire History (DBCA 2025)

2.5 Bushfire Risk Management Requirements

Based on the analysis of the bushfire hazards and risk associated with wind farms, the following are considered key bushfire risk management requirements to be incorporated into wind farm proposals:

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of wind turbines is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit bushfire escape.
- Provision of appropriate vehicular access to each turbine for emergency services and wind farm operations vehicles, including permitting fire appliance turnaround.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.
- Design and construction of turbines should ensure that the risk of uncontrolled turbine fire or failure events is mitigated, to avoid potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so. This would be expected to include:
    - Remote monitoring of the operational status of the turbines, including any faults, with ability to remotely shutdown and de-energisation of turbine/s.
    - Fire detection, alarm and suppression system to provide early warning of internal fire and automatic response.
- Ensure all infrastructure that could potentially present a risk to pilots and aerial operations (e.g. turbines, meteorological monitoring towers etc) are recorded with relevant aviation authorities and provided with any required markers/lights etc to minimise risk during aerial firefighting operations,
- Ensure sufficient information is available for attending firefighters to assist any fire suppression efforts, including the following:
    - Key emergency contacts including wind farm personnel
    - General site plan including location of buildings and renewable energy infrastructure including transmission towers, meteorological monitoring towers etc.
    - Information on any fire/bushfire risk management measures including Asset Protection Zones, fire detection/suppression systems etc.
    - Firewater access locations, including hydrants, tanks and any other static water supplies suitable for firefighting purposes.
    - Access information including public roads, available entrance/exits, internal vehicular access routes and gates (locked/unlocked)
    - Any safety considerations and procedures
- Provision of mobile firefighting equipment and training for wind farm personnel to manage risk of onsite hot works, and potentially intervene any small ignitions until fire brigade arrive.
- Ensure an emergency management plan is established for the facility addressing all relevant hazards, including bushfires and turbine fires, that includes the following with respect to fire:
    - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations)
    - Limiting any onsite ignition sources or fuel loads
    - Ensure communication protocols are established for contacting DFES, nearby farmers/landowners, and relevant agencies (e.g. Western Power, AEMO etc) to

enable management of emergencies, access to land and shutdown of turbines.

- Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
- Staff training and exercises of emergency management procedures
- Ensure DFES (and local fire brigade) familiarisation with the facility
- Response actions for in the event of bushfire in the local area with focus on:
  - Evacuation of staff offsite
  - Ensuring all onsite wind farm access routes are unlocked and available for attending firefighters.
  - Remote shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) and facility closure, if safe to do so.
- Response actions for onsite turbine ignition or fire including
  - Rapid notification of wind farm personnel (including on-call technician), DFES and nearby landowners/ farmers
  - Remote shutdown and de-energisation of relevant turbine/s
  - Conduct first attack response on spot fires until DFES arrival etc.
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the wind farm or any fire events.

3.0 Bushfire Risk Strategy and Management Measures - Renewable Energy Assets

As detailed in Sections 1.3 and 1.4, the CFA *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA, 2023) are currently seen as the best guidance for renewable energy facilities available at this point in time. The CFA Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

CFA (2023) notes that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).

CFA Guidelines Requirements for Wind Turbines

- ***Turbine Siting and Vegetation Modification***
  - CFA Guidelines recommend siting of turbines in "low-risk environments" which it defines as being in gently undulating grassland with good road access and away from "continuous" non-grassland vegetation (noting the term "continuous is not defined), which are considered "high-risk environments".
    - The CFA Guidelines don't preclude siting of renewable infrastructure in "high-risk environments", but note that strengthened or additional risk mitigation measures will be required.
  - A Non-Vegetated Zone (NVZ) must be established and maintained around the base of wind turbines.
    - In low-risk environments, this is to be 10m wide and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.
  - Where wind turbines are sited in high-risk environments (including timber plantations), strengthened or additional fire risk mitigations will be required as per the stage approach detailed in the CFA Guidelines, with the following recommended:
    - Implementation of an additional Asset Protection Zone (APZ; reduced-fuel zone cleared of trees and scrub [as permitted by authority] and grass to <100mm high in bushfire season) around the base of wind turbines, on the outside perimeter of the NVZ, with width:
      - no less than 20m, or
      - to the envelope of the wind turbine blades.
    - There is no further guidance on how to apply this.

Interpretation Note – Continuous and Non-Continuous Vegetation

- *Given the lack of definition around the term "continuous" vegetation, which is critical to the assessment of what is considered 'low-risk' and 'high-risk' environments as per CFA Guidelines it is recommend the following broad principles are considered as being "non-continuous" when assessing the siting and vegetation management around turbines:*
  - *Plots of non-grassland vegetation that are sufficiently small and/or isolated from other forest/woodland/scrub vegetation, by either grassland or low*

shrubland, such that the resultant bushfire passing through these plots would not be considered to be a significantly exacerbated or likely to reach steady state, or be uncontrollable by attending firefighters.

- *Consideration is given to the size and location of the plot, proximity to continuous non-grassland vegetation, access to and around the plot (either via roads, tracks or agricultural land).*
- *Examples are plots of paddock trees or isolated plots of forest/woodland/scrub vegetation within paddocks, where a bushfire passing through would not represent a significant escalation in bushfire behaviour, nor produce behaviour that would make the fire uncontrollable attending firefighters, who would be expected to have reasonable access and water supply.*

- ***Vehicular Access***
  - Suitable emergency vehicle access is required to each turbine and building on-site (with number and location of access point to be determined in liaison with fire brigade).
    - Specifications are similar to private driveways from WA Guidelines, but with passing bays permitted every 600 m in lieu of 200 m.
- ***Firewater***
  - At least one static fire water storage tank of at least 45,000L effective capacity at each site entrance
    - Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design (in consultation with fire brigade)
- ***General Design***
  - Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.
  - Wind turbines must be located no less than 300 metres apart.
  - Wind turbines must be provided with automatic shut-down capability, and the ability to be completely disconnected from the power supply in the event of fire.
- ***Emergency Planning***
  - Include measures in Fire Management Plan for attending firefighters and Emergency Plan for onsite personnel
  - Training and Exercises

CFA Guidelines Requirements for Substations

- The entire substation must be surfaced to eliminate all vegetation including grasses.
- Firewater must be provided to cover substations

CFA Guidelines Requirements for Transmission Lines

- Comply with any local electricity supply legislation or guidance prescribing the vegetation clearance requirements for electric lines.

The CFA Guidelines provide the best guidance available to wind farm design at this current point in time, certainly in terms of infrastructure and bushfire risk management. On that basis, this BRMP seeks to apply the Model Requirements, and associated guidance, from the CFA Guidelines, as much as practical to the proposed wind farm.

It is noted that while most management measure relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

Based on the guidance from the review of the assets and hazards in Section 2.0, and informed by the compliance requirements of the CFA Guidelines and the WA Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

The subsections below detail the proposed bushfire risk management measures to be adopted by the project, with a compliance assessment in Section 4.0 demonstrating how these measures align with the principles from the CFA Guidelines.

The risk management measures have also been summarised in the BMP, to provide a comprehensive list of the Proponents bushfire risk management obligations for this project.

3.1 Wind Turbines

3.1.1 Siting and Vegetation Modification and Management

Based on the guidance from the CFA Guidelines, in addition to the interpretation note on "continuous" and "non-continuous" non-grassland vegetation, the following vegetation modification and management philosophy is proposed around the base of the turbines, based on location and proximity to "continuous" non-grassland vegetation.

- Turbines would ideally be separated by at least 300 m from "continuous" non-grassland vegetation on the following basis, in order to minimise vegetation management measures:
    - CFA Guidelines require separation between turbines of 300 m and the maximum Non-Vegetated Zone (NVZ)/Asset Protection Zone (APZ) in high-risk environments is to the blade envelope.
    - The proposed turbines will have a maximum tip height of 250 m, which with a 10% safety margin, if they toppled would be a safe distance of 275 m.
- Given the above, and in the absence of any specific siting guidance, the following turbine risk categories and associated vegetation management measures are to be adopted:

  Low-Risk Turbine Site

    - ***A turbine is considered to be in a low-risk environment when it is sited further than 300 m from "continuous" non-grassland vegetation.***
    - If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
        - ***10 m NVZ around base of turbine tower***
    - While target BAL rating is not specifically required, a 10 m NVZ would achieve BAL-29 at the turbine tower casing.
    - Currently 13 of the 20 proposed wind turbines are assessed as Low Risk, as depicted on Figure 1 and Figure 2.

  Transition Risk Turbine Site

    - ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
        - ***closer than 300 m to "continuous" non-grassland vegetation, (but not within this non-grassland vegetation) or***
        - ***within "non-continuous" non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
    - If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:

- ***10 m NVZ around base of turbine tower; and***
- ***20 m APZ outside the 10 m NVZ***

- While target BAL rating is not specifically required, the 30 m NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, and would generally provide a BAL-19 or BAL-12.5 impact.
  - The Transition Risk category is aimed more at providing greater separation from "non-continuous" non-grassland vegetation when turbines are sited in/near small plots of forest, woodland, scrub or shrubland vegetation, rather than the instances where turbines are still in grassland areas but within 300 m of "continuous" non-grassland vegetation, and the overall 30 m NVZ/APZ is probably greater than required. Notwithstanding, a consistent vegetation management approach is being applied to both occurrences.
- Currently 5 of the 20 proposed wind turbines are assessed as Transition Risk, as depicted on Figure 1 and Figure 2.

High-Risk Turbine Site

- ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within "continuous" non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
- If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
  - ***10 m NVZ around base of turbine tower***
  - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- While target BAL rating is not specifically required, the NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, more likely BAL-12.5.
- Currently 2 of the 20 proposed wind turbines are assessed as High Risk, as depicted on Figure 1 and Figure 2.
  - These 2 turbines are sited in existing timber plantations in the north of the facility, however the timing of harvesting has not yet been determined.
  - The risk to the turbines is likely to be significantly reduced following future harvesting, however given the uncertainty regarding the timing and future use, a High Risk rating has been applied.

- Should turbines be relocated:
  - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
  - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of forest and grassland may be both high-risk and transition risk). In these instances, we propose that:
    - The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
    - the highest risk category is blanketly applied
- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for "firebreaks" from CFA Guidelines as follows:

  - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
  - Free of vegetation and obstructions at all times.
  - No combustible plant or equipment.
- The Asset Protection Zone (APZ) is to comply with the APZ standards from the WA bushfire Guidelines
- All NVZ and APZ around turbines are to be established and maintained by the Proponent during bushfire season, for the life of the wind farm.

3.1.2 Vehicular access to turbines

- The following site entrances are to be established for the facility:
  - Main site entrance from Scott River Road, near the proposed building and substation envelopes
  - Three additional site entrances as follows:
    - One on Scott River Road, approximately 5.5 km north of the main entrance.
    - One on Governor Broome Road, providing access to turbines to the north.
    - One on Governor Broome Road, providing access to turbines to the south.
- All nominated site entrances are be fitted with gates as follows:
  - Provide at least 6m clear horizontal width
  - If locked, any keys are issued to DFES and any local fire brigade.
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
  - Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 600m that increase the overall driveway width to no less than 6 m wide.
  - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
  - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to each proposed firewater tank, with access is to be provided to within 4 m of the tank suction point.
- In addition to the internal wind farm access driveways, there are existing farm tracks and farm gates, also noted on the concept plan, that could be used in a bushfire emergency by attending firefighters.
  - These are shown for information purposes only, and it is noted that these are not being constructed or maintained by the Proponent as part of this project.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
- The internal wind farm access driveways, site entrances, gates and signage are to be

constructed and maintained by the Proponent in perpetuity (or for the life of the wind farm).

3.1.3 Firewater for turbines

- As detailed on Figures 8 and 9 in the BMP, firewater tanks as proposed in the following locations around the wind farm site (following initial consultation with DFES) to provide 135 kL of firewater capacity for the renewable energy infrastructure:
    - One (1No) 45 kL firewater tank in the northern part of the site, at an intersection of the internal driveways and the termination of the transmission line.
    - One (1No) 45 kL firewater tank at the wind farm building envelope, either collocated or combined with the firewater requirements for the proposed buildings.
    - One (1No) 45 kL firewater tank in the southern part of the site, at an intersection of the internal driveways to a number of turbines.
- While the firewater tank locations above represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- All firewater tanks will comply with the standards from the WA bushfire Guidelines, and the following from the CFA Guidelines:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - Firewater tanks are to be at least 10 m from wind turbines
    - The tank suction point must be within 4 m of a driveway or hardstand
- All firewater tanks are to be sited in an area of BAL-29 or lower as follows:
    - Within a BAL-29 or lower area within the wind farm building envelope
    - Where outside the wind farm building envelope, have a 9 m wide APZ around the perimeter of the tank.
- Vehicular access to each firewater tank is to be via proposed internal wind farm driveways.
    - Access is to be provided to within 4 m of the tank suction point.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- The firewater tanks, and associated APZs, are to be constructed and maintained for the life of the project by the Proponent.

3.1.4 General turbine design and emergency management

In addition to the measures detailed above, the following are also required for the proposed turbines to manage the risk of turbine fires.

3.1.4.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.

- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel onsite, or offsite monitoring.
    - A procedure to be incorporated to ensure that activation of the fire detection system results in notification being provided immediately to the following people that there is an onsite turbine fire:
        - Wind farm personnel (including on-call technician),
        - DFES and local fire brigades
        - Nearby landowners/ farmers

3.1.4.2 Operational Status Monitoring and Control of Turbines

- In addition to the fire detection, alarm and suppression systems, appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
    - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both onsite and remotely offsite.
- Operational control of turbines should be able to be conducted onsite and offsite, to enable remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
    - It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

3.1.4.3 Turbine Shutdown and Disconnection from Power

- In addition to turbine operation status monitoring and control, all wind turbines are to be configured to automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely from offsite.
    - The intent is that in the event of a turbine fire, only the affected turbine would automatically shut-down.
- There will also be ability to remotely shut-down and de-energise the turbines in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]).
    - This will result in the turbine blades turning very slowly but not generating any power nor supplying to the grid.

3.1.4.4 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

3.2 Substation

- The substation envelope is proposed to be co-located with wind farm building envelope, which is a location surrounded by grassland vegetation.
- There are several buildings proposed within the substation envelope, and these will comply with the WA Guidelines as follows:
    - Provision of a compliant 9 m wide APZ around the perimeter of the substation

envelope to ensure a rating of BAL-29 or lower is achieved on all substation infrastructure and buildings (e.g. switchroom, NSP building, Statcom building and harmonic filter room)
    - All land within the substation envelope is to be non-vegetated
    - Provision of compliant private driveway access to the substation envelope, from Scott River Road, that is compliant with the private driveway specifications of the WA bushfire Guidelines
    - No specific firewater provided for the substation, however the firewater tanks within the wind farm building envelope, will provide nearby firewater for bushfire fighting around substation.
- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards.

3.3 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per Western Powers own standards.
    - It is noted that the majority of the proposed transmission line is over existing grassland so there is likely to be limited vegetation clearing required for construction or ongoing maintenance.

3.4 Additional Management Measures

In addition to the measures detailed previously for the specific renewable energy infrastructure, the following is also required to manage bushfire risk for the wind farm facility.

3.4.1 Provision of mobile fire trailer

- Provision of a mobile fire trailer (or similar approved) is required to enable wind farm staff to:
    - have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
    - provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire
- This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.
- As a minimum, the fire trailier (or similar approved) should have:
    - No less than 1000 L tank
    - Fire pump and hose reel
    - Mounted on trailer or ute to enable easy transport around the site.
        - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).
- The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

3.4.2 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and

transformers) comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.

- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for dangerous goods as per relevant Australian Standards.
- Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days
- Ensure tight ignition source control, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility which includes:
    - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to
        - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in turbines or substation)
        - Bushfires
    - Emergency procedures for bushfires (adopting similar concepts to those detailed in the BMP for the operational wind farm)
    - Emergency procedures for fires within the renewable energy infrastructure and buildings.
- Provide wind farm mobile fire trailer (or similar approved) prior to commissioning of the turbines.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 3.4.5.

3.4.3 Operation and Maintenance

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 3.4.6 below).
- Ensure the Emergency Information Book and/or signage is appropriately stored at all nominated site entrances, and reviewed on an annual basis (see Section 3.4.4).
- Ensure inspection, maintenance and any required repair activities are conducted for all

renewable energy infrastructure (turbines, substation), associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.

- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements of the BMP.

3.4.4 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at each nominated site entrance to the wind farm, with any plans or information books provided in a weatherproof container.

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- Details of any emergency equipment, including the type and location of fire and gas detection systems.
- Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire)

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

3.4.5 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 3.4.5) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire

brigade.

3.4.6 Emergency Management Plan

An Emergency Management Plan is to be developed for the facility, which comprehensively details the following (noting this plan it to be for all emergencies and not specifically just to bushfire risk management):

- Facility details including technical support during an emergency, site plans, details of emergency resources and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure.
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:
    - Ongoing compliance with approved BMP and BRMP, including ensuring NVZ/APZs are maintained, vehicular access routes and firewater is maintained and available, and conducting regular bushfire housekeeping inspections.
    - Ensuring ongoing maintenance of all fire and communication systems.
    - Determining forecast Fire Danger Rating Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - Modifying Site Activities (based on Forecast FDR and TFB/HVMB) including limiting activities which may introduce bushfire ignition (hot works, unnecessary vehicle movement etc).
    - Monitoring DFES Bushfire Emergency Warnings (and/or bushfire activity within 50 km of the facility, during bushfire season, and the decision-making triggers
- Detail emergency response procedures to address the nominated hazards.
- For a bushfire emergency, the response should include the following
    - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
    - Conducting early offsite evacuation of all staff away from the bushfire if safe to do (preferred response), ideally to Margaret River, however Augusta, Busselton or Nannup may also be considered.
    - If there is insufficient time to safely travel offsite to Margaret River, Augusta, Busselton or Nannup, without being impacted by bushfire, conduct onsite shelter in place in the O&M building.
        - <u>It is noted that this building is not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.</u>
    - If safe to do so prior to staff evacuation,
        - Unlock all access gates and ensure vehicular access routes and firewater tanks within the wind farm, are available for use by attending fire brigade.
        - Physically shutdown the facility including closing doors/windows of any buildings, storing combustible goods inside buildings etc.
        - Conduct shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) remotely from offsite location.
- The response to onsite fire, including involvement of turbines, is to involve:
    - Immediately notify:
        - Relevant wind farm personnel, in addition to DFES and local brigade to ensure a rapid turnout.
        - Any relevant nearby landowners.

- Confirm shutdown and de-energisation of turbine that is on fire.
- Conduct first attack response on spot fires until DFES/ local brigade arrival etc.

The emergency management plan is to be reviewed regularly and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

Further specific detail on the requirements of the emergency management plan is provided in Section 5 of the project BMP.

4.0 CFA Guidelines Compliance Assessment

As detailed previously, the project is applying the Model Requirements from the CFA Guidelines to the renewable energy infrastructure of the project as much as possible as part of the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 3.0, with a compliance assessment of these measures against the Model Requirements of the CFA Guidelines provided below in Table 2.

As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 2: Summary of Renewable Energy Facility requirements relating to bushfire and the development response (CFA, 2023)

CFA Guideline Section	Requirement	Type	Development Response
Section 2: Consultation	***Consulting with CFA*** • Early consultation with DFES, before developing a planning permit application.	***All Facilities***	• The Proponent has liaised with DFES regarding the proposal on several occasions as follows, and sought to incorporate their feedback as much as practical o Initial meeting and proposal presentation on 18th April, 2024 o Preliminary concept plan and bushfire risk management strategy issued to DFES on 15th August 2024 o Meeting held with DFES on 16th August 2024 o Follow-up concept plan and bushfire risk management strategy issued to DFES on 31 October 2024 o Meeting held with DFES on 13th November 2024 o Onsite meeting held with Shire of Augusta Margaret River Community Emergency Services Manager (CESM) on 29th January 2025. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 3: Fire Risk Management	***Risk Management Plan*** • A Risk Management Plan must be developed for the facility, before development starts. *Additional Guidance from CFA Guidelines* • A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	***All Facilities***	• This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the requirements of the CFA Guidelines, and details how the risk has been appropriately managed. • The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the life of the project. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets. o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o NVZ and APZs around renewable energy infrastructure to reduce bushfire impact to moderate levels, especially on the basis that the turbines are non-combustible materials at their base. ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ The concepts for the above are detailed in Section 3.1.1 of this BRMP and summarised in Section 5.1.1 of the project BMP. This involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. o Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight bushfires both within the wind farm site, and also throughout the local area: ▪ The internal driveway network enables attending firefighters to access all proposed turbines and the substation in a bushfire emergency, while also improving access throughout the wind farm site in general and to the surrounding public roads. ▪ The internal driveways and crane pads also provide significant cleared areas within the wind farm site, which in grassland areas, may also be useful in controlling bushfire spread. ▪ The onsite firewater supplies, provide a significant quantity of additional firewater for attending firefighters to refill appliances, without extended travel time. o All turbines will automatically shut-down upon detection of fire in the turbine. o During a bushfire emergency, all turbines can be remotely shut-down from offsite to limit risk to aerial firefighting appliances, from the turbines, as much as possible. o All turbines, monitoring towers are registered with CASA and compliantly marked, to manage risk to aerial firefighting appliances and enable them to move around the wind farm in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	Facility Risk to Landscape • As assessment of the fire risk from the proposed facility to the landscape	***All Facilities***	• The focus on addressing risk to the landscape is primarily through prevention of uncontrolled turbine fire through the provision of the following: o Operational status monitoring, fault monitoring etc, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified. o Fire detection and alarm systems to ensure early notification to wind farm personnel and DFES/local fire brigade and enable early turnout. o Automatic fire suppression system in the nacelle to prevent any ignition events from becoming uncontrolled turbine fires. • The above is supplemented by the provision of NVZ/APZ that are commensurate with the surrounding bushfire hazard. • Ensuring appropriate onsite response capabilities, through provision of: o Emergency Information Book and signage at site access points, to assist firefighter when turning out, aided by DFES/local brigade familiarisation both prior to facility operation and regularly throughout operation as required. o Compliant internal vehicular access and firewater supplies for attending firefighters, o Mobile fire trailer and training, to enable a rapid response by onsite wind farm personnel to address any spot fires until firefighter turnout. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)*** • The provision of NVZ and/or APZ that reduces the potential for fire to enter or leave an area: o Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. o Of a width of at least 10m. • A NVZ must be: o Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. o Free of vegetation and obstructions at all times. o No plant or equipment of any kind is to be stored in fire breaks. *Additional Requirements for Wind Facilities* • The provision of NVZ (and APZ if required) is not required around the perimeter of the wind energy facility, but must be established around the base of each wind turbine. • Where wind turbines are sited in high-risk environments, additional vegetation management must be considered, with the implementation of an additional reduced-fuel zone recommended around the base of wind turbines, abutting the fire break. The reduced fuel zone may be: o No less than 20m, or o To the envelope of the wind turbine blades.	***All Facilities*** ***Wind Energy Facilities***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1.1 and 3.1.3 of this BRMP. o Primarily this involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. o An APZ is also to be established around firewater tanks to achieve BAL-29 or lower. o No perimeter NVZ has been provided for the wind farm, as permitted by the CFA Guidelines. • These vegetation modification and management requirements have been incorporated into Sections 5.1 and 5.3 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Emergency Vehicle Access • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: o Be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. o Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.	***All Facilities*** ***Wind Energy Facilities***	• Vehicular access requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.2 and 3.2 of this BRMP. o Compliant internal driveway access is to be provided from the nominated wind farm site entrances, to each turbine and firewater tank, including turnaround. o The specifications are to comply with the private driveway specifications of the WA bushfire Guidelines, with the only deviation from the WA bushfire Guidelines will be that if the internal wind farm roads are less than 6 m wide, passing bays will be provided every 600 m (6m wide x 20m long) in accordance with the CFA Guidelines. • These vehicular access requirements have been incorporated into Section 5.2 of the project BMP. • ***Based on the above, the proposed of wind farm driveway and site entrances, supplemented by the use of existing public roads, farm roads and entrances, is considered sufficient to provide a flexible vehicular***

CFA Guideline Section	Requirement	Type	Development Response
	o Otherwise comply with the private driveway specifications of the WA bushfire Guidelines o Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Requirements for Wind Facilities* • Construction of a four (4) metre perimeter road is not required for wind energy facilities, however, suitable emergency vehicle access is required to each turbine and building on-site. • Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes.		***access network to, and within the proposed wind farm, for emergency services use in a bushfire emergency.***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines: o The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. o An external water level indicator must be provided to the tank and be visible from the hardstand area. o Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. o Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure • The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. o The hard-suction point must be protected from mechanical damage where necessary. o The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with the private driveway specifications of the WA bushfire Guidelines and at least 6 m wide and 8 m long, must be provided to the hard-suction point. o The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. *Additional Requirements for Wind Facilities* • Fire water storage tanks of at least 45,000L are provided at each site entrance. • Additional fire water storage tanks of at least 45,000L are incorporated in facility design.	***All Facilities*** ***Wind Energy Facilities***	• Firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.3 of this BRMP. o At least 135 kL of firewater is to be provided for the renewable energy infrastructure, currently proposed to be stored in three (3) 45 kL firewater tanks across the site. o These firewater tanks will comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines, supplemented by some requirements from the CFA Guidelines: o Rather than siting the tanks at the wind farm site entrances, signage will be placed at all wind farm site entrances to indicate to attending firefighters the location of the firewater tanks within the wind farm. The siting of the firewater tanks away from site entrances was noted as the preference of the Shire CESM who advised that water theft was a problem from publicly accessible firewater tanks. • These firewater requirements have been incorporated into Section 5.3 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met, other than the siting of the firewater tanks away from site entrances in some instances, however signage will be provided to clearly indicate the location of the firewater tanks in the development.***
	Fire Detection and Suppression Equipment • Suitable fire detection and suppression equipment must be provided: o For on-site buildings and structures, according to the requirements of the National Construction Code. o For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. o For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. o In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	***All Facilities***	***National Construction Code compliance*** • All buildings are to comply with the fire detection and suppression requirements of the NCC. • From a bushfire construction perspective, the NCC requires additional resilience to be added to Class 1, 2, 3, associated 10a and “certain” Class 9 buildings. None of these building classifications are proposed at the facility, however the Proponent may consider voluntary adoption of bushfire construction measures to some buildings. ***Dangerous Goods compliance*** • It is understood that no significant quantities are proposed at the facility, however if this changes in the future, it is expected it will be transported, handled and stored in accordance with relevant Australian Standards and Dangerous Goods legislation.

CFA Guideline Section	Requirement	Type	Development Response
			Portable fire extinguishers • Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards and Synergy requirements: o Each wind turbine o Each building o Substation rooms (e.g. switchroom, control room) o Wind farm vehicles • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Design Specific to Facility Type *Additional Requirements for Wind Facilities* • As wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions, the following design requirements are to be incorporated: o Wind turbines are located no less than 300 metres apart. o Provision of automatic shut-down, and the ability for wind turbines to be completely disconnected from the power supply in the event of fire. o Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA). o Marking of all guy wires and monitoring towers. • Nacelles are equipped with automatic fire detection, alarm, and fire suppression systems.	***Wind Energy Facilities***	***Turbine Siting*** • The wind turbines will all be located further than 300 m from each other. ***Turbine Automatic Shutdown and Disconnection*** • Wind turbines will be automatically shut-down in the event of turbine fire, with the ability to be completely disconnected from the power supply. • There will also be ability to remotely shut-down the turbines in a bushfire event if required ***Installed Weather Monitoring Station Notification*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will advise CASA of all-weather monitoring stations installed as part of the proposed development ***Marking Guy Wires and Monitoring Towers*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will mark all guy wires and monitoring towers installed as part of the proposed development. ***Turbine Fire Systems*** • All turbines are to be fitted with fire detection, alarm and suppression system to provide early warning of internal fire and automatic response • Activation of fire detection systems will be remotely monitored at all times • An emergency management procedure will be incorporated into the wind farm Emergency Management Plan to rapidly notify DFES, wind farm personnel (including on-call technician) and nearby landowners/farmers, of the onsite turbine fire detection or suppression system activation. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 5: Facility Construction and Commissioning	***Emergency Plan (Construction)*** • An Emergency Plan must be developed for the construction and commissioning phase of the facility. *Additional Guidance from CFA Guidelines* • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction. • Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to:	***All Facilities***	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as summarised in Section 3.4.2 of this BRMP. • It is recommended that the bushfire emergency management concepts detailed in the project BMP for the operational wind farm, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	o Electricity and chemical management. o Vegetation management. o Ignition source control, including hot works. o Infrastructure, equipment and vehicle maintenance. o Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).		
Section 6: Facility Operation	***Fire Management Plan*** • A Fire Management Plan must be developed for the facility, in consultation with fire brigade, before development starts. *Additional Guidance from CFA Guidelines* • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: o A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. o Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. o Description of control measures to prevent and reduce the consequences of external fire impacting the facility. o Details of equipment and resources to manage fire at the facility o Policies and procedures that ensure all control measures are appropriate and effective, and remain so. o Procedures for review of the Plan	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and summarised in Section 3.0 of this BRMP. • These bushfire risk management measures for the renewable energy infrastructure have also been summarised in Section 5.0 of the project BMP, including the nomination of responsible entities for implementation and ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Bushfire and Grassfire • If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Guidelines* • Your facility may be at-risk of bushfire if it is: o Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. o Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities	***All Facilities***	• Bushfire preparedness and response actions for the renewable energy infrastructure has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire preparedness and response actions have been incorporated into Section 5.8 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): o Grass must be maintained at or below 100mm in height during the nominated bushfire season. o Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. o Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days	***All Facilities***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1, 3.2 and 3.3 of this BRMP. • These vegetation modification and management requirements have been incorporated into Section 5.1 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Arc Flash Hazard Management • Where required, appropriate demarcation of arc boundaries to at least 10m from PCU arc flash outlet flaps (blow-out panels) must be provided.	***All Facilities***	• Not applicable – no PCU are proposed as part of this project (typically part of Battery Energy Storage Systems). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Facility and System Monitoring • Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or	***All Facilities***	• The proposed wind turbines are to be remotely monitored, both onsite (during business hours) and offsite (at all times), with the following emergency response procedures included in the bushfire emergency management arrangements (documented in the BMP):

CFA Guideline Section	Requirement	Type	Development Response
	equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.		o Turbine fire detection and suppression systems will be remotely monitored at all times, and upon activation, the response procedure is to include immediate notification to DFES, wind farm personnel (including on-call technician) and local landowners/farmers (if required) of potential onsite turbine fire. o The wind turbine will be automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely if required (in consultation with DFES, Western Power, AEMO). • The substation functionality will be monitored by wind farm operator. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Maintenance • Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. • Maintenance must be in line with any relevant Australian Standards, the manufacturer's requirements.	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management requirements, have also been summarised in the project BMP, including the nomination of responsible entities for ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Fire Risk Review • The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. • The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility.	***All Facilities***	• Like any BMP or BRMP, if there are significant changes to the development, they should be reviewed to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 3.4.6 of the BRMP and Section 5.8 (in particular Section 5.8.5) of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: o Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) o Personnel Training o Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Requirements for Wind Facilities* • Any EP for a Wind Energy Facility must include: o Emergency procedures for fires within, and in the vicinity of, wind turbines. o Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Extreme or above days or approach of bushfire/grassfire to the facility. o Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk. o This information must also be provided within the facility's Emergency Information Book. o Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies	***All Facilities***	• Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 3.4.6 of this BRMP. • The bushfire emergency management preparedness and response concepts detailed in Section 5.8 of the project BMP, which cover both proposed buildings and renewable energy infrastructure, are to be incorporated into the overall wind farm Emergency Management Plan. • The additional requirements for Wind Facilities, documented in the CFA Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan • The CFA Guidelines specifically notes that wind turbines should be capable of being stopped in the "Y" pattern o The process for placing the turbines in the "Y" pattern (rabbit ears position) is a manual one, that needs to be conducted by staff within each actual turbine, and climbing up to the nacelle. o Given staff need to be within each turbine, while all turbines will have the capability to be stopped in the "Y" pattern, this is not considered a safe procedure for wind farm staff to undertake in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: o A description of the premises, its infrastructure and operations. o Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire	***All Facilities***	• The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Guidelines and detailed in Sections 3.4.4 and 3.4.5 of this BRMP. • These requirements have been incorporated into Sections 5.6 and 5.7 of the project BMP.

CFA Guideline Section	Requirement	Type	Development Response
	protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. o A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. o Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) o Details of emergency equipment, including the type and location of gas detectors. o Up-to-date contact details for site personnel, regulatory authorities and site neighbours. o Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. o A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade o A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.		• ***Based on the above, all requirements with the CFA Guidelines have been met.***

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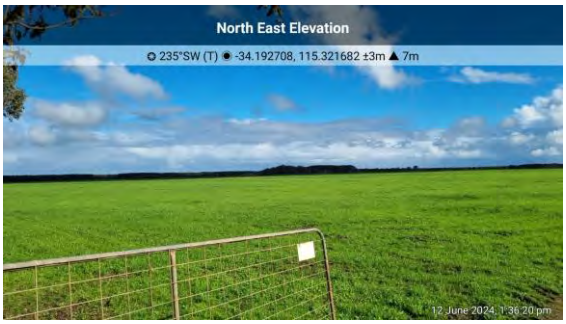
Appendix 1 Vegetation plot photos and description



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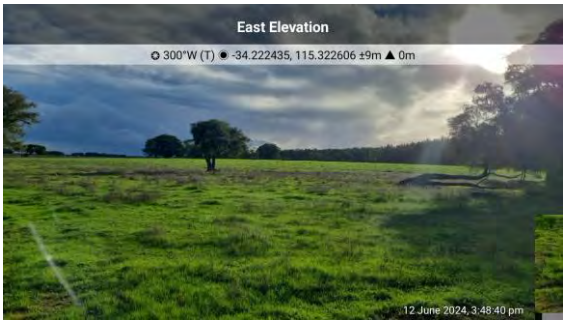
Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



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Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1q



Photo ID: 1r



Photo ID: 1s

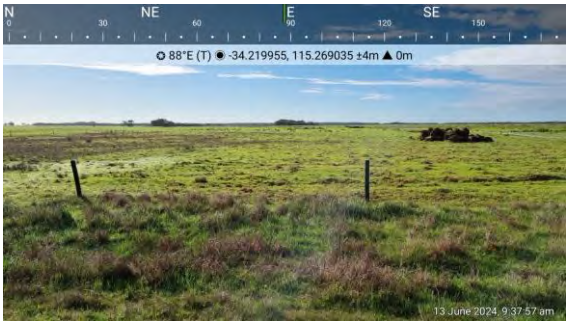

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Photo ID: 1x

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1y



Photo ID: 1z



Photo ID: 1aa



Photo ID: 1ab



Photo ID: 1ac



Photo ID: 1ad



Photo ID: 1ae



Photo ID: 1af

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1ag



Photo ID: 1ah



Photo ID: 1ai



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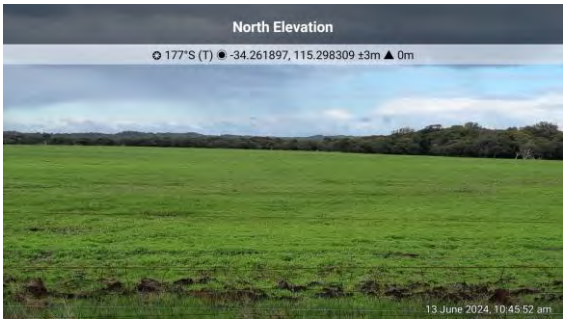
Photo ID: 1am



Photo ID: 1an

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



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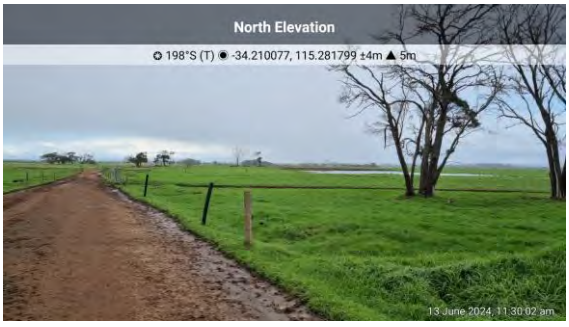

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Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



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Photo ID: 1bc



Photo ID: 1bd

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1be



Photo ID: 1bf



Photo ID: 1bg



Photo ID: 1bh



Photo ID: 1bi



Photo ID: 1bj



Photo ID: 1bk



Photo ID: 1bl

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bm



Photo ID: 1bn



Photo ID: 1bo



Photo ID: 1bp



Photo ID: 1bq



Photo ID: 1br



Photo ID: 1bs



Photo ID: 1bt

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bu



Photo ID: 1bv



Photo ID: 1bw

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 2a



Photo ID: 2b



Photo ID: 2c



Photo ID: 2d

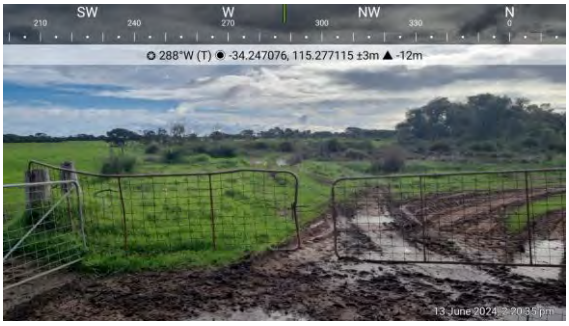


Photo ID: 2e

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 4a



Photo ID: 4b



Photo ID: 4c



Photo ID: 4d



Photo ID: 4e



Photo ID: 4f



Photo ID: 4g



Photo ID: 4h

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4i



Photo ID: 4j



Photo ID: 4k

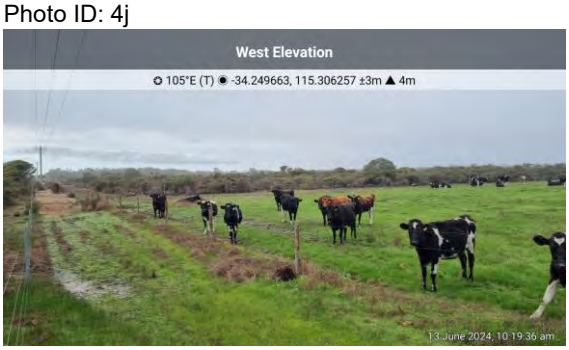


Photo ID: 4l



Photo ID: 4m



Photo ID: 4n



Photo ID: 4o



Photo ID: 4p

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 4q



Photo ID: 4r



Photo ID: 4s

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c



Photo ID: 5d



Photo ID: 5e



Photo ID: 5f



Photo ID: 5g



Photo ID: 5h

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5i



Photo ID: 5j



Photo ID: 5k



Photo ID: 5l



Photo ID: 5m



Photo ID: 5n



Photo ID: 5o

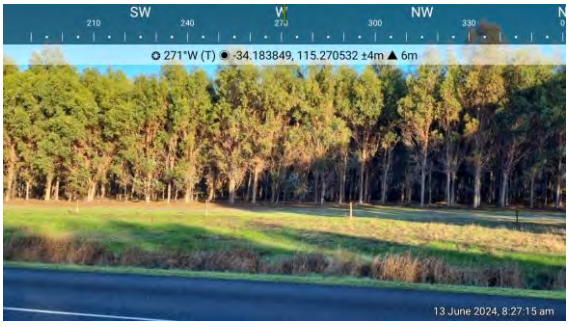


Photo ID: 5p

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5q



Photo ID: 5r



Photo ID: 5s



Photo ID: 5t



Photo ID: 5u



Photo ID: 5v



Photo ID: 5w



Photo ID: 5x

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5y



Photo ID: 5z

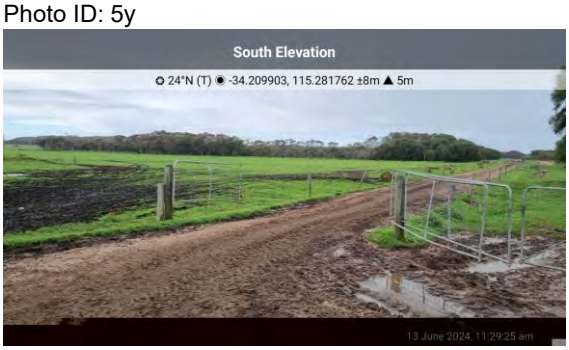


Photo ID: 5aa



Photo ID: 5ab



Photo ID: 5ac



Photo ID: 5ad



Photo ID: 5ae



Photo ID: 5af

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5ag



Photo ID: 5ah

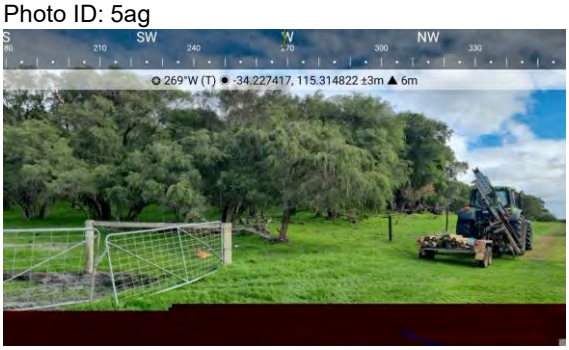


Photo ID: 5ai



Photo ID: 5aj

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 6a



Photo ID: 6b



Photo ID: 6c



Photo ID: 6d



Photo ID: 6e

Plot number	Plot 6
Vegetation classification	Class B Woodland
Description / justification	Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)



Photo ID: 7a



Photo ID: 7b



Photo ID: 7c



Photo ID: 7d



Photo ID: 7e



Photo ID: 7f



Photo ID: 7g



Photo ID: 7h

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7i



Photo ID: 7j



Photo ID: 7k



Photo ID: 7l



Photo ID: 7m



Photo ID: 7n



Photo ID: 7o



Photo ID: 7p

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7q



Photo ID: 7r



Photo ID: 7s



Photo ID: 7t



Photo ID: 7u



Photo ID: 7v



Photo ID: 7w



Photo ID: 7x

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads

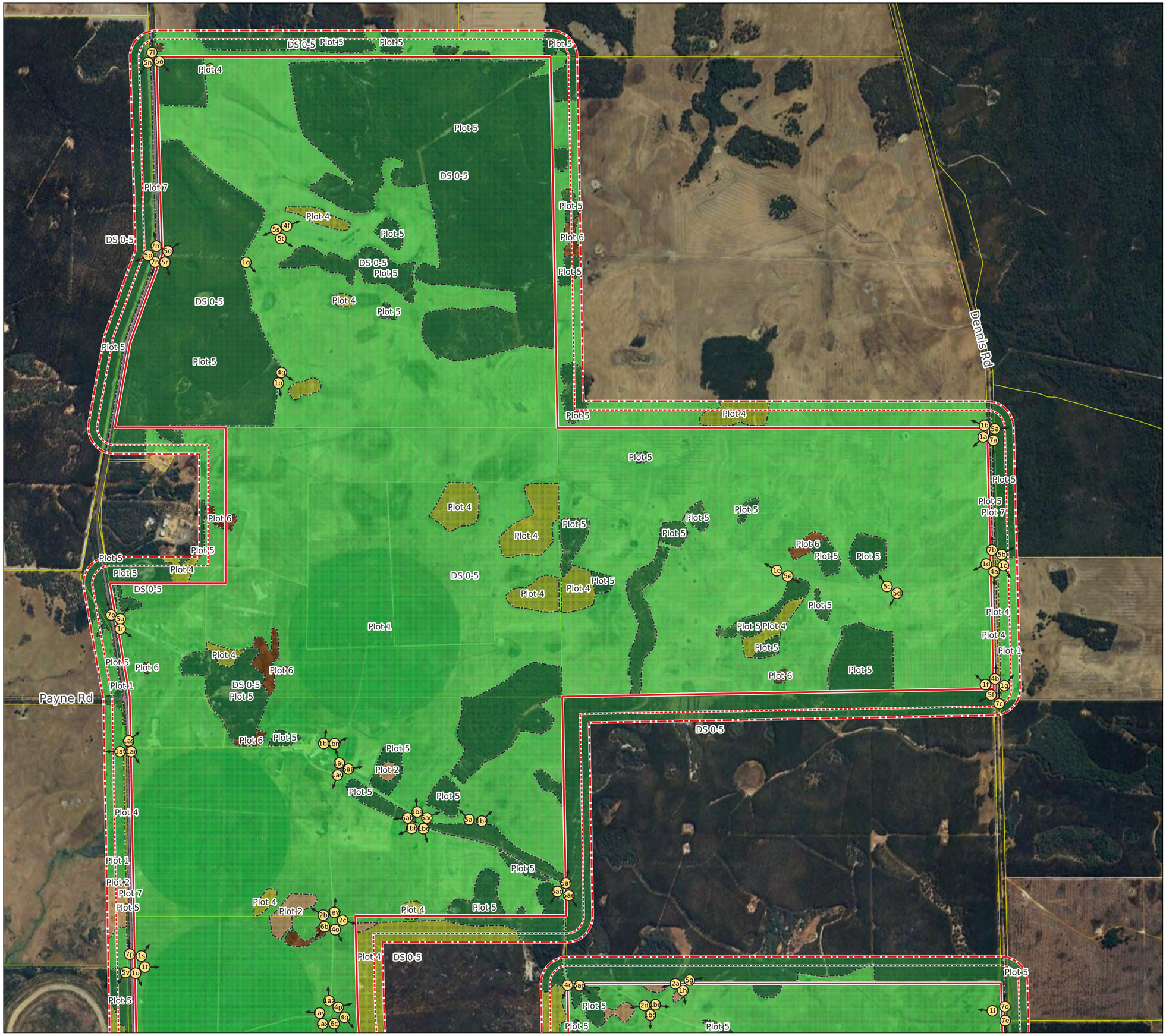


Photo ID: 7y



Photo ID: 7z

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Legend

- Photo Location
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - North)

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Legend

- Photo Location
- Building/Substation Envelopes
- Wind Farm Development Boundary
- 100m
- 150m
- Cadastre

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,800

0 300 600 900 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - South)

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Attachment 7

Transport Impact Statement



Transport Impact Statement

Project:	Beenup Wind Farm Project Scott River Road, Courtenay
Client:	SynergyRED c/o Urbis
Author:	Paul Nguyen/ Liomar De Leon
Date:	16th August 2024
Shawmac Document #:	2405015-TIS-001

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Document Status: Client Review

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File Reference: \\shawmacserver\NewData\Jobs Active 2024\T&T - Traffic & Parking\Urbis_Beenup Wind Farm_TIS_2405015\3. Documents\3.20 TIS\Urbis_Beenup Wind Farm_TIS_Rev A.docx

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Executive Summary

SynergyRED are proposing to establish a new wind farm located across various properties in Courtenay and Scott River on the east side of Scott River Road. The proposed development is a wind farm comprising 20 turbines located across various rural properties.

The site is located approximately 300km south of Perth and 15km north-east of Augusta.

The site plan is shown in Figure 1.

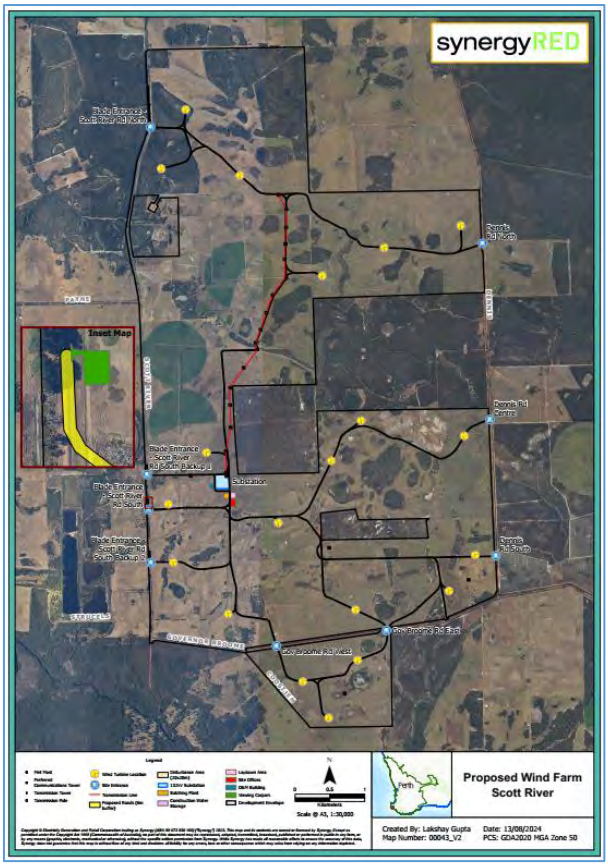


Figure 1: Site Layout

Shawmac has been commissioned to prepare a Transport Impact Statement (TIS) in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines Volume 4 – Individual Developments*.

The TIS focuses mainly on the construction phase of the project as this is when most traffic movements will occur. Once established, the site will be unmanned and generate minimal traffic associated with maintenance only.

In summary, this Transport Impact Statement for the proposed Beenup Wind Farm project concluded the following:

- The peak hour traffic generation during the construction phase is estimated to be an average of 28 vehicle movements per hour and a maximum of 53 vehicles per hour. The construction traffic is considered to have a low to moderate impact and can be accommodated within the existing capacity of the road network.
- It is also noted that the peak periods of traffic generation are expected to be in the morning when most staff are arriving for work and in the afternoon when staff are leaving. The peak period of traffic on Brockman Highway is around mid-day and the background traffic is much lower during the site peak periods.
- Once constructed and operational, the development will generate little or no traffic.
- The transport for the wind turbines to site will require Over Size Over Mass (OSOM) permits. A OSOM Route Assessment has been undertaken by Ares Group and the Route Study concluded:
    - The transport of OSOM components for the Beenup Wind Farm project from the Port of Bunbury is feasible with appropriate modifications made to the routes as noted in their report.
    - The Port of Bunbury has provided capacity for handling wind turbine cargo. Storage areas are sufficient to handle a project of this size.
    - The route assessed is both the most direct and simplest route from Bunbury. There are no overhead obstructions and theoretically there is no limit on the tower size.
    - Ares Group have limited the assessment to 6.0m in diameter for the Route Study. Power line lifting requirements will become significant with towers that are any larger.
- Vehicle access to the site is proposed via Scott River Road. The three access points shown on Dennis Road will be for emergency access only and there will be two crossovers over Governor Broome Road to access the southern lot and turbines.
- The minimum required sight distance is achieved in both directions at the site accesses on Scott River Road and Dennis Road and the crossing on Governor Broome Road.
- The vehicle access will need to accommodate the turning movements of the proposed construction trucks. Swept Path analysis has been undertaken in AutoTURN using a RAV 4 road train templates for the main access on Scott River Road.
- The result of the swept path has concluded that vegetation clearing is required for the main accesses on Scott River Road. No further swept path has been undertaken on Dennis Road, Governor Broom Road and the backup main access on Scott River Road as the required clearing is consistent with all proposed access for the site. This should be further confirmed once designs for the accesses are available.

- The OSOM Route Study prepared by Ares Group includes swept path analysis for OSOM vehicles which are significantly larger, no further swept path analysis has been undertaken.
- The crash history on the adjacent road network is low and does not appear to indicate any major safety issue on the road network. The proposed development will generate a low to moderate volume of additional traffic over a limited period of time and is unlikely to increase the risk of crashes unacceptably.

1 Introduction

1.1 Proponent

SynergyRED are proposing to establish a new wind farm in Courtenay and Scott River.

Shawmac has been commissioned by SynergyRED to prepare a Transport Impact Statement (TIS) in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines Volume 4 – Individual Developments*. The assessment considers the following key matters:

- Details of the proposed development.
- Vehicle access and parking.
- Provision for service vehicles.
- Hours of operation.
- Daily traffic volumes and vehicle types.
- Traffic management on frontage streets.
- Site specific and safety issues.
- Mitigation Strategies such as pre and post dilapidation surveys.

The TIS focuses mainly on the construction phase of the project as this is when most traffic movements will occur. Once established, the site will be unmanned and generate minimal traffic associated with maintenance only. Site Location

The wind farm will be located across various properties in Courtenay and Scott River on the east side of Scott River Road. The local authority is the Shire of Augusta-Margaret River.

The general site location is shown in Figure 1.

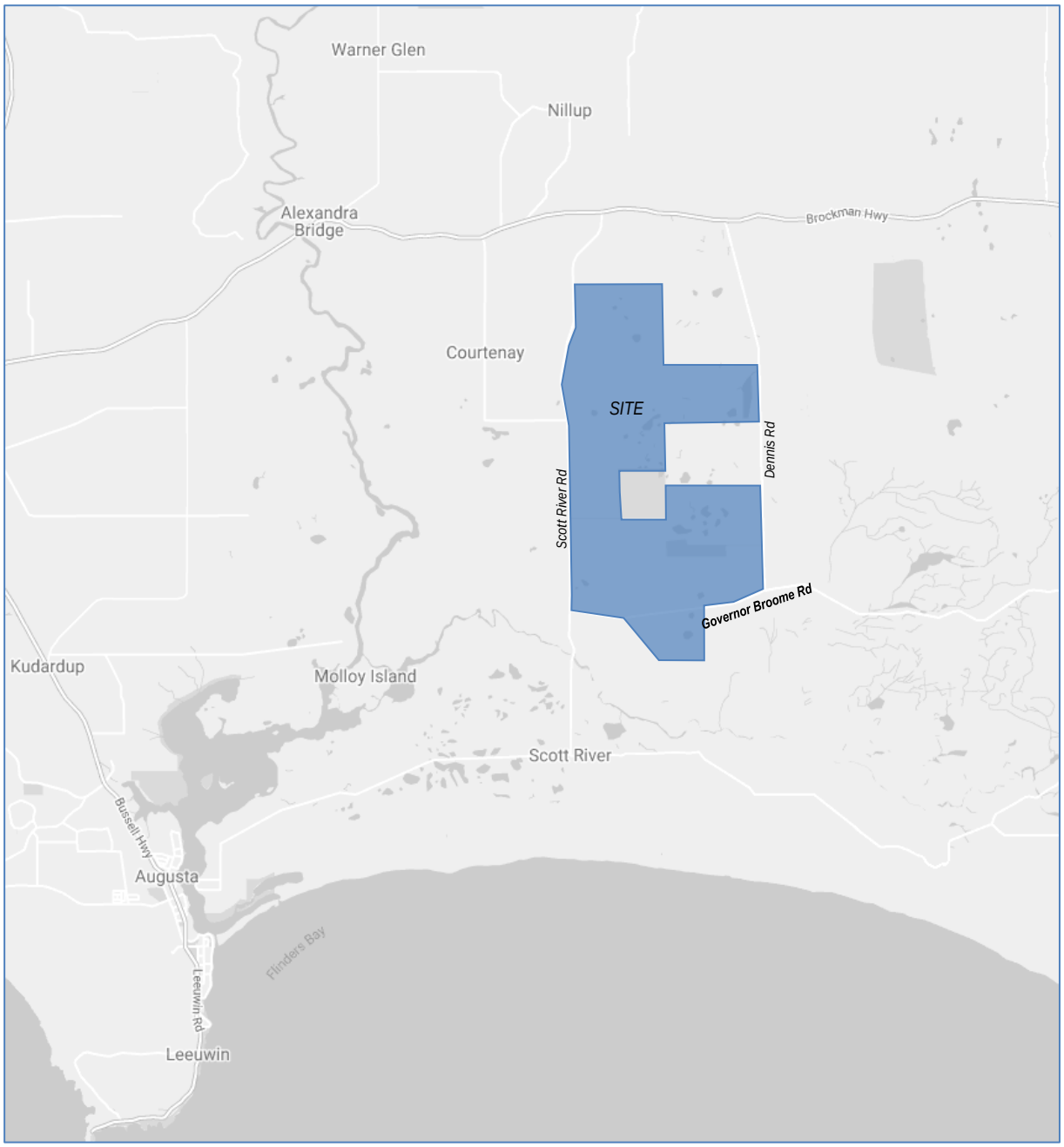


Figure 2: General Site Location

An aerial view of the existing site is shown in Figure 2.

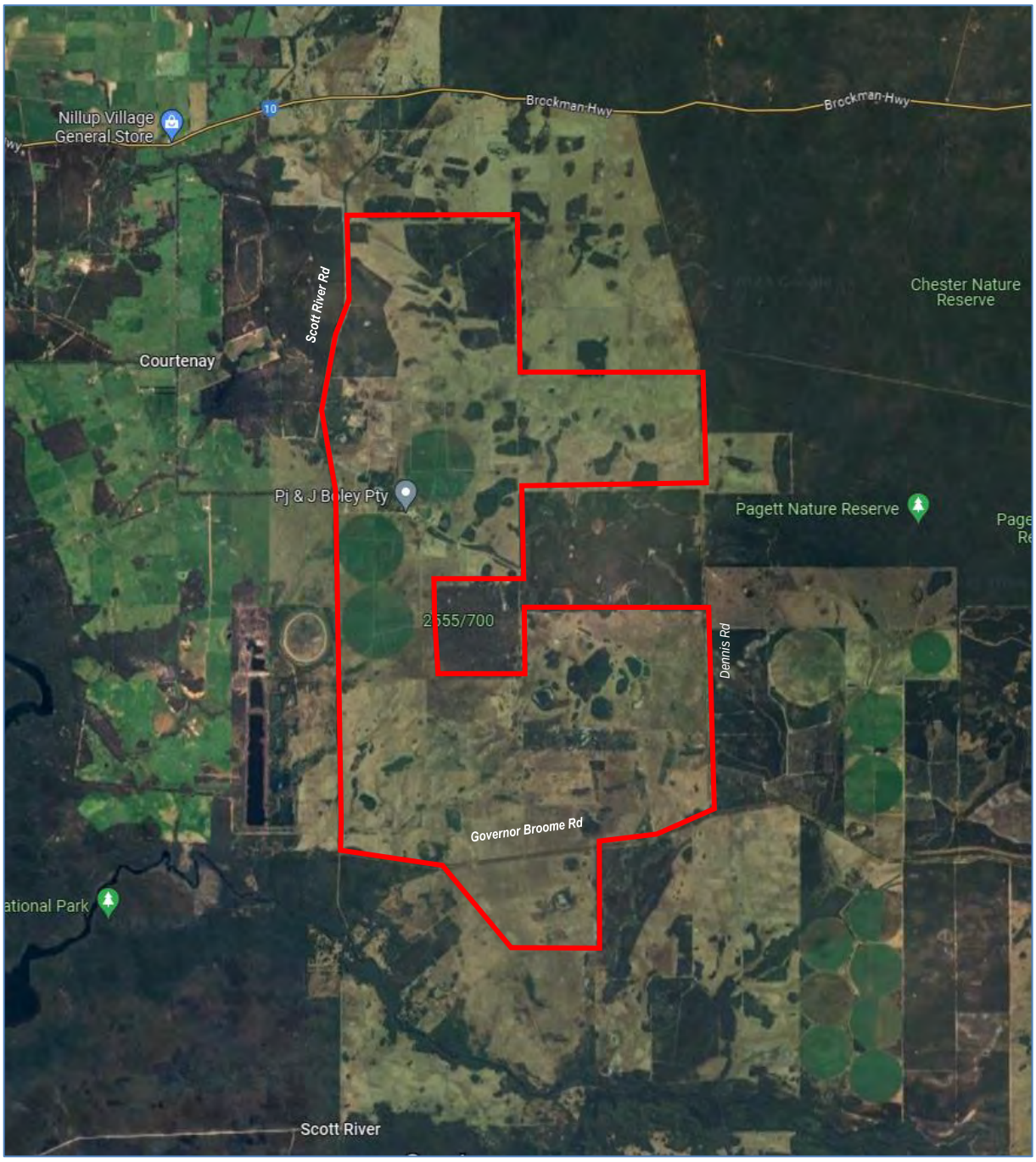


Figure 3: Aerial View (Google Maps)

2 Proposed Development

2.1 Land Use

The proposed development is a wind farm comprising 20 turbines located across various rural properties on the east side of Scott River Road in Courtenay and Scott River.

The site plan is shown in Figure 4.

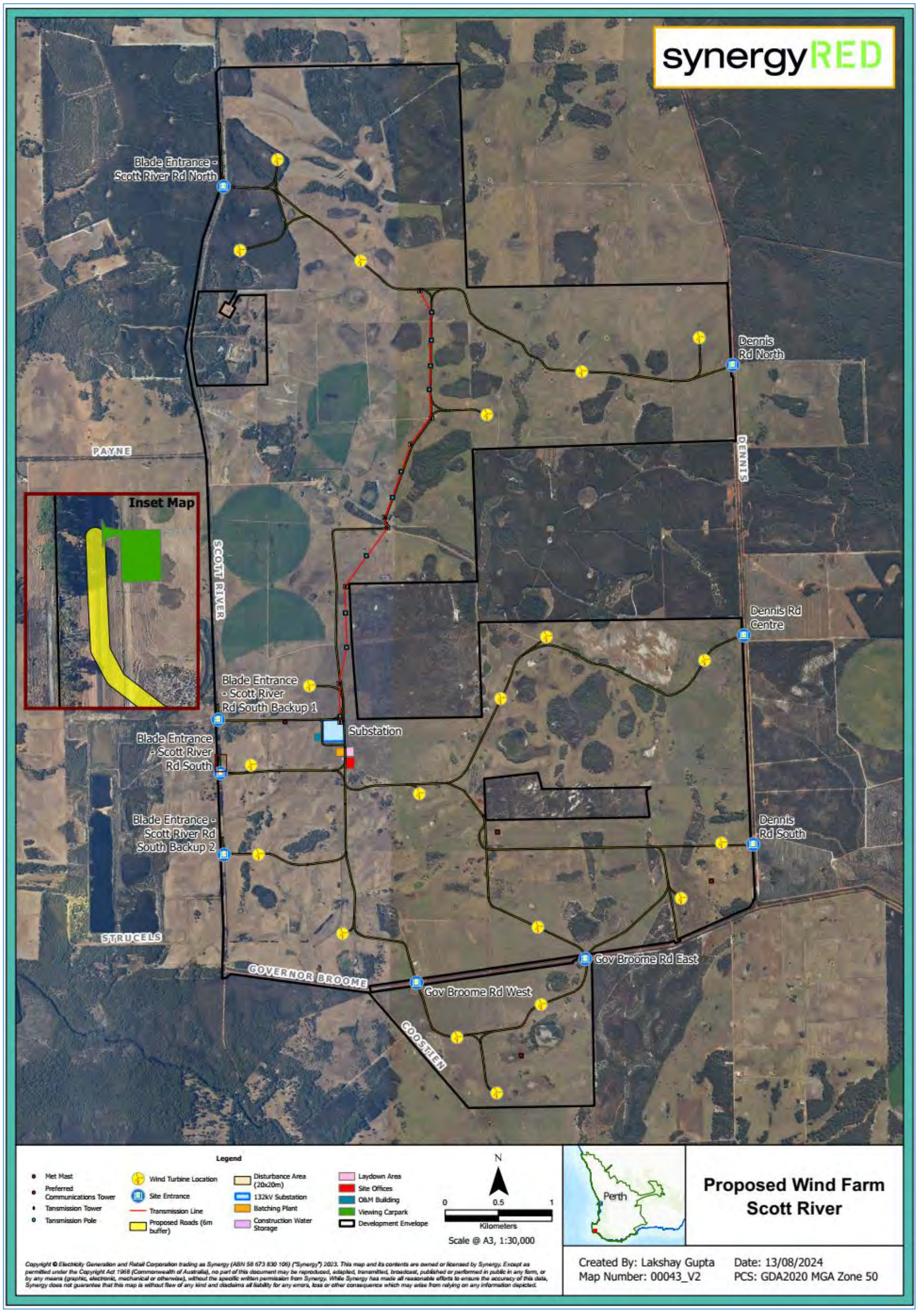


Figure 4: Site Layout

3 Traffic Management on Frontage Streets

3.1 Road Network

The layout and hierarchy of the existing local road network according to the Main Roads WA *Road Information Mapping System* is shown in Figure 5.

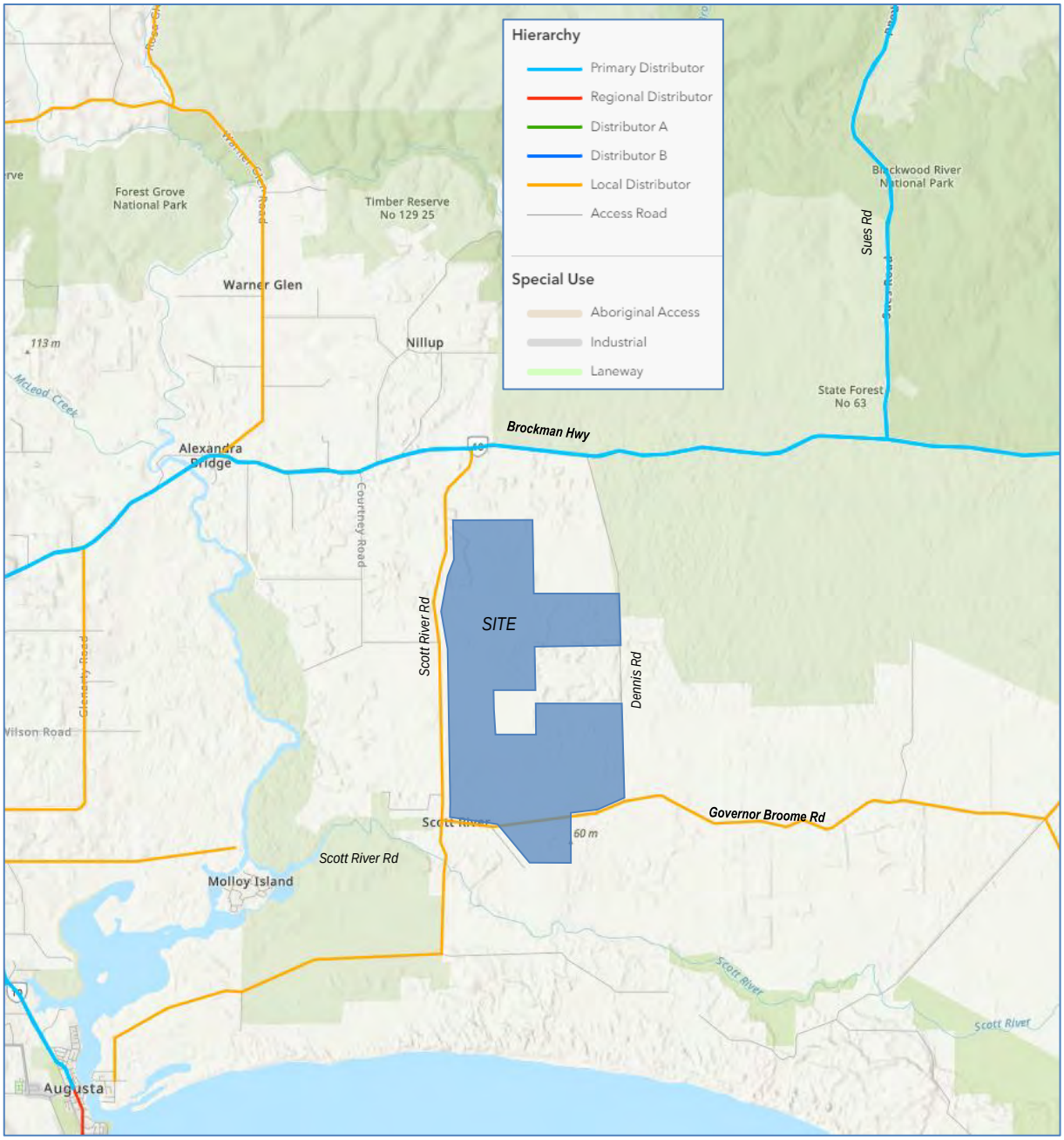


Figure 5: Existing Road Network Hierarchy

3.2 Speed Limits

The existing speed limits on the surrounding roads are shown in Figure 6.

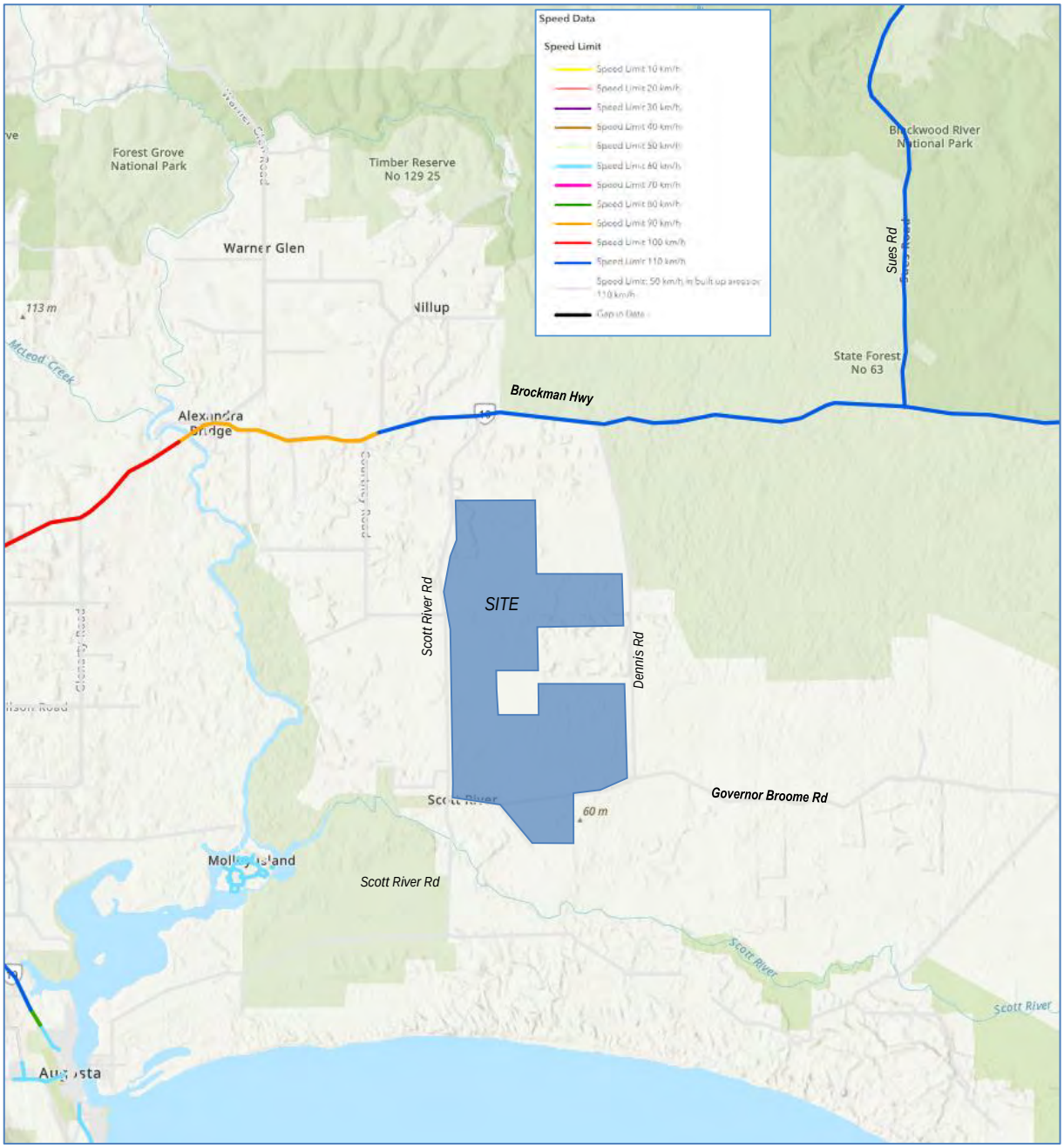


Figure 6: Existing Speed Limits

3.3 RAV Network

The current Restricted Access Vehicle (RAV) network according to Main Roads WA's Heavy Vehicle Services (HVS) network mapping tool is shown in Figure 7 and Figure 8.

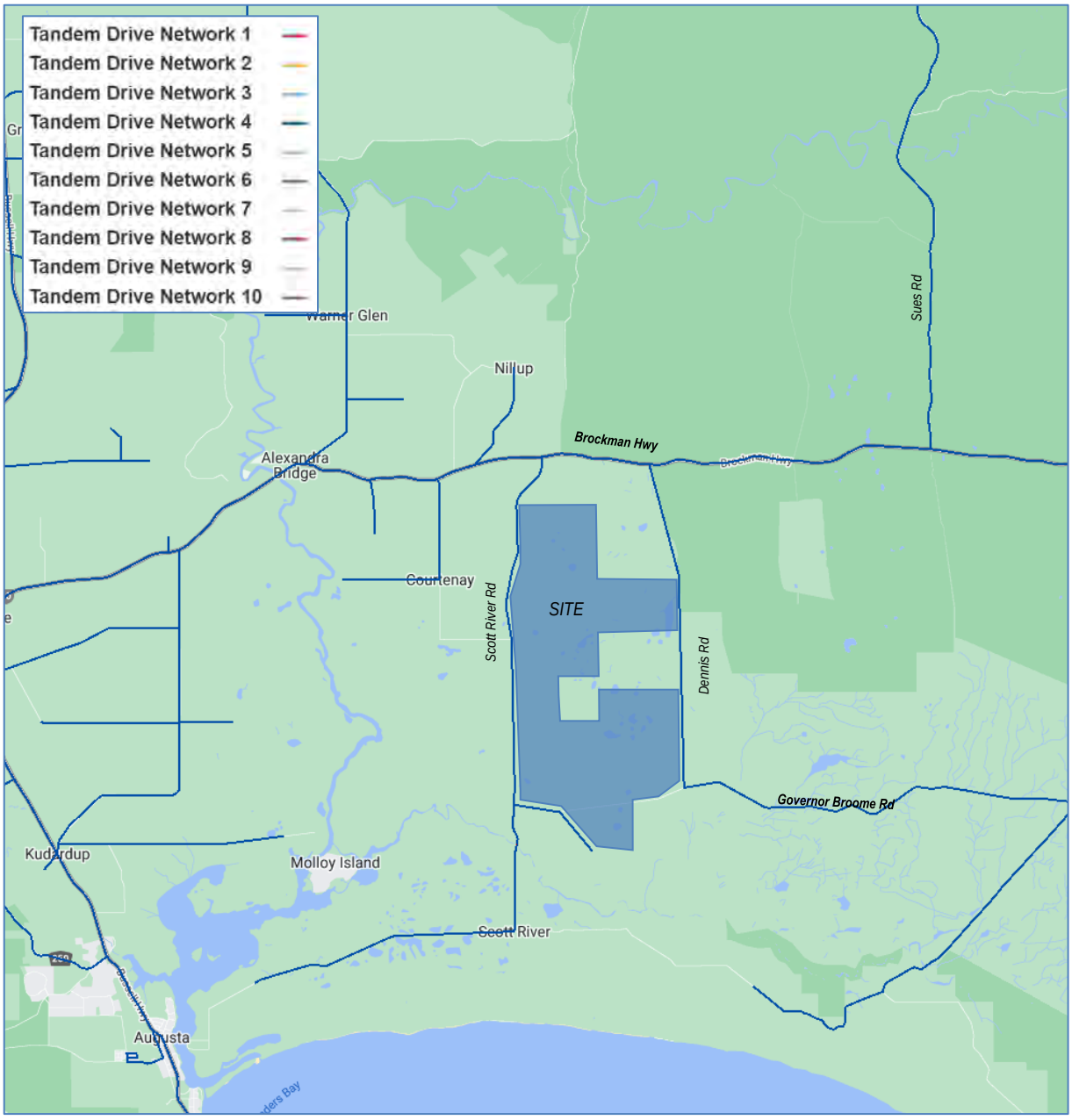


Figure 7: Tandem Drive RAV Network

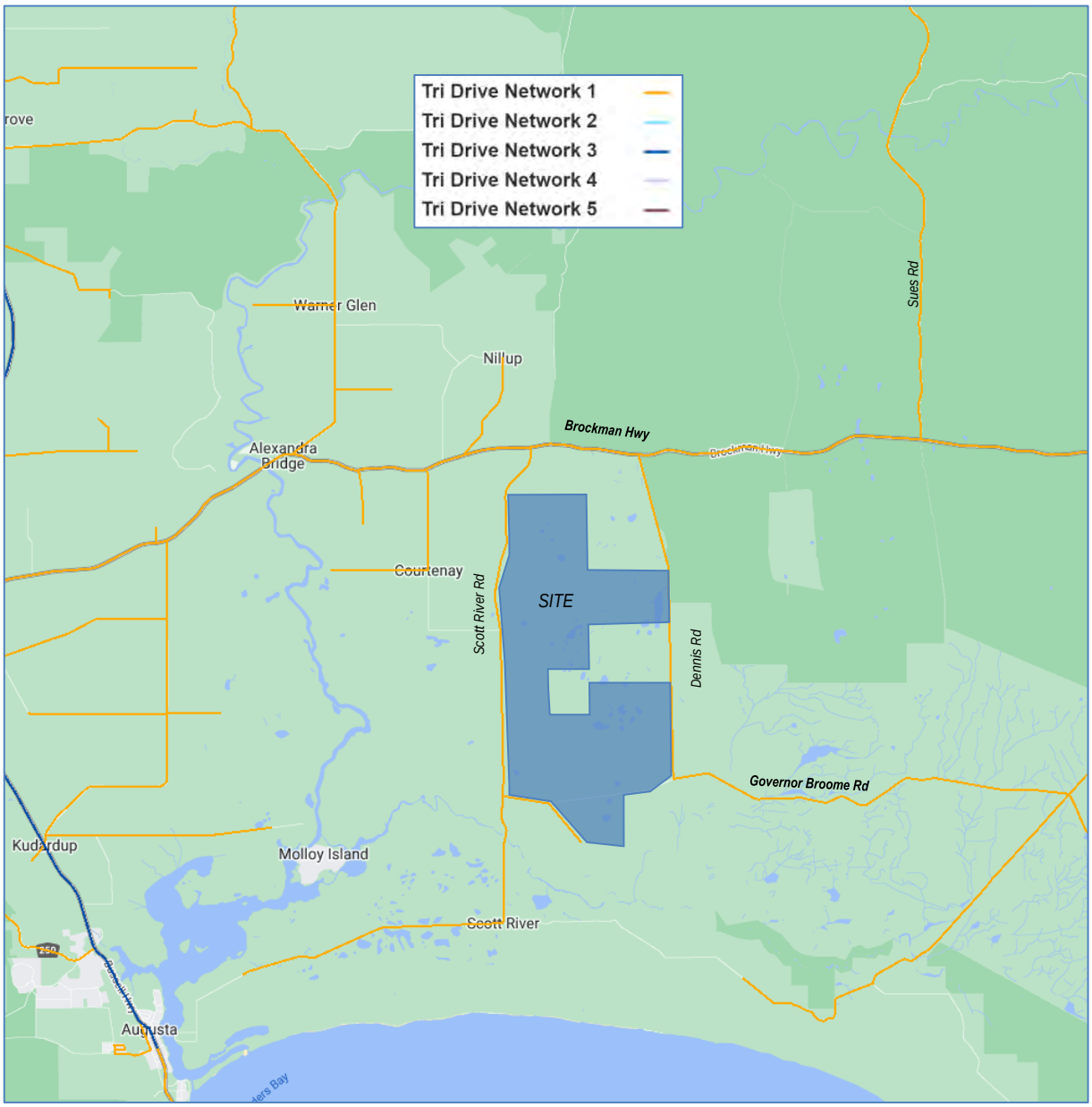


Figure 8: Tri Drive RAV Network

3.4 Traffic Volumes

The latest available traffic volumes for Brockman Highway and Scott River Road were sourced from Main Roads WA's Traffic Mapas summarised in Figure 9 to Figure 12.

mainroads WESTERN AUSTRALIA

SITE 19494

Hourly Volume

Brockman Hwy (M027)

West of Scott River Rd (SLK 55.80)

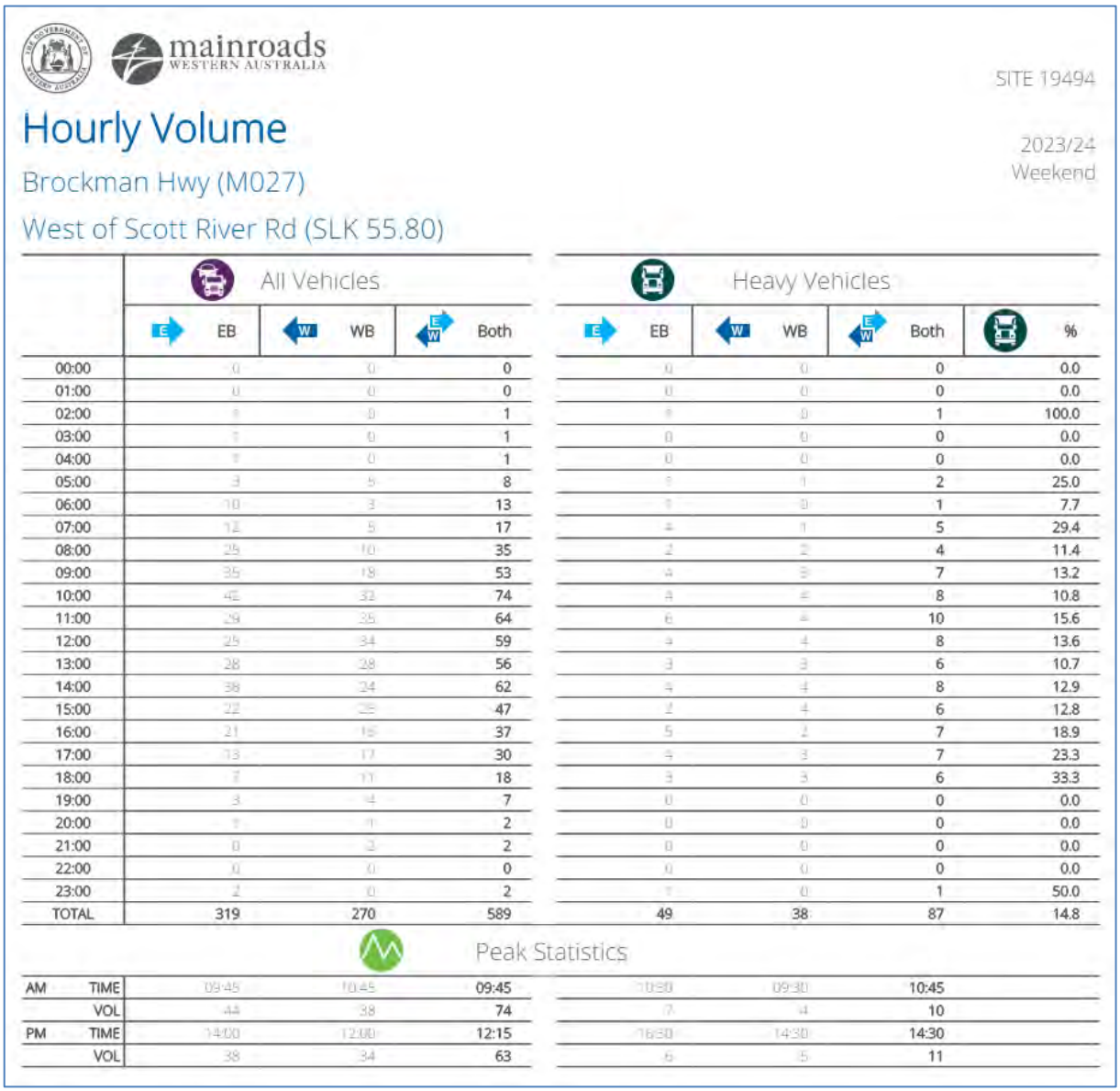
2023/24
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	0	0	0	0	0	0	0.0
01:00	0	0	0	0	0	0	0.0
02:00	0	0	0	0	0	0	0.0
03:00	0	0	0	0	0	0	0.0
04:00	2	0	2	1	0	1	50.0
05:00	6	0	6	2	0	2	33.3
06:00	19	10	29	4	5	9	31.0
07:00	15	15	30	3	5	8	26.7
08:00	25	15	40	5	6	11	27.5
09:00	32	18	50	8	5	13	26.0
10:00	32	21	53	8	4	12	22.6
11:00	38	26	56	10	6	16	28.6
12:00	25	27	52	7	7	14	26.9
13:00	26	29	55	6	8	14	25.5
14:00	25	27	52	8	8	16	30.8
15:00	17	27	44	4	8	12	27.3
16:00	15	27	42	3	7	10	23.8
17:00	8	19	27	2	3	5	18.5
18:00	5	14	19	1	2	3	15.8
19:00	3	8	11	0	1	1	9.1
20:00	4	4	8	1	1	2	25.0
21:00	1	2	3	0	0	0	0.0
22:00	1	1	2	0	0	0	0.0
23:00	0	0	0	0	0	0	0.0
TOTAL	291	290	581	73	76	149	25.6

Peak Statistics

AM	TIME	09:30	11:30	09:30	11:15	11:45	11:30
	VOL	37	27	57	12	9	19
PM	TIME	13:15	13:45	13:15	14:30	14:15	14:15
	VOL	27	29	55	8	9	17

Figure 9: Brockman Highway Traffic Counts – Average Weekday



mainroads WESTERN AUSTRALIA

SITE 19494

Hourly Volume

Brockman Hwy (M027)

West of Scott River Rd (SLK 55.80)

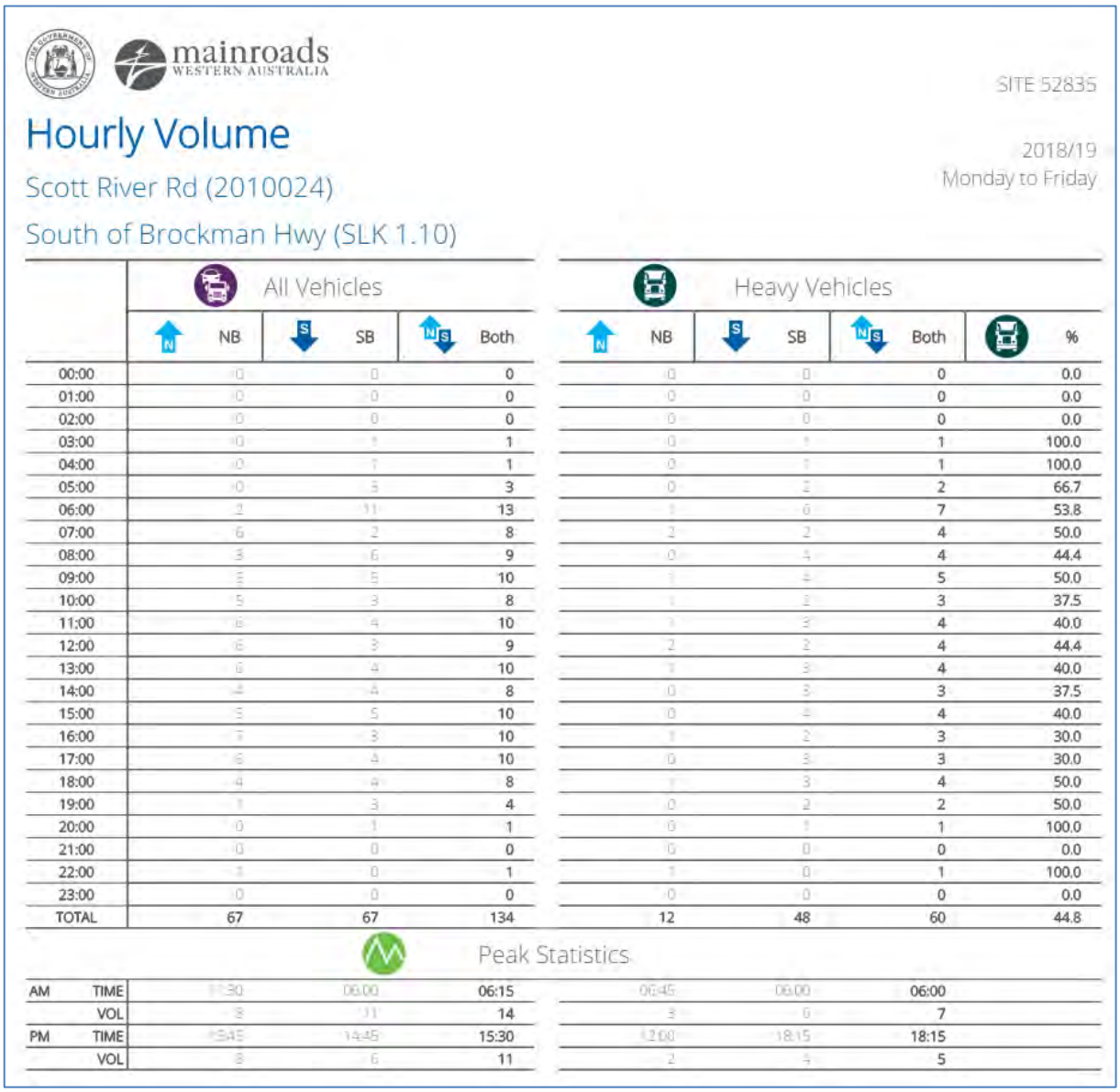
2023/24
Weekend

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	0	0	0	0	0	0	0.0
01:00	0	0	0	0	0	0	0.0
02:00	1	0	1	1	0	1	100.0
03:00	1	0	1	0	0	0	0.0
04:00	1	0	1	0	0	0	0.0
05:00	3	5	8	1	1	2	25.0
06:00	10	3	13	1	0	1	7.7
07:00	12	5	17	4	1	5	29.4
08:00	25	10	35	2	2	4	11.4
09:00	35	18	53	4	3	7	13.2
10:00	42	32	74	4	4	8	10.8
11:00	29	35	64	6	4	10	15.6
12:00	25	34	59	4	4	8	13.6
13:00	28	28	56	3	3	6	10.7
14:00	38	24	62	4	4	8	12.9
15:00	22	25	47	2	4	6	12.8
16:00	21	16	37	5	2	7	18.9
17:00	13	17	30	4	3	7	23.3
18:00	7	11	18	3	3	6	33.3
19:00	3	4	7	0	0	0	0.0
20:00	1	1	2	0	0	0	0.0
21:00	0	2	2	0	0	0	0.0
22:00	0	0	0	0	0	0	0.0
23:00	2	0	2	1	0	1	50.0
TOTAL	319	270	589	49	38	87	14.8

Peak Statistics

AM	TIME	09:45	10:45	09:45	10:30	09:30	10:45
	VOL	44	38	74	7	4	10
PM	TIME	14:00	12:00	12:15	16:30	14:30	14:30
	VOL	38	34	63	6	5	11

Figure 10: Brockman Highway Traffic Counts – Average Weekend



mainroads WESTERN AUSTRALIA

SITE 52835

Hourly Volume

2018/19

Monday to Friday

Scott River Rd (2010024)

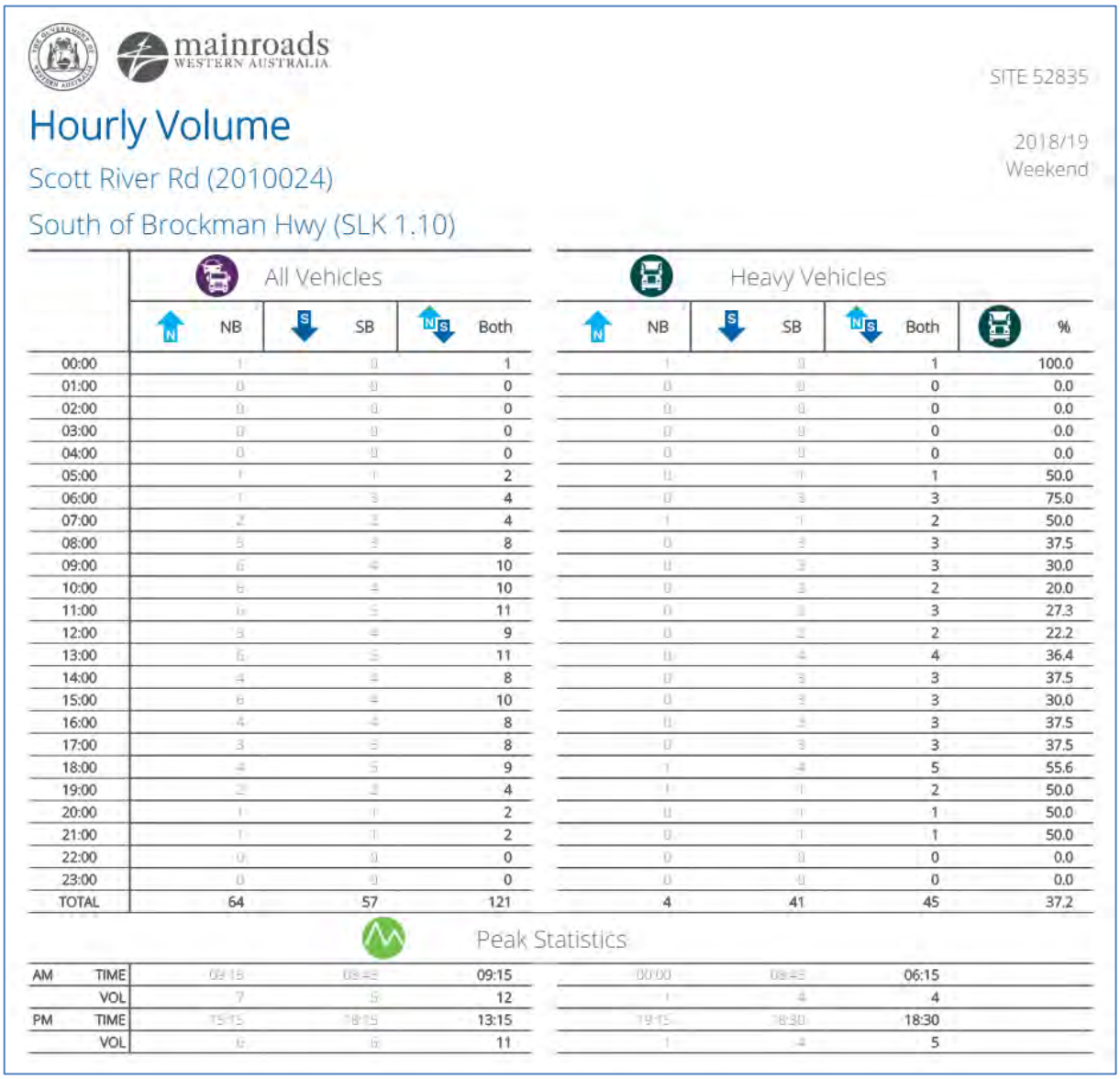
South of Brockman Hwy (SLK 1.10)

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	0	0	0	0	0	0	0.0
01:00	0	0	0	0	0	0	0.0
02:00	0	0	0	0	0	0	0.0
03:00	0	1	1	0	1	1	100.0
04:00	0	1	1	0	1	1	100.0
05:00	0	3	3	0	2	2	66.7
06:00	2	11	13	1	6	7	53.8
07:00	6	2	8	2	2	4	50.0
08:00	3	6	9	0	4	4	44.4
09:00	5	5	10	1	4	5	50.0
10:00	5	3	8	1	2	3	37.5
11:00	6	4	10	1	3	4	40.0
12:00	6	3	9	2	2	4	44.4
13:00	6	4	10	1	3	4	40.0
14:00	4	4	8	0	3	3	37.5
15:00	5	5	10	0	4	4	40.0
16:00	7	3	10	1	2	3	30.0
17:00	6	4	10	0	3	3	30.0
18:00	4	4	8	1	3	4	50.0
19:00	1	3	4	0	2	2	50.0
20:00	0	1	1	0	1	1	100.0
21:00	0	0	0	0	0	0	0.0
22:00	1	0	1	1	0	1	100.0
23:00	0	0	0	0	0	0	0.0
TOTAL	67	67	134	12	48	60	44.8

Peak Statistics

AM	TIME	11:30	06:00	06:15	06:45	06:00	06:00
	VOL	8	11	14	3	6	7
PM	TIME	15:45	14:45	15:30	12:00	18:15	18:15
	VOL	8	6	11	2	4	5

Figure 11: Scott River Road Traffic Counts – Average Weekday



mainroads WESTERN AUSTRALIA

SITE 52835

Hourly Volume

Scott River Rd (2010024)

South of Brockman Hwy (SLK 1.10)

2018/19
Weekend

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	1	0	1	1	0	1	100.0
01:00	0	0	0	0	0	0	0.0
02:00	0	0	0	0	0	0	0.0
03:00	0	0	0	0	0	0	0.0
04:00	0	0	0	0	0	0	0.0
05:00	1	1	2	0	1	1	50.0
06:00	1	3	4	0	3	3	75.0
07:00	2	2	4	1	1	2	50.0
08:00	5	3	8	0	3	3	37.5
09:00	6	4	10	0	3	3	30.0
10:00	6	4	10	0	2	2	20.0
11:00	6	5	11	0	3	3	27.3
12:00	5	4	9	0	2	2	22.2
13:00	6	5	11	0	4	4	36.4
14:00	4	4	8	0	3	3	37.5
15:00	6	4	10	0	3	3	30.0
16:00	4	4	8	0	3	3	37.5
17:00	3	5	8	0	3	3	37.5
18:00	4	5	9	1	4	5	55.6
19:00	2	2	4	1	1	2	50.0
20:00	1	1	2	0	1	1	50.0
21:00	1	1	2	0	1	1	50.0
22:00	0	0	0	0	0	0	0.0
23:00	0	0	0	0	0	0	0.0
TOTAL	64	57	121	4	41	45	37.2

Peak Statistics

AM	TIME	09:15	09:45	09:15	00:00	09:45	06:15
	VOL	7	5	12	1	4	4
PM	TIME	13:15	18:15	13:15	13:15	18:30	18:30
	VOL	6	6	11	1	4	5

Figure 12: Scott River Road Traffic Counts – Average Weekend

According to Austroads *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, the capacity of a typical highway is approximately 1,800 passenger cars per hour for each lane. The above volumes are well within the capacity of the roads.

Traffic counts were not available for Dennis Road and Governor Broome Road, but the existing volumes are estimated to be less than 150 vehicles per day based on the current extent of development.

4 Traffic Impact

4.1 Assessment Period

The site will generate the most traffic during the construction phase which is estimated by the client to last approximately 18 to 24 months.

Once constructed and operational, the site will be mostly unmanned and will generate no traffic other than for occasional maintenance which is expected to occur a few times per year. This assessment therefore focusses on the traffic impact of the construction phase.

4.2 Traffic Generation

The construction phase will generate traffic movements of various vehicle types (light vehicles, heavy vehicles, minibuses and over-size, over-mass (OSOM) vehicles). The OSOM vehicles will be used to transport cranes, wind turbine components and transformer components. These vehicles will travel under escort and will require special permits to be assessed and approved by Main Roads WA. OSOM vehicle movements are expected to occur in the middle 12-month period. A separate OSOM Route Study has been prepared by ARES Group for the project and so further detailed analysis of OSOM vehicles is not required in this TIS (refer Section 4.4)

SynergyRED has advised that estimated traffic generated during the construction phases is consistent with the approved King Rocks Wind Farm Traffic Impact Assessment prepared by Stantec as shown in Table 1.

Table 1: Estimated Construction Traffic Generation

Type of Vehicles	Average Traffic Generation (vehicles per day)	Peak Traffic Generation (vehicles per day)
Light (LV)	25	50
Heavy (HV)	10	25
Water Carting to Site (12 Months Only)	6	6
OSOM	1	3
Total	42	86

Assuming light vehicle traffic movements mostly occur during the peak hours and the heavy vehicles are spread out over the day, the peak hour traffic generation is estimated to be an average of 28 (25 LV, 1 HV, 1 water carting and 1 OSOM) vehicle movements per hour and a maximum of 53 (50 LV, 1 HV, 1 water carting and 1 OSOM) vehicles per hour.

According to the WAPC TIA guidelines, an increase of between 10 to 100 peak hour vehicles is considered to have a low to moderate impact and is generally deemed acceptable without requiring detailed capacity analysis.

The peak hour traffic generation is around the middle of this range and so the construction traffic is considered to have a low to moderate impact and can be accommodated within the existing capacity of the road network.

It is also noted that the peak periods of traffic generation are expected to be in the morning when most staff are arriving for work and in the afternoon when staff are leaving. The peak period of traffic on Brockman Highway is around mid-day and the background traffic is much lower during the site peak periods.

4.3 Impact on Existing Roads

The main impact of the development will during the construction of the Beenup Wind Farm. The additional traffic generated during the construction period and the impact to the existing road network to and from the Port of Bunbury is summarised in Table 2.

As a worst-case scenario, the light vehicles will be travelling to and from the Port of Bunbury. However, it is anticipated that the construction workers will be stationed locally.

Table 2: Anticipated Average Increase in Traffic Volumes on the Surrounding Road Network

Road	Speed (km/hr)	Road Hierarchy	Background AADT*	Anticipated Average Increase in Daily Traffic Associated with the Development	Proportional Increase
Leschenault Drive	50km/h	Access Road	"No Traffic Volume Available"	N/A	N/A
Estuary Drive	60km/h	Distributor B	12,545	86	0.69%
Koombana Drive	60km/h	Distributor B	13,942	86	0.62%
Robertson Drive	60 – 80km/h	Primary Distributor	18,774	86	0.46%
Bussell Highway	60 – 110km/h	Primary Distributor	27,477	86	0.31%
Sues Road	110km/h	Primary Distributor	1,001	86	8.59%
Brockman Highway	110km/h	Primary Distributor	581	86	14.80%
Scott River Road	110km/h	Access Road	121	86	71.07%

**AADT were sourced from latest Trafficmap information*

As shown, the additional traffic generated by the proposed development will have minimal impact to the existing local roads between the Port of Bunbury and Scott River Road. It anticipated that construction workers will be stationed locally and the impact to the roads between Brockman Highway and Leschenault Drive will be further reduced.

Scott River Road currently has low AADT, and the proportional increase will create minor disruptions that can be managed accordingly.

4.4 OSOM Assessment

The site is located approximately 300km south of Perth and 15km north-east of Augusta. The transportation of components will be loaded from the Port of Bunbury and will travel south to Scott River Road. Ares Group had prepared a Over Size Over Mass (OSOM) Route Study in April 2024 and route overview is shown in Figure 13.

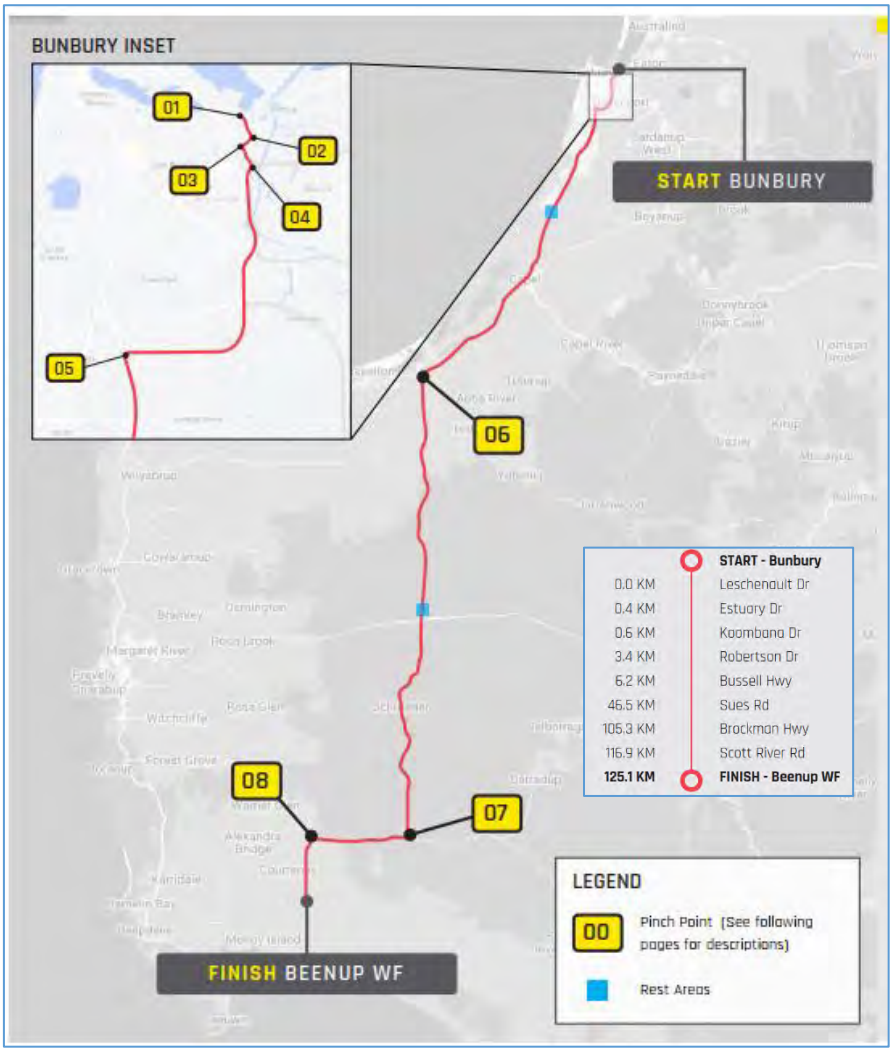


Figure 13: Ares Group - OSOM Route Study

In summary, Ares Group believes that the transport of OSOM components for the Beenup Wind Farm project from the Port of Bunbury is feasible with appropriate modifications made to the routes as noted in their report.

The Port of Bunbury has provided capacity for handling wind turbine cargo. Storage areas are sufficient to handle a project of this size. The route assessed is both the most direct and simplest route from Bunbury. There are no overhead obstructions and theoretically there is no limit on the tower size. Ares Group have limited the assessment to 6.0m in diameter for the Route Study. Power line lifting requirements will become significant with towers that are any larger.

The proposed road modifications are summarised in the table provided by Ares Group in Table 3.

Table 3: Ares Group – Summary of Road Modifications

Summary of Road Modifications

The following table lists all required modifications to allow transport of components to take place.

Pinch Point	Road/Intersection	Modifications Required	Risk
01	Port Storage & Leschenault Dr	Temporary hardstand to be laid down on port land (approx. 320m2)	Medium
02	Leschenault Dr & Estuary Dr	Temporary hardstand to be laid down (approx. 230m2), 1x light pole to be relocated, some wire fencing to be removed	Medium
03	Estuary Dr & Koombana Dr	Temporary hardstand to be laid down (approx. 260m2), 1x sign to be made removeable.	Medium
04	Eelup Rotary	1x sign to be made removeable	Low
05	Robertson Dr & Bussell Hwy	6x signs to be made removeable	Low
06	Bussell Hwy & Sues Rd	Nil at this stage - pending completion of roundabout construction	Low
07	Sues Rd & Brockman Hwy	Temporary hardstand to be laid down (approx. 640m2)	Medium
08	Brockman Hwy & Scott River Rd	Temporary hardstand to be laid down (approx. 260m2), 1x sign to be made removeable	Medium
S01	Site Entrance A	Temporary hardstand to be laid down (approx. 1,500m2), livestock pen and fence to be removed	High
S02	Site Entrance B	Shrub removal required, existing fence to be removed/modified	Low
S03	Site Entrance C	Existing fence to be removed/modified	Low
S04	Site Entrance D	1x tree to be removed (approx. 50m2), shrub to be removed, existing fence to be removed/modified	Medium

It is understood that the Route Study will form part of the application for the development along with this Traffic Impact Statement.

5 Vehicle Access Assessment

5.1 Access Arrangements

Vehicle access to the site is proposed via Scott River Road as shown in Figure 14. The three access points shown on Dennis Road will be for emergency access only and there will be a two crossover over Governor Broome Road to access the southern lot and turbines.

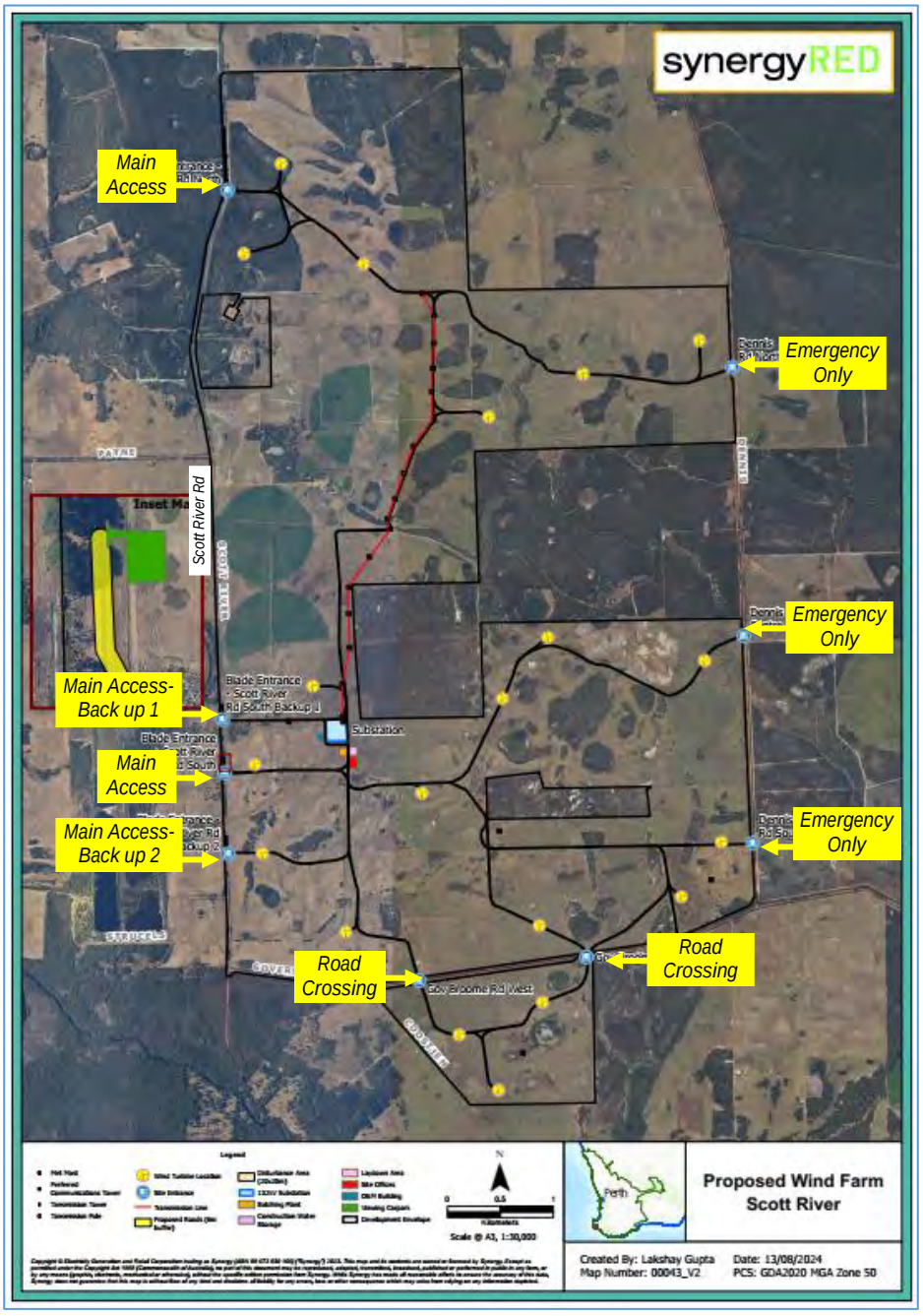


Figure 14: Proposed Vehicle Access

5.2 Sight Distance

Sight distance requirements from vehicle exit points for RAV vehicles are defined in Main Roads WA Standard Restricted Access Vehicles Route Assessment Guidelines (RAV Guidelines) as shown in Table 4.

Table 4: RAV Guidelines Sight Distance Requirements

Appendix D: Required Sight Distances

Posted Speed km/h	Downhill				Level	Uphill			
	-8%	-6%	-4%	-2%		2%	4%	6%	8%
40	74	72	70	68	66	65	64	62	61
50	102	98	95	92	89	87	85	84	82
60	134	128	123	119	116	112	110	107	105
70	170	162	155	149	144	140	136	133	130
80	209	198	190	182	176	170	165	161	157
90	252	239	228	218	210	203	197	191	186
100	308	290	275	263	252	242	234	227	220

The above values have been derived using the formula given in Austroads Guidelines with following factors:

Reaction Time	4.0 s

(Deceleration rate of 0.29g up to 90 km/h, 0.28g at 100 km/h.)

The posted speed limit along Scott River Road is 110km/h but is noted that RAV vehicles are permitted to travel up to 100km/h. As the road is relatively flat, the minimum required sight distance along Scott River Road is 252m.

As Dennis Road and Governor Broome Road are unsealed, there is no prescribed speed limit and the operating speed is based on the conditions of the road. For the purposes of this assessment, a 70km/h operating speed has been assumed. On this basis, the minimum required sight distance along these roads is 144m.

The sight distance checks are shown in Figure 15 to Figure 23. As shown, the minimum required sight distance is achieved in both directions at all proposed access points.



Figure 15: Sight Distance Check – Scott River Road Northern Access



Figure 16: Sight Distance Check – Scott River Road Southern Access



Figure 17: Sight Distance Check – Scott River Road Southern Access - Backup 1

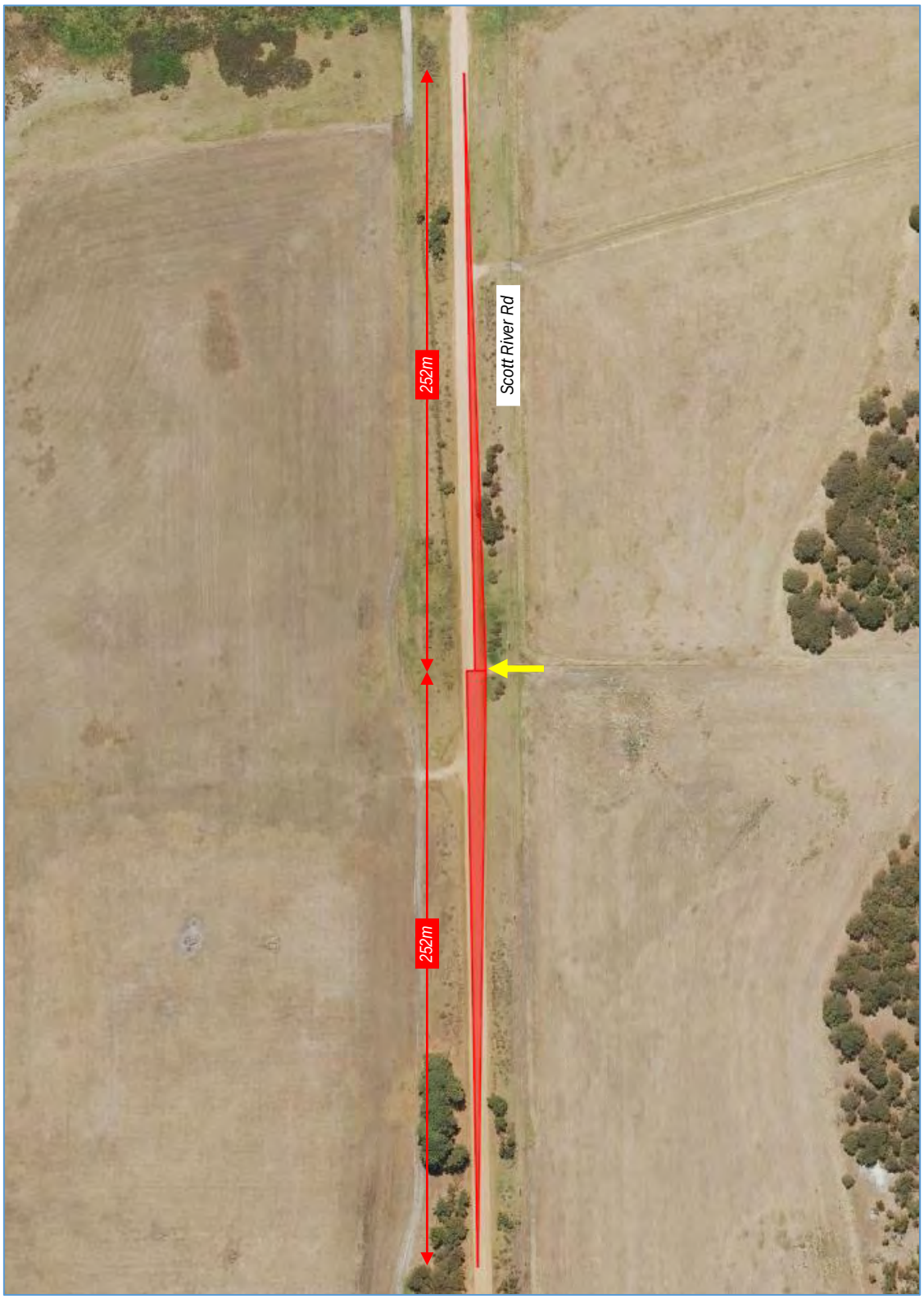


Figure 18: Sight Distance Check – Scott River Road Southern Access - Backup 2

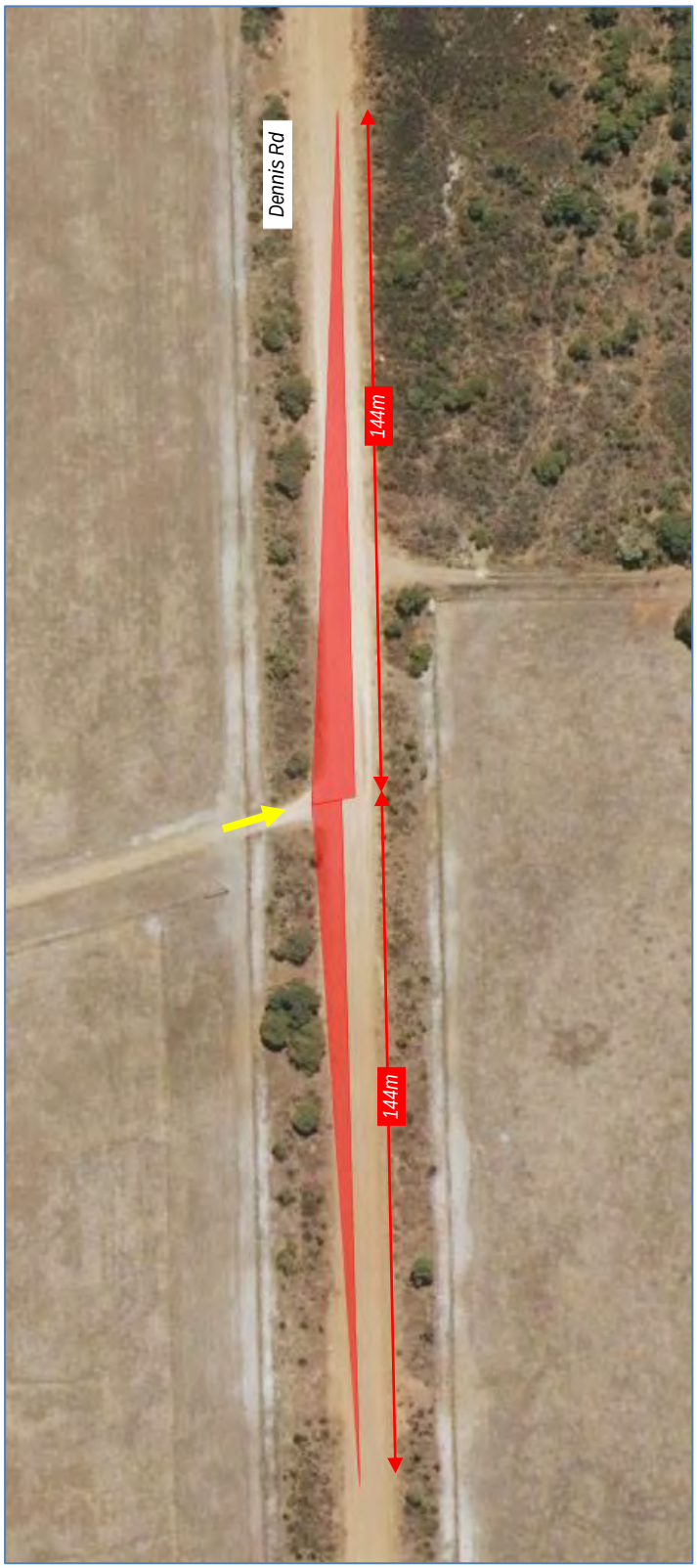


Figure 19: Sight Distance Check – Dennis Road Northern Access



Figure 20: Dennis Road Central Access



Figure 21: Sight Distance Check – Dennis Road Southern Access



Figure 22: Sight Distance Check – Governor Broome Road (West) Crossing



Figure 23: Sight Distance Check – Governor Broome Road (East) Crossing

5.3 Access Geometry

The vehicle access will need to accommodate the turning movements of the proposed construction trucks. Swept Path analysis has been undertaken in AutoTURN using a RAV 4 road train templates for the main access on Scott River Road as shown in Appendix A – Swept Path Analysis.

The result of the swept path has concluded that vegetation clearing is required for the main accesses on Scott River Road. No further swept path has been undertaken on Dennis Road, Governor Broom Road and the back-up main access on Scott River Road as the required clearing is consistent with all proposed accesses for the site. This should be further confirmed once designs for the accesses are available.

The OSOM Route Study prepared by Ares Group includes swept path analysis for OSOM vehicles which are significantly larger, no further swept path analysis has been undertaken.

6 Site Specific Issues and Safety Issues

6.1 Crash History

The crash history of the adjacent road network was sourced from the Main Roads WA's Reporting Centre. The search included the following sections of road:

- Brockman Highway between Scott River Road and Sues Road.
- Scott River Road between Brockman Highway and Milyeannup Coast Road.
- Dennis Road between Brockman Highway and Governor Broom Road.
- Governor Broome Road between Scott River Road and Dennis Road.

The crashes recorded over the five-year period from January 2019 to December 2023 are shown in Figure 24.



Figure 24: Crash History – January 2019 to December 2023

The crash history is low and does not appear to indicate any major safety issue on the road network. The proposed development will generate a low to moderate volume of additional traffic over a limited period of time and is unlikely to increase the risk of crashes unacceptably.

7 Conclusion

This Transport Impact Statement for the proposed Beenup Wind Farm project concluded the following:

- The peak hour traffic generation during the construction phase is estimated to be an average of 28 vehicle movements per hour and a maximum of 53 vehicles per hour. The construction traffic is considered to have a low to moderate impact and can be accommodated within the existing capacity of the road network.
- It is also noted that the peak periods of traffic generation are expected to be in the morning when most staff are arriving for work and in the afternoon when staff are leaving. The peak period of traffic on Brockman Highway is around mid-day and the background traffic is much lower during the site peak periods.
- Once constructed and operational, the development will generate little or no traffic.
- The transport for the wind turbines to site will require Over Size Over Mass (OSOM). A OSOM Route Assessment has been undertaken by Ares Group and the Route Study concluded:
    - The transport of OSOM components for the Beenup Wind Farm project from the Port of Bunbury is feasible with appropriate modifications made to the routes as noted in their report.
    - The Port of Bunbury has provided capacity for handling wind turbine cargo. Storage areas are sufficient to handle a project of this size.
    - The route assessed is both the most direct and simplest route from Bunbury. There are no overhead obstructions and theoretically there is no limit on the tower size.
    - Ares Group have limited the assessment to 6.0m in diameter for the Route Study. Power line lifting requirements will become significant with towers that are any larger.
- Vehicle access to the site is proposed via Scott River Road. The three access points shown on Dennis Road will be for emergency access only and there will be two crossovers over Governor Broome Road to access the southern lot and turbines.
- The minimum required sight distance is achieved in both directions at the site accesses on Scott River Road and Dennis Road and the crossing on Governor Broome Road.
- The vehicle access will need to accommodate the turning movements of the proposed construction trucks. Swept Path analysis has been undertaken in AutoTURN using a RAV 4 road train templates for the main access on Scott River Road.
- The result of the swept path has concluded that vegetation clearing is required for the main accesses on Scott River Road. No further swept path has been undertaken on Dennis Road, Governor Broom Road and the backup main access on Scott River Road as the required clearing is consistent with all proposed access for the site.
- The OSOM Route Study prepared by Ares Group includes swept path analysis for OSOM vehicles which

are significantly larger, no further swept path analysis has been undertaken.

- The crash history on the adjacent road network is low and does not appear to indicate any major safety issue on the road network. The proposed development will generate a low to moderate volume of additional traffic over a limited period of time and is unlikely to increase the risk of crashes unacceptably.

Appendix A – Swept Path Analysis

MAIN ACCESS
SCOTT RIVER ROAD
(NORTHERN ACCESS)

MRWA RAV 2(C) – REV1
Custom

MRWA RAV 2(C) – REV1
Custom

VEGETATION CLEARING REQUIRED

MRWA RAV 2(C) – REV1
Custom

MRWA RAV 2(C) – REV1
Custom

MAIN ACCESS
SCOTT RIVER ROAD
(SOUTHERN ACCESS)

MRWA RAV_2(C) – REV1
Custom

MRWA RAV_2(C) – REV1
Custom

VEGETATION CLEARING REQUIRED

MRWA RAV_2(C) – REV1
Custom

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and communities
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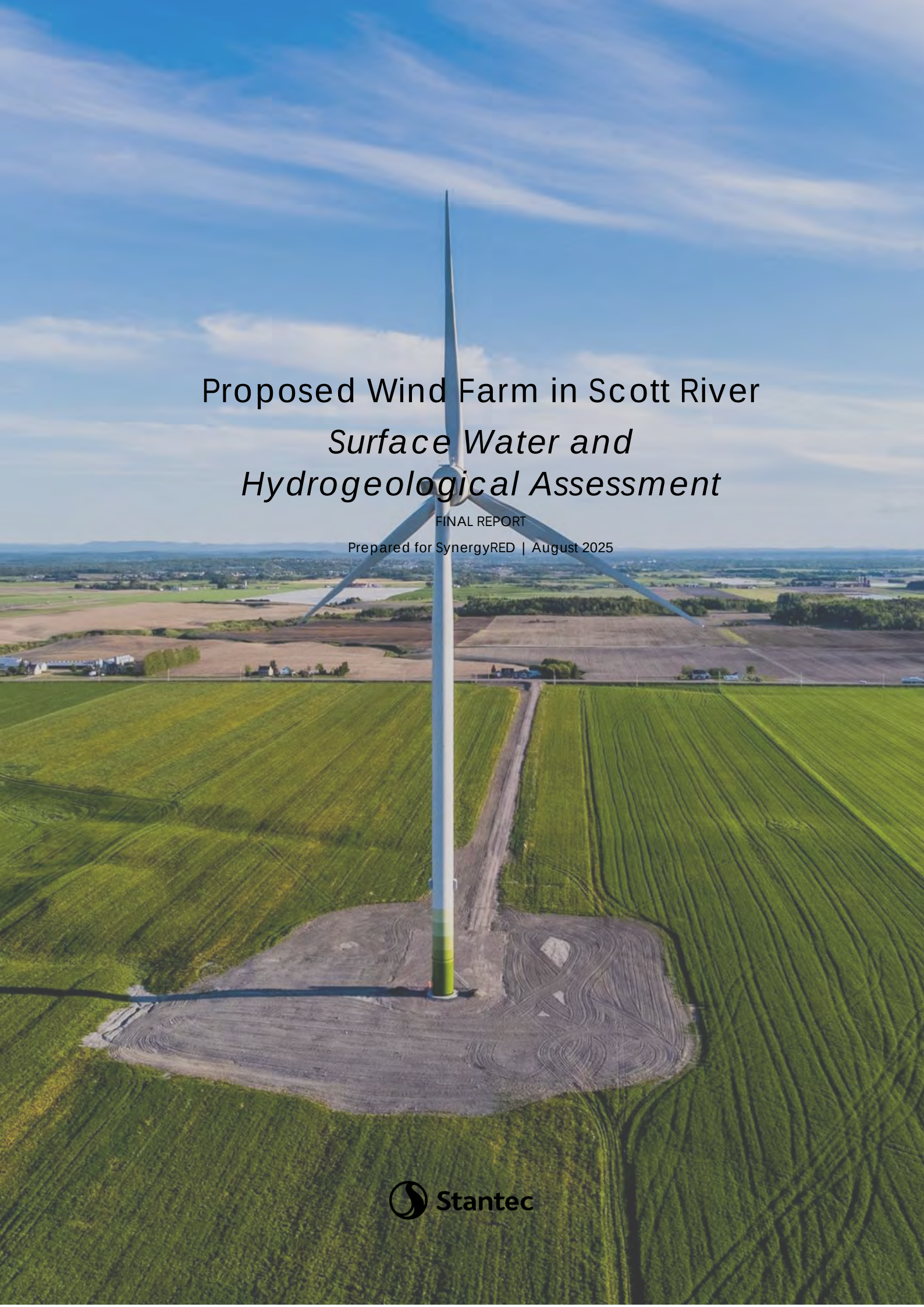
Attachment 4 (RSD) -Appendix A

Surface Water and Hydrogeological Assessment



Proposed Wind Farm in Scott River

Surface Water and Hydrogeological Assessment

FINAL REPORT

Prepared for SynergyRED | August 2025

Stantec

Revision Schedule

Rev. No.	Date	Description	Prepared by	Quality Reviewer	Technical Independent Reviewer	Project Manager Final Approval
A	03/07/2025	Draft report for client review	Fariba Ebrahimi, Fergus Giec-Yorston, and Cameron Love	Sumari Veal, Cameron Love, and Mike Jorgensen, Brooke Hay	Sumari Veal, Mike Jorgensen, Fiona Taukulis and Nicole Bichel	
B	03/07/2025	Draft report for client review	Fariba Ebrahimi, Fergus Giec-Yorston, and Cameron Love	Sumari Veal, Mike Jorgensen, Fiona Taukulis and Nicole Bichel	Sumari Veal, Mike Jorgensen, Fiona Taukulis and Nicole Bichel	
C	03/07/2025	Draft report for client review	Fariba Ebrahimi, Fergus Giec-Yorston, and Cameron Love	Sumari Veal, Mike Jorgensen, Fiona Taukulis and Nicole Bichel	Sumari Veal, Mike Jorgensen, Fiona Taukulis and Nicole Bichel	
0	25/08/2025	Final Report	Joan Deng, Fiona Taukulis and Cameron Love	Fiona Taukulis	Fiona Taukulis	Loraine Roberts

Ground Floor, 226 Adelaide Terrace, PERTH WA 6000

Status: FINAL | Project No: 304501017

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Executive Summary

Background, Scope and Objective

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) engaged Stantec Australia Pty Ltd (Stantec) to support the environmental approvals for a proposed 100 MW wind farm in the locality of Scott River (the Proposal), approximately 15 km north-east of Augusta in the Margaret River region of Western Australia. The scope of works comprised a Surface Water and Hydrogeological Assessment (the Assessment) of the Study Area (approximately 4000 ha in size) to support their feasibility assessment and address environmental regulatory requirements for the Proposal. The objective of the Assessment was to provide surface water and hydrogeological conceptualisation of the Study Area, to inform optimisation of infrastructure, while recommending mitigation and management measures to minimise impacts to the hydrological regime. This Assessment is supported by a technical appendix on the groundwater dependent values of the Study Area.

Proposal Features

The Proposal is anticipated to involve construction and operation of up to 20 wind turbine generators across the Study Area, along with supporting infrastructure including meteorological towers, transmission line and associated foundations, concrete batching plant, access roads, borrow pits, offices and electrical substation and switch yard. During construction, dewatering will be required to a maximum depth of 2 to 3 m to support excavation and installation of foundations, with local disposal via sediment tanks/ponds and infiltration basins. Consideration of surface water and hydrogeological characteristics is required to avoid and mitigate impacts to potentially sensitive ecological and social receptors in the vicinity of the Study Area.

Surface Water Characteristics

Key surface water features in the region consist of historically modified catchments with artificial drains to facilitate the agricultural and plantation activities. These drains have not been built in a coordinated way and intersect with roads and natural drainage lines, resulting in several areas of localised ponding due to catchment modification.

The Study Area has a poorly defined ridgeline that runs approximately through the centre of the Study Area, segregating the 11 Blackwood and Scott River headwater catchments that discharge from the Study Area. Sheet flow occurs across cleared land areas, concentrating into more defined streamflow paths towards the Study Area boundary.

There are several areas of natural ponding following rainfall events in areas designated as wetlands and in depressions formed by historical anthropogenic activities. The roads on almost every boundary of the Study Area act as an impediment to flow paths and cause localised upstream ponding, apart from the southernmost catchment which sheet flows across agricultural land.

Hydrogeological Characteristics

The northern part of the Study Area is characterised by a thin layer of dune sands (<2 m) overlying alternating bands of clay and sand as well as peat, while in the central and south sections, dune sands are deeper (up to approximately 6 m) with interbedded ferricrete and/or clay. The Study Area is located within an area of high to moderate ASS potential (supported by preliminary test results) and is partly within DoW Groundwater Management Zone 7 (from the central area to the south); a buffer zone area defined by an acid sulfate soil plume from Beenup mine site used to restrict groundwater extraction.

The Study Area hosts the Superficial and Leederville Aquifers, with the latter identified within the upper 25 m of the profile. The Superficial Aquifer is localised and discontinuous and is generally hosted within the surficial sand. It includes perched groundwater above impermeable beds of the Leederville Formation, and local confinement zones of low permeability in the laterite (dominant sand and ferricrete) profile. The Leederville Aquifer lies beneath the Superficial Aquifer and is shallower in the north and deepens in the southern portion of the Study Area.

The Superficial Aquifer is recharged by direct diffuse rainfall infiltration and localised downward leakage from creeks, wetlands and irrigation through sandy soils. Potential upward leakage from the underlying Leederville Formation may also occur. The Leederville Aquifer is mostly recharged via lateral flow and vertical downward leakage from the Superficial Aquifer. Discharge from the Superficial Aquifer occurs via evapotranspiration, while the Leederville Aquifer discharges to major rivers and creeks. During the wet season the water table in the Superficial Aquifer is shallow and may locally discharge into wetlands or at the ground surface, while during the dry season, the water table is lowered, and some areas may become dry from reduced rainfall. Previous investigations in the area indicate that in winter the Superficial Aquifer may be connected to creeks, indicating that surface-water groundwater interactions may be ephemeral and seasonally influenced, although this has not been verified by this Assessment. It is unlikely that the deeper Leederville Aquifer is in direct connection to ephemeral surface water features in the Study Area. Registered groundwater pumping occurs within and surrounding the Study Area and is used primarily for irrigation.

Groundwater levels in the Superficial Aquifer and the Leederville Aquifer are strongly correlated to rainfall and are shallowest in winter. Continuous monitoring at the Study Area by Stantec indicated the water table fluctuated between March 2024 and September 2024 by approximately 2 m in both aquifer systems. Groundwater flow in both the Superficial and Leederville Aquifer was inferred to flow in a southward direction (southwest in the western Study Area and southeast in the southeastern Study Area).

The Superficial Aquifer and Leederville Aquifer are classified as freshwater, with total dissolved solids (TDS) typically less than 500 mg/L. The pH ranges from acidic to neutral, with elevated turbidity, copper, iron and manganese in both aquifer systems, while the Superficial Aquifer is also characterised by elevated aluminium and nitrogen concentrations.

Surface Water Assessment

Preliminary flood modelling comprised two-dimensional hydraulic modelling for the 50%, 20%, 10%, 5% and 1% Annual Exceedance Probability (AEP) existing climate scenario and 1% AEP climate change high emissions scenario flood events. Surface water modelling was undertaken to characterise the hydrological regime of formalised flow paths and areas of inundation in frequent to extreme rainfall events. The frequent flow regimes such as the 50% AEP demonstrate a minor extent of inundation with only a small number of defined flow paths discharging from the Study Area. The average flow depth is less than 100 mm across the Study Area in frequent flows, with approximately 100 mm conveyed along the defined flow paths.

Peak flow rates at the outlets during frequent flow regimes (50% AEP) and rare event regimes (1% AEP) range from 0.5 m³/s to ~20 m³/s, respectively and the maximum discharge rate of ~20 m^3/s in the 1% AEP from the Study Area is south to the Scott River. In addition, during a 50% AEP event maximum ponding depth of ~1.2 m occurred near the south-western boundary of the Study Area. Most areas of inundation with depths greater than 0.5 m in the frequent events (~50% AEP) occur upstream of roads acting as hydraulic controls with some ponding in areas with the appearance of wetlands or perched ponds. There are only a small number of defined flow paths discharging from the Study Area with flow rates of up to 0.5 m^3/s in the 50% AEP event.

The rare (1% and 2% AEP) flow regimes demonstrate a widespread level of inundation with all headwater catchments, other than one sub-catchment in the north-east, showing distinctive flow paths to discharge locations outside of the Study Area. The maximum ponding depth of ~2.8 m occurs in the forested northern-most sub-catchment in the Study Area. The second deepest ponding occurs at ~2.3 m in the same location to the 50% AEP near the south-western boundary of the Study Area. Several areas of inundation in the rare (1% and 2% AEP) events exceed 0.5 m in depth across the Study Area, including behind roads acting as hydraulic controls and in areas with the appearance of wetlands or perched ponds. All headwater catchments other than one in the north-east show distinctive rare event flow paths to the discharge locations outside of the Study Area. The maximum 1% AEP discharge rate of ~20 m^3/s from the Study Area is south to the Scott River.

Preliminary Dewatering Assessment

A hydrogeological conceptual model was developed using available data and investigations from the Study Area and surrounds. The model applied several zones to the Study Area, based on likely aquifer characterisation; Zone 1 (bore group WM01) comprising mostly sandy clay, Zone 2 (all other locations) consisting of predominantly sand, and a transition zone, assigned as an arbitrary boundary between the two zones. Preliminary construction dewatering steady-state modelling estimated the following distances to the 0.5 m and 1 m drawdown contours for the targeted dewatering levels for infrastructure components:

- Zone 1 Turbines: approximately 43 m (0.5 m contour) and 31 m (1.0 m contour).
- Zone 2 Turbines: approximately 117 m (0.5 m contour) and 60 m (1.0 m contour).
- Meteorological tower: approximately 86 m (0.5 m contour) and 34 m (1.0 m contour).

Initial pumping rates to attain the target drawdown after five days of pumping ranged between 1,525 m^3/d (Zone 2 meteorological tower) and 2,295 m^3/d (zone 2 turbines). Initial dewatering in zone 1 (turbines) was likely to be similar to the steady-state rate (average approximately 75 m^3/day). To maintain target drawdown, daily pumping rates in Zone 2 ranged between approximately 296 m^3/d (meteorological tower) and 2,058 m^3/d (turbines).

These predicted pumping rates assumed that no management structures were used to reduce lateral inflow. Based on the current predicted inflow model estimate for Zone 2, a water licence may be required due to the approximate steady-state in-flow volume taken, per excavation, and that the pumping rate may require higher than 10 L/s pumping rate over a period of more than 30 consecutive days.

Sensitive Receptors, Risk and Mitigation

The Assessment identified several potentially sensitive ecological (groundwater dependent ecosystems; GDEs) and social receptors that may be impacted by dewatering and excavation during construction. Key impacts from the development of the Proposal include changes to the hydrological regime and flow patterns, contamination of surface water and groundwater, sedimentation and erosion of surface environments, ASS exposure and runoff, and potential interactive effects associated with the acid groundwater plume from the closed Beenup Titanium Mine.

The preliminary risk assessment indicated that following mitigation the risk to hydrology is negligible. Inherent risk rankings of moderate were associated with potential impacts on GDEs from drawdown, exposure and drainage of ASS, and contamination, which were reduced to low following the implementation of mitigation measures including a shallow foundation design and reduced dewatering depth, civil works to be conducted during the dry season, where practicable, with adherence to specific measures in the ASSDMP and CEMP. The temporary and spatially constrained nature of the construction activities will also limit potential impacts to GDEs. Some data gata gaps remain in relation to the Proposal, and the risk assessment may require revision as additional information becomes available.

Abbreviations & Definitions

Abbreviation	Term
1D	One dimensional
2D	Two dimensional
AEP	Annual Exceedance Probability: *The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. A 1% AEP flood event has a 1% chance of occurring in any one year. The conversion from annual recurrence interval (ARI) to AEP is shown below:* *ARI (years) – equivalent AEP (%)* *1 yr ARI – 63% AEP* *5 yr ARI – 18% AEP* *20 yr ARI – 5% AEP* *100 yr ARI – 1% AEP* *2 yr ARI – 39% AEP* *10 yr ARI – 10% AEP* *50 yr ARI – 2% AEP*
AHD	Australian Height Datum, generally equivalent to metres above mean sea-level
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	Annual Recurrence Interval *(see AEP)*
ARR 2019	Australian Rainfall and Runoff 2019: *With the release of ARR 2019, ARR 2016 was superseded (with ARR 1987 becoming superseded with the release of ARR 2016).*
BoM	Bureau of Meteorology
DEM	Digital Elevation Model
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority (Western Australia)
ESA	Environmentally Sensitive Area
GDE	Groundwater-dependent ecosystem
IFD	Intensity, Frequency, Duration
IFM	Index Flood Method: *Used in many locations across Western Australia with the assumption of homogeneous regions. It is important to note that most of the regressions for the runoff coefficient for the Index Flood Method are based on 2- or 5-year ARI flood data.*
LiDAR	Light detection and ranging data: *A remote sensing technology that uses laser light to sample the surface of the earth's surface to produce point cloud datasets that are able to be visualized, shared and used as an input to flood modelling*.
LBLCDC	Lower Blackwood Land Conservation District Committee
LOR	Limit of Reporting
mbgl	metres below ground level
mbTOC	metres below top of casing
ORP	Oxidation-Reduction Potential
RCP	Representative Concentration Pathway
RFFE	Regional Flood Frequency Estimation: *Uses a data-driven approach, which attempts to transfer flood characteristics from a group of gauged catchments to ungauged locations of interest.*
RL	Relative Level (typically equivalent to AHD)
ROG	rain-on-grid
RRM	Regional Rational Method: *Uses a probabilistic or statistical method for estimating the design peak flow by incorporating a runoff coefficient, catchment characteristics, and an average rainfall intensity of the same ARI derived from the IFD design curves for any location in Australia as described in ARR1987 Book 2 Section 1. Section 1.4.7 of ARR1987 Book 4 suggests that the Rational Method for the South-West Region of Western Australia is applicable for loamy soils with the runoff coefficient for ARI of 10 years (C_{10}) as the index variable.*
SILO	Scientific Information for Landowners
Study Area	The Study Area for this assessment is limited to the proposed development footprint of the wind farm. It does not include any areas associated with transportation or supporting infrastructure.
SWL	Standing water level

SWRWQA	Statewide River Water Quality Assessment
TUFLOW HPC Model	1D/2D Heavily Parallelised Compute (HPC) Hydraulic Model: *Generates gridded flood results from a complex model consisting of hydrological inflows, boundary conditions, hydraulic controls, 2D surface levels (from LiDAR, survey and design plans) and 1D network elements*.
WQIP	Water Quality Improvement Plan
WSE	Water Surface Elevation (m AHD)

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Appendix J Mitigation Measures and Proposal Specifications

1 Introduction

1.1 Assessment Scope and Objective

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) engaged Stantec Australia Pty Ltd (Stantec) to support the environmental approvals and planning for a proposed 100 MW wind farm in the locality of Scott River (the Proposal), approximately 15 km north-east of Augusta in the Margaret River region of Western Australia (Figure 1-1). The following scope of works has been completed or is near completion:

1. Aquatic Ecology Assessment (Appendix A).
2. Surface Water Assessment.
3. Hydrogeological Assessment.
4. Groundwater and Surface Water Monitoring.

This report addresses items 2 and 3, comprising the Surface Water and Hydrogeological Assessment (the Assessment) for the Study Area (Figure 1-1). Item 4 has been provided to SynergyRED as a separate deliverable. The objective of the Assessment was to provide surface water and hydrogeological conceptualisation of the location of the Proposal, to inform optimisation of infrastructure, while minimising impacts to the existing hydrological regime. To support the objective the following tasks were undertaken:

- Surface Water Assessment – flood characterisation assessment and modelling to identify inundation areas to inform the placement of Proposal infrastructure to mitigate impacts on surface flow post-development.
- Hydrogeological Assessment – characterisation of hydrogeology and modelling to predict potential changes in groundwater levels and drawdown extent across the Study Area, with the provision of constraints mapping to inform infrastructure layout in relation to potentially sensitive environmental receptors.
- Preliminary Risk Assessment – providing an understanding of key risks associated with the Assessment and indicating preliminary mitigation measures to prevent impacts to sensitive environmental receptors, focusing on groundwater dependent ecosystems.

1.2 Proposal Description

The Proposal is anticipated to involve construction and operation of up to 20 wind turbine generators, each of which will be up to 250 metres (m) in height. As the Proposal is in its early stages of planning and approvals, the location of infrastructure is yet to be finalised. The indicative infrastructure layout, including the turbine configuration is shown in Figure 1-2. Works required for the Proposal are expected to include:

1. Concrete foundations for turbine, transmission points (towers and poles), and meteorological (met) towers.
2. Construction and operation of a concrete batching plant during construction.
3. Construction of two meteorological towers.
4. Construction of crane hardstand area at each turbine location.
5. Buried electrical cables connecting each turbine to wind farm substation(s).
6. Access roads from public road to wind farm substation, turbines and other infrastructure.
7. Construction and installation of electrical substation(s) and switchyard.
8. Construction of operations and maintenance building and workshop.
9. Construction and installation of transmission poles or towers and connecting power lines from substation to the Western Power electricity network.
10. Construction of gravel borrow pits, and extraction of associated material.
11. Temporary construction laydown areas.
12. Temporary (short-term) dewatering to ensure safe, dry conditions during construction of concrete foundations for infrastructure.
13. Excess dewater is expected to be discharged to infiltration basins and/or used during construction (e.g., dust suppression or concrete batching, where appropriate).
14. Water for construction activities and associated infrastructure will be sourced and transported to site (i.e., no installation of water abstraction bores proposed), and/or utilise construction dewater (where appropriate).

1.3 Study Area

The Study Area (Figure 1-1) for the Proposal occupies an area of approximately 4000 hectares (ha) and comprises agricultural properties bound by Dennis Road to the east and Scott River Road to the west. The northern end is bordered by a fence line approximately 1.5 km south of the Brockman Highway, and the southern boundary extends approximately 1.5 km south of Governor Broome Road. The Study Area is zoned as general agriculture with conservation areas of remnant vegetation, and neighbours the historical rehabilitated BHP Beenup Titanium Mine. There are several plantations within the Study Area which are also zoned as general agriculture.

The Study Area is split between two main catchment areas with the Blackwood River catchment covering the west and north of the Study Area, and the Scott River catchment covering the east and south of the Study Area (Figure 1-2; Section 3.3.3). An area of 13.7 km² (43%) of the Study Area drains into the Blackwood River, while 18.3 km² (57%) of the Study Area drains into the Scott River.

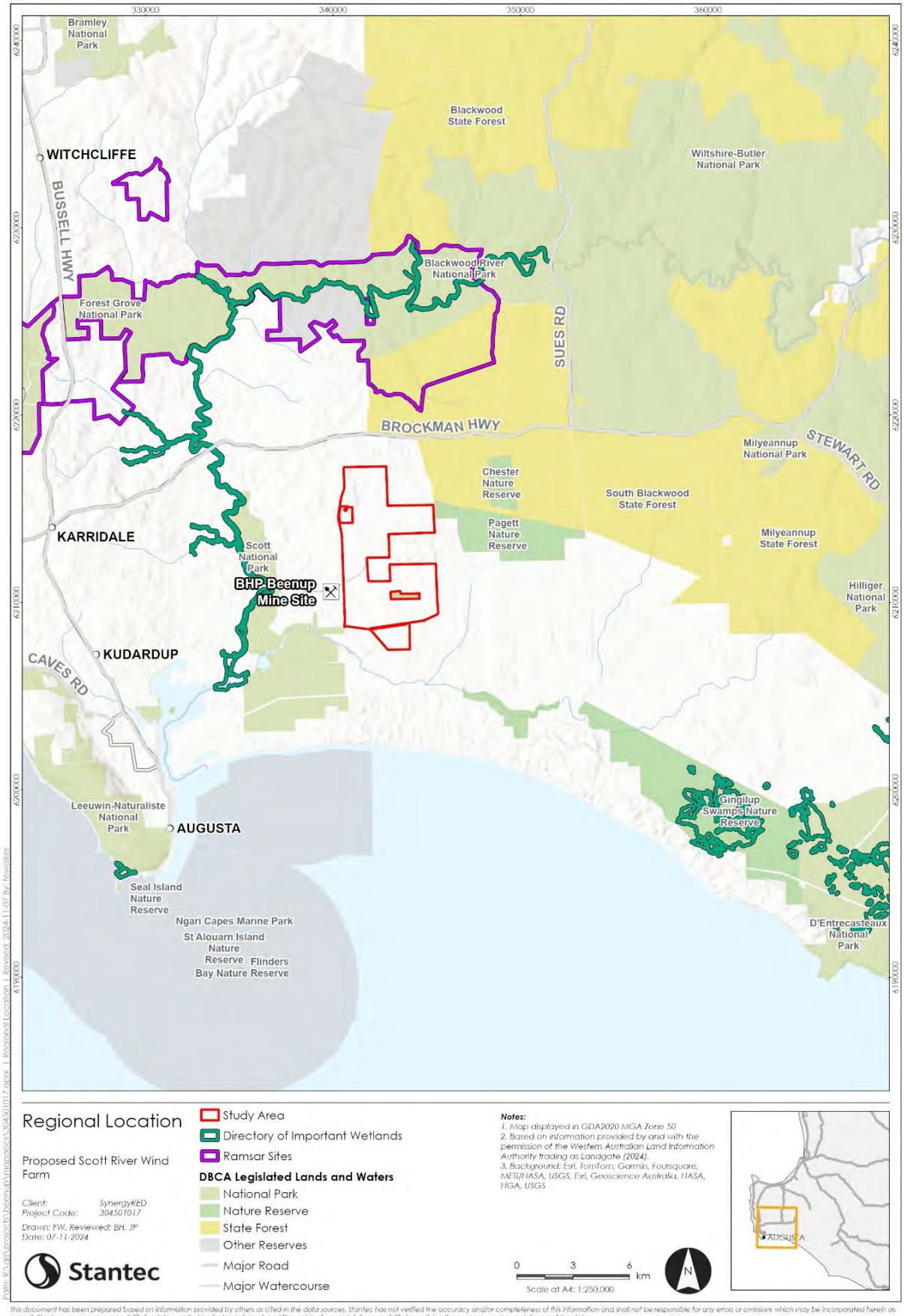

Figure 1-1: Location of the Proposal, showing the Study Area, in the southwest region of Western Australia.

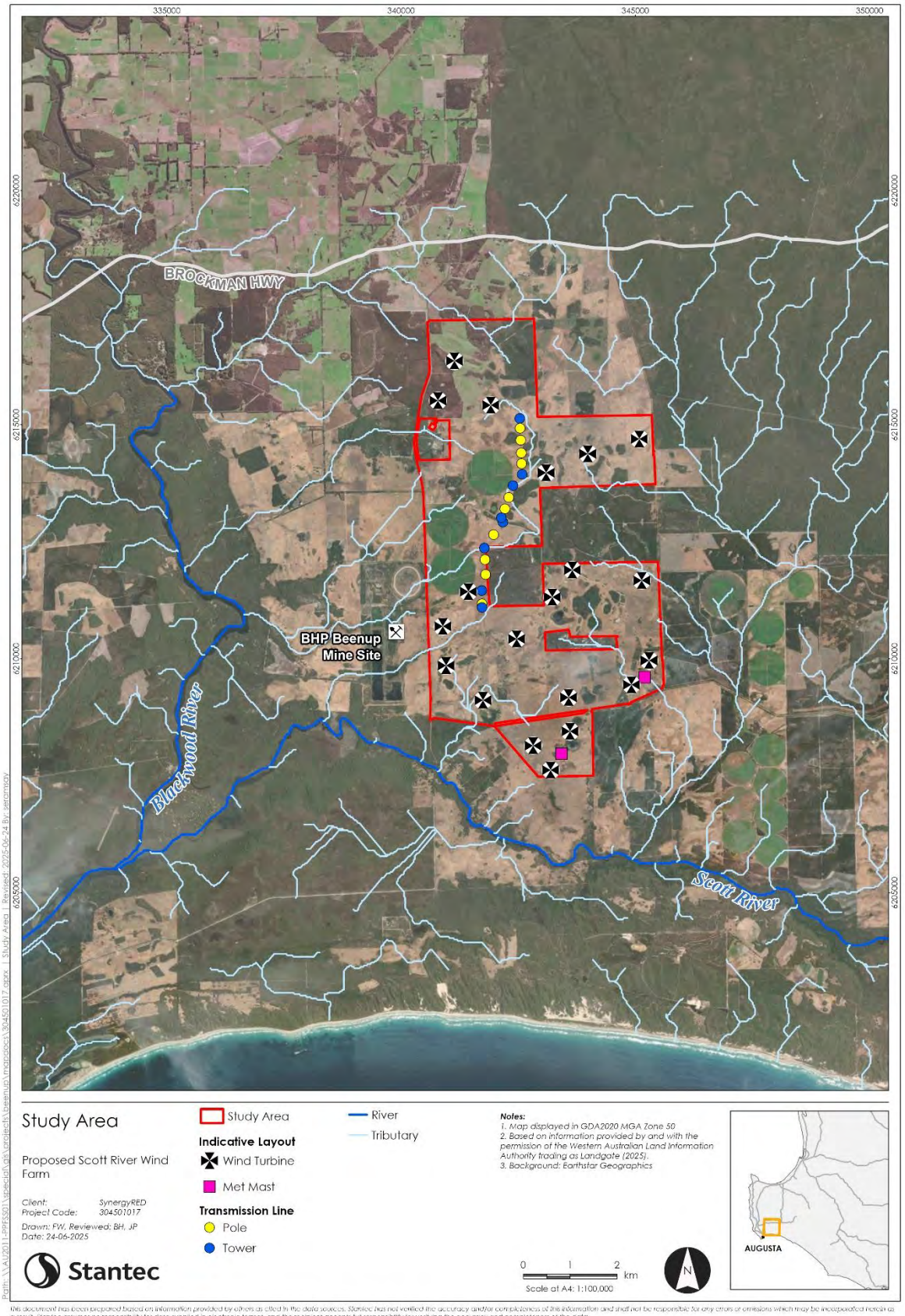

Figure 1-2: Study Area and indicative layout for the Proposal.

1.4 Regulatory Setting and Consultation

The Assessment has been undertaken in alignment with relevant legislation and guidance (Table 1-1) and prepared to a standard suitable for submission to the Department of Water and Environmental Regulation (DWER) and the Environmental Protection Authority (EPA) as part of the initial Referral and for planning purposes via Development Approval Application. Specific to the Proposal, applicable legislation and guidance is focussed on maintaining surface water and groundwater regimes to protect environmental values, including sensitive areas, conservation significant species and groundwater-dependent ecosystems (GDEs).

SynergyRED, assisted by Stantec, liaised with DWER and the Lower Blackwood Land Conservation District Committee (LBLCDC) to request existing groundwater and water quality studies for the Blackwood and Scott River catchments for review. Additional information was also provided by BHP for the rehabilitation of the historic Beenup Titanium Mine, closed in 1999. This was generally related to the historical surface and groundwater monitoring conducted for closure approvals.

Table 1-1: Relevant Western Australian legislation and guidance for the Proposal

Legislation and Guidance	Relevant Legislative Requirements
Biodiversity Conservation Act 2016	• Purpose: to provide greater protection for biodiversity, particularly threatened species and threatened ecological communities
Environmental Protection Act 1986	• Purpose: prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing
Statement of environmental principles, factors, objectives and aims of EIA (EPA 2023)	• Objective: EPA to use best endeavours to protect the environment and to prevent, control and abate pollution and environmental harm • Principles: Precautionary, intergenerational equity, conservation of biological diversity and ecological integrity • Factors: Inland Waters, Flora and Vegetation, Terrestrial Fauna, Terrestrial Environmental Quality
Environmental Factor Guideline – Inland Waters (EPA 2018)	• Objective: To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected • Impacts: dewatering and disposal, construction of water off-takes, modification of drainage, impacts to waterways, wetlands or water quality/quantity, exposure of acid sulfate soils (ASS) and runoff • Waterbodies: conservation significant wetlands or waterways, wild rivers, springs/pools, ecosystems supporting significant species, GDEs.
Environmental Factor Guideline – Flora and Vegetation (EPA 2016a)	• Objective: To protect flora and vegetation so that biological diversity and ecological integrity are maintained. • Impacts: altered hydrology, including increase or decrease of groundwater level and alteration of surface water flow. • Flora: Locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater)
Environmental Factor Guideline – Terrestrial Fauna (EPA 2016b)	• Objective: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained • Impacts: pollution or modification of water quality and water regimes • Fauna: threatened or priority species, restricted species
Environmental Factor Guideline – Terrestrial Environmental Quality (EPA 2016c)	• Objective: To maintain the quality of land and soils so that environmental values are protected • Impacts: clearing in areas prone to erosion and salinisation, disturbance of ASS, land use causing soil contamination
Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER 2015)	• Purpose: to provide technical and procedural advice to avoid environmental harm and to assist in achieving best practice environmental management in areas underlain by ASS
Operational Policy No. 5.12 – Hydrogeological Reporting Associated	• Purpose: to facilitate the assessment of groundwater licence applications for the grant, amendment or transfer of a licence to

Legislation and Guidance	Relevant Legislative Requirements
With A Groundwater Well License (DoW 2009a)	take groundwater and assessment of monitoring results to comply with licence conditions
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)	• Purpose: to provide authoritative guidance on the management of water quality for natural and semi-natural water resources in Australia and New Zealand
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Australia 2021)	• Purpose: to expand upon, and refine, the ANZECC & ARMCANZ (2000) guidelines by providing an updated and expanded Water Quality Management Framework, guidance on its application, development of conceptual models, an outline of the weight-of-evidence process, provision of new and revised toxicant default guideline values and associated methods, new physical and chemical stressor guidance and default guidelines values for more regions, and improved information and guidance for cultural and spiritual values
Guideline: Assessment and management of contaminated sites (DWER 2021)	• Purpose: to provide guidance on the assessment and management of contaminated sites in Western Australia

2 Background Studies

Relevant surface water and hydrogeological studies were reviewed to gain insight into the hydrological conditions, and groundwater and geological categorisation of the Study Area and surrounds, in relation to potentially sensitive human and environmental receptors. Key assessment items are summarised in Table 2-1 below.

Table 2-1: Surface water, hydrogeology and other studies reviewed for the Assessment.

<table>
<tr><th>Investigation</th><th>Key Assessment Items</th></tr>
<tr><td>Lower Blackwood River and Scott River Flood Study (Water Authority of Western Australia 1992)</td><td>

The Lower Blackwood River and Scott River Flood Study was undertaken by the Water Authority of Western Australia (now Water Corporation) in 1992. The report presents the design flood estimation of the lower Blackwood and Scott Rivers for catchment areas of 1390 km² and 550 km², respectively.
The rainfall-runoff routing RORB model used 1987 Australian Rainfall and Runoff methodologies to conduct flood frequency analysis. The RORB model used data in stream gauges in Scott River (Brennans Ford) and lower Blackwood River (Hut Pool and Darradup).
The RORB model results for the Scott River at Brennans Ford provides the peak design flow for the 100-year, 20-year, and 10-year events of 120 m³/s, 68 m³/s, and 55 m³/s, respectively. The critical duration for the 100-year event in the Scott River catchment is 3 days.
The study also provided a Region Rational Method (RRM) and Index Flood Method (IFM) as validation of the RORB model results as provided in below table below for the Scott River.
The RORB model results for the Scott River at Brennans Ford provides the peak design flow for the 100-year, 20-year, and 10-year events of 120 m³/s, 68 m³/s, and 55 m³/s, respectively. The critical duration for the 100-year event in the Scott River catchment is 3 days.
The Blackwood River peak flow was 1200 m³/s based on the 100-year event. The critical duration for this peak flow is 4 days.
The study focused on providing flow estimates which are located downstream of the Study Area. The study also excluded flood extent and velocity data. Therefore, the study cannot be directly used to ascertain existing surface water flow path extents, peak flows, and velocities for the headwater catchments within the Study Area.
The study may be used as validation for regional flows in future studies if deemed appropriate yet remains outside the scope of this assessment.

<table>
<tr><th colspan="2">ARI (years)</th><th>2</th><th>5</th><th>10</th><th>20</th><th>50</th><th>100</th></tr>
<tr><td rowspan="3">Peak Flow (m³/s)</td><td>RRM*</td><td>18.8</td><td>20.9</td><td>25.7</td><td>-</td><td>41.4</td><td>-</td></tr>
<tr><td>IFM**</td><td>21.9</td><td>33.2</td><td>43.7</td><td>-</td><td>76.9</td><td>-</td></tr>
<tr><td>RORB</td><td>-</td><td>-</td><td>55</td><td>68</td><td>-</td><td>120</td></tr>
</table>
Note: * = Regional Rational Method (RRM) and ** = Index Flood Method (IFM).
</td></tr>
<tr><td>Scott River Action Plan (LBLCDC 2020)</td><td>

The Scott River Action Plan was prepared by the LBLCDC in December 2020. The report identified the Scott River catchment as an important and productive agricultural area (43%), with the remaining area comprising of reserves (53%) and unallocated crown land, rich in biodiversity. Water quality data was collected and analysed in the study to provide an indication of the Scott River catchment condition.
Approximately 90% of the waterways assessed (~120 km of a total of 185 km of waterways) were rated as degraded or severely degraded due to the absence or limited vegetation cover in the riparian zones, significant bank erosion, and weed infestations. Heavy metal and acid forming potential analysis.
The sub-catchments with waterways in better conditions were the Middle Scott Lower Reaches and the Lower Scott River. The Proposal Study Area is within the Lower Scott River sub-catchment area.
Most minor waterways and tributaries assessed have lost much of the endemic flora and fauna. These findings match those of DWER Healthy Rivers Program which

</td></tr>
</table>

Investigation	Key Assessment Items
	consists of detailed waterway assessments (using a different methodology) at key locations in the catchment. • A few properties have patches of native bush of high biodiversity value, but these are not always fenced off to exclude stock. • Several widespread weeds were recorded. Two declared species (Apple of Sodom and Cape Tulip) and some woody weeds. No Arum lily or Blackberry (Rubus fruticosus) were recorded in the catchment. • The biodiversity in the main channel is in good condition in terms of the number and diversity of flora and fauna species although there are signs of stress associated with upstream nutrient runoff along some sections. • A variety of natural and augmented natural drainage systems traverse the Scott River Catchment mainly from north to south that convey streamflow from the forested Barlee Scarp to the river. Drains have not been built in a coordinated way in the catchment but in response to land use needs and the most prolific drainage seems to be associated with plantation establishment. • The study will be used to assist with identification of existing environment conditions, as discussed throughout this report.
Healthy Estuaries Program (DWER 2005-2019) Healthy Rivers Program (DWER 2005-2019) Hardy Inlet: Blackwood catchment - nutrient report, 2019 (DWER 2023a) Hardy Inlet: Scott catchment - nutrient report, 2019 (DWER 2023b)	• The DWER Healthy Rivers and Estuaries Programs were designed to target known pressures and associated stressors in the Western Australian river and estuarine systems and to enable the detection of new issues. Some common threats to the waterways include altered flow regimes due to changing climate and anthropological factors, reduced catchment and streamside vegetation, invasion of exotic species, degradation of aquatic habitat, poor water quality (particularly eutrophication, secondary salinisation, low dissolved oxygen and contaminants) and barriers to movement of aquatic fauna. Baseline quality of groundwater aquifers at the mine (Warren Sands and Beenup Beds) • There are five surface water sampling sites in the region as part of the DWER Healthy Rivers program: • 6091051 Scott River – Brennans Bridge • 6091224 Scott River Trib – Coonack Downs • 6091225 Scott River Tributary – Governor Broome Rd • 6091226 Scott River Trib – Woodhouse • 6091309 Paynes Rd (Blackwood River Catchment) • Several nutrient reports were published in 2017-2019 as part of the Healthy Estuaries program for monitoring completed from 2005, including the most recent Beenup (Blackwood Catchment) and Lower Scott River Catchment Hardy Inlet Nutrient Reports in 2019. The sampling sites are illustrated in Figure 3-7.
Baseline Water Monitoring Program (Stantec, unpublished data)	• Surface water discharge points are ephemeral, with flow observed primarily following rainfall events. Sampling was feasible during the July, September, and January campaigns. • Wetlands showed more consistent water levels throughout the year, while Creekline discharge points remained dry during extended dry periods due to limited catchment sizes. • Groundwater levels showed strong correlation with rainfall, rising in wet and shoulder wet seasons and declining by up to 2.0 m during dry periods. • The Leederville Aquifer exhibited the highest groundwater levels in the northern portion of the Study Area (WM01), indicating a general southward flow direction. • Seasonal groundwater fluctuations were observed across the aquifers: - WM01 cluster: ~2.0 m - WM02 location: ~1.2 m - WM03 location: ~1.7 m Water Quality

Investigation	Key Assessment Items
	• Pesticide analyses in groundwater (April 2024) and surface water (July 2024) detected no contaminants above laboratory reporting limits. • Groundwater was generally fresh but mildly acidic, with an average pH of 6.0—below the Department of Health's trigger value for non-potable use (6.5). No clear seasonal trends in pH were observed. • Elevated concentrations of naturally occurring heavy metals (iron, aluminum, copper, manganese, and zinc) were detected in groundwater. • Surface water showed elevated nutrient levels—particularly nitrogen and phosphate—likely influenced by nearby agricultural land use. The details are discussed in detail in Section 4.7.
Scott Coastal Plain Bore Completion Reports, Volume 1 – sites 1 to 10. Hydrogeology Report 1995/35 (Baddock 1992)	• Conceptualisation of the regional hydrogeological landscape. • Bore completion reports for 22 sites (volume 1 and 2). • Bores relevant to the Study Area include SC5 (southwest Study Area boundary), SC9 (southeast Study Area boundary) and SC15 (western Study Area boundary).
Beenup Titanium Minerals Project: Annual Environment Report, 1996 (BHP 1996) Beenup Titanium Minerals Project: Annual Environment Report, 1997 (BHP 1997)	• Geotechnical investigations including drilling air-cores associated with the dredge mine path. • Heavy metal and acid forming potential analysis. • Geophysics surveys including seismic surveys, echo-sounding, acoustic surveys and wireline logging.
Beenup Titanium Minerals: Baseline Monitoring Report, 1998 (BHP 1998a)	• Incomplete report version – missing end pages. • Baseline quality of surface waters near the mine. • Baseline quality of groundwater aquifers at the mine (Warren Sands and Beenup Beds).
Beenup Titanium Minerals Project: Monitoring Bore Completion Report, November 1998 (BHP 1998b)	• Bore completion reports for monitoring bores 1 to 58; 109 to 117 and 128 to 138. • Description of the local geology and hydrogeological regime. • Reported groundwater bores relevant to the Study Area are DM22LB (lower Beenup), DM23UB (upper Beenup), DM28LB, DM29WS (Warren sands), B01LB, B02UB, B03WS, B04WS, B05WS, B06WS, B07WS, B08WS, B09WS, MDS137 and MDS138. These are located northeast, east or southeast of the mine operation area.
Hydrogeology Report No. HR 166 (Water and Rivers Commission 2000)	• Conceptualisation of the regional hydrogeological landscape. • Installation of 44 monitoring bores (up to 18 m deep) and three test pumping bores (with six observation bores) across nine sites. • Details local hydrogeology, relevant aquifer descriptions and geochemical parameters. • Bores relevant to the Study Area include SM41, SM42 and SM43 (southeast Study Area boundary) and SM44, SM45 and SM46 (southwest Study Area boundary).
SouthWest Groundwater Areas Allocation Plan (DoW 2009b)	• Detailing underlying geology to the SouthWest region. • Identifying major and minor potential aquifers within the region. • Adverse effects that climate change has had on the groundwater. • Analytical assessment of groundwater parameters and contamination related to mining activity. • Hydrological and hydrogeological surveys. • Groundwater-dependent ecosystems and key environmental values. • Groundwater-dependent cultural and social values.

Investigation	Key Assessment Items
Blackwood groundwater area subarea reference sheets: Plan companion for the SouthWest groundwater areas allocation plan (DoW 2009c)	• The Study Area intersects the Beenup Groundwater Management Subarea and the Blackwood Groundwater Management Area, Beenup Subarea of the South-West Groundwater Allocation Plan (Blackwood GMA Beenup Subarea). • It also intersects with Groundwater Management Zone 7 which is defined as a "buffer zone area defined by acid sulfate soil plume from Beenup mine site" (DoW 2009c). • As a consequence of the implementation of Groundwater Management Zone 7, water use from the Superficial, Leederville and Lesueur aquifers is restricted, meaning that no new water allocation and no new bores or excavations are permitted to be constructed in the Superficial or Leederville aquifers, within the management zone boundary, other than for exempt use, replacement of existing bores, monitoring purposes, or remediation (DoW 2009c).
Scott Coastal Plain: Bore Completion Report (DoW 2011)	• Provides a hydrogeological characterisation and understanding of groundwater-dependent ecosystems of the Scott Coastal Plain. • Bore completion details of shallow groundwater bores. The closest bores to the Study Area were EW17A, EW17B and EW18A (associated with Palusplain wetlands).
Beenup Titanium Minerals Project: Annual Environment Report (BHP 2015)	• Summary of the site conditions and contamination status. • Hydrographs for long term bore monitoring. • Bore construction and lithological logs.
Geotechnical Desktop Report (Stantec 2024a)	• Preliminary site setting and landscape characterisation of the Study Area. • Preliminary ASS assessment. • Recommendations for future sampling and analysis.
Preliminary Geotechnical and Baseline Contamination Report (Stantec 2024c)	• Installation of 3 geotechnical boreholes (piezometers) (WM01, WM02 and WM03) to 25 metres below ground level (mbgl). • 13 shallow piezometers installed up to 7 mbgl, in locations near the three deep piezometers. • 20 test pits were excavated across the Site at specific locations, each to a maximum depth of 2.0 m BGL or until refusal, soil sampling (including ASS sampling) occurring every 0.25m BGL.
Biological Surveys and Wetland Mapping for the Proposed Scott River Wind Farm (Phoenix in prep.-b)	• A Basic fauna survey was undertaken within the Study Area, indicating species of conservation significance. • Wetland boundaries were mapped within the Study Area and their classification and management category were determined on the basis of their biological values, in accordance with the biological attributes.
Detailed Flora and Vegetation Survey for the Proposed Scott River Wind Farm (Phoenix in prep.-a)	• A single season detailed flora and vegetation survey with targeted searches for threatened flora as well as introduced flora was undertaken in spring 2023. • Potential groundwater-dependent flora, vegetation and/or ecosystems were recorded where present.

3 Existing Environment

3.1 Biogeographical Context and Land Systems

The Study Area is located within the Warren (WAR) bioregion and the Southern Jarrah Forest subregion (Jarrah Forest 2; JF2) of Western Australia (Figure 3-4), as defined by the Interim Biogeographic Regionalisation for Australia (IBRA) classification system (Thackway and Cresswall 1995). The IBRA classification system represents a landscape-based approach to classifying the land surface of Australia, delineated by a unifying set of environmental influences which has influences the occurrence of flora and fauna and their interaction with the physical environment (e.g. climate, geomorphology, landforms and lithology (DSEWPaC 2012).

Land systems are defined as an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation (Tille 2006). Land resources of the Busselton-Margaret River-Augusta- region have been mapped by the Natural Resources Assessment Group (NRAG) from the Department of Primary Industries and Regional Development (formerly the Department of Agriculture and Food; DAFWA), which provides a description of biophysical resources across each region (Tille and Lantzke 1988). The Study Area lies predominantly within the Scott River Plain land system (3,178 ha) and intersects the Nillup Plain land system (15.6 ha) (Table 3-1, Figure 3-5).

Table 3-1: Land systems and extent within the Study Area.

Land System	Description	Proportion
Nillup Plain System (Np)	Poorly drained plain, in the southern Donnybrook Sunkland. Sandy gravel, non-saline wet soil, grey deep sandy duplex, loamy gravel and pale deep sands. Jarrah-marri-paperbark woodland.	15.6 ha
Scott River Plain System (Sr)	Poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and jarrah-marri-paperbark woodland.	3,178.5 ha

3.2 Climate

3.2.1 Rainfall

The climate of the Study Area is described as moderate Mediterranean, with mild wet winters and hot summers. The Bureau of Meteorology (BoM) weather stations closest to the Study Area are Warner Glen (Station ID 009613), Alexandra Bridge (Station ID 009801), and Cape Leeuwin (Station ID 009518). A single Department of Water, Environment, and Regulation (DWER) rainfall station is located at Scott River – Brennans Ford (Station ID 509199). The Study Area is located approximately 7 km southeast from Warner Glen, 9 km southeast from Alexandra Bridge and 23 km northeast from Cape Leeuwin. Rainfall gauge locations are shown in Figure 3-7. The Scott River station is most representative of the climate conditions at the Study Area. Cape Leeuwin also provides ambient temperature readings otherwise unavailable at the other stations.

A review of all relevant stations is provided for context.

- Scott River – Brennans Ford (509199)
  - The average annual rainfall recorded at the DWER rainfall station is 953.2 mm comparative to the ten-year average of 934 mm. In 2023, the annual rainfall was 845 mm, which is below the ten-year average but exceedingly higher than that recorded at Cape Leeuwin.
- Warner Glen (Station ID 009613)
  - The ten-year annual average rainfall at Warner Glen is 958.7 mm (BoM 2024). Over the last 10 years, at Warner Glen, annual rainfall has been below the long-term annual average of 999.3 mm, with 762.4 mm in 2015, 767.8 mm in 2019 and 839.7 mm in 2023. The year 2021 was a “wet year” exception in the last 10 years, with 1221.8 mm recorded compared to the long-term average. Peak rainfall occurred in 2013 with a total of 1256 mm.
- Alexander Bridge (Station ID 009801)
  - Between 2013 and 2023, the annual average rainfall at Alexandra Bridge was 895.3 mm, below the long-term average of 1073.2 mm. In July 2013, the maximum rainfall reached 279.8 mm, which accounted for 20% of the annual total of 1333 mm. Notably, both 2013 and 2021 experienced above-average annual rainfall, with 1333 mm and 1292 mm, respectively.

- Cape Leeuwin (Station ID 009518)
    - The Cape Leeuwin rainfall and temperature gauge indicates an average annual rainfall of 770.8 mm from 2013 to 2023 relative to the long-term average of 950.4 mm. In 2023, the annual rainfall was 599.8 mm, which is below the ten-year average.
    - Cape Leeuwin records the highest mean maximum monthly temperature (25.5°C) in February and the lowest minimum mean monthly temperature (18°C) in July. The average monthly rainfall against temperature ranges at Cape Leeuwin from 2011 to 2023 is shown in Figure 3-1.

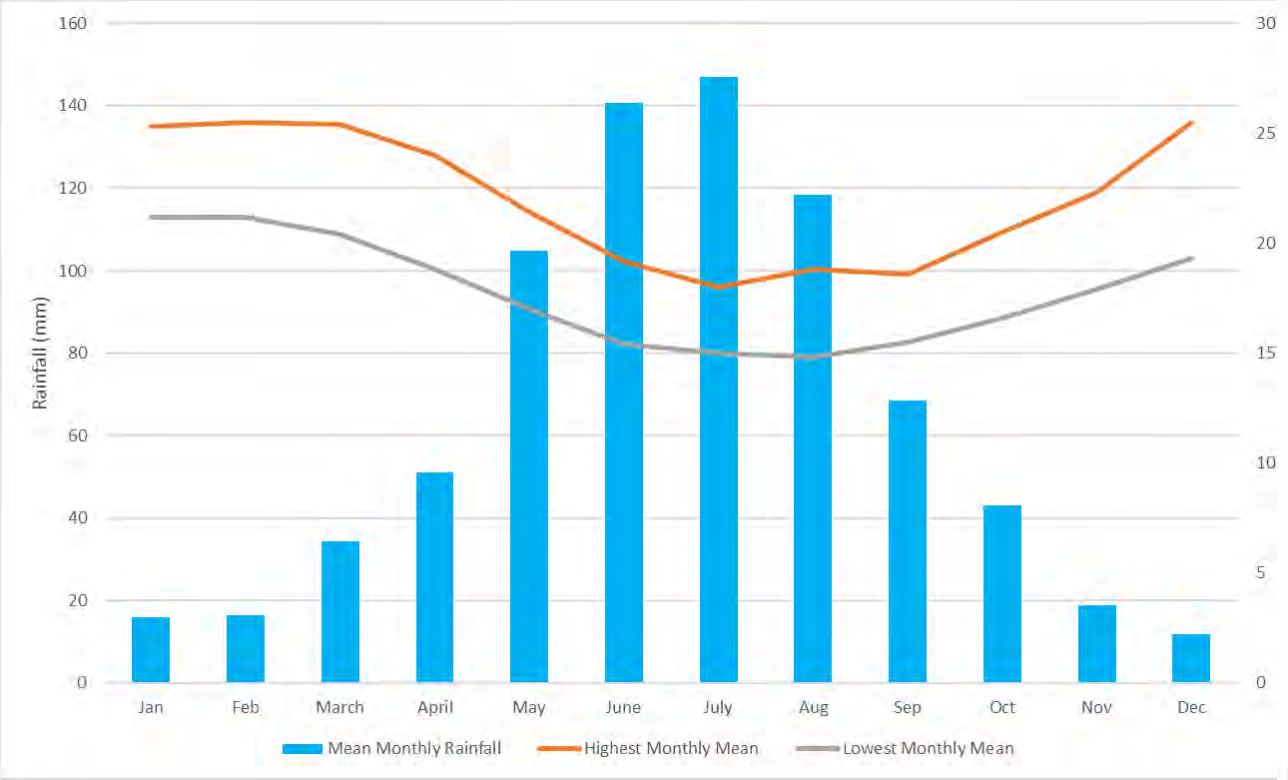

Figure 3-1: Monthly mean rainfall and mean maximum and minimum temperature at Cape Leeuwin (BoM Station ID 9518).

3.2.2 Scientific Information for Landowners (SILO) Data

The Scientific Information for Landowners (SILO) has grided evaporation across Australia, this assessment has extracted evaporation data available for (-34.25,115.30) the southern portion of the Study Area. For the long-term period from 2010 to 2023, the annual average pan evaporation is estimated as 1452 mm, with the annual average rainfall estimated as 932 mm. This shows a deficit between annual average rainfall and pan evaporation.

The long-term annual total rainfall and evaporation between 2010 to 2023 for the Study Area SILO site is presented in Figure 3-3. The maximum recorded rainfall was interpolated as 1207 mm in 2013 and 1152 mm in 2021. Notably, the highest yearly evaporation was interpolated in 2023, reaching 1734 mm. Comparing this to the annual rainfall of 793.3 mm at the same location in 2023, Figure 3-2 shows evaporation in 2023 exceeded the monthly rainfall for approximately 70% of the year.

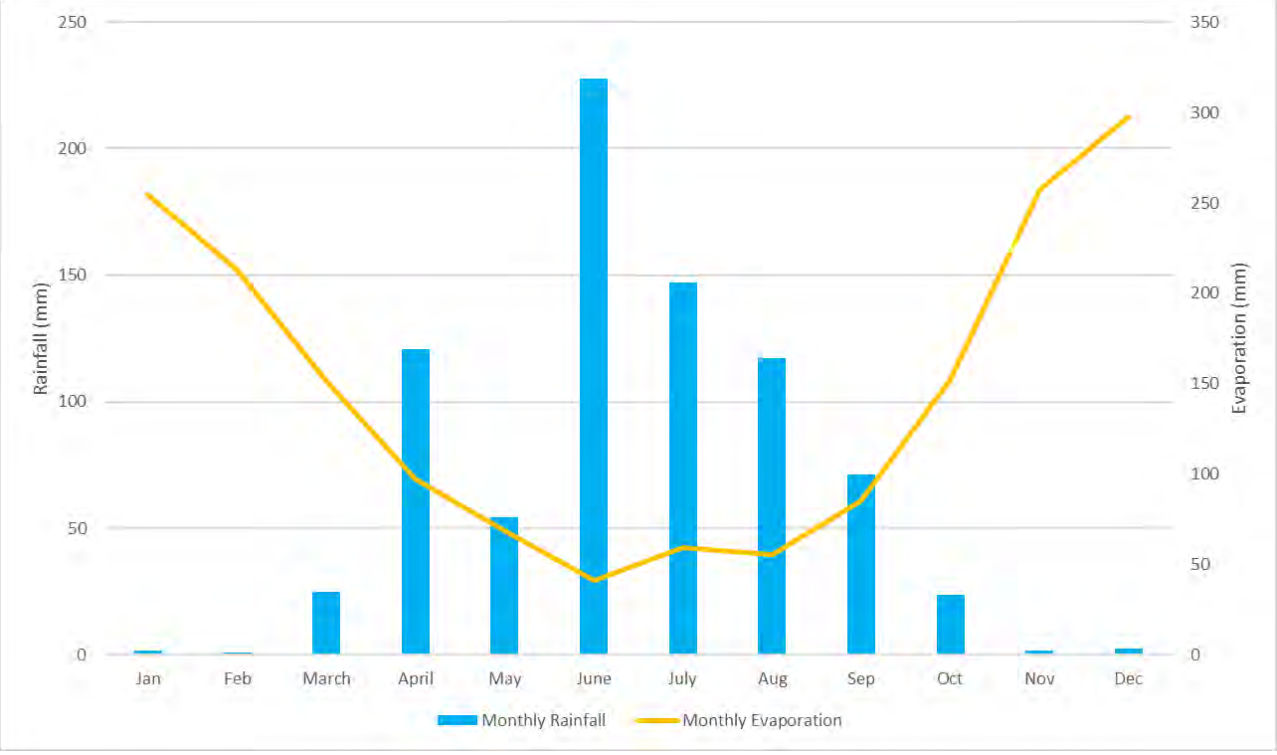

Figure 3-2: Monthly total rainfall and evaporation in 2023 at the Study Area (SILO 2024).

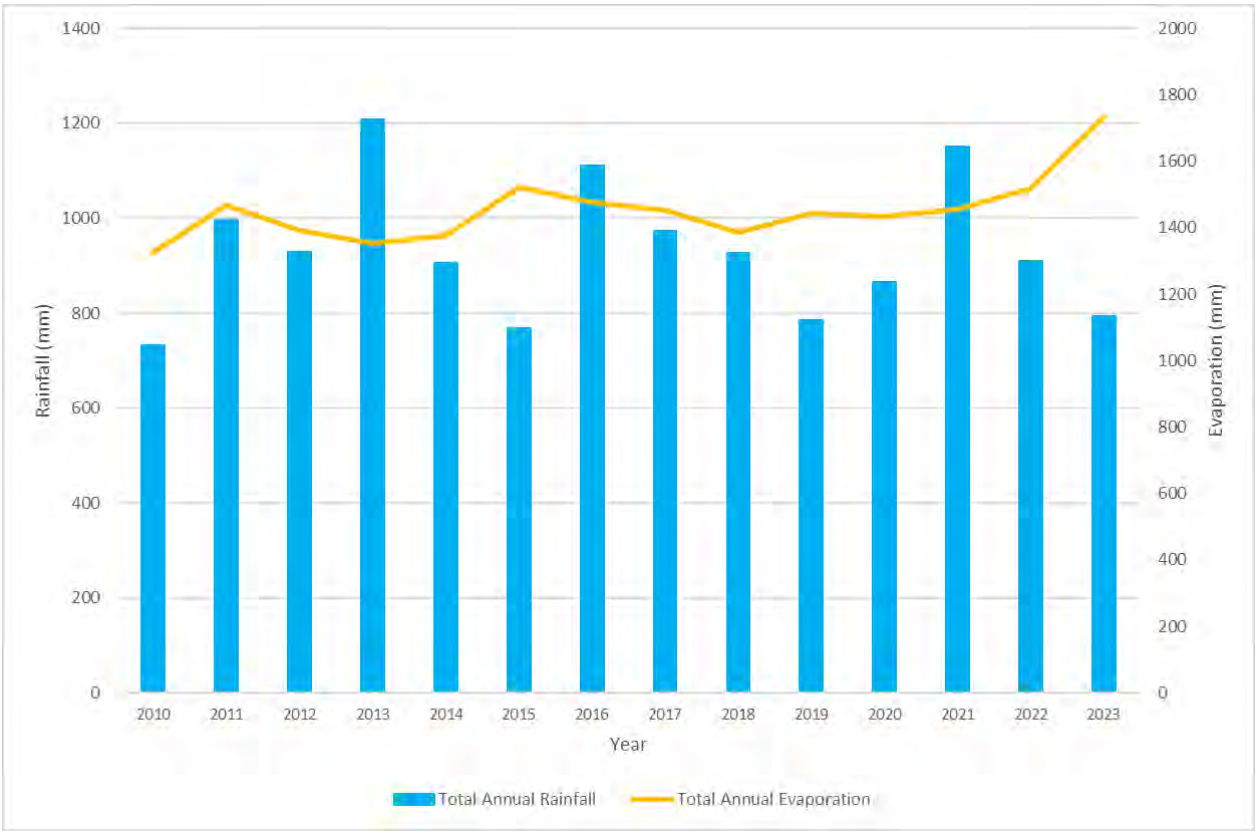

Figure 3-3: Annual total rainfall and evaporation in 2010-2023 at the Study Area (SILO 2024).

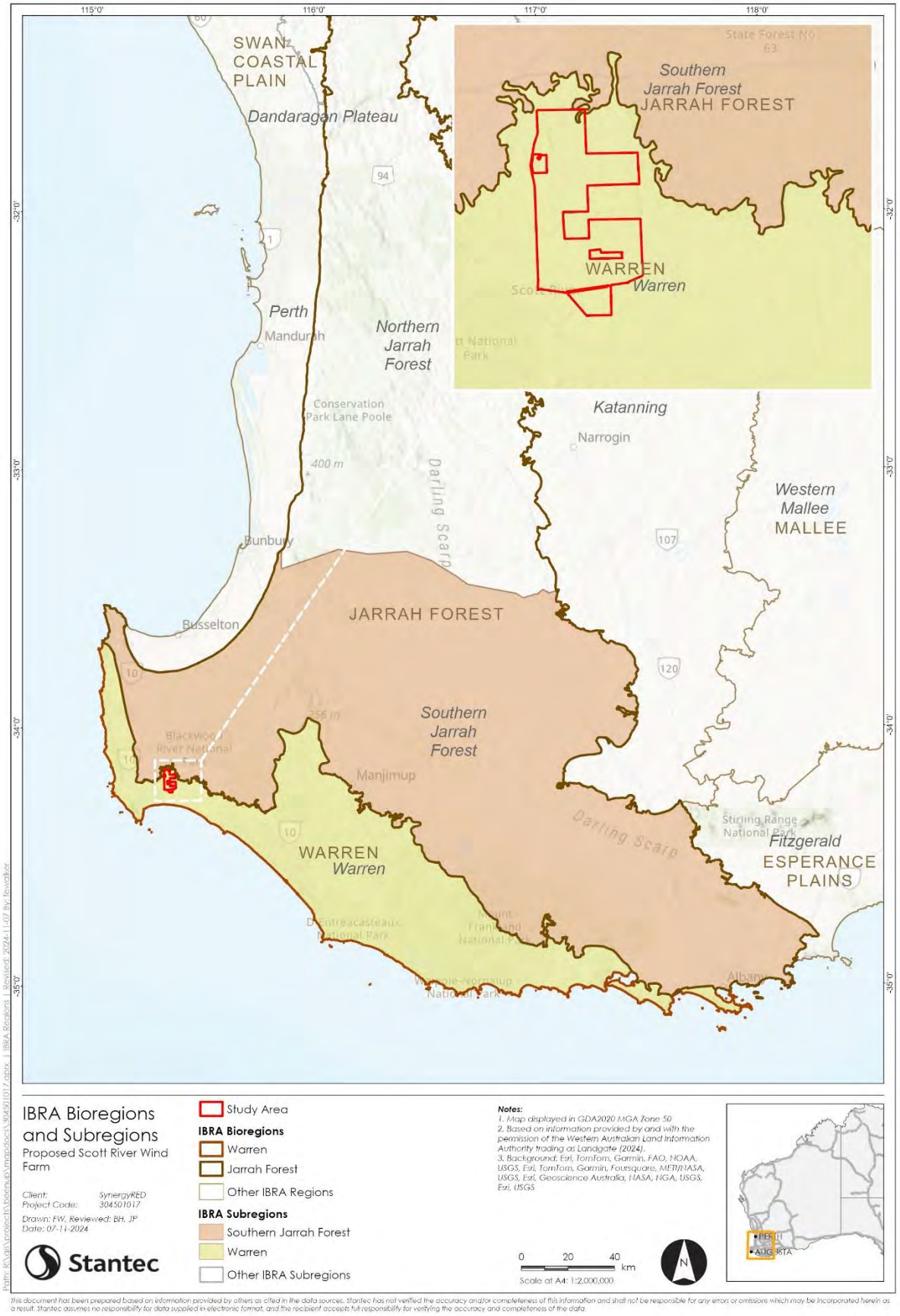

Figure 3-4: Location of the Proposal within the IBRA Southern Jarrah Forest subregion and the Warren bioregion.

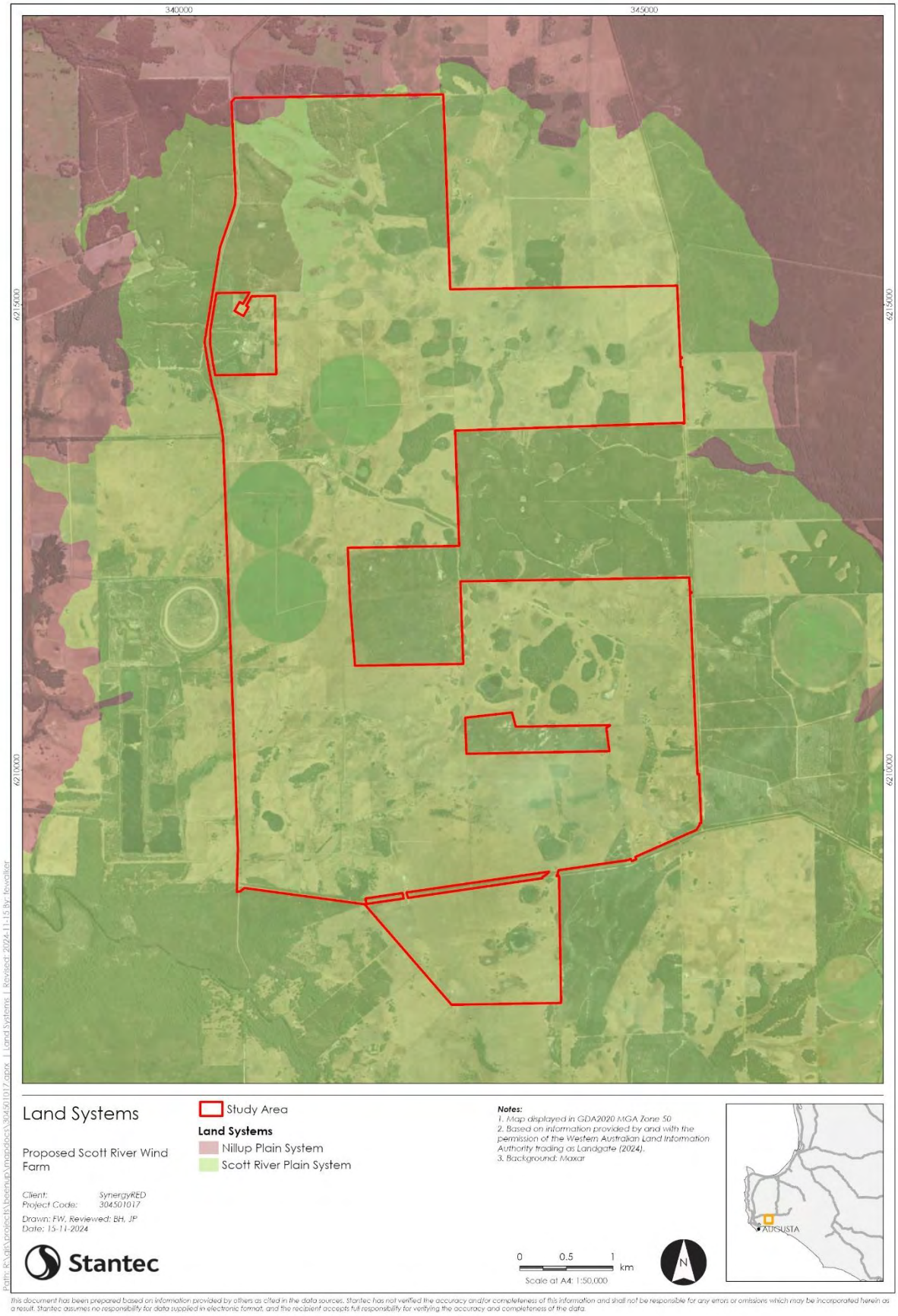

Figure 3-5: Location of the Nillup Plain and Scott River Plain land systems in relation to the Proposal.

3.3 Surface Water

3.3.1 Surface Water Management and Public Drinking Water Areas

The Study Area intersects with the Lower Blackwood, Beenup and Scott Surface Water Management Areas (Figure 3-6). The rivers in this region are known to be influenced by natural groundwater flows, supporting environmental values (DoW 2016). The Study Area is also located 10 km from the Fisher Road Wellfield Water Reserve Public Drinking Water Source Area (PDWSA) (Figure 3-6). The Study Area is at least 20 km from the next closest PDWSA; the Margaret River Catchment Area.

3.3.2 Regional Gauges and Sampling Sites

There are four gauges owned by the DWER, with an additional five surface water sampling sites located near the Study Area (Figure 3-7). The main rainfall gauge is 509199 Scott River – Brennans Ford. The three stream gauges include 609002 Scott River – Brennans Ford, 609060 Blackwood Tributary Beenup Wetland Outflows, and 609026 Scott River – Milyeannup Br (decommissioned). The five surface water sampling sites include:

- 6091051 Scott River – Brennans Bridge
- 6091224 Scott River Tributary – Coonack Downs
- 6091225 Scott River Tributary – Governor Broome Rd
- 6091226 Scott River Tributary – Woodhouse
- 6091309 Paynes Rd

The average annual flow recorded at Scott River – Brennans Ford (609002) for the period 1969-2018 was 88.5 GL, a decrease from the average of the period 1969- 2009 which was 94.7 GL. Between 1970-1999 the average flow was 106 GL and the average 2000-2019 flow was 61 GL, which shows a 42% reduction post-2000 (LBLCDC 2020).

There are three additional Bureau of Meteorology (BoM) rainfall gauges located near the Study Area (Figure 3-7):

- 009613 Warner Glen;
- 009518 Cape Leeuwin (also includes a temperature gauge); and
- 009801 Alexandra Bridge.

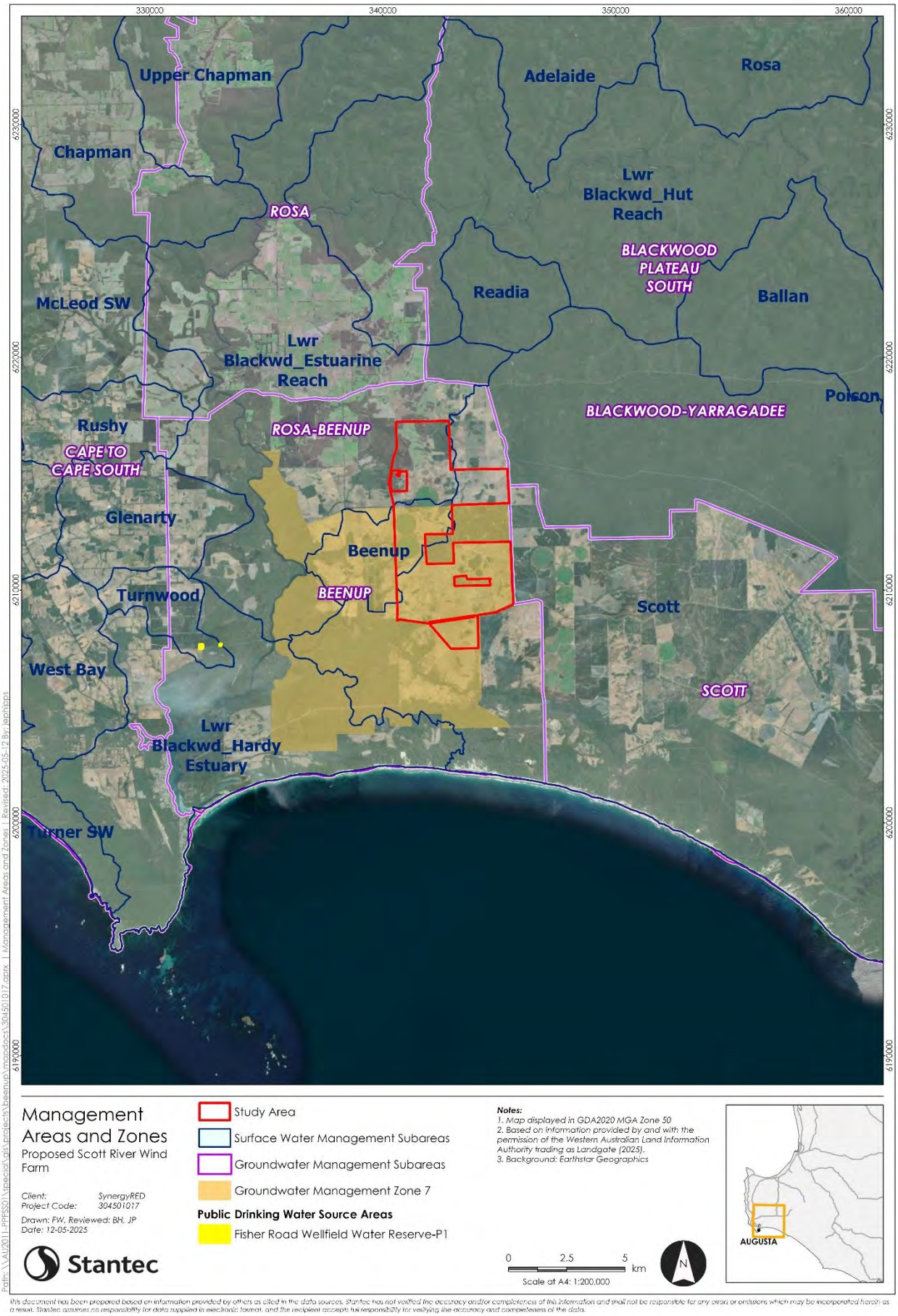

Figure 3-6: Water Management Areas and Public Drinking Water Sources in relation to the Study Area.

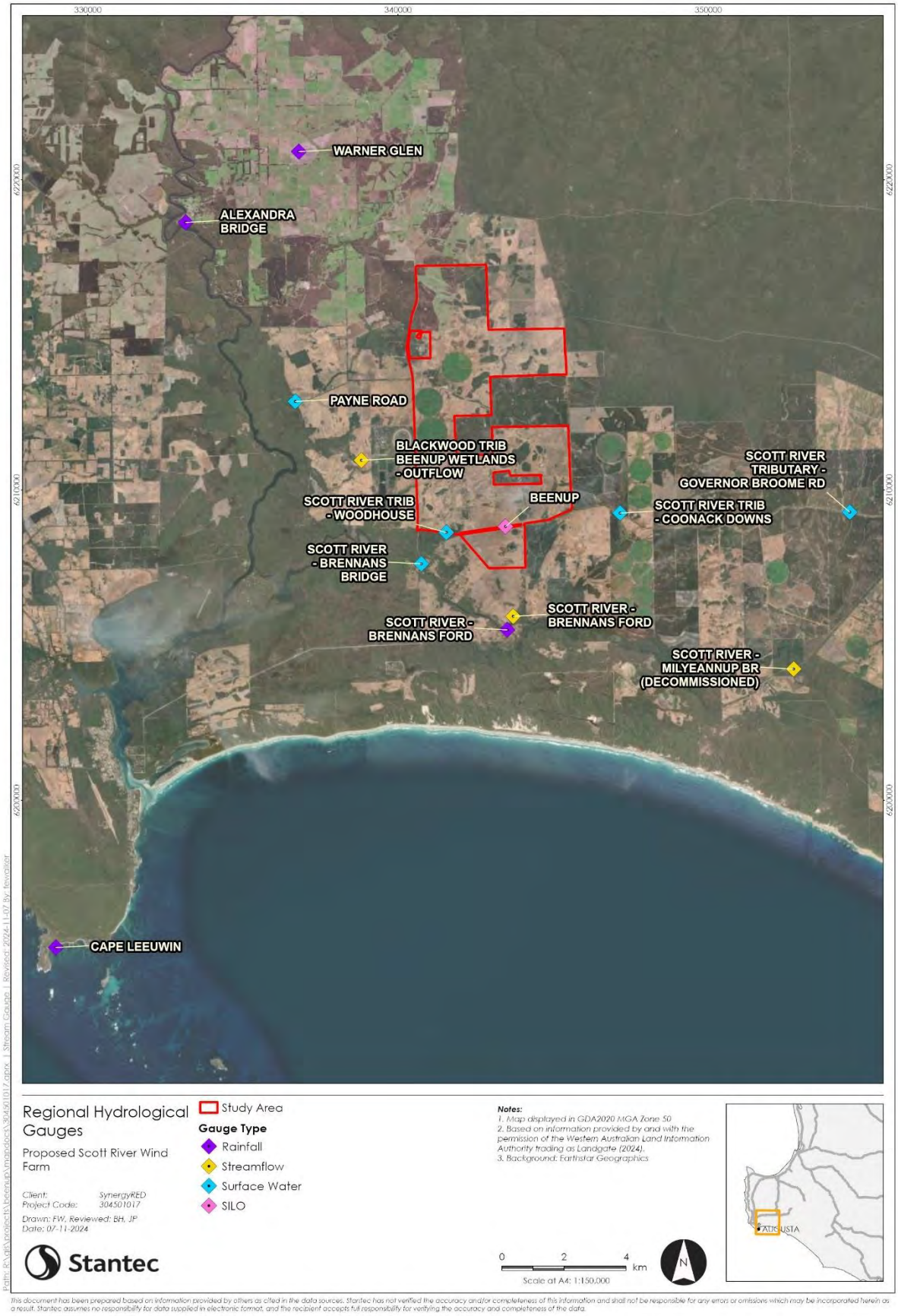

Figure 3-7: Gauge and sampling site locations in relation to the Study Area.

3.3.3 Topography

The Study Area is located on the Scott Coastal Plain, between the Darling Escarpment to the west and the Stirling Range to the east and wheatbelt to the north. With the southern boundary of the Study Area located approximately 4 km north of the Indian Ocean-Southwestern Australian coastline, the surface topography of the region abruptly rises in elevation, with 30m of elevation rise within 200 m of the coastline. North of the coastal dunes, the topography is gently undulating with no other significant topographical features.

Locally across the Study Area, there is a gradual increase in elevation from the southwest (as little as 9 m AHD) to the northeast (as great as 38 m AHD). There is a poorly defined drainage divide that runs approximately through the centre of the Study Area, segregating the Blackwood and Scott River headwater catchments.

There is an average slope from north to south of approximately 2.5 m/km and less than 1 m/km from east to west. The topographical data (DA94 MGA Zone 50 horizontal datum and referenced to the vertical Australian Height Datum) used for the Assessment consisted of two datasets. These datasets were used to resample a 1 m merged digital elevation model (DEM) for the entire Study Area (Figure 3-8) as follows:

- 1 m LiDAR data coverage from DWER was available for the southern part of the Study Area and the Scott River section; and
- 2 m resolution DEM tiles generated by Landgate was available for the entire Study Area; however, were only used for the northern section where the Scott River 1 m data was not available.

3.3.4 Catchment Delineation

The Study Area intersects 11 headwater tributary catchments of the Scott and Blackwood Rivers. An area of 13.7 km² (43%) of the Study Area drains into the Blackwood River, while 18.3 km² (57%) of the Study Area drains into the Scott River (Figure 3-9). Drains to facilitate the agricultural and plantation activities in the Study Area have not been built in a coordinated way and intersect with roads and natural drainage lines, resulting in several areas of localised ponding due to catchment modification.

The sub-catchments were delineated using the Shuttle Radar Topography Mission (SRTM) publicly available topographical data for the region to quantify discharge locations from the Study Area and validate hydraulic results. The topographical data outlined in Section 3.3.3 was used to refine the local catchments but is not available for the full catchment extents required to ensure all external catchments have been considered.

The sub-catchments in the region are illustrated in (Figure 3-9) and details outlined in Table 3-2. Each of the sub-catchments which intersect the Study Area has at least one main flow path, which is deemed a key stream for the purposes of this Assessment.

Table 3-2: Regional Sub-catchment details relative to the Study Area.

River Catchment	Sub-catchment	Area (km²)	Area in Study Area (km²)	Reach Length (km)	Average Slope (m/km)
Scott River	**A**	7	2.2	1.6	6.1
	B	4.3	1.9	0.9	2.7
	C	9.6	4	1.9	7.6
	D	21.9	2	1.8	7.1
	E	8.2	6.6	1.2	7.2
Blackwood River	**F**	11.6	7.3	2.6	6.2
	G	8.2	1.8	1.2	5.4
Scott River	**H**	4.5	0.8	1.1	13.7
Blackwood River	**J**	9.4	1.4	1.1	5.0
	K	37.8	3.2	1.1	3.9
Scott River	**L**	21.7	0.8	0.5	1.1
	I	9	0	*Outside Study Area*	
	M	3.7	0		
	N	3.8	0		
	O	0.6	0		
	P	4.8	0		

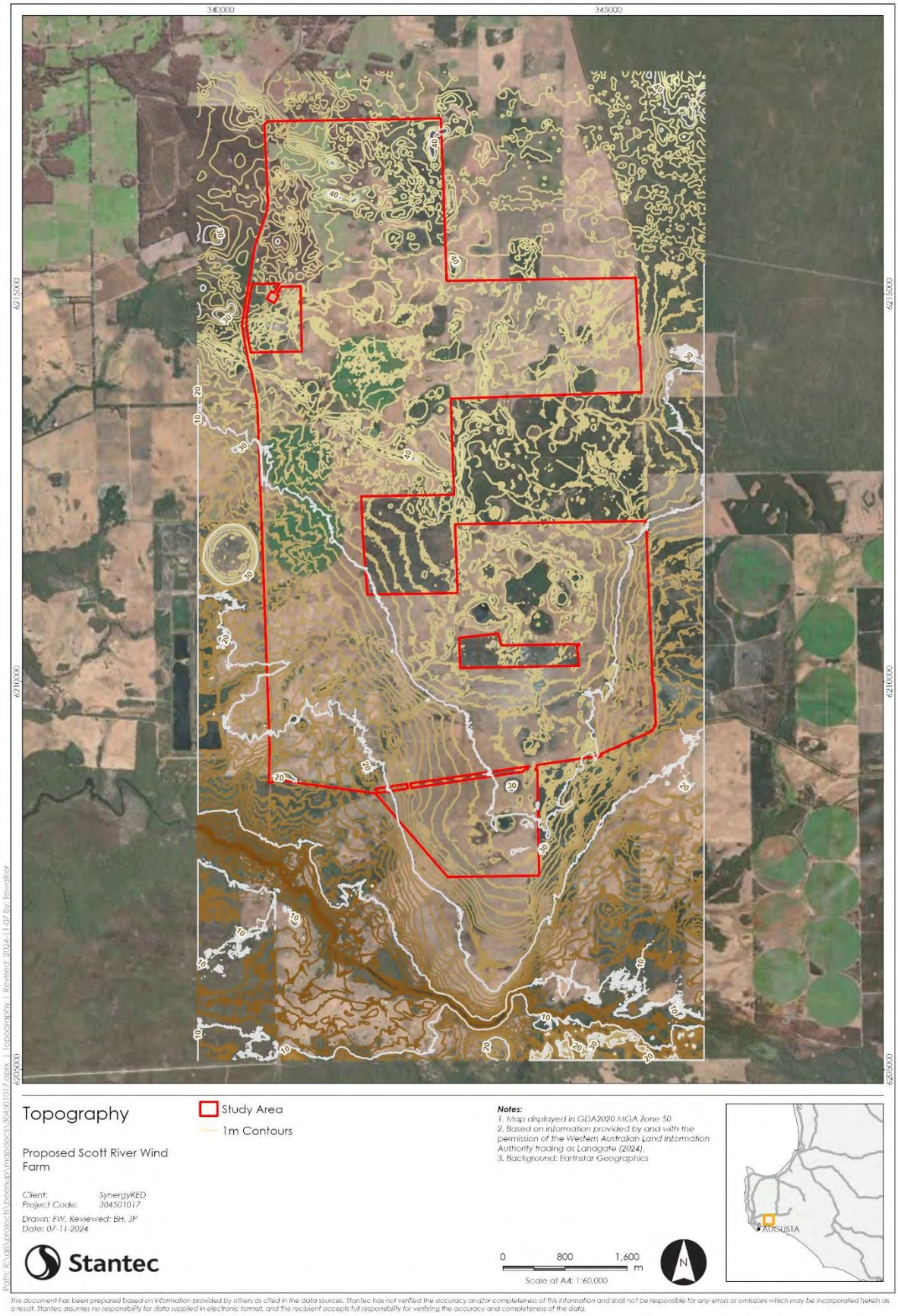

Figure 3-8: Topography data available for the Assessment in relation to the Study Area.

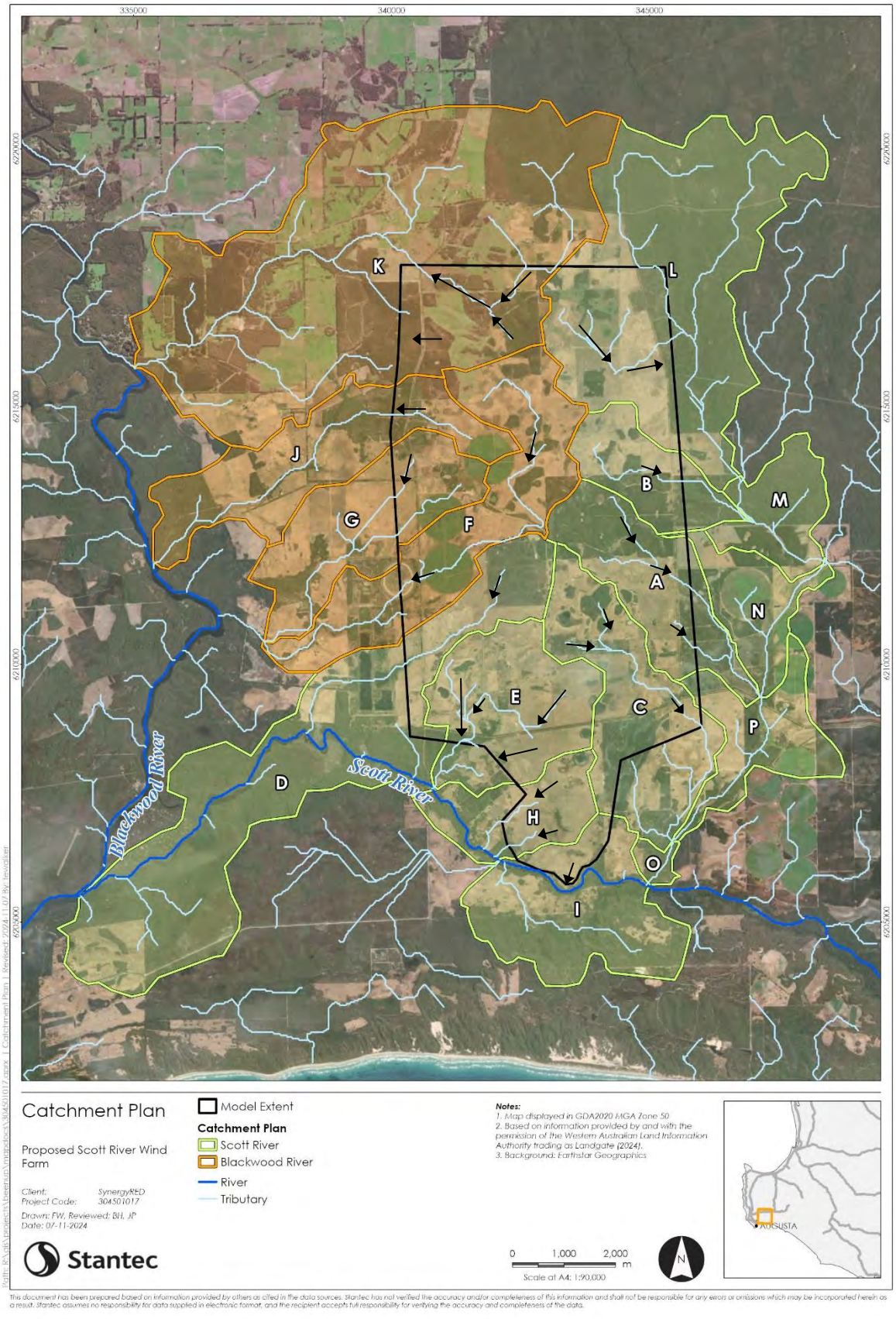

Figure 3-9:-Catchments, sub-catchments and flow path directions in relation to the hydraulic model extent.

3.3.5 Waterways and Wetlands

There are several ephemeral waterways and wetlands located within the Study Area (Figure 3-10). Minor waterways also traverse the Study Area, primarily flowing from northeast to southwest towards Blackwood River, located approximately 3.8 km to the east of the Study Area (Figure 3-9), with a smaller proportion flowing in a southeasterly direction towards Scott River located approximately 1km south of the Study Area. The Lower Scott River sub-catchment area is in better condition than the upper reaches of the Scott River. The main channel has a diverse assemblage of fauna, and the flora is in good condition, although there are signs of stress associated with upstream nutrient runoff along some sections (LBLCDC 2020).

The Blackwood River is a major river system within the catchment. During the dry summer months, groundwater from the Yarragadee and Leederville Aquifers contributes 30% to 100% of the discharge into the Blackwood River. During summer, the surrounding tributaries either contract or dry completely (Beatty et al. 2009).

The ecological values of the Blackwood River include a high native species richness and endemism of fish and crayfish as well as a diverse macroinvertebrate community. The Blackwood River is also an important nursery and spawning ground. Parts of the catchment also support extensive riparian vegetation. Groundwater influence plays an important role in maintaining aquatic biota and the riparian communities. However, the Blackwood River is subject to threats including salinisation (from land clearing) and reduced rainfall due to climate change (Beatty et al. 2009; Department of Water, Water Science Technical Series 2015).

The Study Area's waterways and wetlands are surrounded by agricultural land with and only remnant riparian vegetation remains (Figure 3-10). Three broad geomorphic wetland types have been mapped based on their topographical features and inundation regime (Semeniuk and Semeniuk 1995; 1997):

- Sumpland: located within a basin landform and defined as seasonally inundated.
- Dampland: located within a basin landform and defined as seasonally waterlogged.
- Palusplain: located on a flat landform and defined as seasonally waterlogged.

The Study Area was historically a widespread wetland environment and was predominantly palusplain (seasonally waterlogged flats), characterised by a series of damplands and sumplands in varying condition (Phoenix in prep.-b; V & C Semeniuk Research Group 1997).

3.3.6 Aquatic Habitat and Waterbirds

Ten fauna habitat types have been identified from within the Study Area, including three wetland types (Phoenix in prep.-b). The wetlands comprised seasonally inundated paperbark woodland, shrubland and sedgeland (Figure 3-11). They are sporadically distributed throughout the Study Area and are mostly ephemeral (seasonally inundated), with relatively shallow water levels when flooded (typically less than 1 m). In addition, there was one larger wetland south of Governor Broome Road and a wetland cluster in the northern section of the Study Area where surface water persisted into summer, suggesting a potential perennial regime (Phoenix in prep.-a).

The northern boundary of the Study Area contains a mosaic of remnant bushland and wetlands that are largely cohesive and provide important habitat for flora and fauna (Phoenix in prep.-b). In the centre of the Study Area, wetlands are separated by paddocks and are generally in poor condition, while to the south there is an isolated group of fenced wetlands and one larger, unfenced wetland (Phoenix in prep.-b).

The wetlands, paddocks and floodplains of the Study Area provide seasonal foraging habitat for waterbirds including migratory species. (Phoenix 2025a; in prep.-b). During the wetter months (May to September), large aggregations of waterbirds such as Straw-necked Ibis, Australian White Ibis, Australian Shelduck, Grey Teal, Black Swan, Pacific Black Duck and White-faced Heron are prevalent in the local waterways and wetlands, while from spring to early summer (September to November) there is an influx of migratory shorebirds (Phoenix 2025a; in prep.-b).

There have been seven significantly listed waterbird species (State and Commonwealth) recorded from the Study Area in low numbers, during prolonged periods of inundation (Phoenix in prep.-b). This includes several Sandpipers (Common Sandpiper, Wood Sandpiper and Marsh Sandpiper), as well as the Double-banded Plover, Blue-billed Duck, Osprey and Common Greenshank (Appendix A). A total of 11 State and Commonwealth listed significant aquatic and semi-aquatic species also have the potential to occur in wetlands and waterways across the Study Area. This comprises three crustaceans (two crayfish and one marron), one mollusc (Carter's Freshwater Mussel), five fish (including two *Galaxiella* species), and two frog (White and Orange Bellied Frog) species (Appendix A).

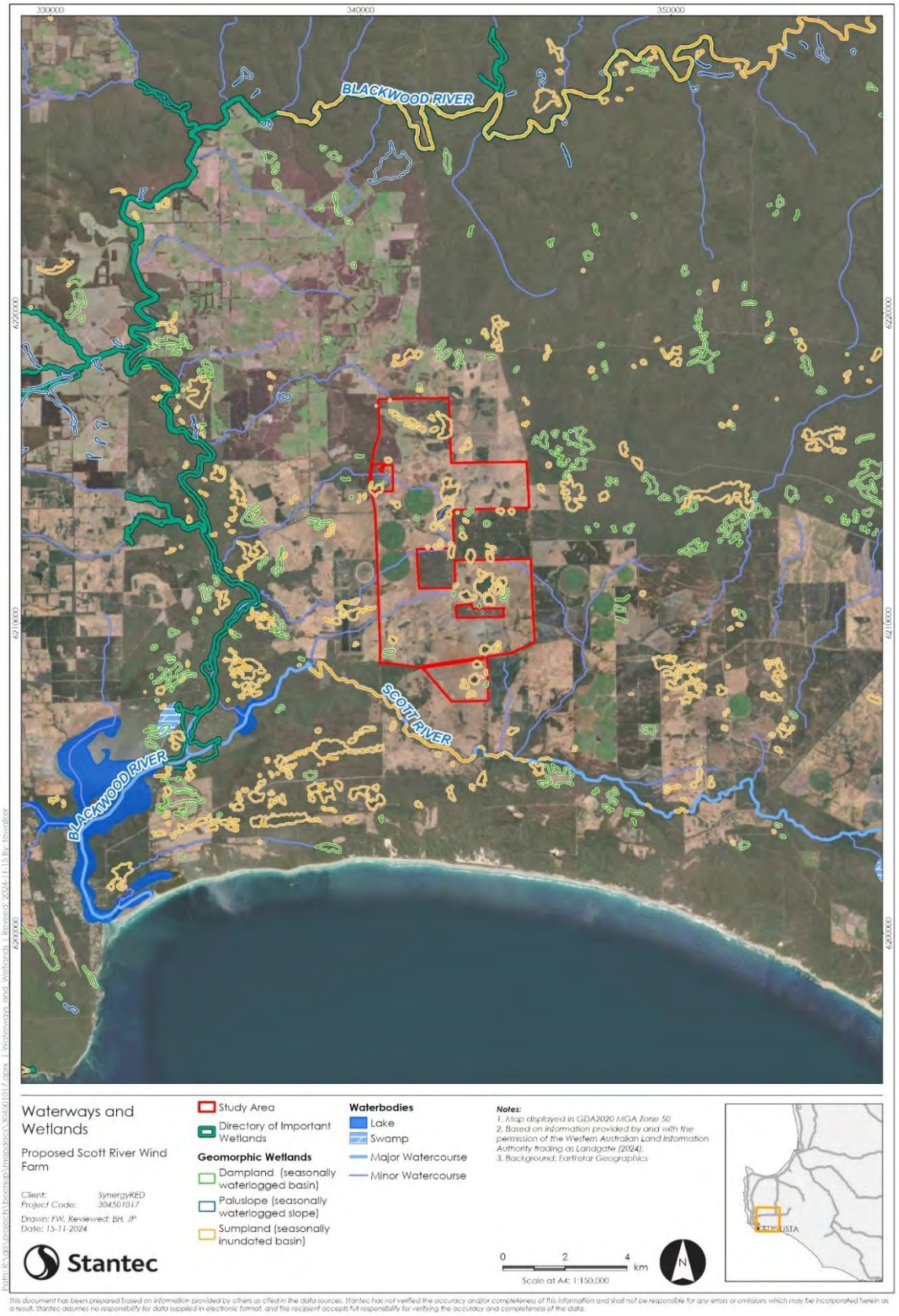

Figure 3-10: Waterbodies and geomorphic wetlands mapped within the Study Area. Spatial layer source (Semeniuk and Semeniuk 1995; 1997).

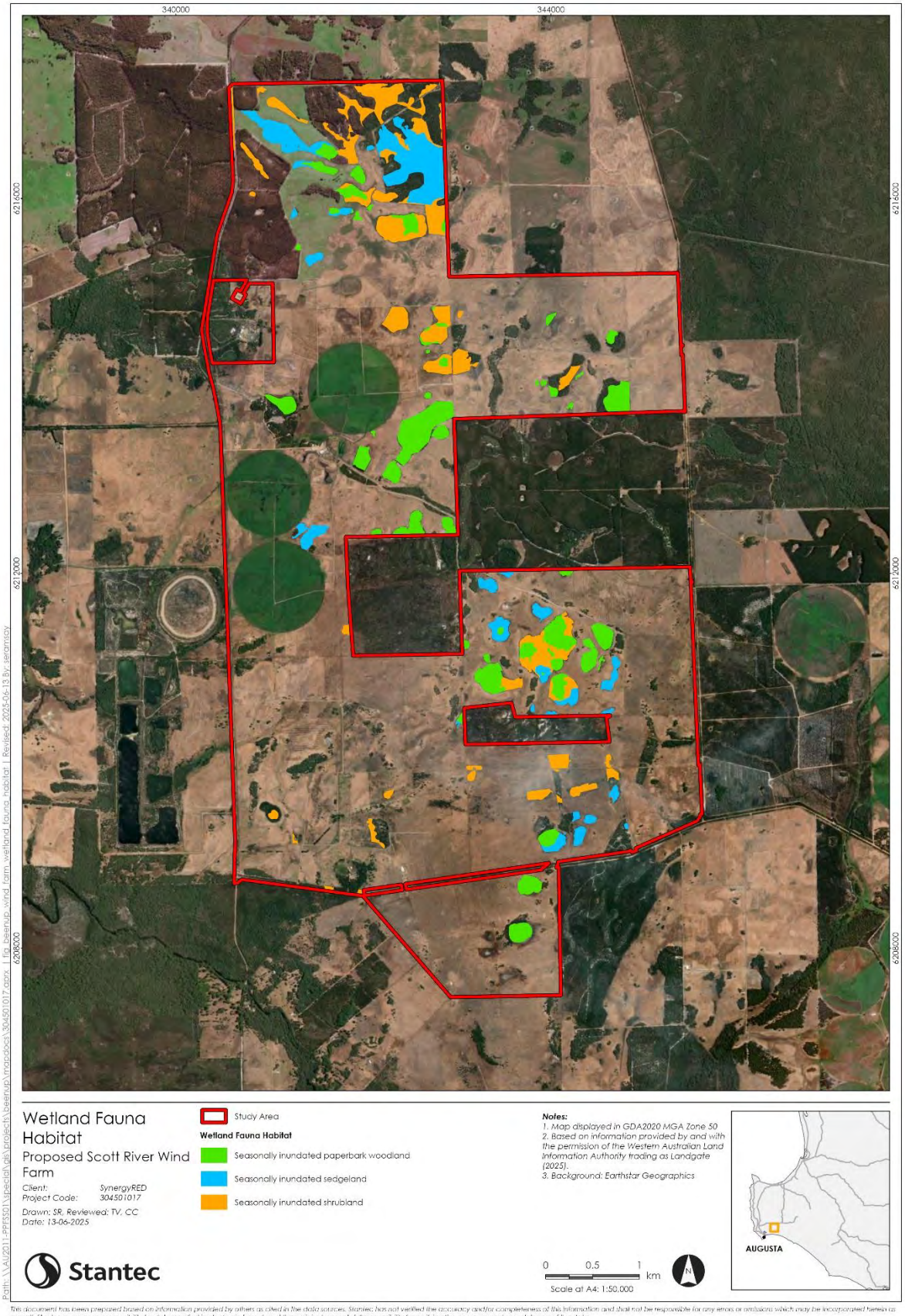

Figure 3-11: Wetland fauna habitats, within the Study Area. Spatial layer source (Phoenix in prep.-b).

3.3.7 Surface Water Quality

The DWER have undertaken surface water sampling at several locations as part of the Healthy Rivers Program, in the vicinity of the Study Area. The latest Beenup (Blackwood Catchment) and Lower Scott River Catchment Hardy Inlet Nutrient Reports in 2019 reported on the results at the 6091051 Scott River – Brennans Bridge, 6091226 Scott River Trib – Woodhouse and 6091309 Paynes Rd sites (Figure 3-7).

The ANZECC 2000 trigger values for benchmarking water quality were adopted in the DWER Healthy Rivers Program, as outlined in Table 3-3. The Statewide River Water Quality Assessment (SWRWQA) Classification Bands also used to classify water quality as part of the DWER sampling program are summarised in Table 3-4.

The report notes that a dairy shed is located immediately upstream of the Woodhouse site. As such, salinity (measured as total suspended solids; TSS) and concentrations of total nitrogen (TN) and total phosphorous (TP) are elevated for most measured contaminants at Woodhouse (on a tributary to the Scott River) compared to Brennans Bridge on the Scott River itself. The Woodhouse site has been incorporated into the ongoing site water quality monitoring being conducted in parallel to this scope of works as Surface Water Monitoring Site 5 (SW5).

Table 3-3: Benchmark water quality trigger values (ANZECC 2000).

Parameter	Units	Trigger Values
TP	mg/L	0.025
TN	mg/L	1.2
pH	unit	6.5 – 8.0
Dissolved Oxygen	(% saturation)	90 - 120

Table 3-4: Statewide River Water Quality Assessment (SWRWQA) Classification Bands.

Parameter (mg/L)	Very High	High	Moderate	Low
TP (SWRWQA 2009)	>0.20	>0.08 – 0.20	0.02 – 0.08	<0.02
TN (SWRWQA 2009)	>2	>1.2 – 2	0.75 – 1.2	<0.75
TSS (SWRWQA 2009)	>25	>10 – 25	>10 – 25	<5
Salinity (DoW 2014)	>3,000 (saline)	>1,000 – 3,000 (brackish)	500 – 1,000 (marginal)	<500 (fresh)

Note: Classification bands originally sourced from Statewide River Water River Water Quality Assessment (SWRWQA 2009) and Department of Water 2014, accessed via DWER (2024).

It is understood that nutrients enter the tributary streams from agricultural land use upstream of the sampling sites. Given the catchment is cleared and lacks fringing vegetation, nutrients tend to be washed into the streams quickly following rainfall events. Additional catchment-scale water quality factors identified include:

- High nutrient levels have been known to lead to algal bloom from fertilisers and dairy farming.
- Most of the soils in the cleared portion of the catchment have a low capacity to bind phosphorus. This is often so poor that any phosphorus applied to them can be quickly washed into drains and other waterways (DWER 2024).
- Low dissolved oxygen levels have been measured due to increasing temperature, algal bloom and reduced flows.
- Monitored sites show a first flush effect where nutrients, suspended solids and salts are mobilised following heavy rainfall. Much of this is probably the result of mineralisation of organic nitrogen in soils and drains over the summer period, and runoff of high-concentration waters from upstream agricultural areas which build up with fertiliser and animal waste over summer (DWER 2019).
- Salinity shows a slight inverse seasonal relationship, with concentrations being highest at the start and end of the flow year. This suggests that the start of the winter rains wash salts into the stream from surrounding land use as well as mobilising salts left behind in the stream after it dried the previous summer (DWER 2019).

It is possible the heavily vegetated main channel of the Scott River upstream of the Brennans Bridge site is acting like a large linear wetland, processing total ammonia and nitrate via plant uptake and denitrification (DWER 2019).

There are four key metrics against which water quality has been assessed at the sampling sites for Total Nitrogen (TN), Total Phosphorus (TP), pH, salinity and Total Suspended Solids (TSS). This includes:

- Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values:
  - Payne Road mean TN concentration exceeds trigger value 2005-2010 and 2012-2019.
  - Payne Road mean TP concentration exceeds trigger value 2017-2018.
  - Brennans Bridge TN concentration moderately exceeds trigger values in 2016-2019.
  - Long-term Woodhouse TN or TP mean not reported against trigger values.
  - All annual pH medians at all sites were between the upper and lower trigger values.
- Statewide River Water Quality Assessment (SWRWQA) classification bands of low, moderate, high and very high:
  - Woodhouse mean TN classified as high (2005-2018) and very high (2019). It appears that TN concentrations increased at Woodhouse between 2016 to 2019.
  - Woodhouse mean TP classified as high (2005-2019).
  - Payne Road mean TN classified as high (2005-2019).
  - Payne Road mean TP classified as moderate (2005-2019).
  - Brennans Bridge TP concentration moderately exceeds trigger values in 2019.
  - All sites were recorded as having low mean TSS (2005-2019).
  - All sites were reported as having low mean salinity (up to 2018 SWRWQA approach).
- Hardy Inlet Water Quality Improvement Plan (WQIP) targets:
  - Woodhouse mean TN and TP exceeds winter median targets in 2016-2019 (from when they were established), being 1 mg/L and 0.1 mg/L, respectively.
- Water Resources Inventory 2014 salinity ranges for fresh, marginal, brackish or saline in the 2019 nutrient report (2018 nutrient report used the SWRWQA bands):
  - All sites were reported as fresh, with salinity levels less than 500 mg/L.

3.3.8 Cultural Heritage Places

A registered and lodged Aboriginal cultural heritage site intersects the Study Area and are associated with tributaries of the Blackwood River and Scott River. It is expected that SynergyRED will engage a specialist consultant to ensure that cultural heritage considerations are captured as part of stakeholder engagement as the Proposal develops.

3.4 Geology and Soils

3.4.1 Regional Geology

Published geological, geomorphological, and soil landscape information was reviewed by Stantec (2024a). Information provided within The Geological Survey of Western Australia (1967) 1:100,000 scale; Busselton and Augusta map sheet indicate that the Study Area is primarily underlain by Quaternary alluvium, comprising quartz-rich sand dunes and Cainozoic laterite. The Scott Coastal Plain is comprised of alluvial, lake, swamp, estuarine, and shoreline deposits unconformably overlying Mesozoic sediments (Leederville Formation of the Warnbro Group) and basalt flows or marine sediments of the Eocene.

The nearby 1:50,000 scale Karridale – Tooker map sheet (The Geological Survey of Western Australia, 2002) suggests that the Leederville Formation, comprising interbedded sedimentary rock and associated units derived via weathering may be encountered during excavation, underlying the dune deposits and laterite (ferricrete) across the site. The Leederville Formation is the only one of the three formations that comprise the Lower Cretaceous Warnbro Group to occur beneath the Scott Coastal Plain (Chan 2011). The Warnbro group was defined by BHP (1998, 2015) as a series of distinct lithological units comprising the Strucel Beds and Beenup Beds, which likely make up the Leederville Formation (Quindalup and Mowen Members) (Table 3-5).

The 1:500,000 linear structures' geological map indicates that the plateau upon which the site is located is bounded by two north-south faults (Figure 3-12). One fault or shear zone runs along the western portion of the site, and a major fault (Busselton Fault) runs along, and parallel to, the eastern boundary of the site. Further west lies the Alexandra Bridge Fault and then the Dunsborough Fault. The Study Area is situated within the Vasse Shelf, and the lateral extent (west to east) is from the Busselton Fault to the Dunsborough Fault (Chan 2011).

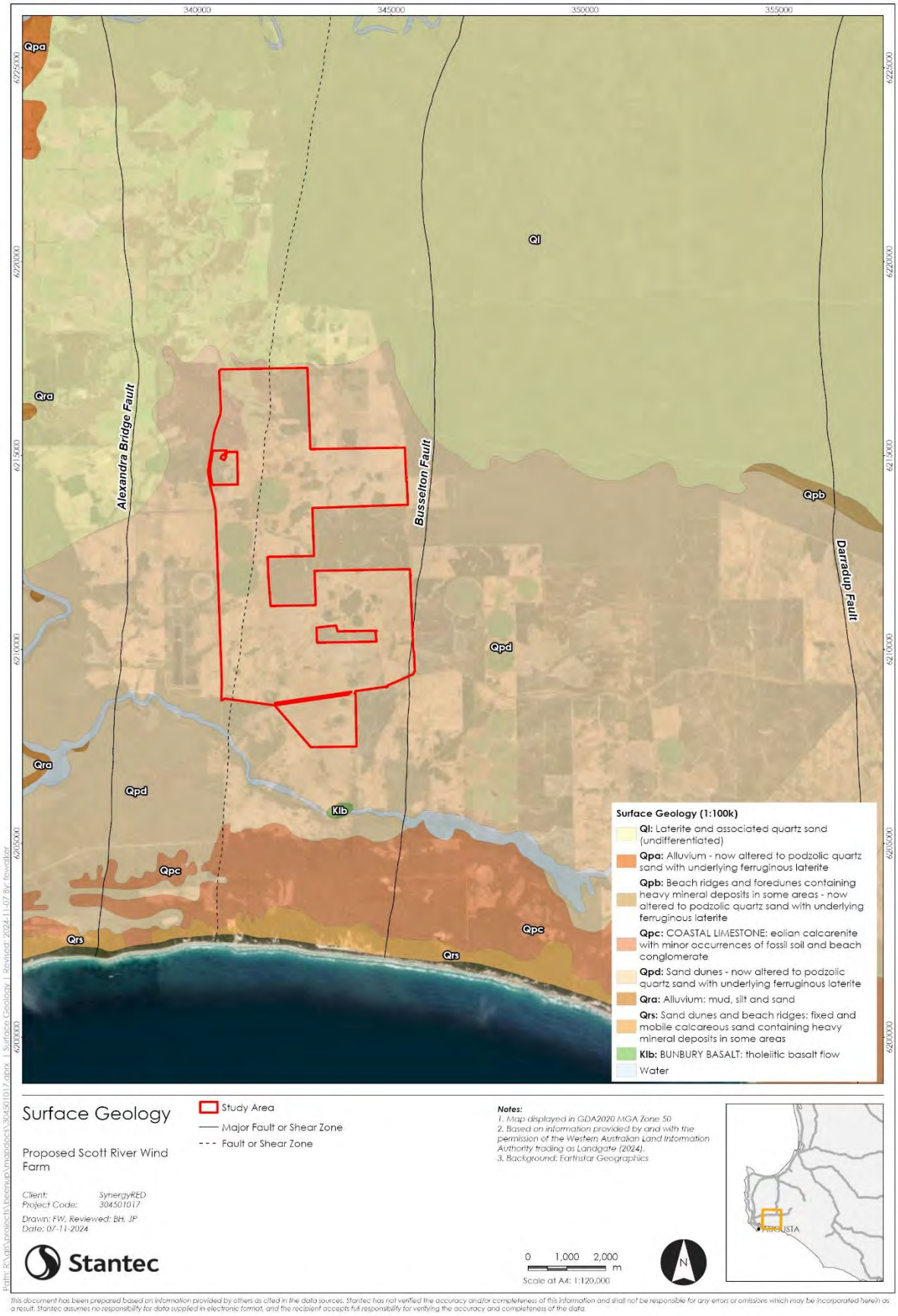

Figure 3-12: Surface geology in the vicinity of the Study Area.

An investigation was undertaken between 2014 and 2015 by Brockman South for the Alexandra Iron Ore Project (C19/2014) where a more detailed lithology map pertaining to the Study Area was developed (Brockman South Pty Ltd 2015). The report noted that basement strata did not crop out at the site, which is covered extensively by Quaternary superficial deposits deposited unconformably on unconsolidated sediment assigned to the Lower Cretaceous Warnbro Group (Figure 3-12).

Table 3-5: Generalised stratigraphy of the Study Area (Baddock 1995; Crostella 2000).

Era	Period / Epoch	Formation / Group	Dominant Lithology
Cainozoic	Quaternary / Holocene	Alluvium, lake and swamp deposits	Sand, clay, peat
Mesozoic	Early Cretaceous	Leederville Formation / Warnbro Group	Clay, sand, coal
		Bunbury Basalt	Basalt
	Triassic	Lesueur Sandstone	Sandstone

Geology across the site comprises siliceous dune sands deposited unconformably on the Leederville Formation. Within the dune sands localised diagenetic features comprise organic stained siliceous sands, bleached siliceous sands, and shallow sands overlying ferricrete (also referred to as coffee rock). The main geological stratigraphic units encountered at the Study Area are the Quaternary alluvium, lake and swamp deposits, the Early Cretaceous Leederville Formation and Triassic Lesueur Sandstone (Figure 3-13).

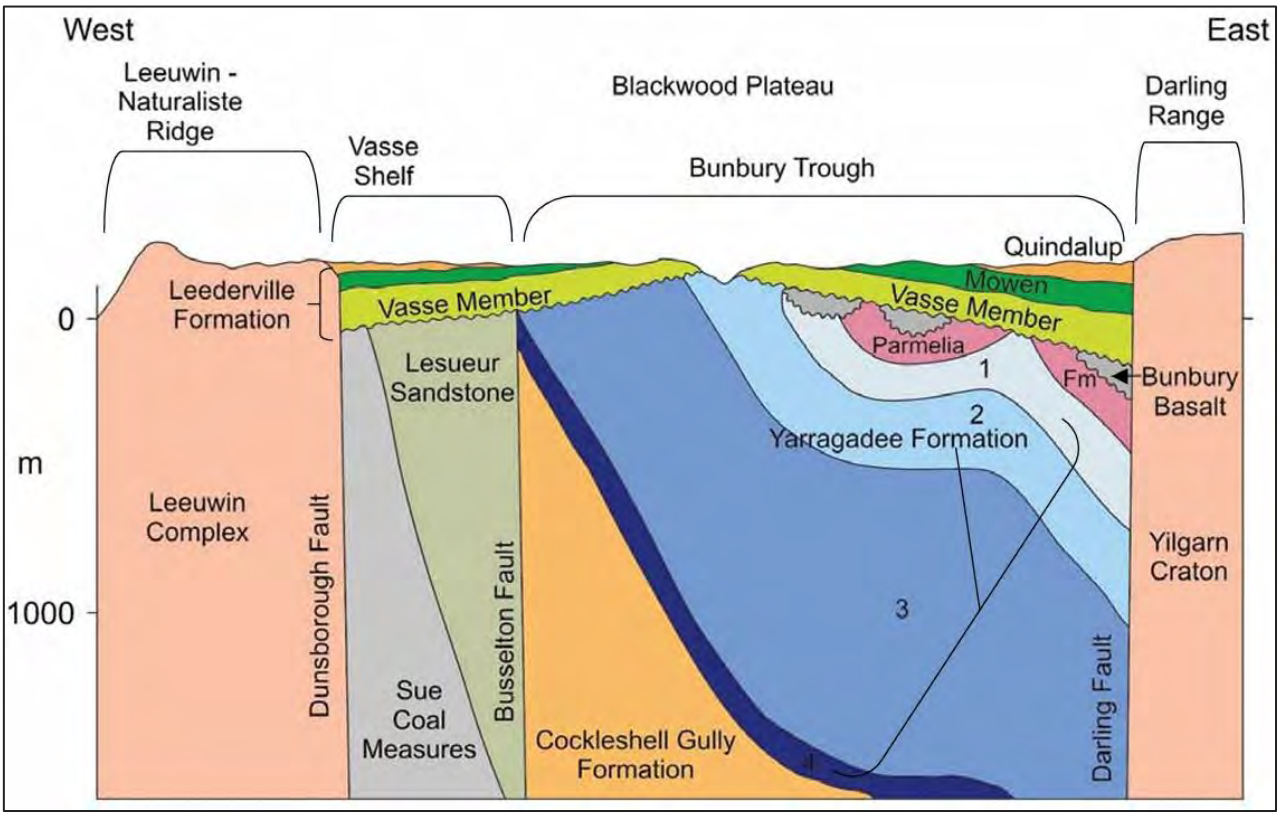

Figure 3-13: Regional conceptual cross-section (west to east) of the Southern Perth Basin.

3.4.2 Site Geology

The Study Area is situated within the eastern portion of the Vasse Shelf (DoW 2009a). The general site lithology is described in Stantec (Stantec 2024c) and is based on logs from test pits (TP01 to TP20) and boreholes (WM01 to WM03 bore groups), shown in Figure 3-14 and Appendix B, and is summarised as follows:

- Test pits (2 m depth maximum): The shallow sub-surface area, generally comprised a thin layer of topsoil, overlying sand (of various silty fines fraction), often overlying iron cemented rock strength material (ferricrete). Where ferricrete was not encountered, further sand was present to termination depth, though some layers with significant content of organic materials were encountered.
- Groundwater bores (up to ~25 m depth): Significantly varied sub-surface conditions, particularly between the north of the site (WM01 bore group) and the central and southern areas of the site (WM02 bore group and WM03 bore group, respectively). A summary of the bore group lithology is provided below.
    - WM01 bore group (north): A thin layer of dune sands (up to 2.0 m depth) overlying saturated grey and dark grey, interbedded / alternating bands of clayey and sandy soils and frequent pockets of organic and peaty material, likely residual soils developed on the Leederville Formation.
    - WM02 bore group (south): A layer of dune sands (up to 6.0 m depth) with interbedded ferricrete, indurated to a duricrust. The ferricrete was encountered as a thick, massive rock unit directly overlying weakly cemented organic rich sands, likely associated with historic dune swales and lacustrine depositional environments. The soils comprising dominant clay, below the sands, were likely residual soils developed on the Leederville Formation.
    - WM03 bore group (central south): Similar to WM02, dune sands up to 6.2 m below surface, and ferricrete was encountered as thick, massive rock unit within the sands. Weakly cemented organic rich sands were present directly beneath the ferricrete, extending to 6.2 m before intersecting clayey and sandy soils, likely residual soils developed on the Leederville Formation. A thin layer of sandstone was encountered at 19.65 m overlying more residual soils, which were encountered to the base of the hole.

Bores within 500 m of the Study Area (Mohsenzadeh and Diamond 2000)(Baddock 1992; BHP 1998; Chan 2011, BHP 2015) noted similar lithological sequences and are summarised as:

- Quaternary Deposit: Sand and silty sand from surface to 10 mbgl, thickening from west to east and north to south.
- Ferricrete of variable thicknesses, from <0.5 mbgl to approximately 10 mbgl.
- Leederville Formation (Warnbro Group): sands, silts and clays, underlying the Quaternary deposit and ferricrete, to at least 35 mbgl.

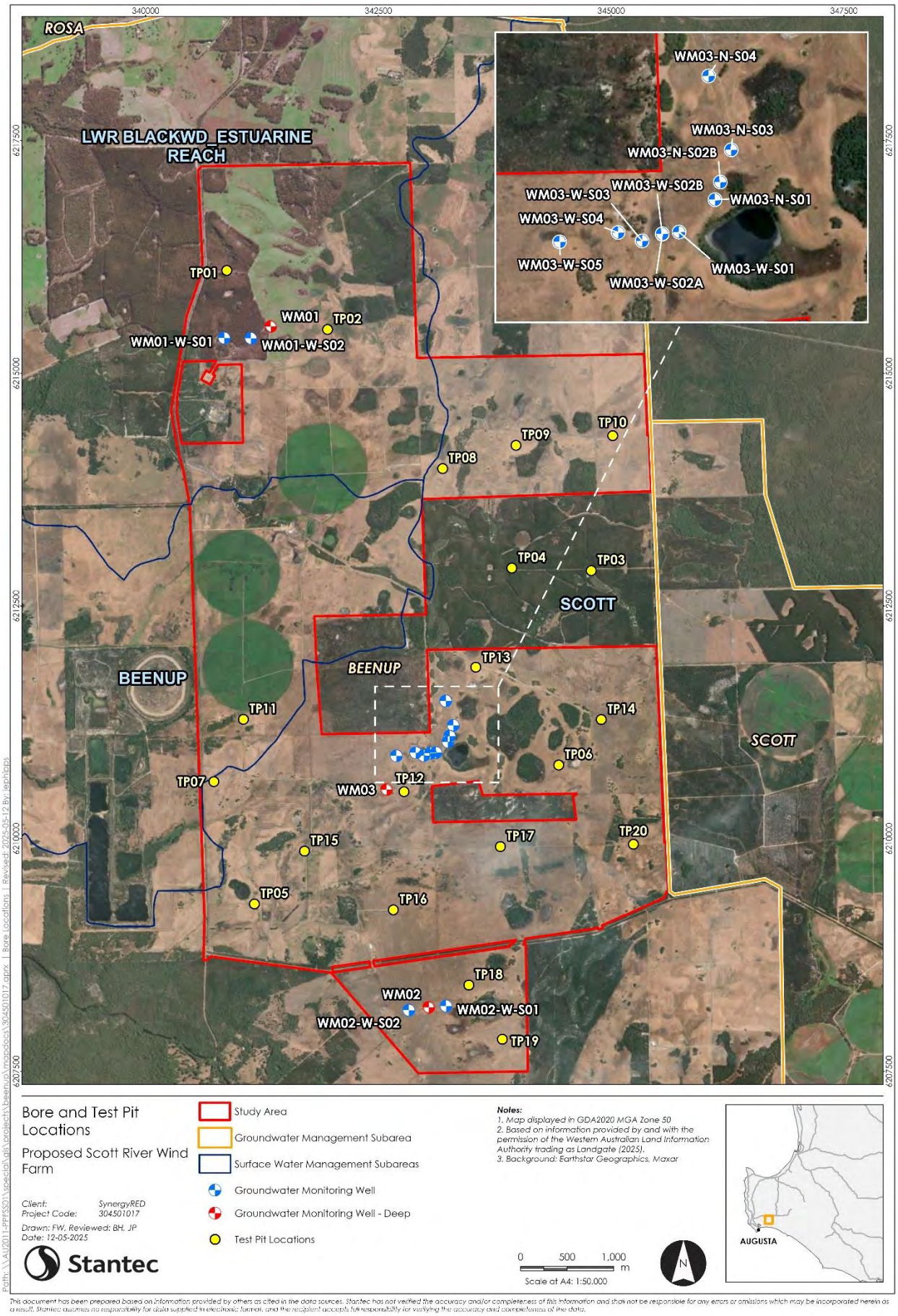

Figure 3-14: Groundwater bore locations (shallow and deep bores) and test pit locations.

3.4.3 Soils and ASS

The Study Area is located within the Scott Coastal Plain and is flanked by the Blackwood Plateau to the North, separated by the Barlee Scarp, and the Leeuwin Naturaliste Ridge to the West (Stantec 2023). Based on DWER 2019 Soil Landscape Mapping – Best Available (DPIRD-027), this Study Area is mostly covered by Scott River wet ironstone flat Phase (215SrSRwi), Scott River wet sandy depression Phase (215SrSRwd) and Scott River low dune Phase (215SrSRd2) (Figure 3-15). The Scott River Action Plan (LBLCDC 2020) translates these as varying from fine white, brown, and grey sands to ferricrete and clay (White 2012).

The Study Area is located within an area of high to moderate potential to contain ASS (derived from DWER-048 to 55) and is within Groundwater Management Zone 7 which is defined as a "*buffer zone area defined by acid sulfate soil plume from Beenup mine site*" (DoW 2009c). A preliminary ASS assessment was completed within the Study Area by Stantec (2024c). Soil samples were collected from 20 test pits (TP01 to TP20) and three geotechnical bores (MW01 to MW03). All samples recorded moderate to extreme reactions, indicating the possible presence of potential ASS (PASS). A suspension peroxide oxidation combined acidity and sulfur (SPOCAS) method analysis was then performed on the 70 samples and 50 of these exceeded the net acidity action criteria. An ASS Management Plan (ASSMP) was recommended to be developed and implemented for managing the disturbance of ASS.

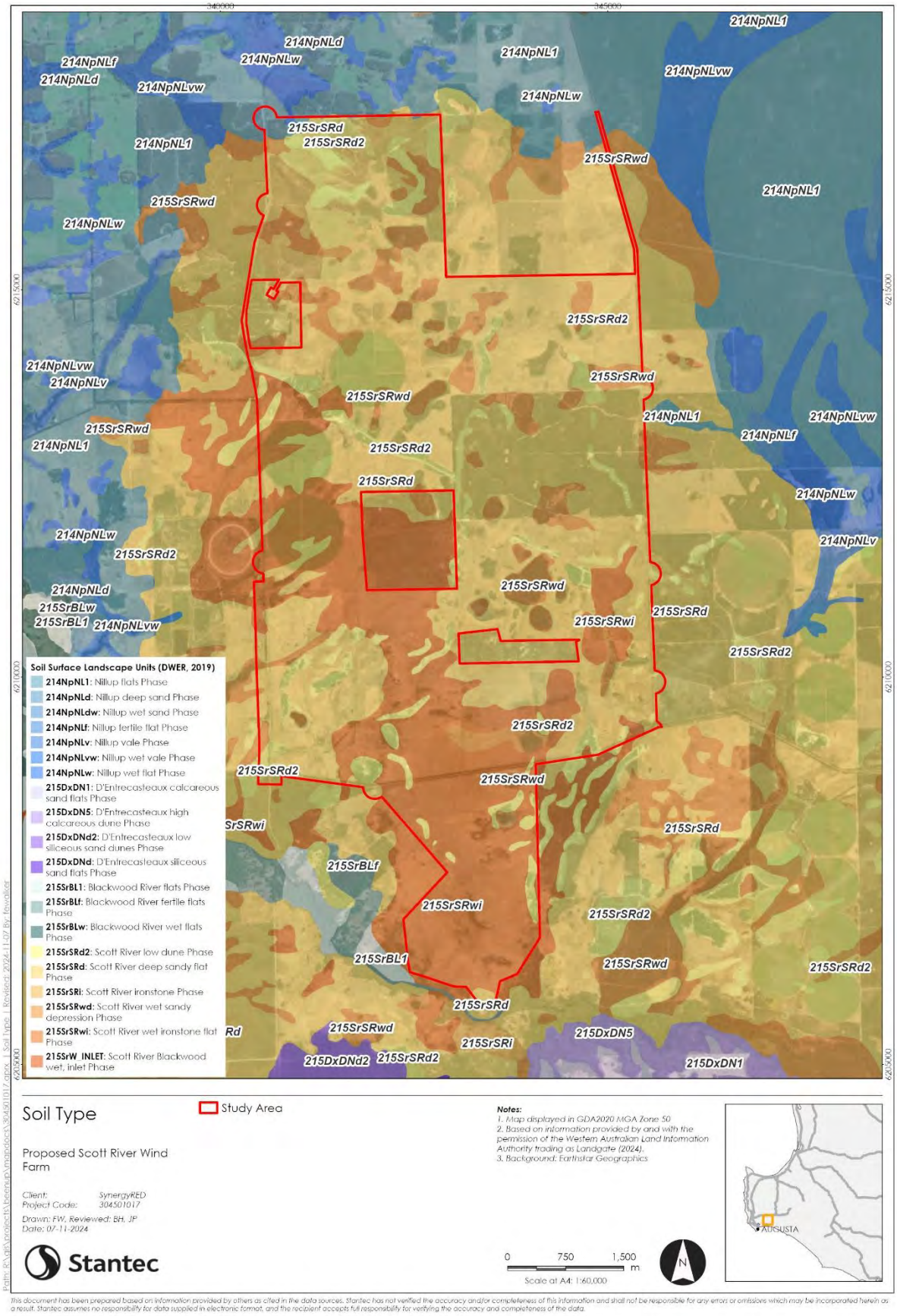

Figure 3-15: Soil landscape units (DPIRD-027) (DWER 2019) in the Study Area.

3.5 Groundwater

3.5.1 Groundwater Management

The Study Area intersects the Beenup Groundwater Management Subarea, and is also defined within the Blackwood Groundwater Management Area, Beenup Subarea of the South-West Groundwater Allocation Plan (Blackwood GMA Beenup Subarea) (Figure 3-6). It also intersects with Groundwater Management Zone 7 which is defined as a "*buffer zone area defined by acid sulfate soil plume from Beenup mine site*" (DoW 2009c). The historic Beenup Titanium Mine is located 50 m to the southwest of the Study Area at an approximate elevation of 17 mAHD.

The historic Beenup Titanium Mine site has been subject to extensive management, remediation, and rehabilitation as a result of the formation of an acid rock drainage plume, caused by waste rock generating acidic groundwater. In addition, the Leederville Aquifer is now artificially connected to the Lesueur Sandstone formation throughout the historic Beenup Titanium Mine site as a result of mining activities. The contaminated groundwater flows south towards the Scott River and Hardy Inlet (DoW 2009c) and is currently subject to increased monitoring to document movement of the plume. Management measures are also being implemented, including a reduction in abstraction to minimise changes in groundwater level to prevent exposure of ASS.

As a consequence of the implementation of Groundwater Management Zone 7, water use from the Superficial, Leederville and Lesueur aquifers is restricted, meaning that no new water allocation and no new bores or excavations are permitted to be constructed in the Superficial or Leederville aquifers, within the management zone boundary, other than for exempt use, replacement of existing bores, monitoring purposes, or remediation (DoW 2009c).

3.5.2 Registered Groundwater Bores and Other Users

There are 24 registered groundwater bores on, or within 500 m, of the Study Area. Of these, 11 are registered as being subject to monitoring, one is registered for water supply, one is registered for stock and domestic use, and 11 are registered as Unknown. Unknown registered bores appear to be associated with the historic Beenup Titanium Mine and are likely associated with groundwater monitoring. The next closest confirmed groundwater user outside of the 500 m buffer is the community of Courtenay, approximately 2 km to the northwest.

3.5.3 Groundwater-Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) rely on groundwater for some or all their water requirements and can include groundwater dependent vegetation (phreatophytes), wetlands and subterranean fauna. While there is limited understanding of the interaction between surface and groundwater in the Study Area, it has been confirmed that the area does not support suitable habitat for subterranean fauna (Invertebrate Solutions 2024).

Groundwater dependent vegetation is primarily characterised by a dominance of phreatophytes (obligate or facultative) with other mesophytes, xerophytes or halophytes occupying the understory (Thomas 2013). Obligate phreatophytes are riparian vegetation species that rely entirely on groundwater, while facultative phreatophytes use groundwater situationally (Thomas 2013). The Study Area contains seven vegetation types that are known or potential GDEs (across 176 ha), comprising obligate or facultative phreatophytes (Phoenix 2025a). These vegetation types are summarised in Table 3-5 and shown in Figure 3-16, and can be broadly described as follows:

- Four known GDEs comprising obligate phreatophytes that are representative or analogous to the Scott River Ironstone Association Threatened Ecological Community (TEC).
- Three potential GDEs comprising facultative phreatophytes, with dominant taxa including *Melaleuca rhaphiophylla* and *Melaleuca preissiana*.

In addition, another seven vegetation types occupying 110 ha of the Study Area, supported incidental or non-dominant occurrences of groundwater dependent flora. These communities lacked sufficient, intact vegetation units to be characterised as GDE; however, comprise incidental or non-dominant groundwater dependent flora (Table 3-5; Figure 3-16). Potential GDEs can be identified by the presence of indicator species (Table 3-7, Figure 3-16), including albeit not limited to the following:

- *Banksia ilicifolia and B. littoralis: obligate phreatophytes that inhabit areas with shallow groundwater depth and typically have access to a year-round use of groundwater (Canham et al. 2009).*
- *Banksia attenuata*: a facultative phreatophyte that can periodically resist drought and can persist in a range of hydrological conditions and geomorphological gradients as water sources become available (Canham *et al.* 2009).
- *Melaleuca rhaphiophylla* and *M. preissiana:* facultative phreatophytes that thrive in alluvial soils and swamps, but can adapt to water-limited environments by extracting water from near the soil surface or deeper sources, depending on water accessibility, groundwater salinity fluctuations and surface salt accumulation (Mensforth and Walker 1996; Steggles *et al.* 2016).
- *Eucalyptus* spp. are commonly facultative phreatophytes (Phoenix 2025a) that use deep-rooted systems to avoid drought and maintain high rates of evapotranspiration by tapping into groundwater pockets and soil moisture sources (Markey and Dillon 2011).

Potentially groundwater dependent flora (Figure 3-17) also provide habitats for significant terrestrial bird and mammal species (Phoenix 2025b; Stantec 2024b). For example, the Study Area recorded potential breeding trees (*Eucalyptus* species) within seasonally inundated shrubland and seasonally inundated paperbark (*Melaleuca* spp.) woodlands (Phoenix 2025b). Whereas potential groundwater dependent species such as *Banksia ilicifolia* and *Banksia attenuata* provide foraging habitat for significant cockatoo species (Johnston *et al.* 2016).

Confirmed and potential GDE vegetation types typically aligned with two of the mapped wetland fauna habitats in the Study Area, comprising seasonally inundated paperbark woodland and seasonally inundated sedgeland, which support *Melaleuca rhaphiophylla* and/or *Melaleuca preissiana* (Phoenix in prep.-b). These wetland fauna habitats are located throughout the Study Area, covering more than 200 ha, with more than 90% of the mapped habitats overlapping with confirmed and potential GDE vegetation types (Figure 3-16). It also appears that more perennial waterbodies occur in the south of the Study Area, which may interact with the Superficial Aquifer, however, the reliance on these systems on groundwater is currently unknown.

Table 3-6: Vegetation types confirmed or considered potential GDEs within the Study Area (Phoenix 2025a).

Vegetation Type	Description	Groundwater Dependence
Confirmed GDEs		
AmBsHc	Scott River Ironstone TEC.	Obligate
EmmTpAs	Analogous to Scott River Ironstone TEC; Scott River Ironstone TEC.	Obligate
Mj	GDE Scott River Ironstone TEC.	Obligate
XpMdLm	Scott River Ironstone TEC.	Obligate
Potential GDEs		
MpXpHfSs	Dominated by *Melaleuca* spp. particularly *M. preissiana.*	Facultative
MrCh	Dominated by *M. rhaphiophylla*, *M. preissiana.*	Facultative
MrTjLs	Dominated by *M. rhaphiophylla*, *M. preissiana.*	Facultative

Table 3-7: Vegetation types containing incidental or non-dominant groundwater dependent species, considered potential GDEs within the Study Area (Phoenix 2025a).

Vegetation Type	Incidental / Non-dominant Groundwater Dependent Flora Species	Groundwater Dependence
AsLs	Presence of *M. preissiana.*	Facultative
CcTpCeOh	Presence of *Banksia attenuata* and *M. preissiana.*	Facultative
EmmAffMtAsDb	Presence of *B. attenuata* and *B. ilicifolia.*	Facultative
EmmTpGoMtPu	Presence of *B. attenuate* (located north-east of Study Area).	Facultative
EmmXpMtDb	Presence of *B. littoralis* and *B. ilicifolia.*	Obligate
PeeLs	Presence of *B. littoralis.*	Obligate
TiLs	Presence of *M. rhaphiophylla.*	Facultative

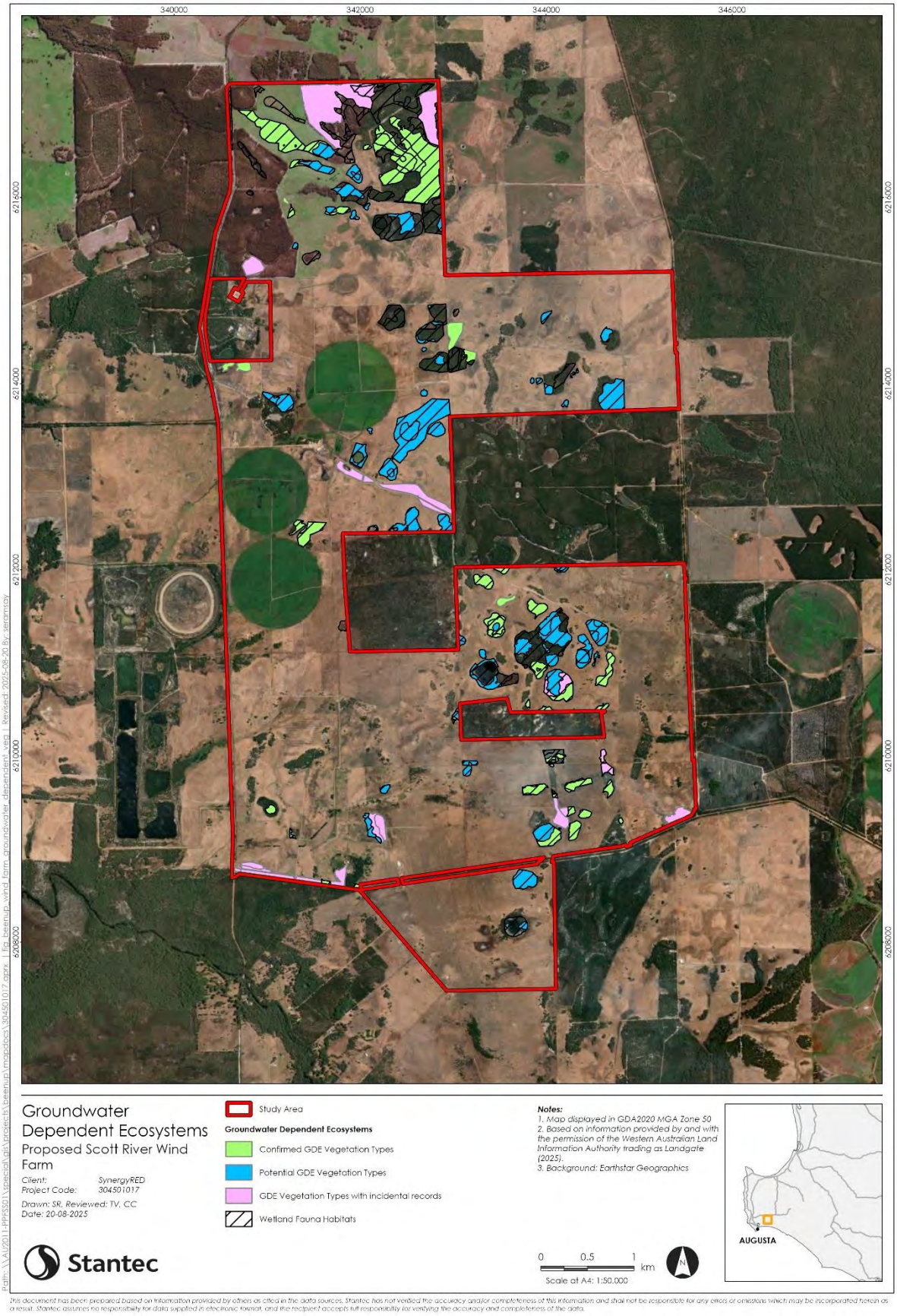

Figure 3-16: Confirmed and potential GDE vegetation types (including incidental records) and wetland fauna habitats (seasonally inundated paperbark woodland and seasonally inundated sedgeland) within the Study Area. Spatial layer source (Phoenix 2025a).

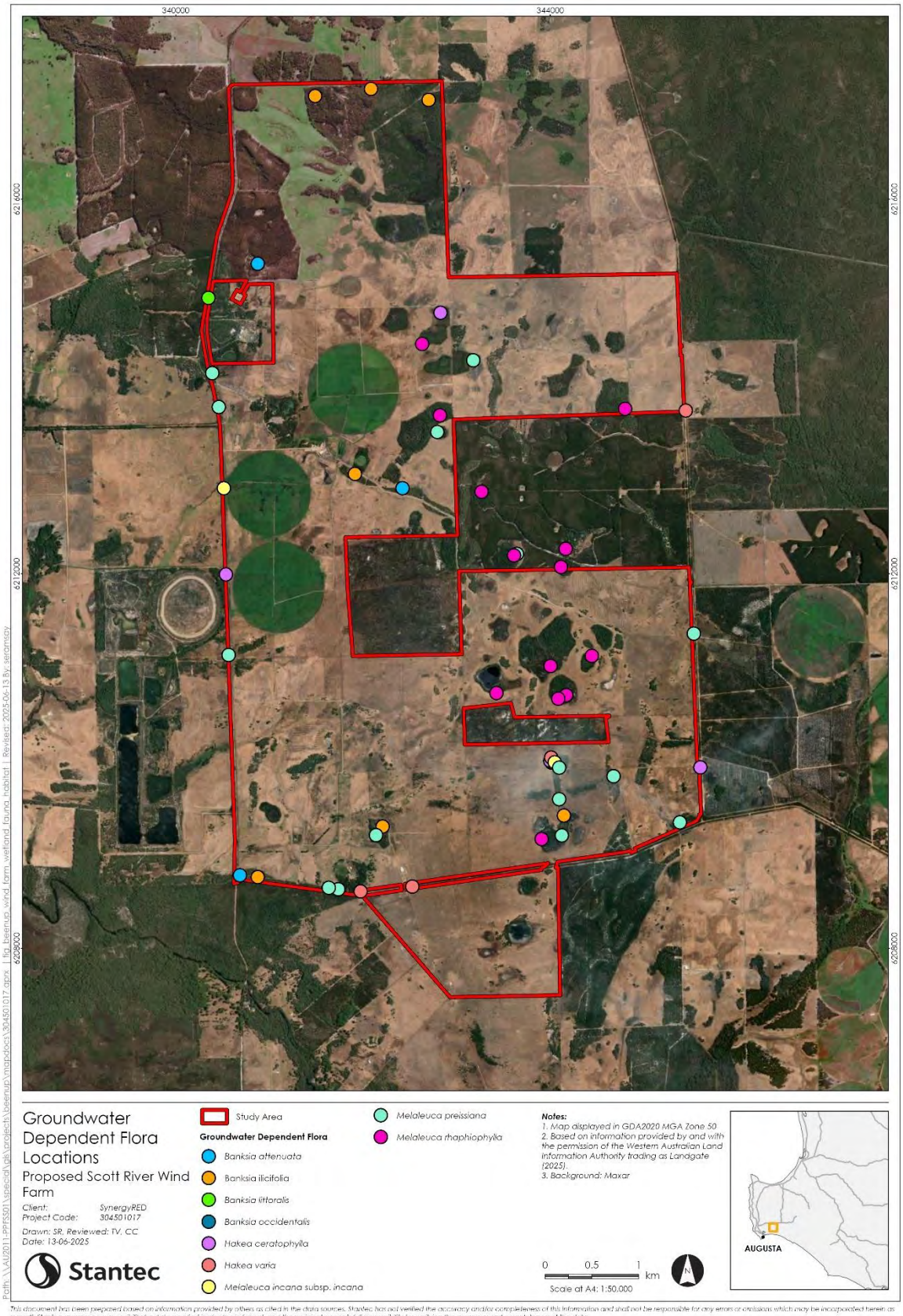

Figure 3-17: Groundwater dependent flora within the Study Area. Spatial layer source (Phoenix 2025a).

4 Hydrogeological Setting

4.1 Hydrostratigraphy

The regional Study Area is defined by three distinct hydrostratigraphic units within the Vasse Shelf; the Superficial, Leederville and Lesueur aquifers (Mohsenzadeh and Diamond 2000)(Baddock 1992, BHP 1998; Schafer *et. Al.,* 2008, Chan 2011, BHP 2015). A schematic model of the typical hydrological and geochemical elements associated with the upper 30 m of the historic Beenup Titanium Mine and southwest portion of the Study Area is presented in Figure 4-1.

The maximum depth of the Stantec (2024c) monitoring bores is approximately 25 m and the aquifer units associated with these bores are the Superficial Aquifer and Leederville Aquifer. Groundwater bores, including other nearby non-Stantec installed bores, and respective aquifer units within and near to the Study Area are summarised in Appendix C and Appendix D.

The Lesueur Sandstone aquifer is a deeper confined aquifer generally ranging from between 50 mbgl to 420 mbgl (Baddock, 1992; BHP 2015). The aquifer is only exploited for groundwater on the Vasse Shelf, where it is overlain by the Leederville or Superficial Formation and was not encountered during the 2024 Stantec investigations, nor is it likely to be encountered during the proposed development and therefore not summarised any further.

4.1.1 Superficial Aquifer

Regionally, a confining layer known as the Mowen aquitard separates the Superficial Aquifer from the underlying Leederville Aquifer. Excluding the coastal dunes, the Superficial Formation typically has a saturated thickness of less than 10 m; however, across the western sections of the broader coastal plains, it is only a few metres thick (Mohsenzadeh and Diamond 2000). The occurrence of the Superficial Aquifer is localised, including perched groundwater above impermeable beds of the Leederville formations, and local confinement zones of low permeability in the laterite (ferricrete) profile (DoW 2009b). This unit has also been described by BHP (1998, 2015) as the Warren Sands (Figure 4-1).

At the Study Area, the Quaternary Superficial Formation is a dominant sand and ferricrete of variable thickness and hosts a shallow unconfined aquifer with a water table, generally less than 3 m deep. Where ferricrete is present this may represent the accumulation and precipitation of dissolved iron at the water table, which is supported by high dissolved iron concentrations (iron 6-30 mg/L) (Section 3.3.7).

Stantec (2024c) reported groundwater seepage at several shallow test pits (TP01, TP07, TP08, TP09) that were defined as Quaternary dune deposits (superficial). These indicate that a discontinuous (likely seasonal) perched Superficial Aquifer is present locally across the Study Area. The Superficial Aquifer was identified in several Stantec (2024c) groundwater monitoring bores (WM01-W-S01, WM01-W-S02, WM02-W-S01, WM02-W-S02, WM03-N-S01, WM03-N-S03, WM03-N-S04 and WM03-N-S05), as well as at non-Stantec groundwater bores near the Study Area (Mohsenzadeh and Diamond 2000)(Baddock 1992, BHP 1998; Chan 2011, BHP 2015).

4.1.2 Leederville Aquifer (Warnbro Group)

Regionally the Leederville Aquifer on the Vasse Shelf (between Busselton and Dunsborough faults) is confined and lies beneath the Superficial Formation of the coastal plains. It can be found at the surface in certain areas of the Blackwood Plateau, where it has been weathered and lateritised. The Mowen aquitard is composed of the Quindalup and Mowen members, which are primarily made up of clay and silty clay units. In areas where the Quindalup Member is sand-dominant and the Mowen Member becomes thinner, there is a corresponding increase in sand content. As a combined unit, these members effectively integrate into the Leederville Aquifer, as a multi-layered aquifer, comprising discontinuous interbedded sequences of sand and clay, typically up to 100 m thick, and up to 200 m in some places. (DoW 2009). These defining features of the Leederville aquifer have been described by BHP (1998, 2015) as the Beenup Beds and Strucel Beds (Figure 4-1).

At the Study Area, the Leederville aquifer was identified in several Stantec (2024c) groundwater monitoring bores from 1.6 m to 9.25 mbgl (WM01, WM01-W-S01, WM02, WM02-W-S02, and WM03), including non-Stantec installed groundwater bores near the Study Area (Mohsenzadeh and Diamond 2000)(Baddock 1992, BHP 1998; Chan 2011). The Leederville formation appeared to become shallower toward the north and deepen toward the south, which is consistent with the regional understanding.

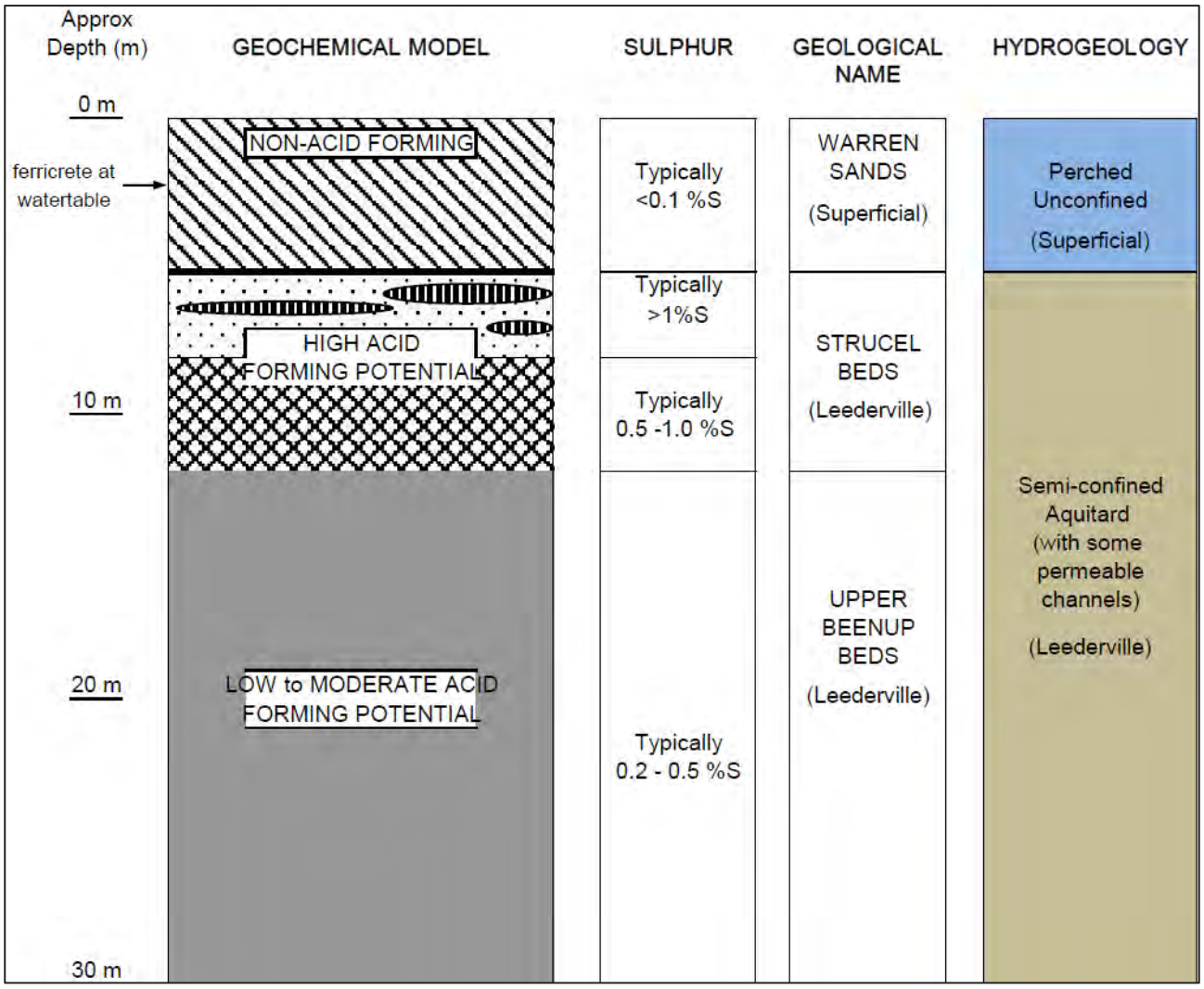

Figure 4-1: Hydrological and geochemical schematic conceptual model of the historic Beenup Titanium Mine (Leederville Formation) deposit (adapted from BHP 2015).

4.2 Groundwater Levels and Flow Direction

The long-term monitoring undertaken by BHP (2015) (between 10 and 34 years) indicates that groundwater levels in the Superficial Aquifer and the Leederville Aquifer have fluctuated between 1 m and 2 m in summer. BHP hydrographs indicate seasonal fluctuation between 1 m and 2 m with the highest groundwater levels between August and September, followed by a reduction between April and May (Appendix E). Groundwater SWL variations, reported by BHP (2015), throughout each year generally fluctuated between 2 m and 3 m. However, drawdown of up to 15 m was noted in monitoring bores in proximity to production bores.

Stantec undertook groundwater monitoring between April 2024 and September 2024. Groundwater standing water levels (SWLs) in the Superficial Aquifer (shallow bores) ranged from 0.56 metres below top of casing (mbTOC) (-0.11 mbgl) to 3.75 mbTOC (3.15 mbgl), corresponding to a relative level (RL) elevation range of between 26.25 m AHD and 35.32 m AHD (Figure 4-2). Several bores are situated within a localised topographic depression (in the form of wetlands or ponding) that is subject to surface inundation. It is uncertain whether the observed inundation is attributable to groundwater discharge or the accumulation of surface water. Groundwater flow within the Superficial Aquifer is likely discontinuous across the Study Area and local flow direction pathways may be variably influenced by seasonal rainfall, evapotranspiration and recharge. Generally, the groundwater flow direction is inferred to follow down topographic gradient, toward the south or southwest (Figure 4-4) and in the eastern Study Area, toward the southeast. Shallow test pits (TP01 – northwest, TP07 – southwest, TP08 – northeast, TP09 – northeast) encountered groundwater seepage from the Superficial Aquifer, ranging from 1.1 mbls to 2.0 mbls (Appendix C).

Groundwater SWLs in the Leederville Aquifer (deep bores) ranged from 0.72 mbTOC (0.07 mbgl) to 2.94 mbTOC (2.25 mbgl) (elevation RL ranged between 28.03 mAHD and 35.52 m AHD) (Figure 4-3). Groundwater SWLs recorded in the Leederville Aquifer were higher in the northern portion of the Study Area (WM01), which suggests a generally southward direction of flow (Figure 4-5.

Regional groundwater flow is generally from north to south, ultimately discharging downwards into the underlying formations, surface-water features such as the Scott River, and into the Southern Ocean (Chan 2011).The inferred groundwater flow direction of the Leederville Formation (WM01 - WM03) is from the north to the south (Figure 4-5). Elevations for the Superficial Aquifer also suggest a southward direction of flow Figure 4-4.

A summary of groundwater level gauging information from March to September 2024 is presented in Appendix C. Table E.4. Groundwater levels in both the Superficial and Leederville Aquifers showed clear seasonal variation that was strongly correlated to rainfall. Peak groundwater levels occurred mainly in winter months and at the beginning of spring (July to September) and declined by up to 2.0 m during dry periods. Seasonal groundwater fluctuations were observed across the Superficial Aquifer and the Leederville Aquifer with variations of approximately 2.0 m recorded from the WM01 cluster, approximately 1.2 m at WM02 and approximately 1.7 m at WM03.

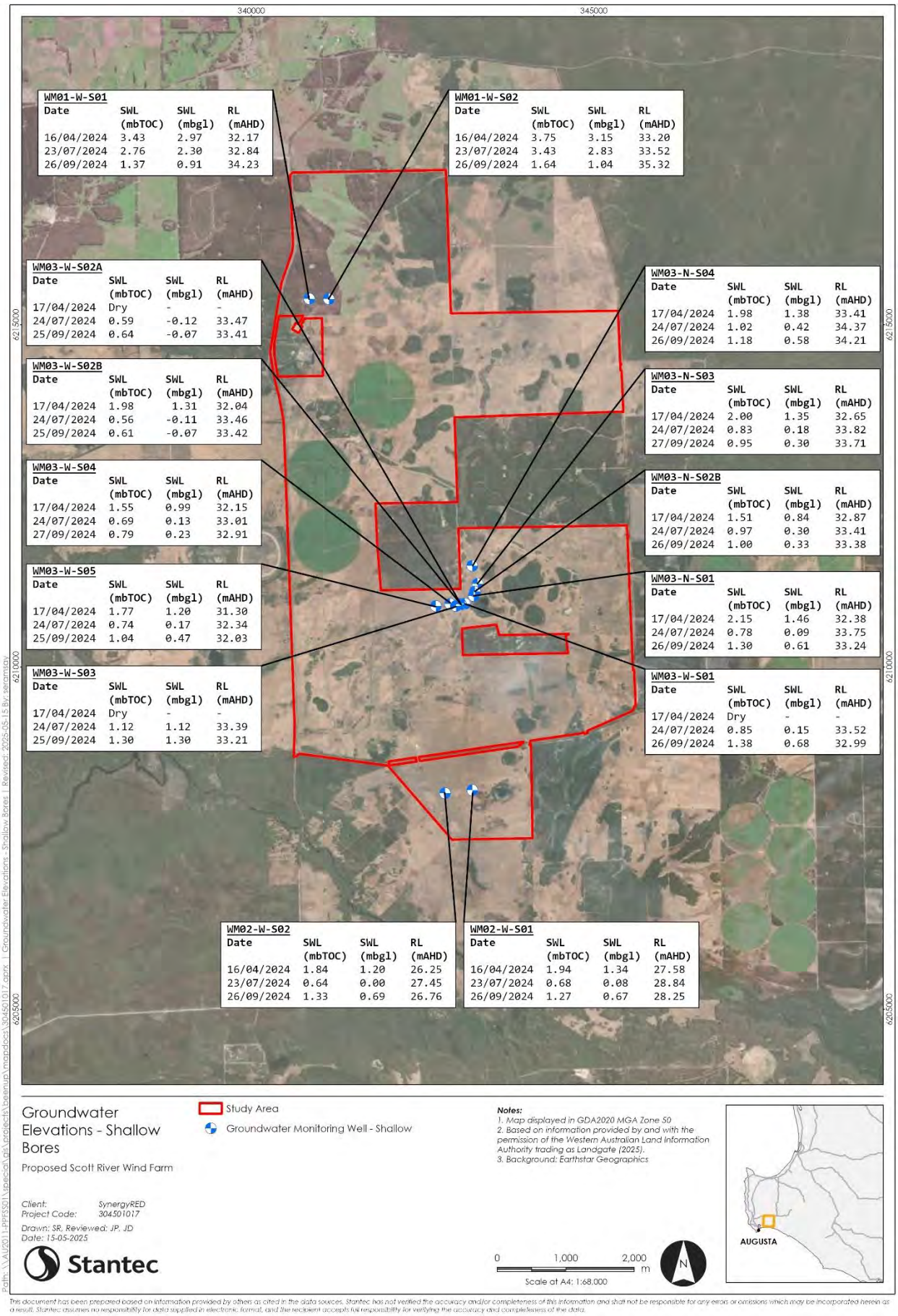

Figure 4-2: Superficial Aquifer groundwater depths and elevations (shallow bores).

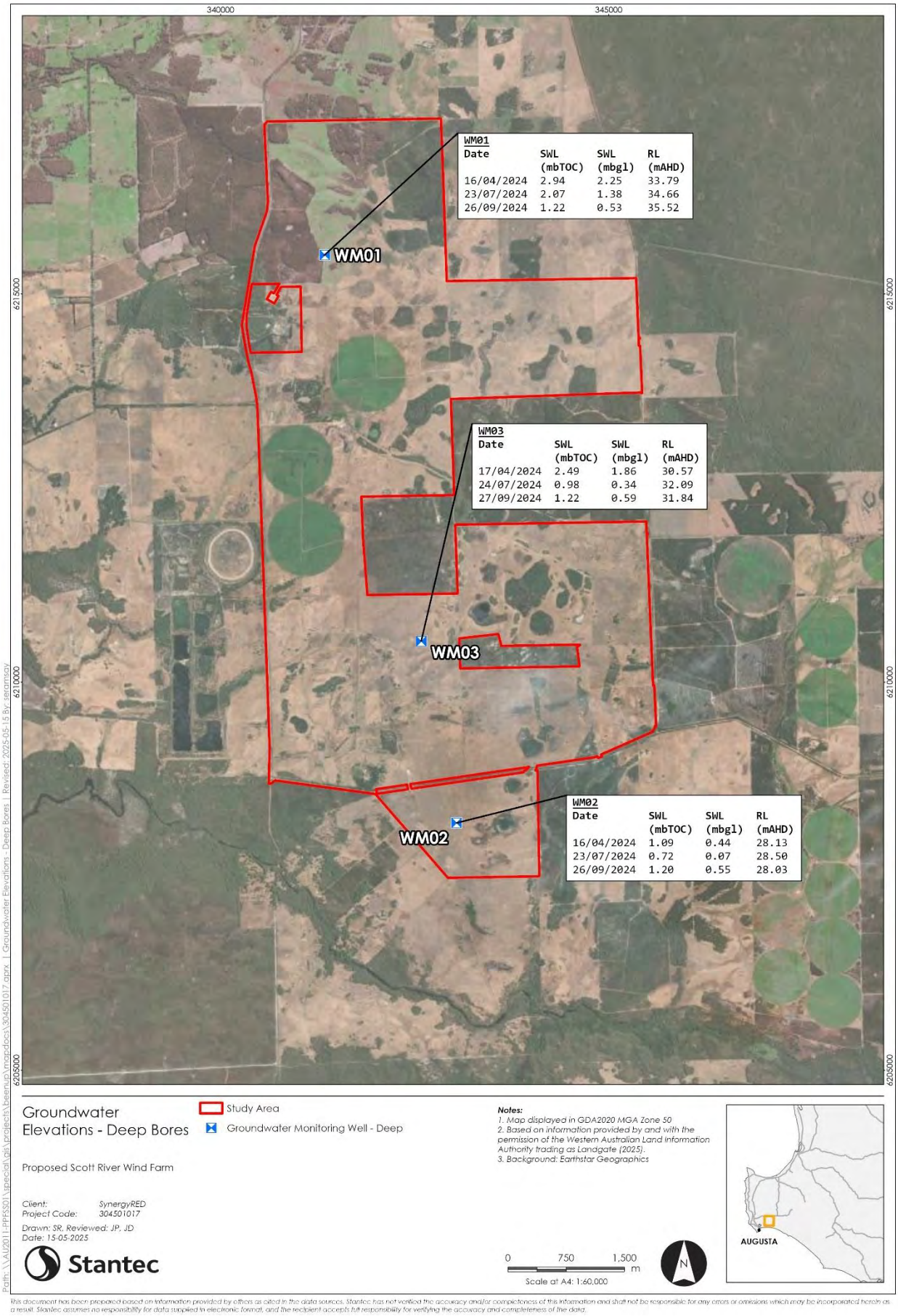

Figure 4-3: Leederville Aquifer groundwater depths and elevations (deep bores).

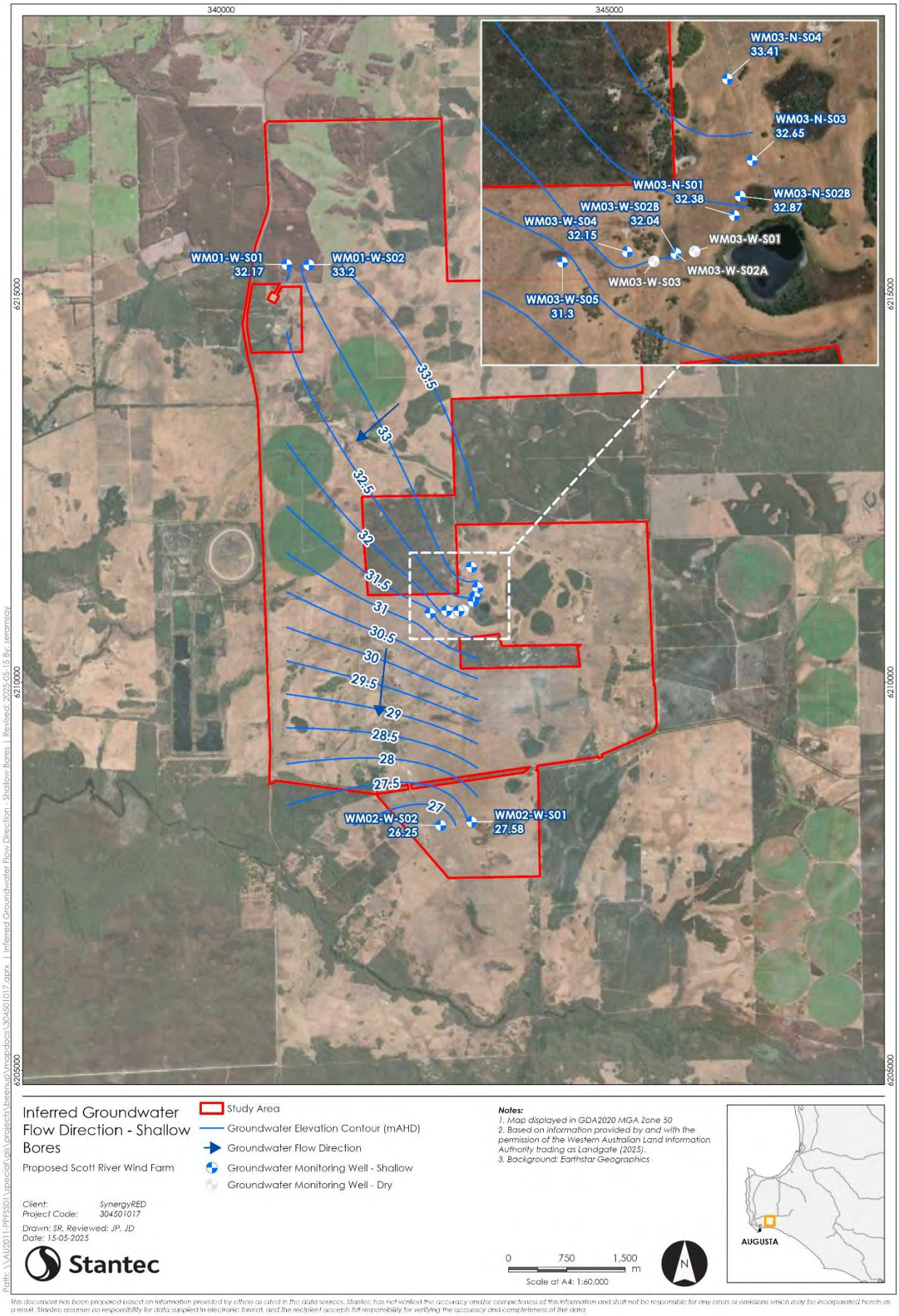

Figure 4-4: Superficial Aquifer groundwater inferred groundwater flow direction April 2025 (shallow bores).

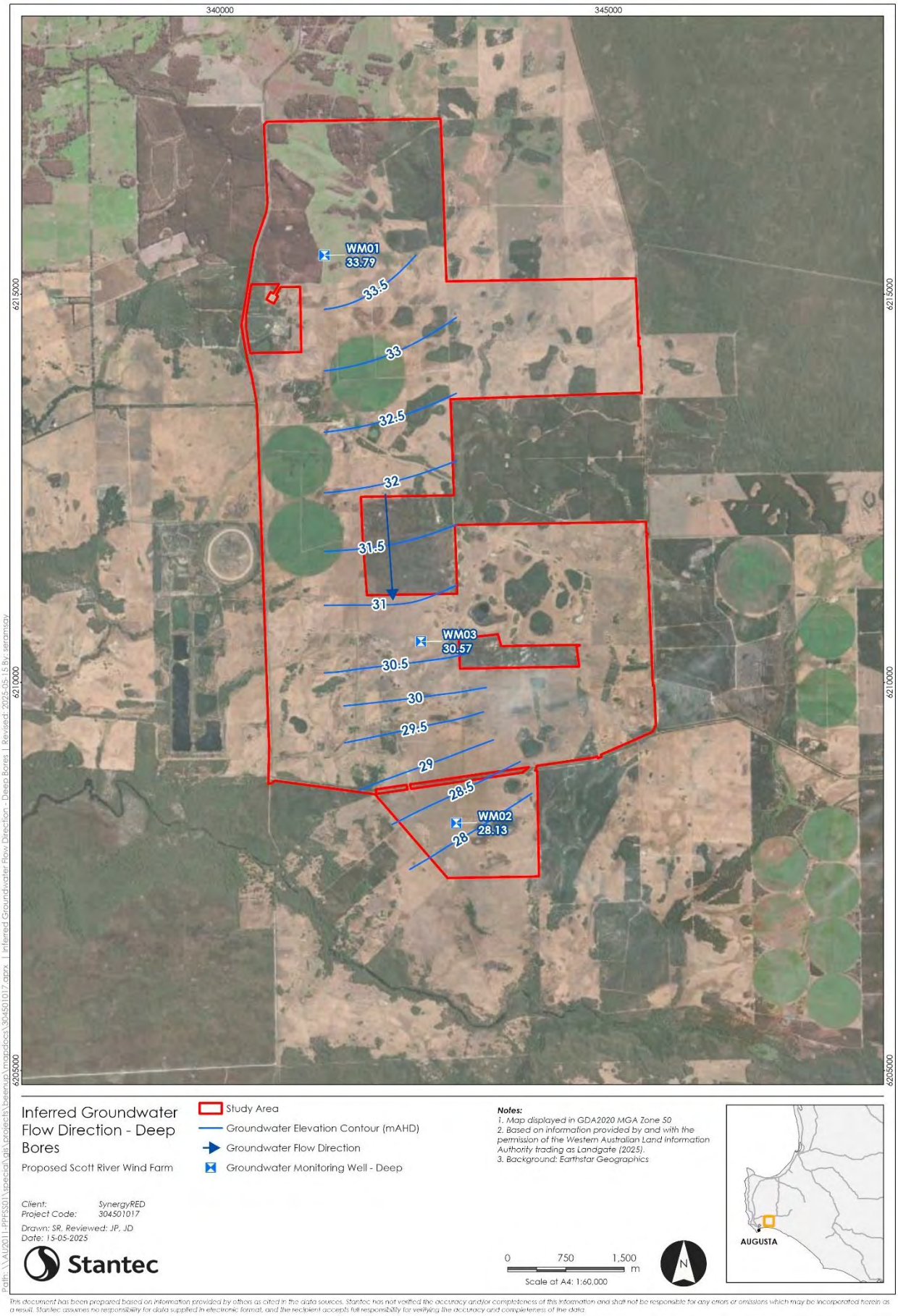

Figure 4-5: Leederville Aquifer groundwater inferred groundwater flow direction April 2025 (deep bores).

Groundwater depths at nearby non-Stantec bores within the Superficial Aquifer were reported from 0.76 mbTOC to 3.0 mbTOC and in the Leederville Aquifer (Warnbro Group) from 0.25 mbTOC to 3.7 mbTOC. Depths were dependent on season and topographic elevation, greater levels in high topographic areas, and low elevation in low topographic areas, which is consistent with Stantec observations within the Study Area (Mohsenzadeh and Diamond 2000)(Baddock 1992, BHP 1998, Chan 2011).

Groundwater SWLs in the Stantec bores were measured continuously between March 2024 and September 2024. Through April 2024 rainfall was considerably below average. Hence, recorded water levels across the Study Area were likely to be much lower than during years with average or above-average rainfall. However, between June 2024 and September 2024 groundwater SWLs recorded in the Stantec bores had increased by up to approximately m in the superficial aquifer (Figure 4-6, Figure 4-7 and Figure 4-8) and approximately 2 m in the Leederville aquifer (Figure 4-9, Figure 4-10 and Figure 4-11). Since September 2024 groundwater levels have dropped between 0.5 m and 1.0 m in response to a lack of significant rain.

Seasonal variation in each aquifer appears to respond to rainfall, with the Superficial Aquifer (shallow bores) indicating a greater response compared to the Leederville Aquifer (deep bores). WM02 located in the southern Study Area indicated oscillating groundwater levels, with drawdown ranging between 0.15 to 0.3 mbgl, between February to March and in September 2024. This is characteristic of nearby groundwater extraction and pumping influences which aligns with likely seasonal irrigation pumping regimes.

In summary groundwater levels are influenced by seasonal variation and irrigation. All well locations that were identified to host groundwater throughout the year variably responded to rainfall, with increasing groundwater levels during the wetter months. Seasonal spatial influences were not as apparent, however Superficial Aquifer locations in the north appeared to respond with greater increases than central and south. The Leederville Aquifer level responses and increases were relatively consistent except for WM02, which only varied by up to 0.5 m and was seasonally influenced by nearby pumping effects.

The data within WM02 has been modified due to potential damage of the bore installation, this has been presented in Figure 4-14.

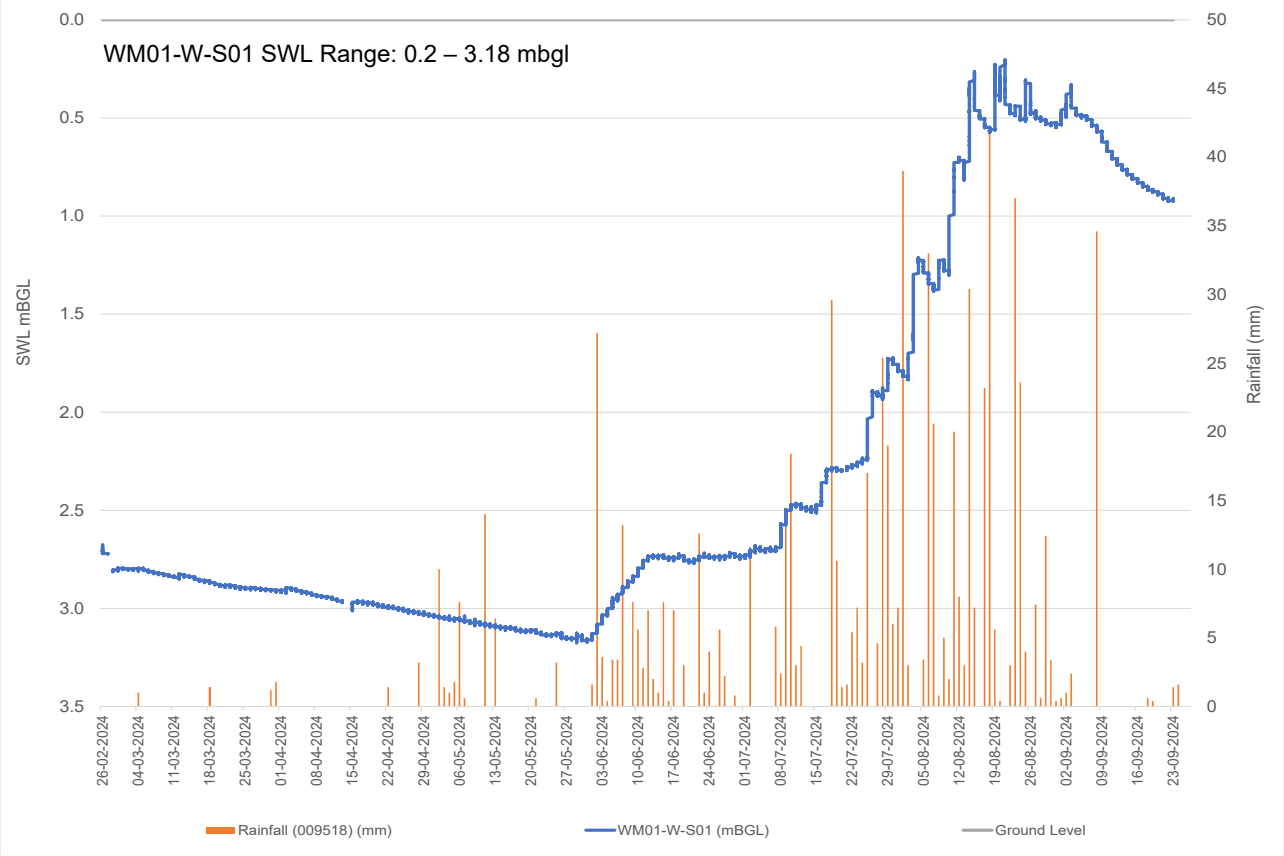

Figure 4-6: Recorded groundwater levels and rainfall, Superficial Aquifer (WM01-W-S01).

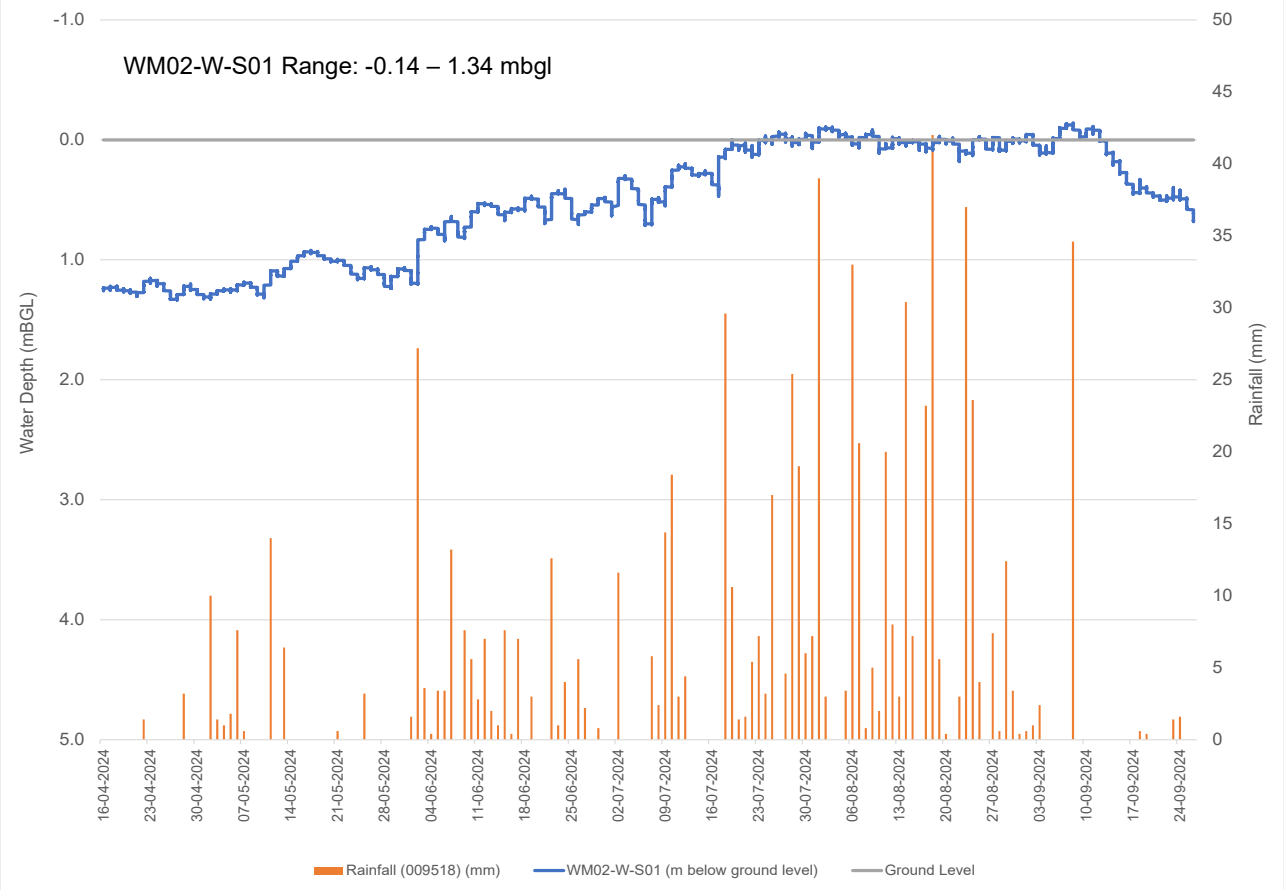

Figure 4-7: Recorded groundwater levels and rainfall, Superficial Aquifer (WM02-W-S01).

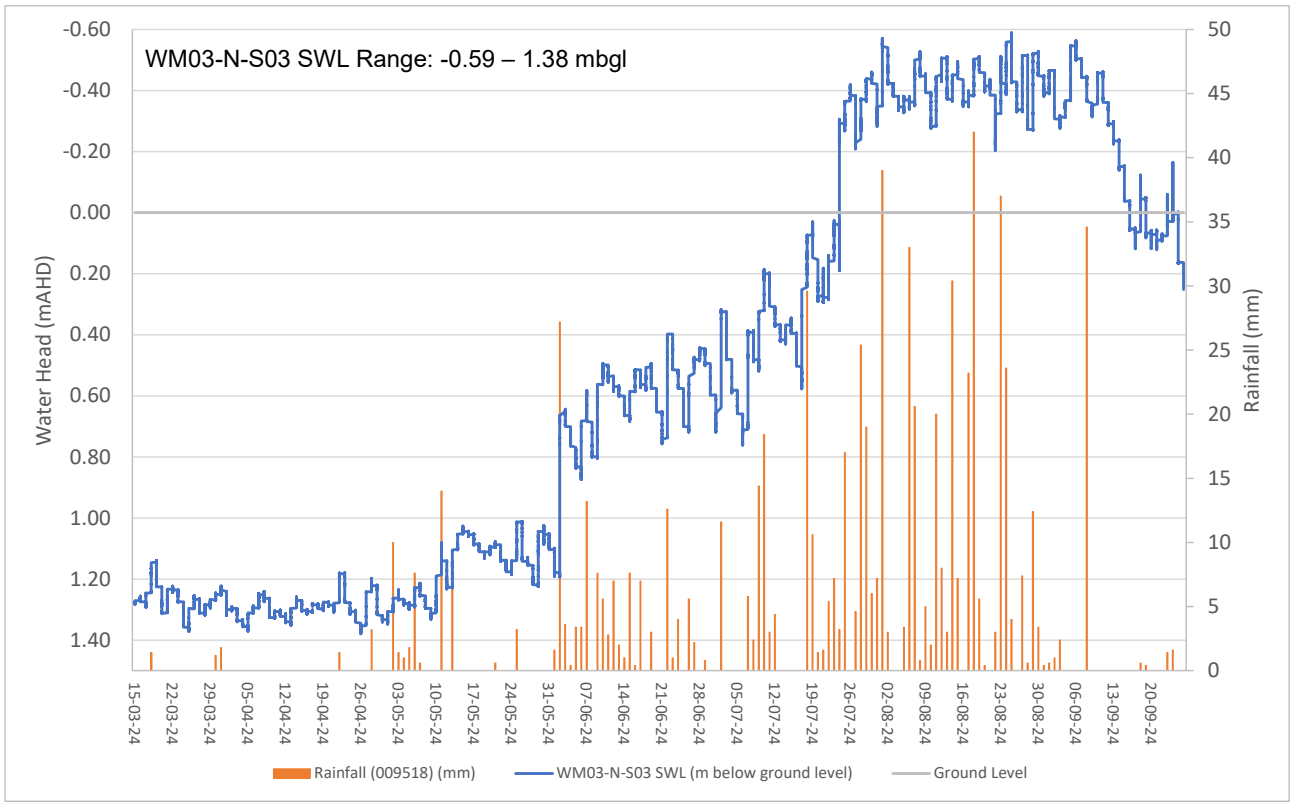

Figure 4-8: Recorded groundwater levels and rainfall, Superficial Aquifer (WM03-N-S03).

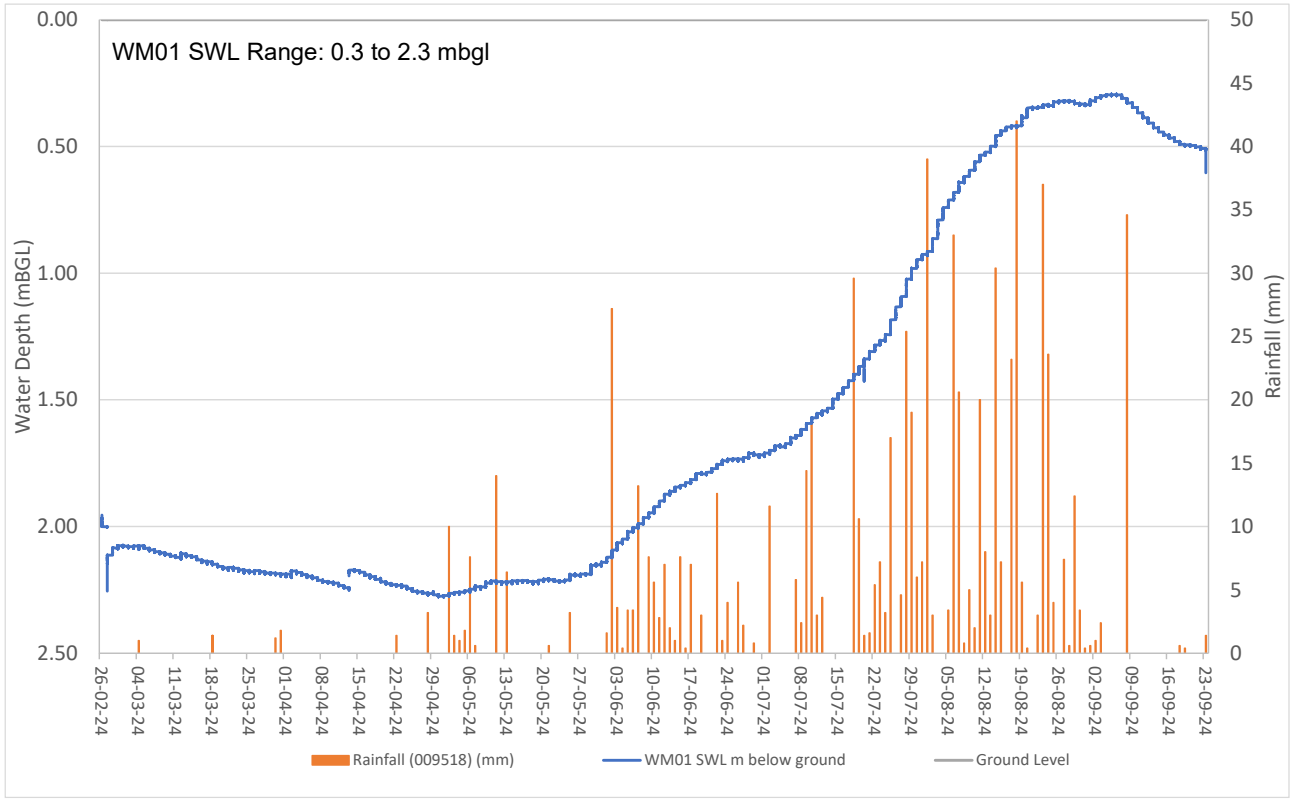

Figure 4-9: Recorded groundwater levels and rainfall, Leederville Aquifer (WM01).

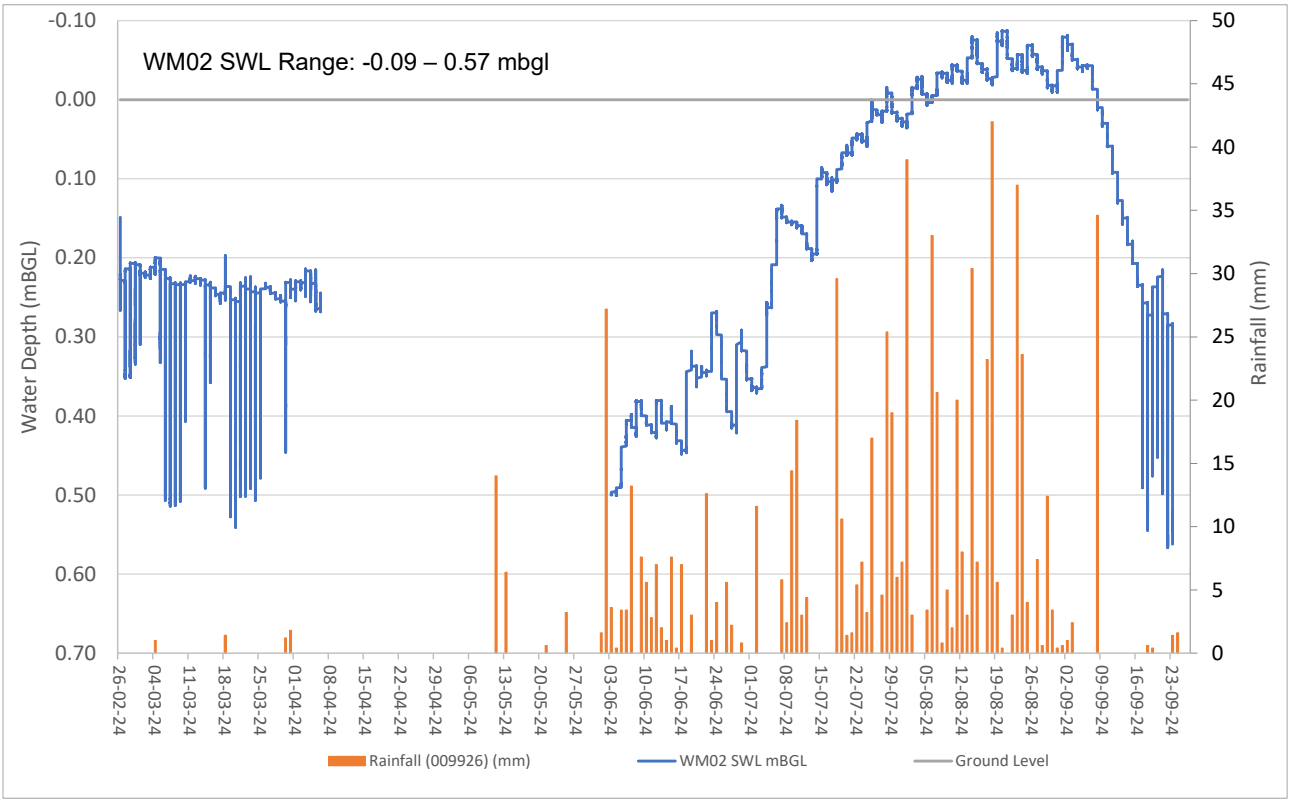

Figure 4-10: Recorded groundwater levels and rainfall, Leederville Aquifer (WM02).

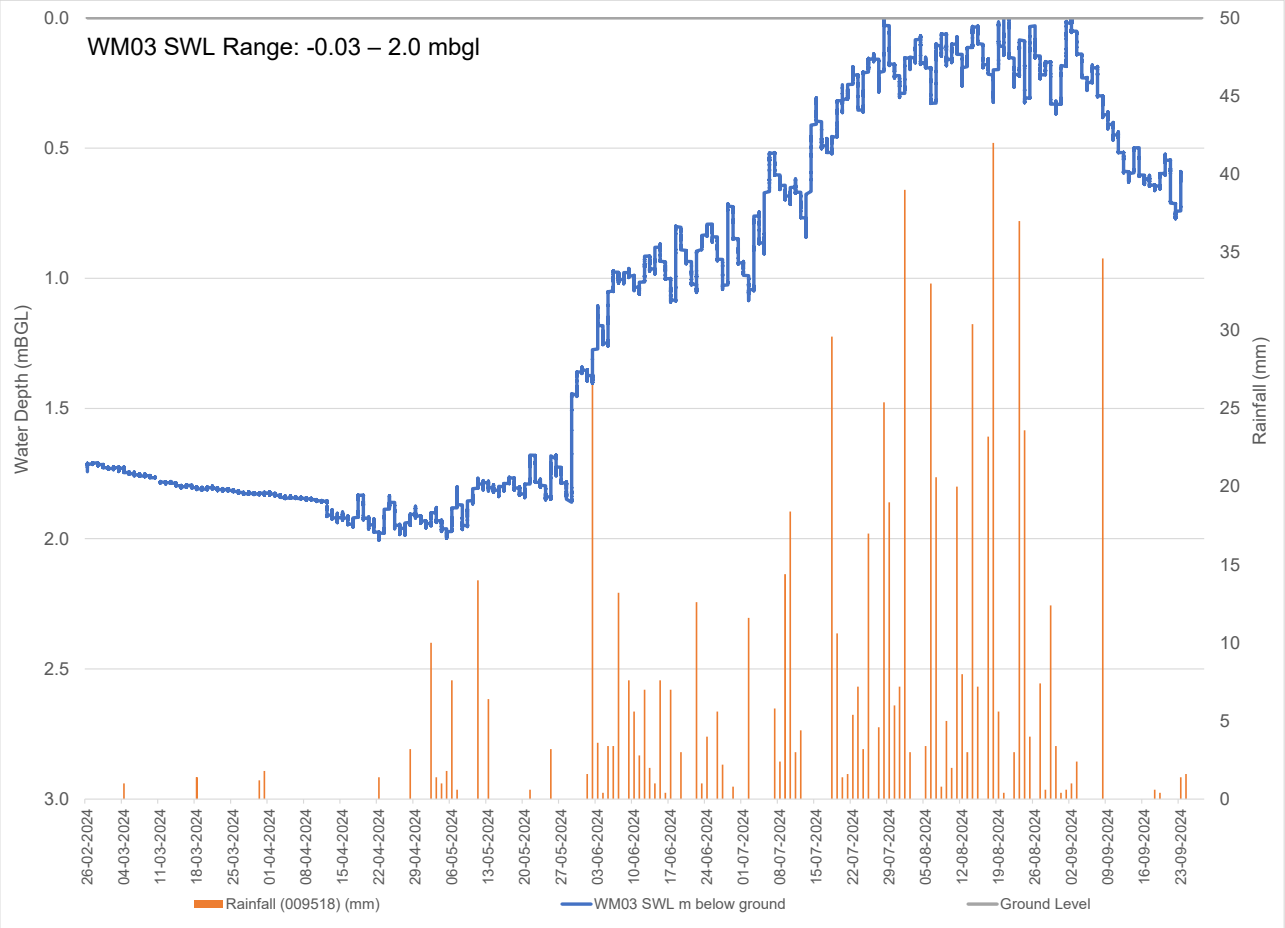

Figure 4-11: Recorded groundwater levels and rainfall, Leederville Aquifer (WM03).

4.3 Groundwater-Surface Water Interaction

In April 2024, Stantec monitored several potential surface water monitoring sites, with all locations dry except one location, which is located in the western area, closest to the historic Beenup Titanium Mine. Surface water at this location was suspected to be related to discharge from a nearby irrigator.

Assessment of potential surface water and groundwater interactions were unable to be adequately assessed at the groundwater bores, in relation to these interactions and their effects on nearby wetland features, due to the investigation being undertaken during an extended drought period. Monitoring also did not capture any wetland water levels and therefore it is difficult to quantify the direct relationship between the groundwater levels and wetlands.

A BHP (1998) assessment had indicated that the Superficial Aquifer was likely connected to creeks during wetter periods (winter), suggesting that surface water- groundwater interactions may be ephemeral and seasonally influenced. It can be inferred that for most of the Study Area locally perched and seasonally present groundwater within the Superficial Aquifer in proximity to wetlands and drainage features may be seasonally connected.

Areas in the low-lying southwest, southeast and closer to Scott River are likely to host perennial systems, due to discharge from the upgradient Superficial Aquifer and the general hydraulic gradient from the north to the south contributing lateral flow to these areas. It is unlikely that the deeper Leederville Aquifer was in direct connection to the ephemeral surface water features across most of the Study Area, except where potential outcropping in the northern area may occur.

With the currently available monitoring data and spatial coverage, confidently evaluating surface water-groundwater interactions across the broader study area is difficult to quantify and may need to be quantified on a localised basis.

4.4 Recharge and Discharge Processes

4.4.1 Groundwater Recharge

The Superficial Aquifer is recharged by direct diffuse rainfall infiltration and localised downward leakage from creeks, wetlands and irrigation through alluvial soils. Potential upward leakage from the underlying Leederville Formation may also occur (Baddock 1995). Lateral flow may enter the Superficial Aquifer from adjacent areas with higher groundwater levels, such as from nearby wetland areas and the dune peaks. During typical wetter seasons (winter) the water table is shallow (often surface expressing in wetlands and lakes); while during drier seasons (summer) some areas can become dry, with reduced rainfall affecting depth to the water table. The Leederville aquifer is recharged via lateral flow and vertical downward leakage from the Superficial Aquifer, with potential upward leakage from the Lesueur aquifer (BHP 1998, Chan 2011).

The data captured from the ongoing water level monitoring indicates a significant response between rainfall and groundwater levels, in both the shallow Superficial Aquifer by up to 2 m (Figure 4-6, Figure 4-7 and Figure 4-9) and deep Leederville Aquifer, approximately 2 m (Figure 4-9, Figure 4-10 and Figure 4-11).

4.4.2 Groundwater Discharge

Discharge from the Superficial Aquifer occurs via evapotranspiration, where the water-bearing zones of the Superficial Aquifer are within approximately 2 m of the unsealed land surface, from lateral flow into surface-water features and downward leakage into the underlying formations. Drainage and land-use activities may also affect the Superficial Aquifer further. The Leederville aquifer discharges to major rivers creeks or the coast and to other aquifers via vertical leakage. Groundwater pumping from the Superficial Aquifer and Leederville Aquifer occurs around the Study Area, as evidenced by numerous registered groundwater bores within 2 km of site, used for irrigation.

Irrigation bore extraction from the aquifer occurs within and around the Study Area. An increase in groundwater levels (Figure 4-6 to Figure 4-11) may also suggest that seasonal irrigation pumping has decreased or reduced. WM02 located in the south indicated oscillating groundwater levels between February to March and September 2024, which is characteristic of nearby groundwater pumping influences.

4.5 Aquifer Hydraulic Parameters

No hydraulic parameter testing has been completed at the site to date. Inferred values of hydraulic conductivity used in the drawdown model (Section 6) were based on bore log lithologies and particle size distribution of the saturated soils encountered during the installation of the geotechnical bores.

Estimates were conducted using Hydrosieve analysis for WM03 (4.0-5.0 m), which is in poorly graded sand. The calculated geomean hydraulic conductivity (K) is approximately 20 m/d. Literature values for fine sands ranged between 1 m/day and 5 m/day; while for medium sand up to 20 m/day is reported (Kruseman and deRitter, 2000), which is consistent with the geomean of approximately 20 m/d. A representative K value of 10 m/d has been adopted to reflect the interbedded sands, sandy clays, and clayey sands in which the shallow water table occurs. For the clayey sands to sandy clays noted in the log for WM01, literature values range between 0.001 m/d and 0.1 m/d.

The following storage characteristics (specific yield) were adopted based on bore log material description compared to literature values:

- Bore group WM01 sand clay to clayey sand: 5% (based on silt) (Morris and Johnson 1967).
- All other locations sand: 20% (based on typical sand) (Heath 1983).

4.6 Groundwater Flow Systems

Groundwater flow systems in any terrain characterise the occurrence of groundwater and its flow from areas of recharge to areas of discharge, often into surface water bodies. The main influences on groundwater occurrence and flow across the Study Area are:

- Rainfall distribution (providing maximum recharge to groundwater during winter periods, when rainfall is expected to exceed evaporation).
- Vegetation land clearing of formally remnant wetland environments would likely introduce more recharge into the underlying system, and potentially cause the shallow water table to rise.
- Spatial distribution of higher permeability, dominantly sandy layers (which have the potential to increase the percolation rate of infiltrating water).
- Spatial distribution of lower permeability clay, silt and ferricrete layers (which have the potential to slow the percolation of infiltrating water and confine deeper more permeable layers).
- There are several naturally occurring surface water features that may seasonally interact with the shallow Superficial Aquifer, near and within the Study Area, detailed as follows:
    - Ephemeral wetlands across the site, with the entire site characterised as a wetland environment. However, the majority of the site has been highly modified resulting in fragmented wetland communities distributed across the landscape.
    - Ephemeral creeks or drainage lines, which are evident across the site, are often connected to wetland groups, which discharge into inferred perennial rivers, such as the nearby Scott River.
    - Inferred perennial streams and the Scott River south of the Study Area.
- To the southwest of the site, the BHP former mine voids (now pit lakes) are still present and filled with water. These lakes may still be connected to the variable lithological units at these locations, where subsurface flow and connection is present.
- Existing groundwater users (i.e., water abstraction/irrigation).

Geological cross sections for the areas represented by WM01, WM02 and WM03 are shown in Figure 4-12 to Figure 4-14.

The Superficial Aquifer developed in the dune materials thickens from a thin veneer of approximately 2 m in the northern area at WM01 to between 4 m and 6 m in the central area at WM03, then approximately 10 m in the southern area at WM02.

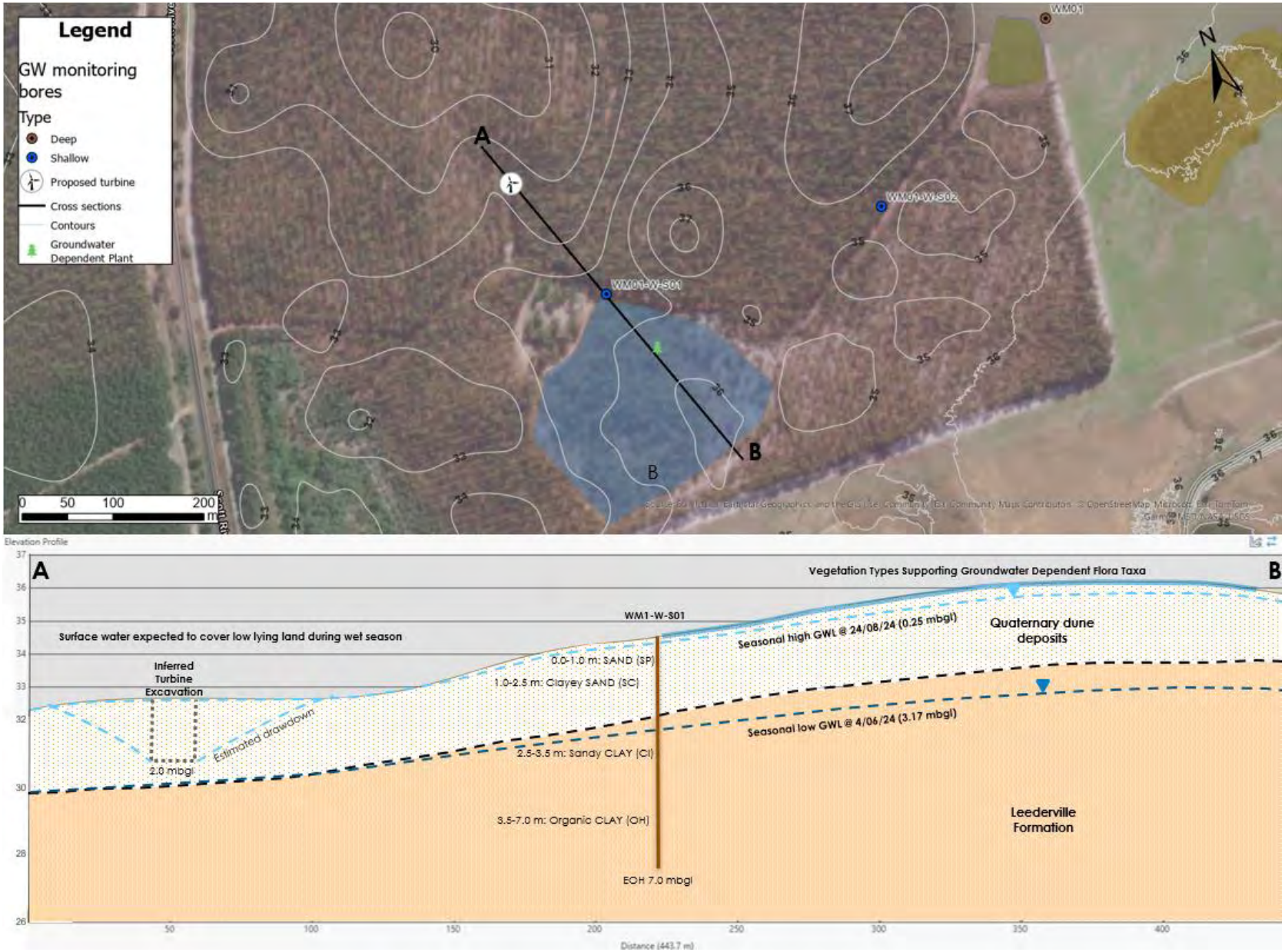

Figure 4-12: WM01-S01 geological cross section and predicted extent of targeted drawdown for turbines.

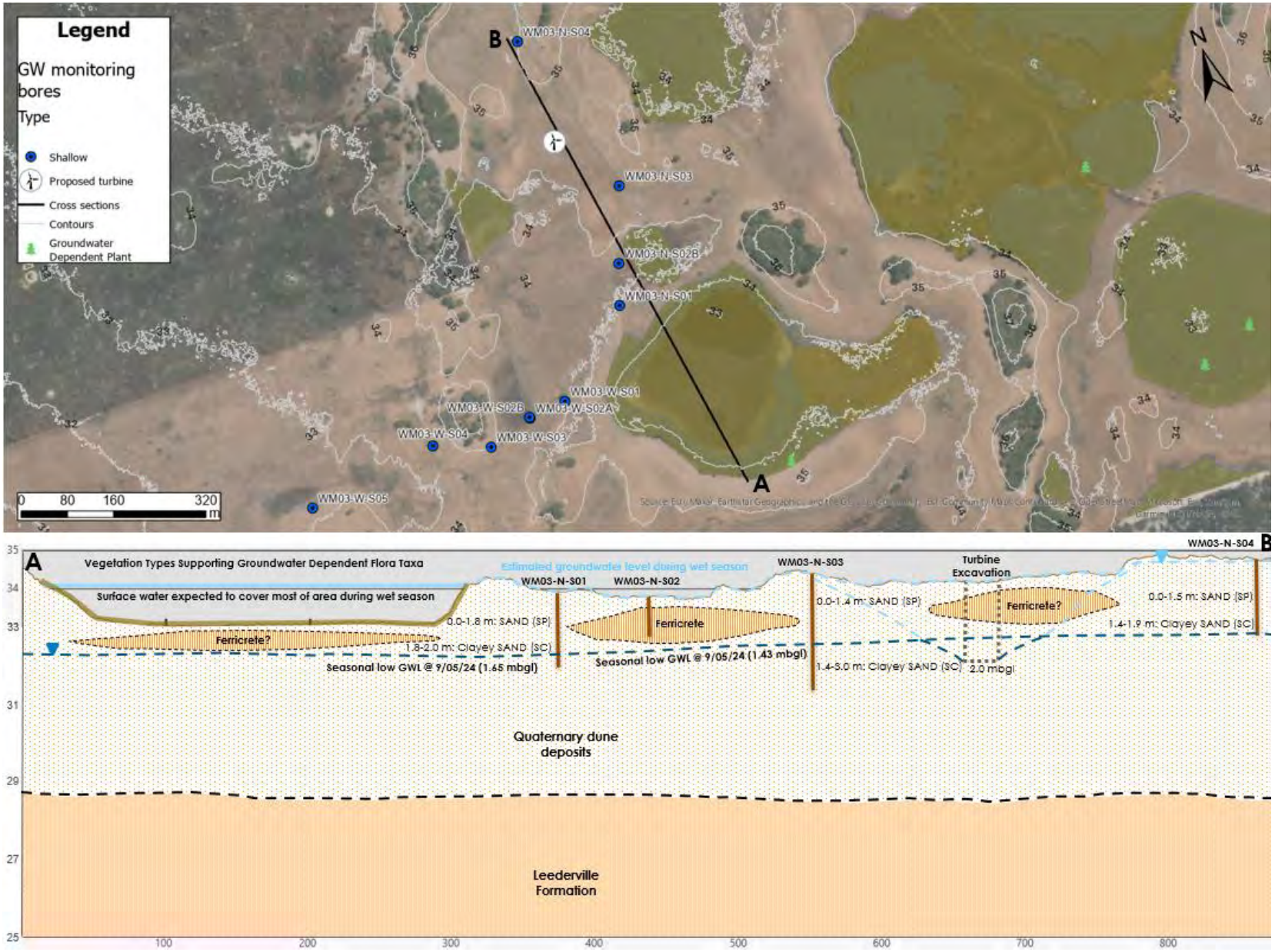

Figure 4-13: WM03 bore group area northern bore transect geological cross section and predicted extent of targeted drawdown for turbines.

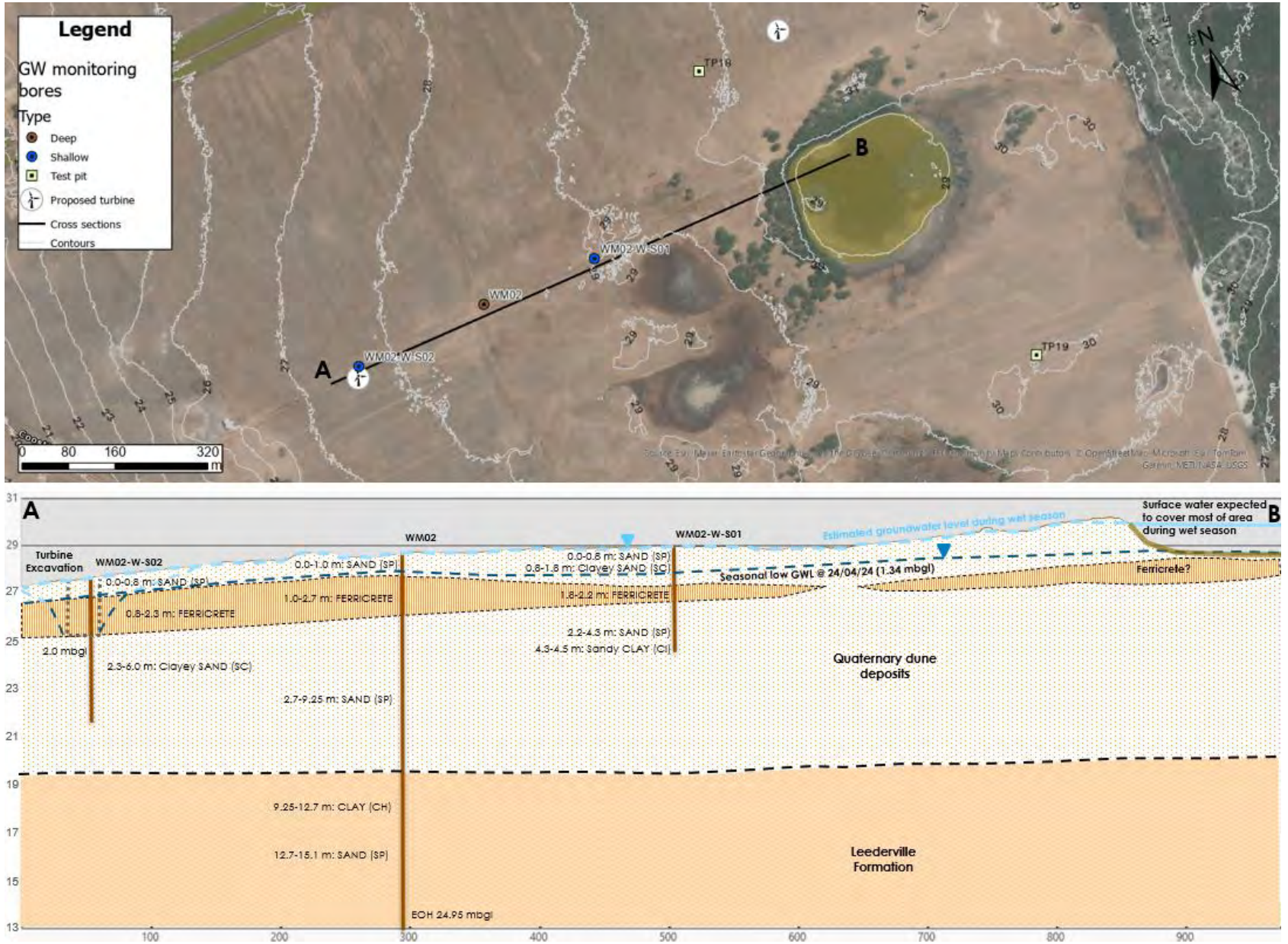

Figure 4-14: WM02 bore group area western bore transect geological cross section and predicted extent of targeted drawdown for turbines.

4.7 Groundwater Quality

Regionally, the Superficial Aquifer and Leederville Aquifer salinity is generally fresh, with total dissolved solids (TDS) of less than 500 mg/L (DoW 2009b). Groundwater monitored from nearby non-Stantec bores within the Superficial Aquifer ranged from approximately 200 to 500 mg/L (Baddock 1992, Chan 2011). Site-specific monitoring results are consistent with these regional values. Groundwater quality was classified as acidic to neutral and was freshwater. Several exceedances of relevant guideline triggers were recorded for the following parameters:

Superficial Aquifer

- pH at all monitoring bores and all monitoring events, majority of values acidic, no clear seasonal trends.
- Salinity at three monitoring bores during July 2024, September 2024, and January 2025, electrical conductivity at the majority of bores across all monitoring events, and chloride at one monitoring bore during July 2024, September 2024, and January 2025 were elevated; likely attributed to surrounding agricultural land use, clearing and runoff, although historical records exhibit a similar, or higher, average salinity compared with the Program; no clear seasonal trends were apparent.
- Turbidity at most bores across all monitoring events excluding two; likely attributed to surrounding agricultural land use, clearing and runoff; no clear seasonal trends except for July 2024 where records tended to be elevated across monitoring bores.
- Nutrient concentrations were variable and exceeded guideline triggers at the majority of bores across all monitoring events (excluding one bore) for total nitrogen, and ammonia at three monitoring bores during three monitoring events; influenced by infiltration of surface water impacted by the use of fertilisers on surrounding agricultural land; no clear seasonal trends excluding some elevated records in July 2024, with a spike in concentration in September 2024 (WM03-N-S03) likely attributed to infiltration from surface water and runoff following above average rainfall that occurred in winter.
- Dissolved metals were generally below the level of analytical detection except for aluminium, copper, iron and manganese which exceeded relevant guideline trigger values, with copper and iron elevated within all bores and aluminium consistently higher in bores WM03-N-S03 and WM03-W-S04; likely attributed to the mineralisation of the Superficial Aquifer, potentially with minor contribution from surface water infiltration by aluminium; no clear seasonal trends, although a spike in aluminium concentration occurred in September 2024 (WM03-N-S03).
- Pesticides were below the analytical limit of reporting (LOR) from surface water sites during the only two monitoring events where samples were analysed.

Leederville Aquifer

- pH at all monitoring bores and all monitoring events; majority of values acidic; no clear seasonal trends.
- Salinity at all monitoring bores and all monitoring events, and electrical conductivity at almost all bores across all monitoring events, excluding bore WM01; no clear seasonal trends.
- Turbidity was elevated at three bores across all monitoring events in July 2024, September 2024, January 2025; no clear seasonal trends.
- Nutrient concentrations were below the relevant guideline triggers across all bores and all monitoring events; no clear seasonal trends.
- Dissolved metals were generally below the level of analytical detection except for copper, iron and manganese which exceeded relevant guideline trigger values, with all three metals elevated across all bores during the majority of monitoring events; likely attributed to the mineralisation of the Leederville Aquifer; no clear seasonal trends.

A summary of groundwater quality from monitoring bores within the Study Area (Stantec 2025) is presented in Table 4-1.

Table 4-1: Summary of groundwater quality data from monitoring bores.

Aquifer	Key Groundwater Quality Characteristics
Superficial Aquifer	• pH was classified as acidic to neutral with all pH values exceeding the lower ANZECC & ARMCANZ (2000a) trigger value. • Salinity was classified as freshwater (mostly below 500 mg/L) and exceeded DoH (2014) non-potable use trigger at monitoring bores WM01-W-S02 (July 2024), WM03-N-S03 (September 2024), and WM03-W-S04 (July 2024, September 2024, January 2025). • Groundwater was dominated by sodium and chloride, with concentrations of chloride exceeding the DoH (2014) non-potable use trigger at WM03-W-S04 during July 2024, September 2024, and January 2025. • Electrical conductivity exceeded the ANZECC & ARMCANZ (2000a) trigger value at almost all bores across all monitoring events, excluding bore WM01-W-S02. • Turbidity exceeded the ANZECC & ARMCANZ (2000a) trigger value in the majority of bores excluding bores WM01 W S01 (September 2024) and WM01-W-S02 (January 2025). • Total nitrogen exceeded the ANZECC & ARMCANZ (2000a) trigger value within all bores and across the majority of monitoring events, excluding WM02-W-S02, and ammonia exceeded the DoH (2014) non potable use trigger at WM02-W-S01, WM03-N-S03, and WM03-W-S04 during July 2024, September 2024, and January 2025. • Aluminium exceeded the Water Quality Australia (2021) DGV and the DoH (2014) non-potable use trigger at WM03-N-S03 and WM03-W-S04 in April 2024, July 2024, September 2024, and January 2025. • Copper exceeded the Water Quality Australia (2021) DGV at all bores, predominantly during April and July 2024. • Iron exceeded the DoH (2014) non-potable use trigger and the ANZECC & ARMCANZ (2000b) agricultural irrigation LTV at all bores during the majority of monitoring events. • Manganese exceeded the ANZECC & ARMCANZ (2000b) agricultural irrigation LTV within bores WM01-W-S01 (July 2024, September 2024, January 2025), WM02-W-S02 (September 2024, January 2025), and WM03-W-S04 (July 2024).
Leederville Aquifer	• pH was classified as acidic to neutral with all pH values exceeding the lower ANZECC & ARMCANZ (2000a) trigger value. • Salinity was classified as freshwater (below 500 mg/L) and was dominated by sodium and chloride. • Electrical conductivity exceeded the ANZECC & ARMCANZ (2000a) trigger value at almost all bores across all monitoring events, excluding bore WM01. • Turbidity exceeded the ANZECC & ARMCANZ (2000a) trigger value in the majority of bores excluding bores WM01 (July 2024, September 2024, January 2025) and WM03 (September 2024, January 2025). • Nutrient concentrations were below the relevant guideline triggers across all bores and all monitoring events. • Copper exceeded the Water Quality Australia (2021) DGV at all bores, predominantly during April and July 2024 with a spike in concentration in January 2025. • Iron exceeded the DoH (2014) non-potable use trigger and the ANZECC & ARMCANZ (2000b) agricultural irrigation LTV in all three bores across all monitoring events excluding September 2024. • Manganese exceeded the ANZECC & ARMCANZ (2000b) agricultural irrigation LTV in bores WM02 and WM03 in July 2024, September 2024 and January 2025.

5 Surface Water Assessment

5.1 Approach

The surface water assessment was carried out to satisfy the EPA objective for Inland Waters, to ensure hydrological regimes and quality of surface water is maintained during construction and operation of the Proposal. To achieve this requirement, surface water modelling of the existing catchment is necessary to determine the extent of flow paths, peak flow and flow velocities. This information can be used to determine construction and operational elements which may influence this hydrodynamic behaviour.

5.2 Model Methodology

A two-dimensional (2D) rain-on-grid hydraulic model was developed for the Study Area to represent the disperse nature of planned infrastructure across the Study Area, and relative location to the headwaters. Furthermore, all watercourse flow paths have been assessed within the Study Area so this model can be utilised regardless of the Proposals final layout within the Study Area.

In using a rain-on-grid approach, rainfall hyetographs (rainfall depths over time) are applied directly to the hydraulic model grid, and flow paths are automatically computed by the hydraulic model based on the specific catchment characteristics, such as catchment shape, flow path slopes, and land use conditions. The hydraulic analysis software TUFLOW HPC (version 2023-03-AD-iDP-w64) was used to identify the surface flow characteristics.

5.3 Hydrology

5.3.1 Rainfall Depths and Temporal Patterns

Australian Rainfall and Runoff 2016 Intensity-Frequency-Duration (IFD) data was downloaded from the Bureau of Meteorology (BoM) website for -34.22°S, 115.29°E. Standard and non-standard durations were used, ranging from 20 minutes to 12 hours as shown in Table 5-1.

The QGIS 'ARR19' plugin was utilised to generate the required hyetographs for the applicable design events. The hyetographs that were developed represent the 'burst' part of the storm and exclude rainfall losses and pre-burst rainfall. These were applied separately using event-based loss values and are discussed in the upcoming section.

Table 5-1: Intensity Frequency Duration (IFD) Data (mm).

Annual Exceedance Probability (AEP)						
Duration	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**
20 min	13.1	17.4	20.5	23.7	28.3	32
25 min	14.3	18.9	22.3	25.7	30.7	34.7
30 min	15.3	20.2	23.7	27.4	32.7	37
45 min	17.6	23.1	27.2	31.4	37.3	42.2
1 hour	19.5	25.4	29.8	34.4	40.8	46.1
1.5 hour	22.3	28.9	33.8	38.9	46.1	52.1
2 hours	24.6	31.7	36.9	42.5	50.3	56.7
3 hours	28.1	36	41.9	48.1	56.8	64.1
4.5 hour	32.2	41	47.6	54.4	64.3	72.5
6 hours	35.3	44.9	52	59.5	70.3	79.1
9 hours	40.1	51	58.9	67.3	79.4	89.4
12 hours	43.7	55.6	64.2	73.2	86.4	97.1

5.3.2 Climate Change (RCP 8.5)

A single 1% AEP climate change high emissions scenario Representative Concentration Pathway (RCP) 8.5 model run was conducted for the existing conditions. The climate change run will inform the potential increases in flood characteristics including flood levels, velocity, and potential hazards to the year 2090. The design depth of rainfall is increased based on the expected temperature rise within the scenario and location. ARR19 interim climate change factors (Engineers Australia March 2024) are presented in Table 5-2.

Table 5-2: ARR19 interim climate change factors for hydraulic model.

Scenario	Interim Climate Change Factor	Percentage Increase in Design Rainfall Depth
2090 RCP 8.5	4.5	24%

5.3.3 Rainfall Losses

Non-neutral initial and fixed continuing losses for the Study Area were selected based on modifying values from the ARR Data Hub presented in Table 5-3. The initial loss values represent the value for complete storms as the rainfall hyetographs were adjusted based on the median pre-burst rainfall using the QGIS ARR Data Hub plug-in. Non-neutral losses have been applied directly from the QGIS ARR data plug-in for this Assessment. This means for more frequent events and for durations less than 90 hours, the initial loss value applied was less than 27 mm, based on the pre-burst and rainfall depth. The adopted initial loss values for frequent events range between 3.1 mm to 27 mm.

Table 5-3: Loss parameters adopted in hydraulic model.

Interstation area	Initial Loss (mm)	Continuing Loss (mm/hr)
Beenup ARR Datahub	27	4.2

5.3.4 Design Event Selection

The initial hydraulic model was run for the full suite of applicable AEPs, durations and the associated temporal patterns to select a refined number of design events per AEP for the Study Area. Each AEP event has been run for the 20, 25, 30, 45, 60, 90, 120, 180, 360 and 720-minute durations. The 1% AEP Climate Change (CC) event (Table 5-2) has also been modelled for these durations.

This was found to capture all critical durations for the modelled extent. In total, over 300 model runs have been simulated within the hydraulic model. Design events were selected based on the median temporal pattern of the critical duration based on the water surface level outputs from TUFLOW for each AEP event. It is noted that when using TUFLOW outputs, as there are 10 ensemble temporal patterns for each duration, the ensemble peak flow result one above the 'true median' was selected (Table 5-4).

Table 5-4: Critical duration and median temporal pattern selection for hydraulic model.

AEP	Critical Duration	20 min	30 min	45 min	60 min	90 min	120 min	180 min	270 min	360 min	540 min	720 min
1% CC	Median Temporal Patterns	10	9	-	2	1, 8	10	2	10	4	6	7
1%		10	9	-	2	1, 8	10	2	10	4	6, 8	7, 9
2%		10	9	-	2	1, 8	6	2	10	7, 10	10	6
10%		9	10	10	-	10	1	7	10	7	2	10
50%		9	10	1	-	-	10	10	2	4	9	1

5.4 Hydraulic Model

5.4.1 Key Model Parameters

The key parameters adopted in the TUFLOW hydraulic model for the Assessment are summarised in Table 5-5.

Table 5-5: Key hydraulic model parameters adopted in the Assessment.

<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Model Extent</td><td>The hydraulic model extent includes the Study Area and an additional 100 m to 200 m offset to ensure model boundaries and potential instabilities are not influencing the flood results.</td></tr>
<tr><td>Grid Size</td><td>A hydraulic model grid size of 3 m was adopted. Sub-grid sampling (SGS) was enabled with a sample distance of 1 m.
This grid size was found to provide a suitable high-level resolution for the purposes of this assessment. It is noted that future design works may require smaller resolution grid cell computations and feature survey.</td></tr>
<tr><td>Direct Precipitation Inflow</td><td>The hydraulic model adopts a direct rainfall approach as outlined in Section 5.3, using a ‘2d_rf’ layer. This rainfall layer has been digitised based on the catchment of the Study Area. The hyetograph for each design event is applied evenly to every active cell within the ‘2d_rf’ layer.</td></tr>
<tr><td>Digital Elevation Model</td><td>The digital elevation model (DEM) for the hydraulic model was based on the 1 m DWER Scott River LiDAR of the region and 2 m Surface Elevation Model from Landgate. These datasets were incorporated into the hydraulic model in the form of a merged 1 m DEM. The extent of the two datasets is outlined in Section 3.3.3.
It should be noted that the accuracy and resolution of the datasets varied. The 1 m DWER Scott River Lidar had a vertical accuracy of 0.15 m while the 2 m Landgate dataset has a vertical accuracy of 0.8 m.</td></tr>
<tr><td>Roughness</td><td>Hydraulic roughness in the model is based on the inspection of aerial imagery. Manning’s ‘n’ roughness is spatially varied based on the level of vegetation on the floodplain, the presence of waterways and vegetation within those waterways as well as the presence of roads, buildings, and ponds (Figure 5-1).
<table>
<tr><th>Description</th><th>Manning's n</th></tr>
<tr><td>Dense Vegetation</td><td>0.05</td></tr>
<tr><td>Paved Road</td><td>0.025</td></tr>
<tr><td>Gravel Road</td><td>0.03</td></tr>
<tr><td>Open Water</td><td>0.025</td></tr>
<tr><td>Building</td><td>0.3</td></tr>
<tr><td>Low Vegetation Pervious Terrain (General)</td><td>0.035</td></tr>
</table></td></tr>
<tr><td>Boundaries</td><td>Several stage-discharge boundaries have been applied along the tributary outlets from the headwater catchments, approximately 100-200 m downstream of the Study Area. The slope of the corresponding flow path has been separately applied for each flow path.</td></tr>
<tr><td>Soil Infiltration</td><td>Rainfall losses are applied directly within TUFLOW. Multiple approaches can be used to model losses within TUFLOW, with a soil file being used for this assessment. This approach extracts water from wet 2D cells within the hydraulic model and is more suited to modelling rainfall losses, as opposed to interception losses. The soils layers were digitised initially using the roughness grids and then modified to suit the ARR 2019 land use categories for pervious and impervious areas.</td></tr>
</table>

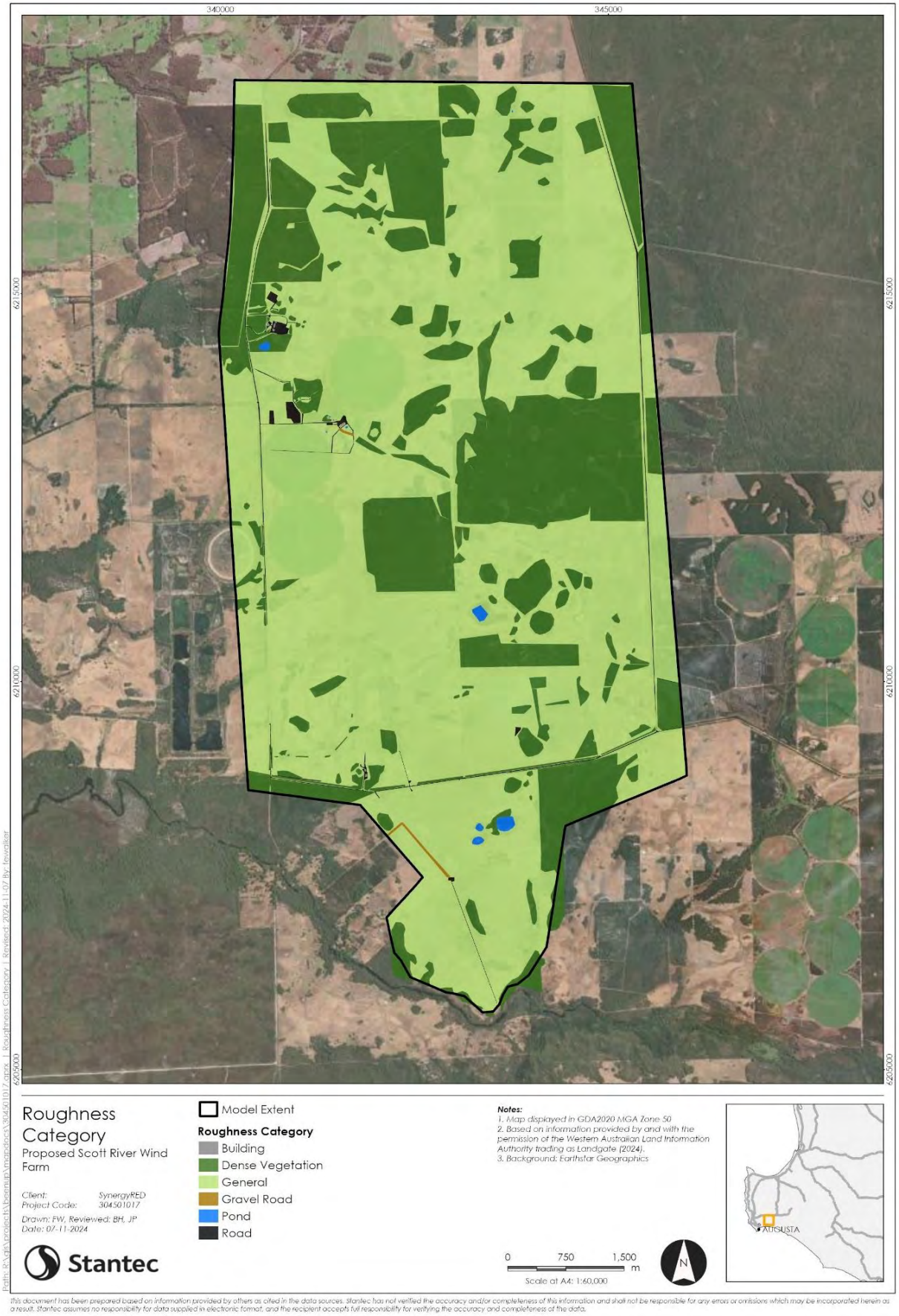

Figure 5-1: Hydraulic roughness categories adopted in hydraulic model.

5.5 Flood Results

5.5.1 Overview

Flood hazard has been assessed in accordance with Australian Rainfall and Runoff (2019) and the *Australian Emergency Management Institute Hazard Categorisation* criteria outlined in Table 5-7 and Figure 5-2. Flood mapping for peak flood extents, depths, peak flood velocities and hazards were prepared for the 1%, 2%, 10%, 50% and 1% AEP Climate Change existing case scenarios. The 1% AEP flood depths, velocities and hazard are illustrated in Figure 5-3 to Figure 5-5 The results in the northern portion of the Study Area which rely on the supplied Landgate dataset are considered to be of lower confidence than the results in the southern portion of the Study Area. This is evidenced by a slight artificial ponding that occurs between the two DEM datasets (~200 mm) and the reduced granularity in flow paths in the north.

The details of individual discharge locations for the 11 headwater subcatchments and areas of significant ponding are outlined in Appendix F and detailed flood maps are outlined in Appendix G. The following generalisations regarding the flood behaviour of the Study Area have been made to assist the environmental approvals:

- The frequent flow regimes such as the 50% AEP demonstrate a minor extent of inundation. The maximum ponding depth of ~1.2 m occurs near the south-western boundary of the Study Area, near the milking sheds and upstream of an access track.
- Most areas of inundation with depths greater than 0.5 m in the frequent events (50% AEP) occur upstream of roads acting as hydraulic controls with some ponding in areas with the appearance of wetlands or perched ponds. There are only a small number of defined flow paths discharging from the Study Area with flow rates of up to 0.5 m^3/s. (50% AEP).
- The rare (1% and 2% AEP) flow regimes demonstrate a widespread level of inundation. The maximum ponding depth of ~2.8 m occurs in the forested northern most sub-catchment in the Study Area. The second deepest ponding occurs at ~2.3 m in the same location to the 50% AEP near the south-western boundary of the Study Area.
- Several areas of inundation in the rare (1% and 2% AEP) events exceed 0.5 m in depth across the Study Area, including behind roads acting as hydraulic controls and in areas with the appearance of wetlands or perched ponds.
- All headwater catchments other than one in the north-east show distinctive rare event flow paths to the discharge locations outside of the Study Area.
- The maximum discharge rate of ~20 m^3/s from the Study Area is south to the Scott River at the location of the DWER sampling site 6091226 Scott River Trib – Woodhouse and the Proposal Surface Water Monitoring Location 5 (SW5).

5.5.2 Flood Velocity Criteria

Velocities in the baseline condition remain below the threshold of 2 m/s typically considered to contribute to general erosion and scour. Potential increases to velocity through the design phase will need to be quantified and design countermeasures constructed to ensure impacts to sensitive receptors and operational risks are mitigated in line with the recommended shear stress and velocity threshold guidance outlined in Table 5-6.

Table 5-6: Shear stress and velocity threshold guidance for future design information.

Material Category	Material Type	Permissible Shear Stress (N/m^2)	Permissible Velocity (m/s)
Soil	Alluvial silt (noncolloidal)	2	0.6
Soil	Alluvial silt (colloidal) or stiff clay	12	0.9-1.1
Gravel/Cobble	25-50 (mm)	16-32	1.5-1.8
Vegetation	Short native grass	45	1.2
Vegetation	Class C turf	48	1.1
Vegetation	Long native grass	81	1.8
Gravel/Cobble	150 (mm)	96	2.3
Vegetation	Class B turf	101	2.1
Riprap	150 (mm)	120	3
Vegetation	Class A turf	177	2.4
Riprap	230 (mm)	182	3.4

Material Category	Material Type	Permissible Shear Stress (N/m^2)	Permissible Velocity (m/s)
Gravel/Cobble	300 (mm)	192	3.7
Soil Bioengineering	Coir roll	239	2.4
Riprap	300 (mm)	244	4
Soil Bioengineering	Brush layering (initial/grown)	299	3.7
Riprap	450 (mm)	364	4.9
Soil Bioengineering	Vegetated coir mat	383	2.9
Soil Bioengineering	Live brush mattress (grown)	393	3.7
Hard surfacing	Gabions	479	5.8
Riprap	600 (mm)	484	5.5
Hard surfacing	Concrete	599	5.8

Adapted from source: https://www.marincounty.org/-/media/files/departments/pw/mcstoppp/residents/fischenichstabilitythresholds.pdf

5.5.3 Flood Hazard Criteria

Flood hazard has been assessed in accordance with Australian Rainfall and Runoff (2019) and the *Australian Emergency Management Institute Hazard Categorisation* criteria outlined in Table 5-7 and Figure 5-2. Flood hazards are typically low across the site despite widespread level of inundation in rare events. Areas of ponding demonstrate higher risk profiles (depths above 0.3 m) as expected and should be avoided in future design activities unless suitable mitigation measures are integrated for infrastructure resilience.

Table 5-7: Flood Hazard Classes ARR2019 for future design information.

Hazard Class	Description	Classification Limit (D x V)	Limiting Depth (m)	Limiting Velocity (m/s)
H1	Generally safe for vehicles, people and buildings.	≤ 0.3	0.3	2
H2	Unsafe for small vehicles.	≤ 0.6	0.5	2
H3	Unsafe for vehicles, children and the elderly.	≤ 0.6	1.2	2
H4	Unsafe for vehicles and people.	≤ 1.0	2	2
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.	≤ 4.0	4	4
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.	> 4.0	-	-

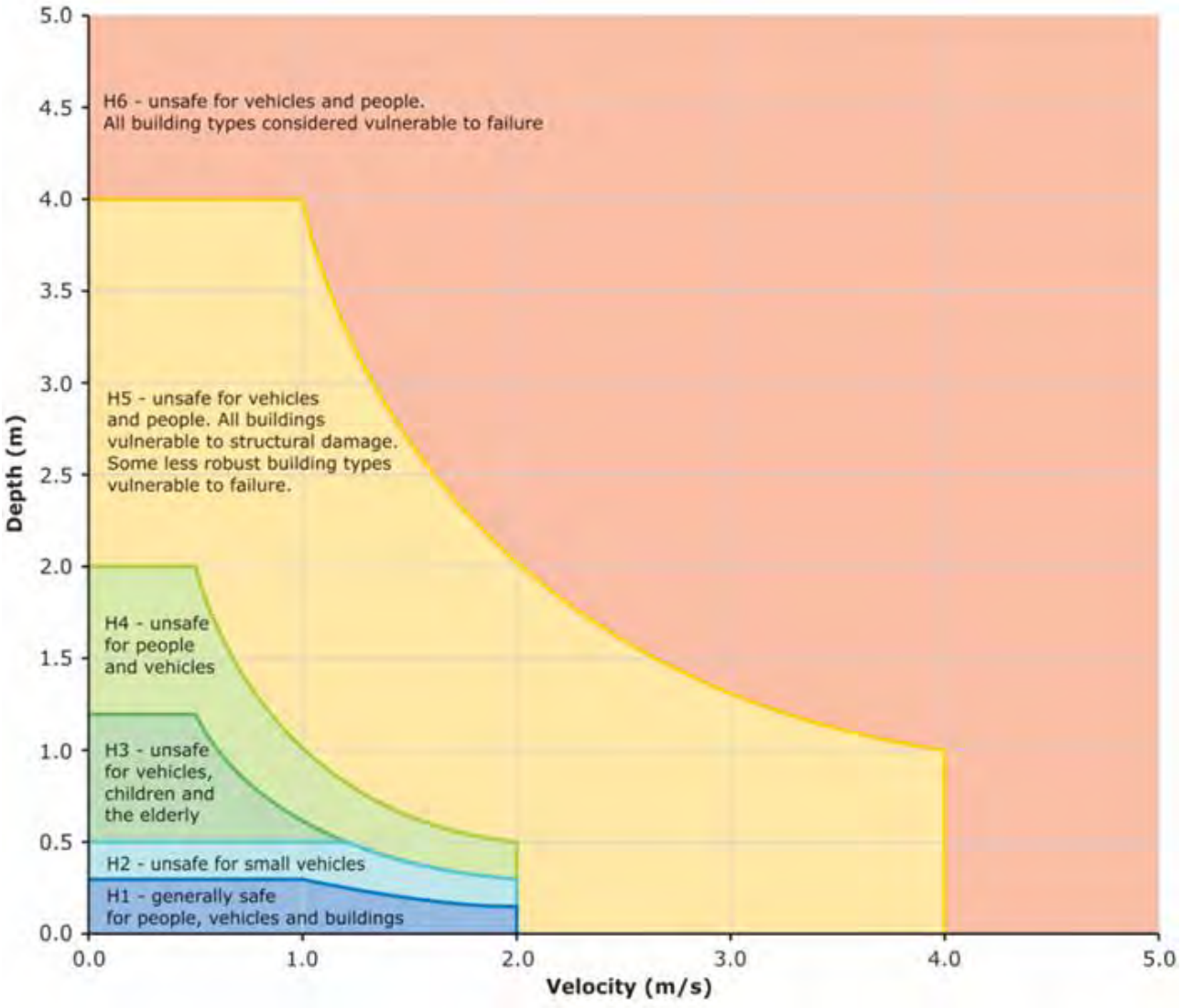

Figure 5-2: Australian emergency management institute hazard categories (2014).

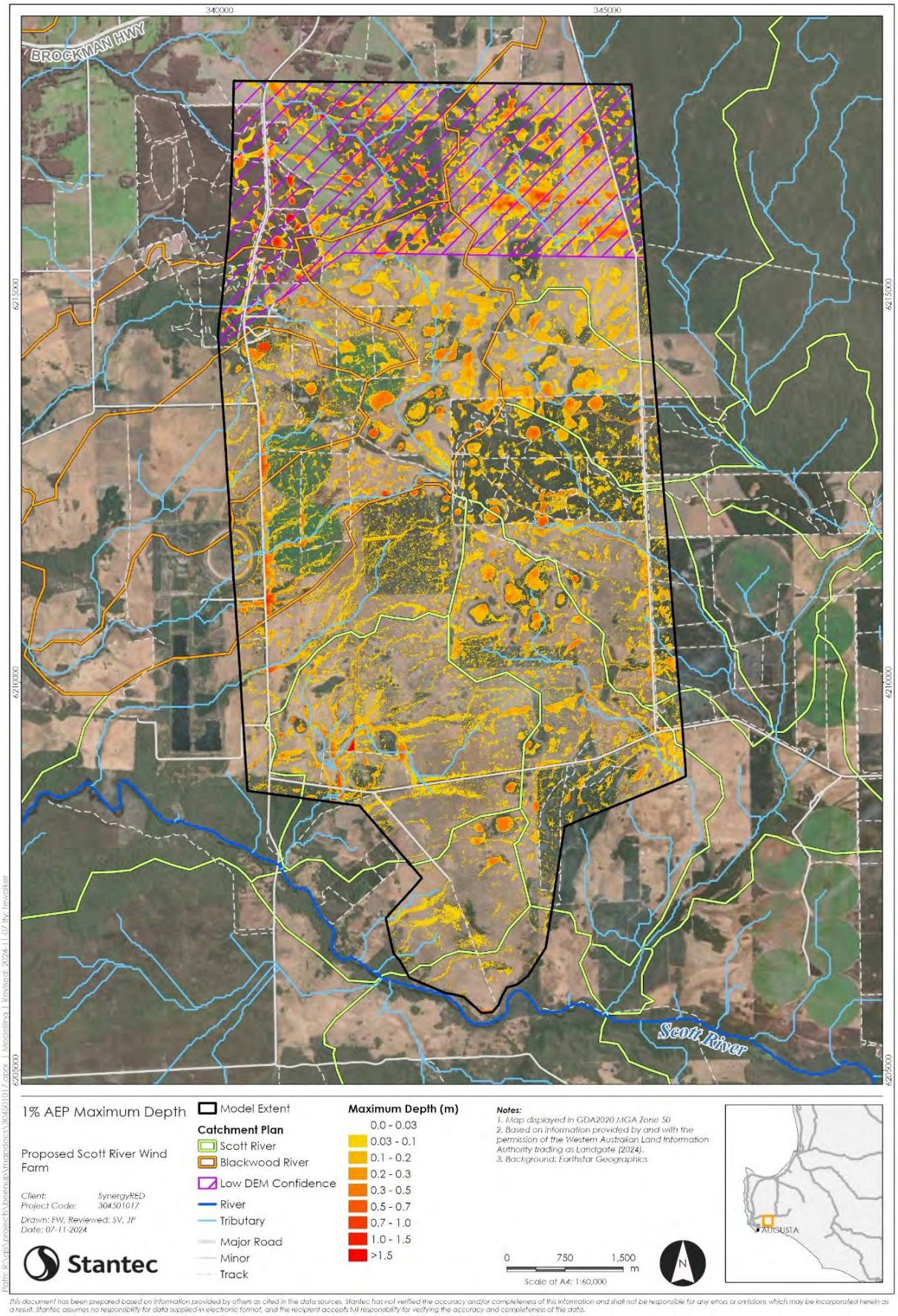

Figure 5-3: 1% AEP peak flood depths within the model extent.

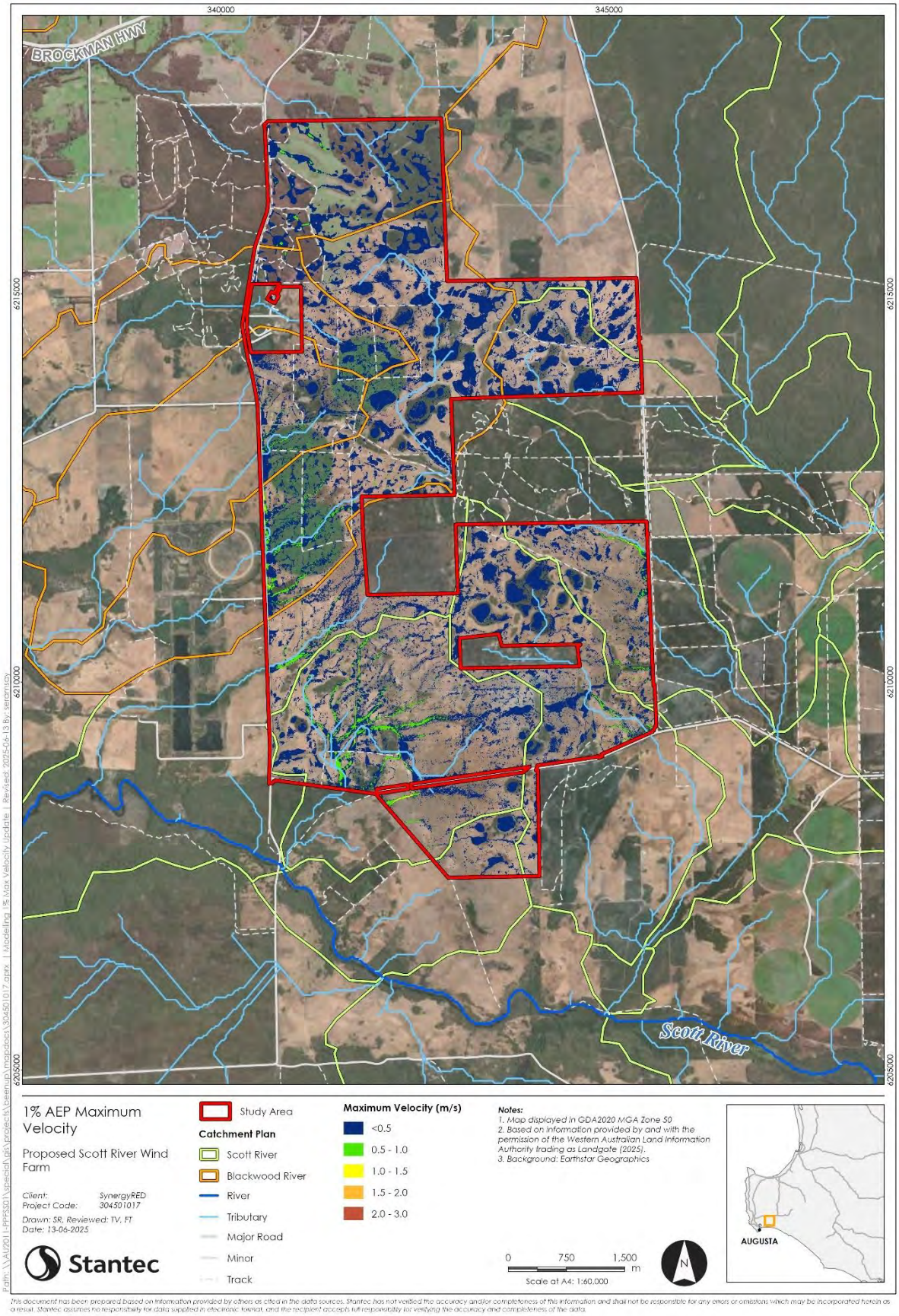

Figure 5-4: 1% AEP peak flood velocity within the model extent.

Note: there are localised areas where velocity exceeds 2m/s, this cannot be seen at this scale. A digital database has been provided to SynergyRED for infrastructure planning purposes.

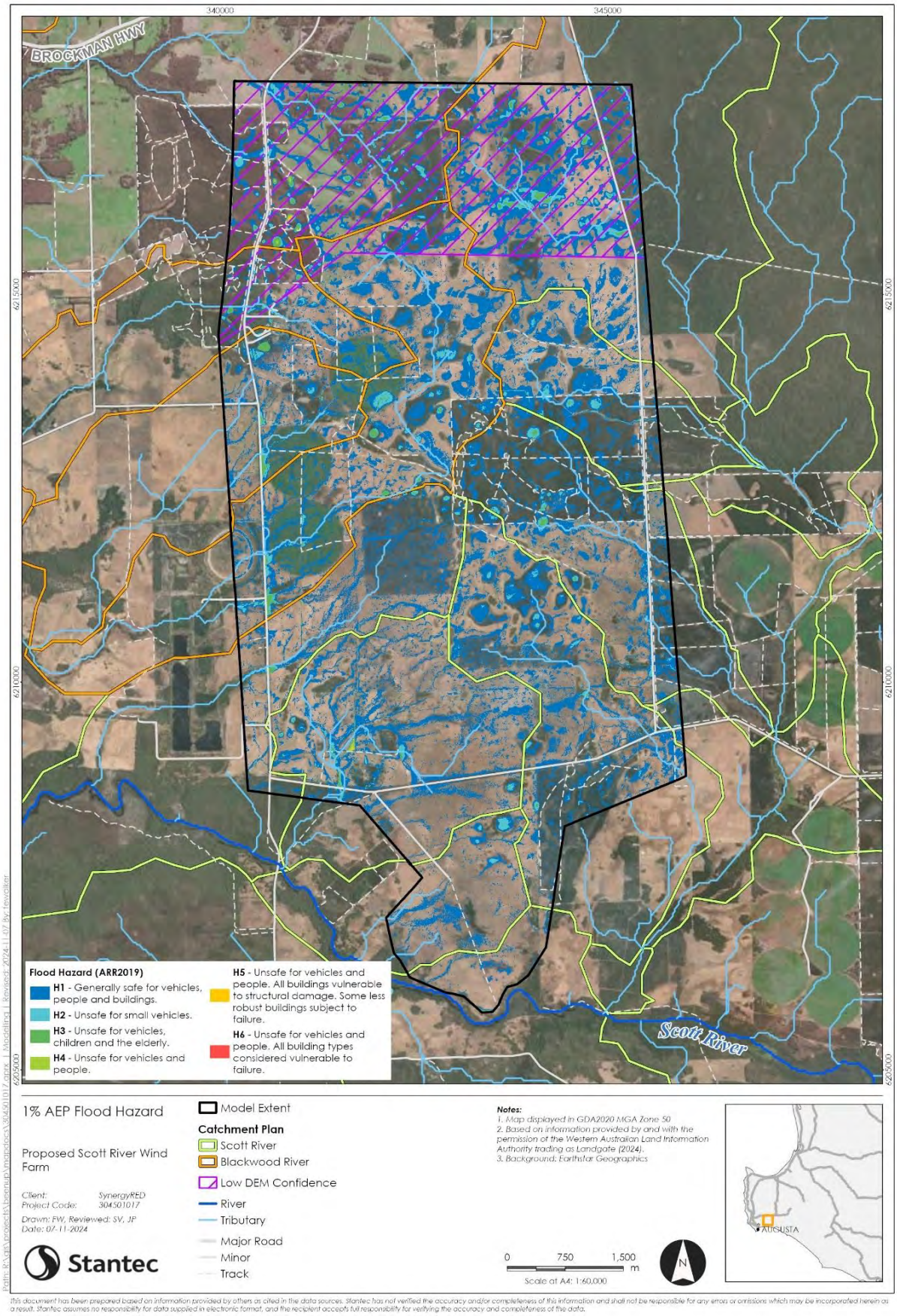

Figure 5-5: 1% AEP peak flood hazard (ARR 2019) within the model extent.

Note: there are localised areas where flood hazard exceeds H1 this cannot be seen at this scale. A digital database has been provided to SynergyRED for infrastructure planning purposes.

5.6 Design Event Validation

The Study Area is bound by roads on all edges where discharge from the catchments is occurring, apart from the southernmost catchment which sheet flows across the bordering agricultural land. The roads and historical drain diversions built as part of the agricultural operations (including tree plantations) have significantly impacted the natural hydrological regime. These controls, as well as the natural ponding which occurs across the site, limits the potential to validate the hydraulic model results to regional peak flow estimation methods that do not account for storage characteristics of the natural depressions, flow building up behind road embankments or catchment shape. The hydraulic model extent was maintained within a 100-200 m buffer from the Study Area extent (originally provided in April 2024) meaning that the full extent of the headwater catchments is not captured in the hydraulic model area. This is appropriate given the scope of the Proposal.

The maximum discharge rate of ~20 m^3/s in the 1% AEP from the Study Area is south to the Scott River at the location of the DWER sampling site 6091226 Scott River Trib – Woodhouse and the Surface Water Monitoring Location 5 (SW5) established for this Proposal. This flow rate correlates to an approximately 20-minute Rational Method calculation runoff response for the main, direct flow path to the discharge location. However, given the flow attenuation behind the roads across the catchment, the hydraulic model shows a peak flow occurring at approximately 2 hours.

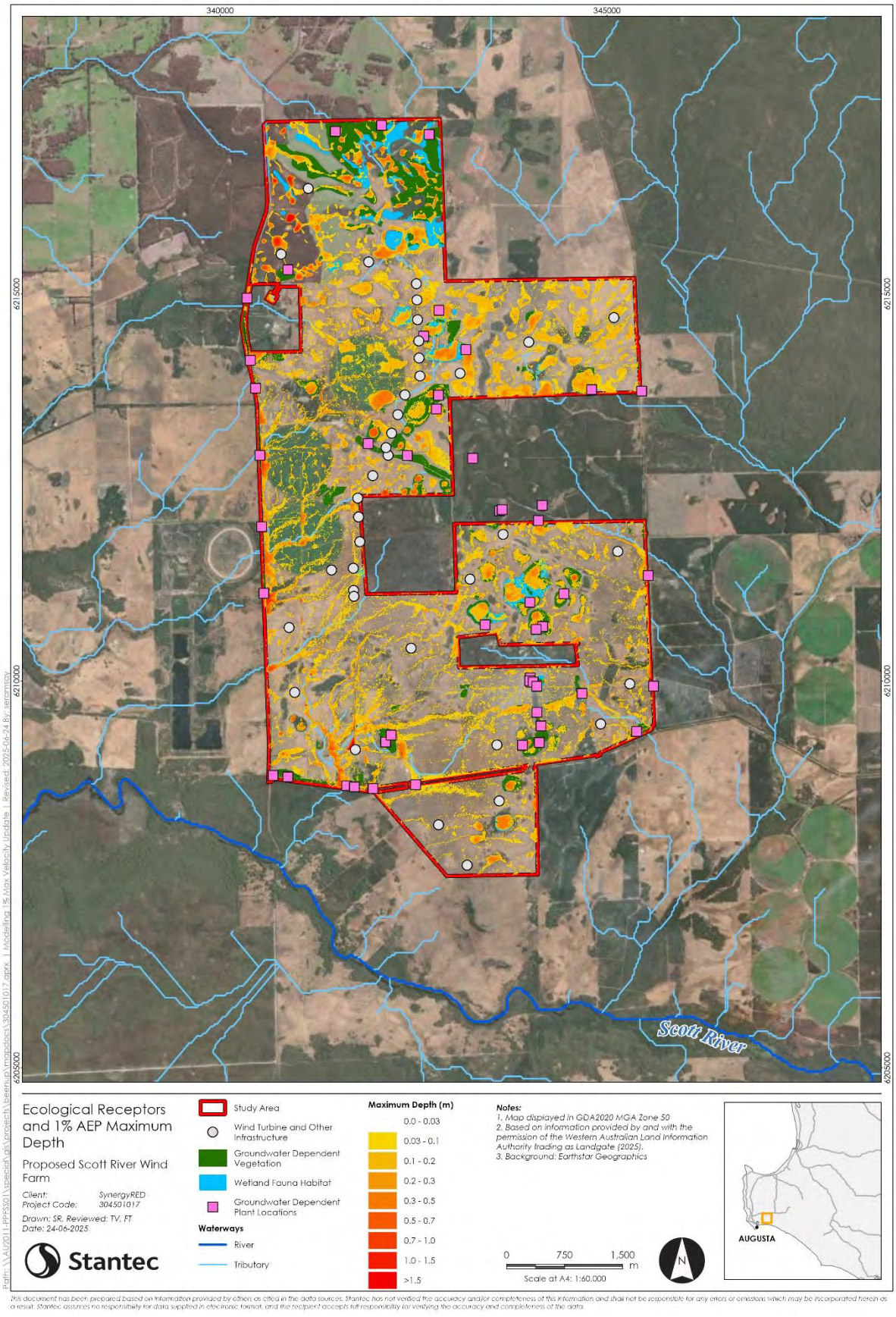

Figure 5-6: 1% AEP peak flood depths within the model extent.

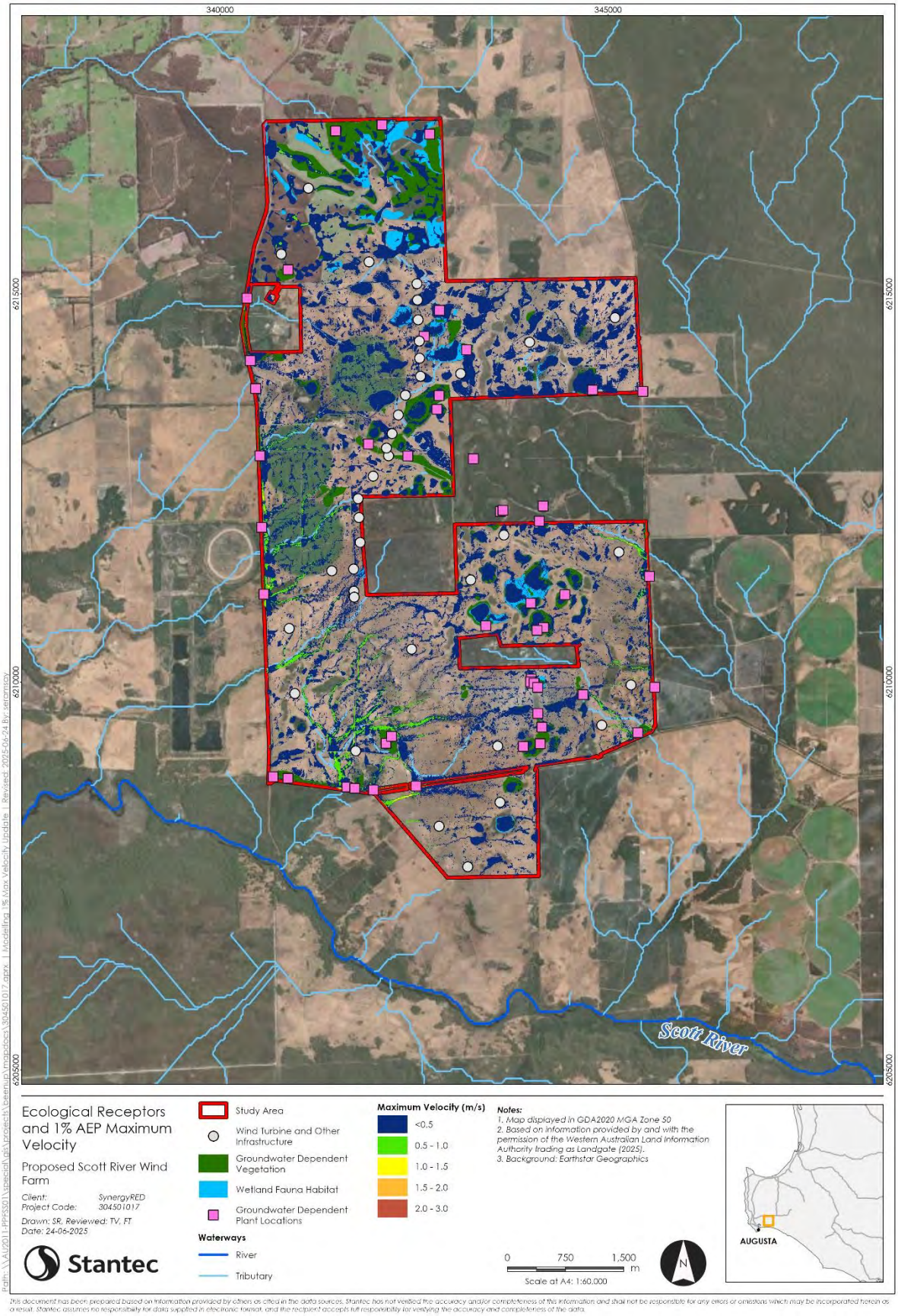

Figure 5-7: 1% AEP peak velocities within the model extent.

6 Preliminary Dewatering Assessment

6.1 Modelling Objective

The modelling objective was to evaluate predicted groundwater drawdown extents and groundwater inflows during construction dewatering for proposed infrastructure foundations likely to intercept groundwater. This includes the foundations for turbines, and meteorological towers.

The predicted groundwater drawdown extent is used as a preliminary diagnostic tool to inform the estimated groundwater drawdown extent to support the preliminary risk assessment. The groundwater inflows are estimated to inform potential groundwater take, and the groundwater management and potential licencing requirements.

6.2 Model Context

Construction dewatering at each proposed infrastructure foundation is anticipated based on the reported groundwater depth across the Study Area during the wetter months. A conservative approach was adopted by assuming the water table level was at surface (during wetter period) which is a typical approach for predicting groundwater dewatering within dynamic systems at the local level.

The proposed foundation excavations are assumed to be:

- Turbines: 0.8 mbgl and a target groundwater drawdown of 2 mbgl over an excavation of 30 m by 30 m.
- Meteorological tower: maximum design dimensions 1.5 mbgl and assumed groundwater drawdown to 3 mbgl with a single pier with an excavation footprint of 1.8 m by 1.8 m.

6.3 Model Design

The following models for an unconfined aquifer were used and are provided in more detail in Appendix H:

- Cooper Jacobs (Kruseman and Ridder 1994): Time-variant dewatering from a bore. This model was used to predict initial dewatering rates for specific time to achieve a target drawdown.
- Dupuit-Thiem (Kruseman and Ridder 1994): Steady-state dewatering from a bore. This model was used to predict steady-state dewatering discharge rates and distance-drawdown.
- Marinelli and Niccoli (2000) model: steady-state inflow into a mine pit. This model was used to predict steady-state dewatering discharge rates.

6.4 Assumptions and Limitations

The evaluation of groundwater distance-drawdown and inflows are based on simplified calculations assuming a likely range of aquifer hydraulic conductivities (both horizontal (K_h) and vertical (K_v)). Note that the hydraulic conductivity of the aquifer may change over several orders of magnitude over short distances. For each modelled scenario, the timeframe to attain steady-state conditions will depend upon the pumping rate used to attain the target groundwater level and has not been evaluated.

Vertical and horizontal spatial data limitations were considered, given that only three bore groups and 20 shallow test pit locations across the large Study Area were available to inform the aquifer conditions and models. Assumptions of the ground conditions (such as lithology) were made across areas where no data was available.

The dominant lithology described in bores and shallow test pits (up to 2 m deep) was used to classify the model inputs. Bore group WM01 in the northwest is a dominant shallow sandy clay and clayey sand (WM01) and was inferred to extend around the bore group. The bore groups WM03 and WM02 in the central south and southern area, respectively, and the majority of test pits are a dominant sand, therefore this material type was assigned to the remainder of the Study Area. The model did not include cumulative drawdown effects from concurrent nearby excavation and potential irrigation dewatering.

6.4.1 General Model Inputs

Specific adopted model inputs for the Cooper-Jacob, Dupuit-Thiem, and Marinelli and Niccoli models are presented in Appendix H. The following general modelling inputs applied to both time-variant and steady-state models:

- Excavation dimensions will be:
  - Turbines: 30 m by 30 m, depth 0.8-1.2 mbgl.
  - Meteorological towers: maximum dimensions – 1.8 m by 1.8 m, depth 1.5 mbgl.
- The models assume that the entire sub-surface is fully saturated from ground surface level.
- To provide dry working conditions across the excavation, groundwater was assumed to be lowered to a maximum depth of approximately:
  - Turbines: 2 mbgl.
  - Meteorological towers: 3 mbgl.
- Horizontal hydraulic conductivity (based on Domenico and Schwartz 1990) was assigned as two zones to enable flexibility across the site, with regards to potential infrastructure placement (see Figure 6-5):
  - **Zone 1** (bore group WM01): dominant sandy clay (typical silt, clay range) aquifer was assigned 0.5 m/day.
  - **Zone 2** (All other locations): dominant sand (typical fine sand range) aquifer was conservatively set to 20 m/day.
  - Transition zone: assigned to highlight an arbitrary boundary between the two zones and was estimated based on the limited soil bores and test pits in the northern area. The transition zone approximately circles the WM01 bore group and extends toward two proposed turbine locations in the north.

6.4.2 Time-variant Inflow

The following model assumptions have been made in evaluating time-variant groundwater inflow:

- The aquifer was unconfined, infinite, homogeneous, isotropic, uniform thickness and pumped at an initial transient pumping rate for the Cooper-Jacobs model to attain the target drawdown.
- 5 days of initial pumping to attain the target drawdown (which may vary per location) followed by steady-state pumping to maintain the target drawdown to satisfy the excavation development and typical 28-day curing of the concrete. Total dewatering is 33 days. The actual time needed to achieve the target groundwater drawdown may vary between excavation sites—it could be shorter or longer than five days, depending on conditions.
- The discharge is from a single, small diameter bore that is fully penetrating.
- Aquifer thickness was set to 20 m to satisfy the model equations.
- A specific yield of:
  - Zone 1 sandy clay or clayey sand 5% (based on silt) (Morris and Johnson 1967).
  - Zone 2 sand 20% (based on typical sand) (Heath 1983).

6.4.3 Steady-state Inflow & Distance-Drawdown

The following model assumptions have been made in evaluating steady-state groundwater inflow and distance-drawdown:

- The aquifer was infinite, homogeneous and anisotropic in both zones (Marinelli and Niccoli 2000).
- For the Dupuit-Thiem model
  - the aquifer was considered unconfined and was evaluated for steady-state constant daily discharge rate to maintain the target drawdown.
  - flat initial water table with pumping from a fully penetrating bore under steady-state conditions.
- For the Marinelli and Niccoli model
  - recharge was 30% of the average annual rainfall of 933 mm for the nearest BOM station (Scott River).
  - vertical conductivity was assumed to be half of the horizontal hydraulic conductivity, to account for a matrix comprised of sand.
- No sheet piling or cut off walls are used.

6.5 Model Output

6.5.1 Distance-Drawdown

Modelled steady-state output for the distance from the centre of the excavation to drawdown values are presented in Figure 6-1 to Figure 6-3 for the turbines, and meteorological towers. For each type of infrastructure, the predicted distance-drawdown is based on steady-state discharge predicted by the steady-state Dupuit-Thiem model. The seasonal variation for the Study Area is conservatively assumed to be approximately 1 to 2 m for the Superficial Aquifer (see Section 4.2) and is presented to visually compare to the estimated distance-drawdown modelling and to inform the risk assessment (Section 7).

For the turbines in Zone 1, the predicted steady-state distance drawdown curve is presented in Figure 6-1. The predicted distance to 0.5 m drawdown is approximately 43 m. For the turbines in Zone 2, Figure 6-2 presents a distance-drawdown curve for steady-state conditions. The predicted distance to 0.5 m drawdown is approximately 117 m.

The predicted steady-state distance to drawdown for dewatering the meteorological tower excavation for the target drawdown of 3 m (assumed sand aquifer, K_h =20 m/d) is presented in Figure 6-3. The predicted distance to 0.5 m of drawdown is approximately 86 m.

A summary of predicted distance-drawdowns for the proposed excavations under steady-state conditions is presented in Table 6-1.

Table 6-1: Summary of predicted steady-state distance-drawdown (Dupuit-Thiem).

Structure Type	Target Drawdown (m)	Zone	Predicted Distance-Drawdown (m) from Centre of Bore to a Depth (m) of			
			>3	2	1	0.5
Turbine Tower	2	Zone 1	9.5	17	31	43
		Zone 2	5	17	60	117
Meteorological towers	3	Zone 1	*N/A*	*N/A*	*N/A*	*N/A*
		Zone 2	1	6	34	86
N/A not applicable. Meteorological tower not proposed in the north. Zone 1 northern area around WM01 bore group; Zone 2 central southern bore groups WM03 and WM02 and test pits.						

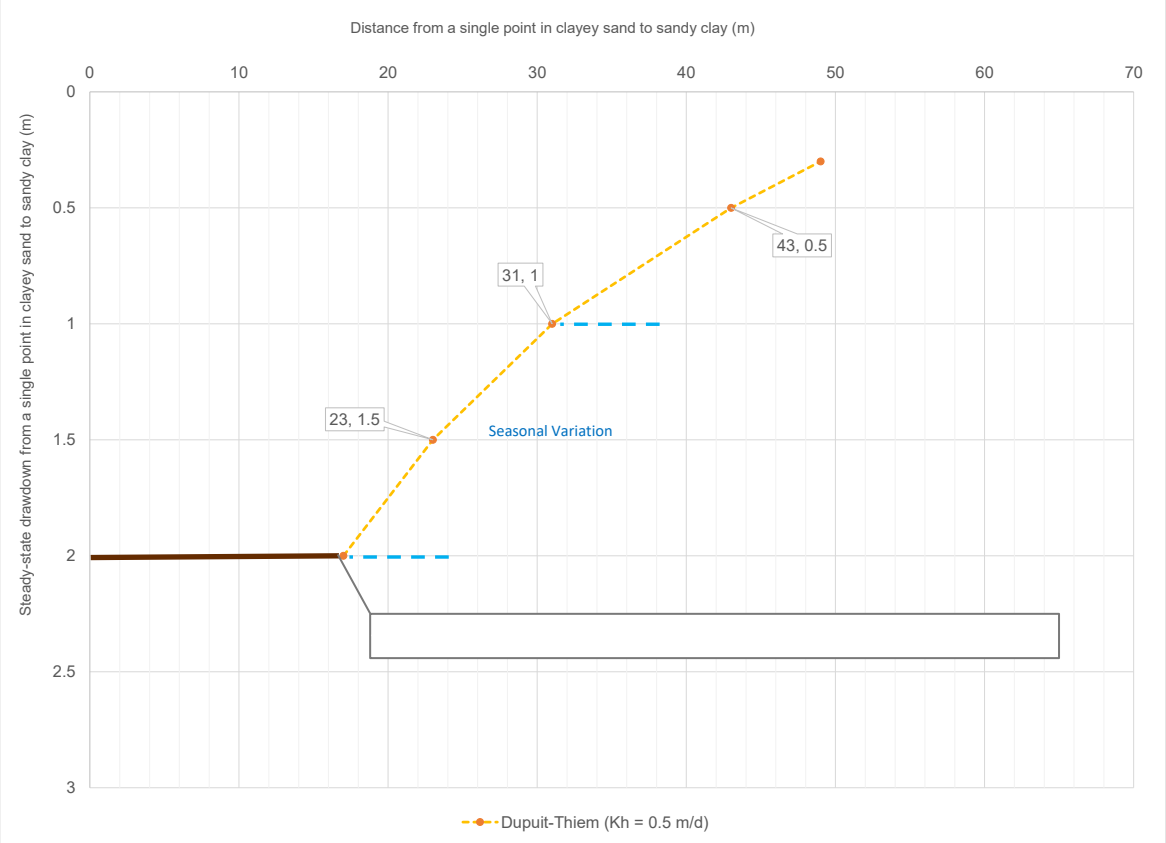

Figure 6-1: Zone 1 turbine evaluation of steady-state Dupuit-Thiem distance-drawdown (K_h=0.5 m/d).

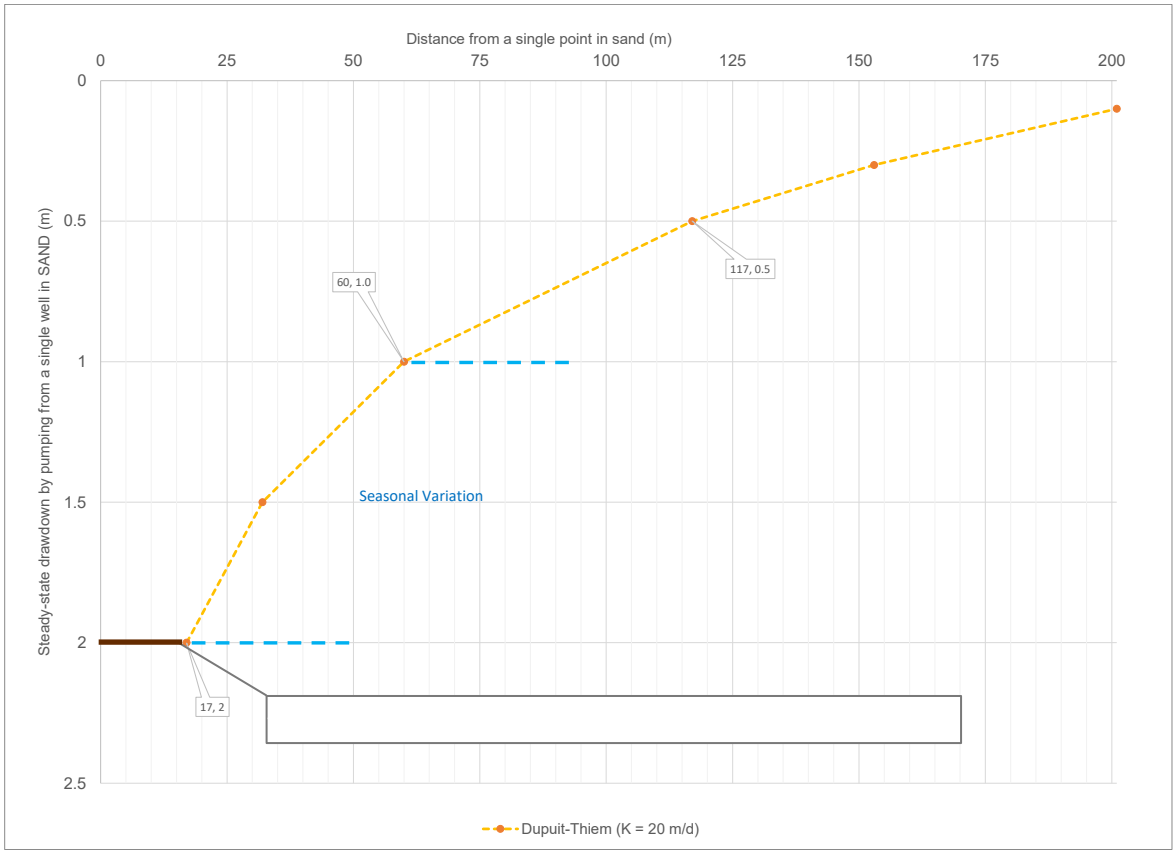

Figure 6-2: Zone 2 turbine evaluation of steady-state Dupuit-Thiem distance-drawdown.

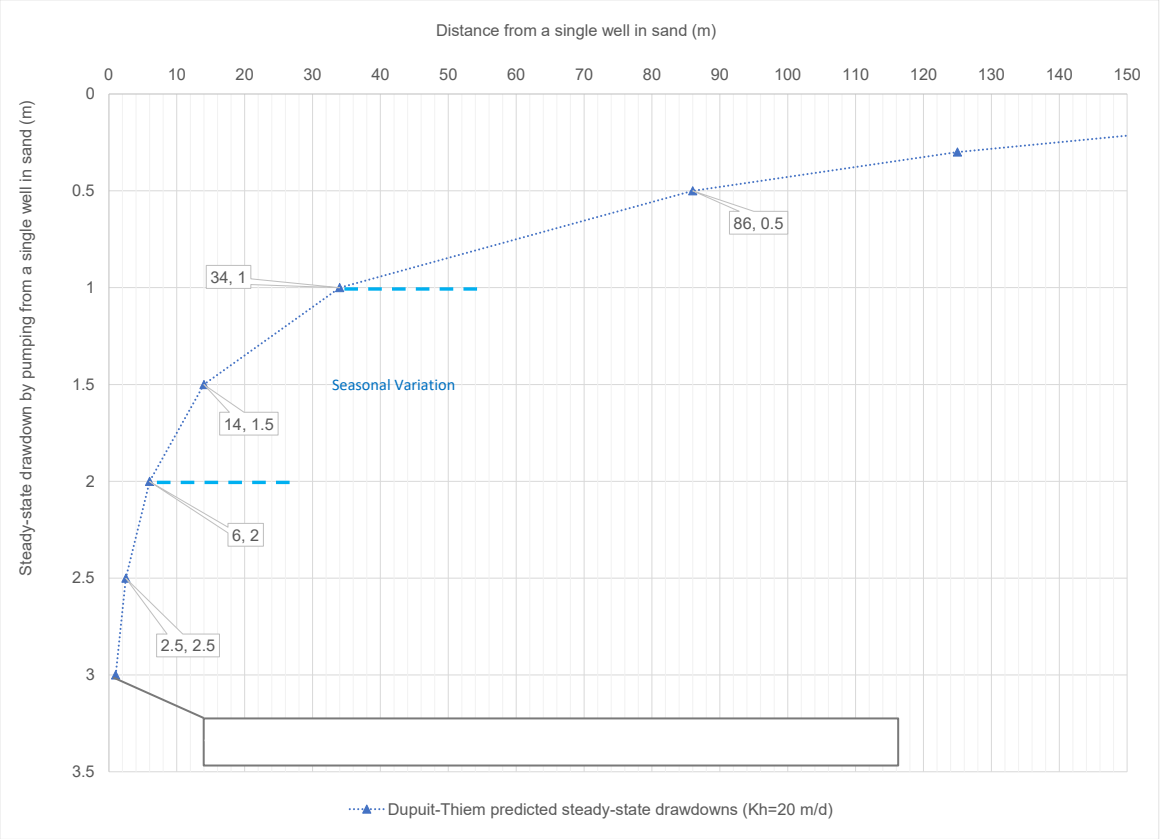

Figure 6-3: Zone 2 meteorological towers evaluation of steady-state distance-drawdown.

6.5.2 Rate of Inflow to Excavation

6.5.2.1 Initial Time-Variant Pumping

Elapsed time to attain the target drawdown depends upon the pumping rate. For the meteorological towers and turbines in zone 2, to achieve the target drawdown at 5 days the following pumping rate is required, per location in Table 6-2.

Table 6-2 Summary of time-variant discharge rates, per zone.

Model Type	Zone	Hydraulic Conductivity (m/day)	Turbine: Discharge to Achieve Target 2.0 m Drawdown After 5 Days			Met Towers: Discharge to Achieve Target 3.0 m Drawdown After 5 Days		
			Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 5 days (m^3)	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 5 days (m^3)
Cooper Jacobs	1	0.5[1]	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
	2	20[2]	2,295	27	11,475	1,525	18	7,625

Notes:
n/a model was unable to calculate initial discharge for target drawdown. To satisfy the model equation, when Zone 1 was 0.5 m/day, the transient pumping estimated over 35 days to be valid and therefore was unable to be calculated. A steady-state model was likely to be representative of the initial discharge (see below).
[1] Clayey sand and sandy clay;
[2] Sand.

As shown on Figure 6-4, for Zone 2, pumping rates to achieve a target drawdown was variable for both infrastructure type. For the meteorological tower excavation, pumping rates were lower, which reflects the smaller excavation volume compared to the turbine excavation. Pumping rates to achieve target drawdown are dependent on the aquifer properties and could vary, such that realistic target drawdown times and dewatering rates may take longer.

Zone 1 time-variant data was unavailable for the period up to 33 days, because the analytical models are not valid for lower K_h values with low drawdown targets and larger radius of influence targets (drawdown targets across vast footprints). To satisfy the model equation, when Zone 1 was 0.5 m/day, the transient pumping estimated 36 days to be valid and therefore was not used to predict initial dewatering rates. A steady-state model was likely to be representative of the initial discharge. The model at 36 days indicated a discharge of 62 m^3/day, which is within range of the steady-state models (see Table 6-3.

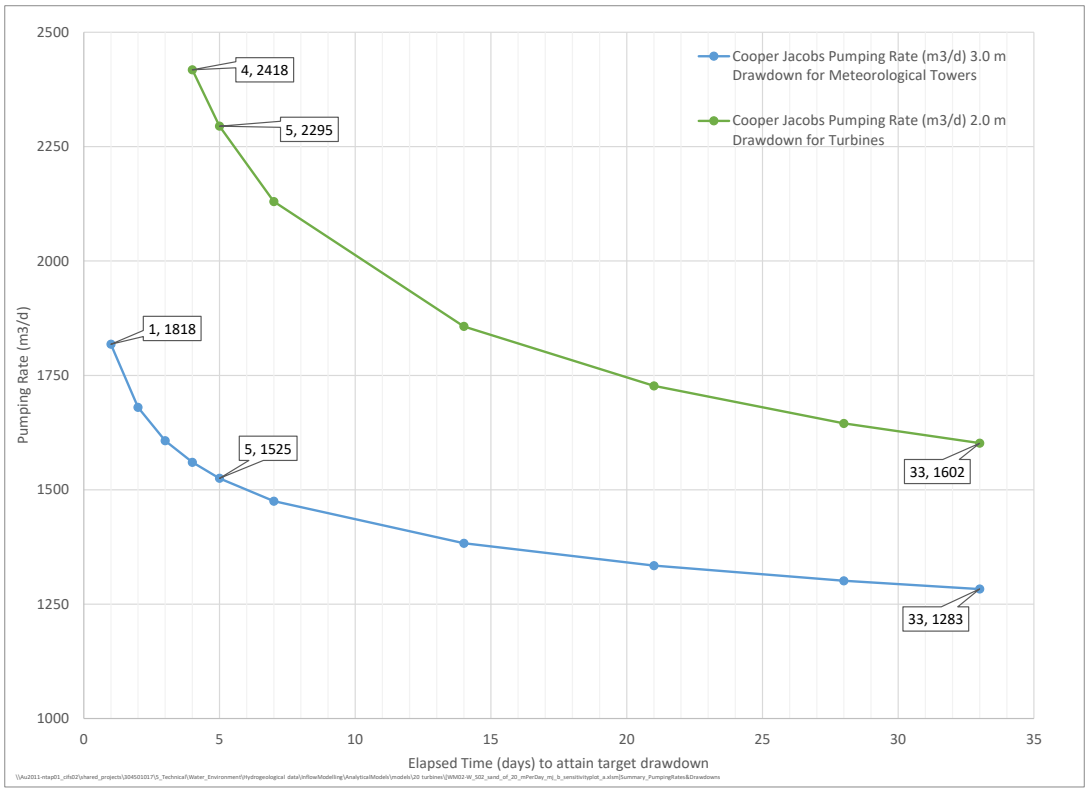

Figure 6-4: Zone 2 various elapsed times and corresponding pumping rates to attain target drawdown.

6.5.2.2 Steady-state Pumping

Steady-state inflow rates predicted using the Dupuit-Thiem model and Marinelli and Niccoli model for the Zone 1 and Zone 2 are presented in Appendix H, with summary steady-state pumping rates presented in Table 6-3. For the Zone 1, the Dupuit-Thiem model and Marinelli & Niccoli model predicted a steady-state inflow of approximately 95 and 56 m^3/d, respectively. For Zone 2, the Dupuit-Thiem model and Marinelli & Niccoli model predicted a steady-state inflow for the turbines of approximately 1,833 m^3/day and 2,045 m^3/day, respectively, and the met tower 296 m^3/day, respectively.

These pumping rates are conservative based on the adopted horizontal hydraulic conductivity values and the absence of any cutoff structures in the excavation, such as sheet piles. Note that initial inflows are predicted to be greater to attain the target drawdown within a week, then the pumping rate would be reduced to maintain the target depth under steady-state conditions.

Table 6-3: Summary of steady-state model pumping rates.

Model Type	Zone	Target 2.0 m Drawdown for a Single Turbine			Target 3.0 m Drawdown for a Single Met Tower		
		Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume (m^3)	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume (m^3)
Dupuit-Thiem	1	95	1	2,660[1]	*n/a*	*n/a*	*n/a*
	2	1,833	21	51,324	-	-	-
Marinelli & Niccoli	1	56	0.7	1,568	*n/a*	*n/a*	*n/a*
	2	2,045	24	57,260	296	3.4	8,204[2]

Notes:
n/a met tower not proposed within the northern area Zone 1;
-Dupuit-Thiem model not used for inflow rate in zone 2, only Marinelli and Niccoli
[1] cumulative value is based on 5 days to reach target drawdown using the steady-state inflow and 28 days dewatering, total 33 days
[2] cumulative value is based on 5 days to reach target drawdown using the time-variant pumping and steady-state 28 days dewatering, total 33 days

6.5.2.3 Inflow Summary

A summary of the estimated pumping rates for both Study Area zones are presented in Table 6-4.

Table 6-4: Summary of Pumping Rates and Estimated Volume, per location.

Zone	Turbine: Discharge for Target 2.0 m Drawdown After 33 Days			Met Tower: Discharge for Target 3.0 m Drawdown After 33 Days		
	Discharge[1] (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 33 days (m^3)	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 33 days (m^3)
1	75.5	0.9	2,492[1]	-	-	-
2	2,058	24	65,767[2]	296	3.4	15,829[2]

Note:
Initial pumping rate to achieve target drawdown will be higher before achieving steady state
- Met tower not planned to be installed in Zone 1
[1] Mean steady-state models
[2] Cumulative total based on discharge from time-variant 5 days to achieve target drawdown and 28 days steady-state model output

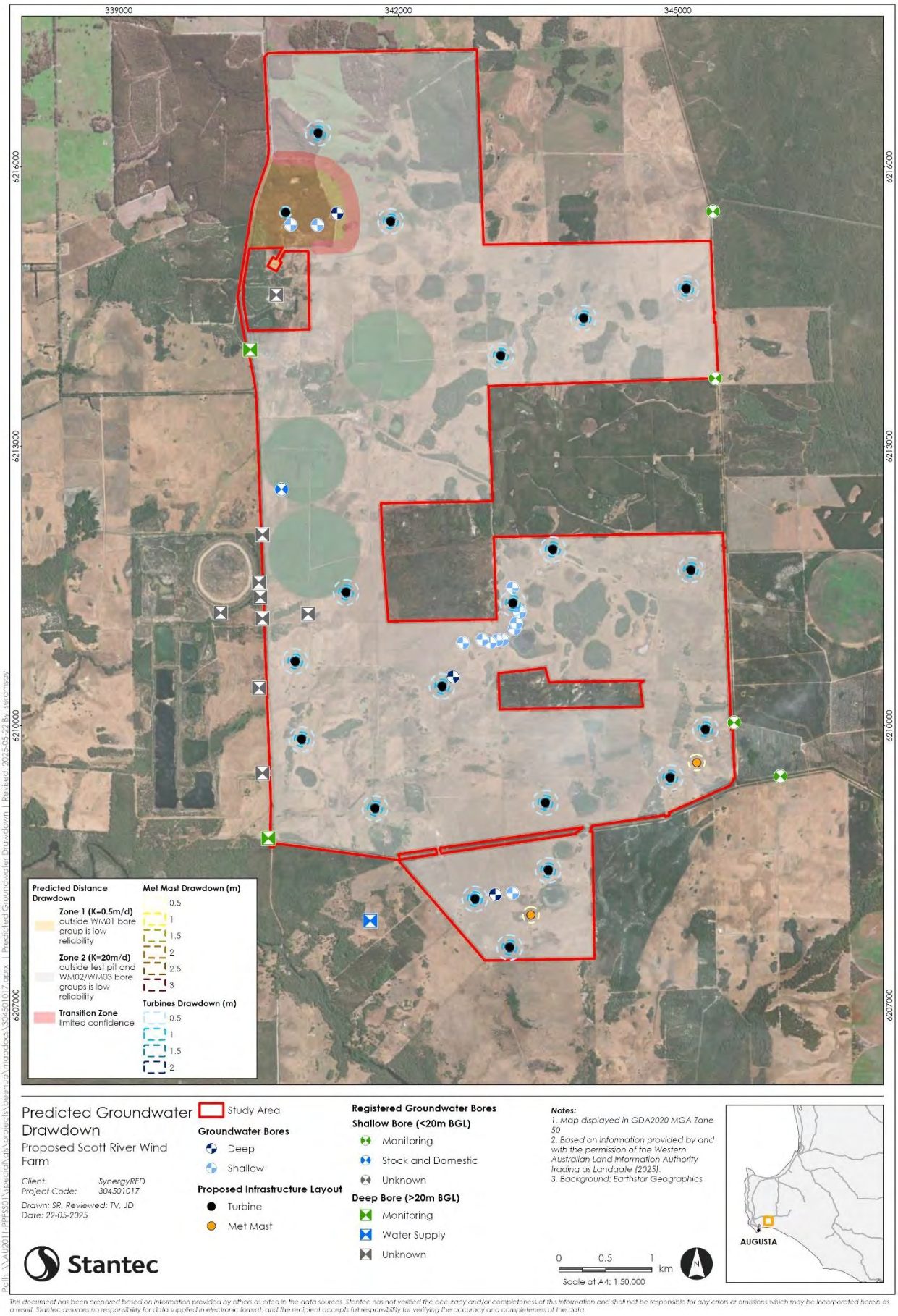

Figure 6-5: Predicted steady-state drawdown versus distance across the hydrological zones of the Study Area.

6.6 Drawdown Interaction and Expected Recovery

The predicted distance-drawdown model results vary depending on the drawdown target of foundation types and the hydrogeological characteristics across the Study Area (Figure 6-6). The greatest lateral extent (0.5 m drawdown contour) is predicted at the turbines (117 m) in Zone 2 compared to only 43 m in Zone 1 and attributed to varying hydrogeological characteristics. Meteorological towers located in Zone 2 have a predicted lateral extent of 86 m at the 0.5 m drawdown contour.

Under the proposed dewatering scenario, the drawdown extents that are predicted to potentially interact with GDEs (Section 3.5.3) are shown in Figure 6-6 and social receptors in Figure 6-7. The total area of interaction with GDEs (0.5 to 2 m drawdown extent) is 0.04 ha (Table 6-5), which only occurs in Zone 2 (Figure 6-6). This includes 0.04 ha of confirmed and potential groundwater dependent vegetation types (Mj and MrCh), which have also been mapped as wetland fauna habitats, comprising seasonally inundated Paperbark Woodland and Seasonally Inundated Sedgeland (Table 6-5). No GDE flora records intersect the predicted drawdown extents (Figure 6-6).

The predicted drawdown extent between 0.5 m to 2 m is typically confined to within the Study Area, with minor drawdown extending onto adjacent tenure considered minor, temporary, and well within the observed natural seasonal groundwater variation (Figure 6-6, Figure 6-7). While there is also the potential for cumulative drawdown impacts to occur in relation to other bore users in the Study Area (shallow bores down to 20 mbgl; Stock and Domestic Bore Number 60910768 and Water Supply Bore Number 60910782), predicted modelling does not indicate interference (Figure 6-7).

However, as dewatering for construction and excavation is expected to occur during the dry season (where practicable), it is anticipated that groundwater levels in the Superficial Aquifer would unlikely be encountered or would likely recover during the subsequent winter period (under average rainfall conditions). Groundwater in the Leederville Aquifer is not anticipated to be intercepted during the turbine and meteorological tower excavation dewatering. However, if this did occur, this system is likely to recover comparatively quicker (within weeks to months), as it is recharged via horizontal and vertical flow from the north towards the south and vertical downward leakage from the Superficial Aquifer. Regardless, the temporary and spatially constrained nature of potential dewatering and predicted drawdown is expected to maintain the existing hydraulic regime and avoid long-term impacts on groundwater users and GDEs.

Table 6-5: GDEs including vegetation types and wetland fauna habitats interacting with predicted drawdown extents.

GDE Category and Sub-Category		Area within Drawdown Extents (ha)		
		>2m	1m - 2m	0.5m - 1m
Confirmed GDE	**Vegetation Type** Scott River Ironstone TEC (Mj) **Wetland Fauna Habitat** Seasonally inundated sedgeland (containing *Melaleuca rhaphiophylla*)	0	0	0.03
Potential GDE	**Vegetation Types** Dominated by *Melaleuca rhaphiophylla* and *Melaleuca preissiana* (MrCh) **Wetland Fauna Habitat** Seasonally inundated paperbark woodland (containing *Melaleuca rhaphiophylla* and *Melaleuca preissiana)*	0	0	0.01
	Total (ha)	**0**	**0**	**0.04**

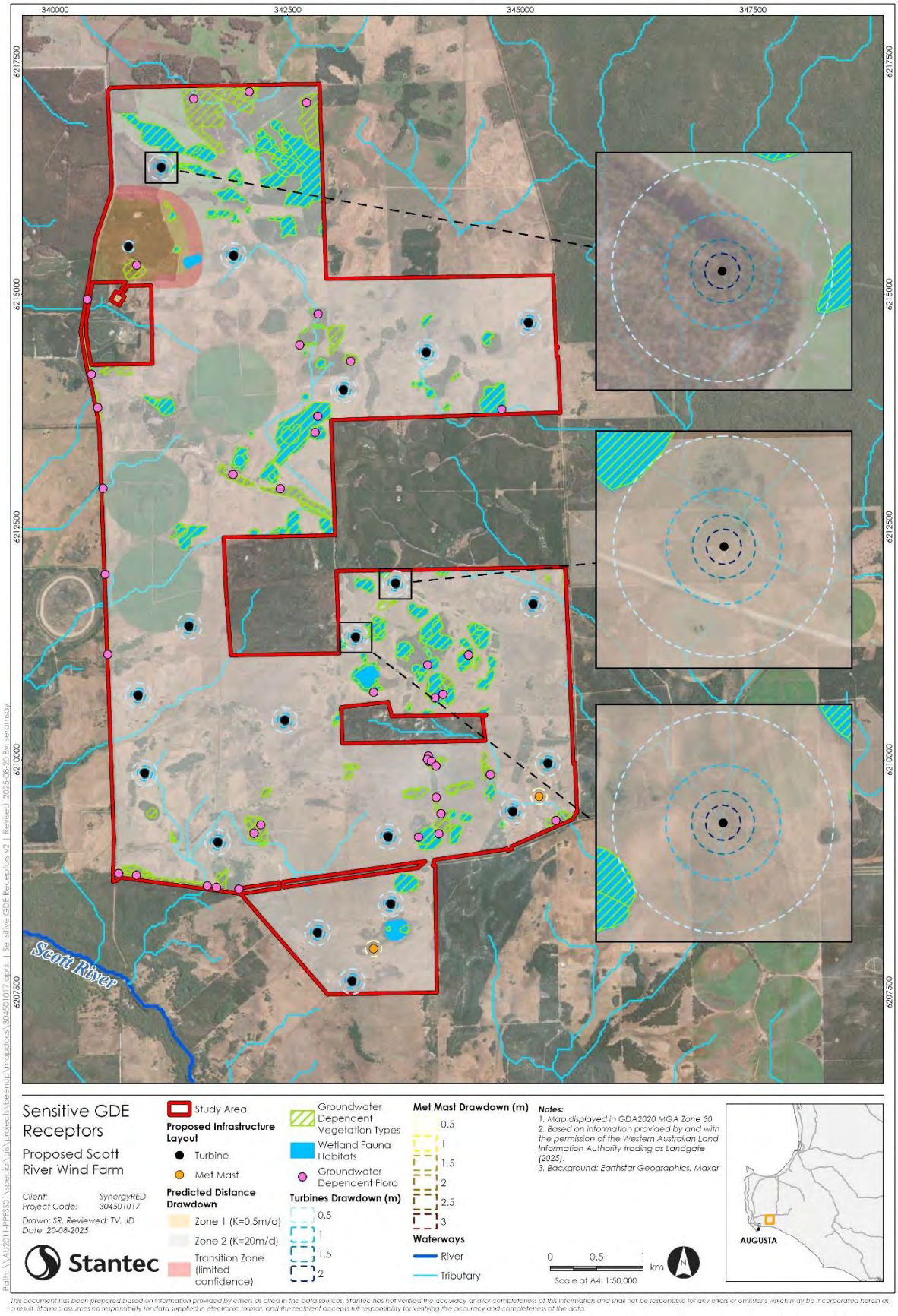

Figure 6-6: Predicted groundwater drawdown and potentially sensitive GDE receptors across the Study Area. Mapped receptors comprise GDE vegetation types with confirmed, potential and incidental records and wetland fauna habitats including seasonally inundated paperbark woodland and seasonally inundated sedgeland.

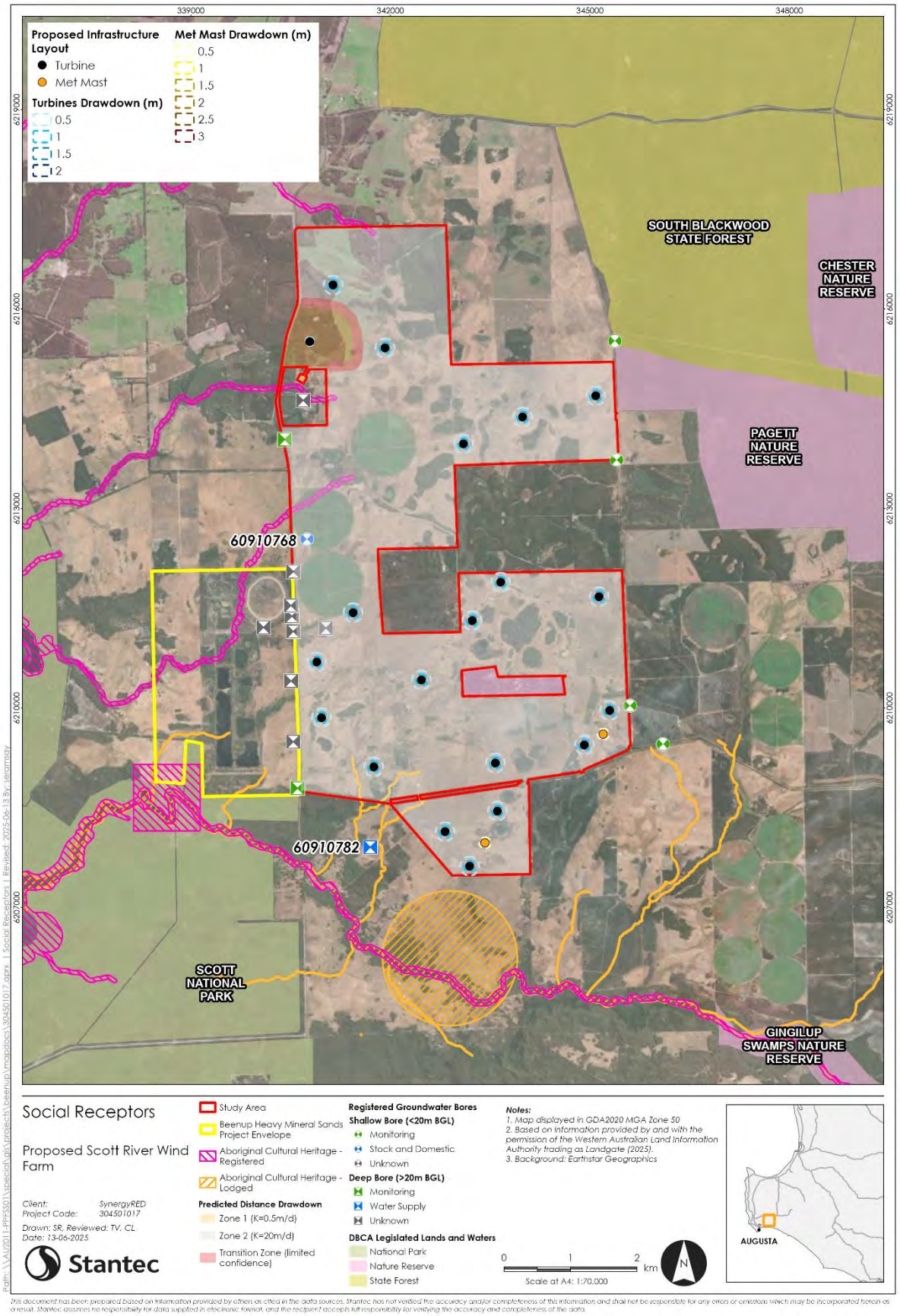

Figure 6-7: Predicted groundwater drawdown and potentially sensitive social receptors across the Study Area.

7 Preliminary Risk Assessment

7.1 Sensitive Receptors and Potential Impacts

The preliminary risk assessment for the Proposal is presented in Table 7-1 and is based on the outcomes of a workshop undertaken by SynergyRED and Stantec in May 2024 as well as the subsequent findings of this Assessment. It follows the SynergyRED Risk Assessment Framework (Appendix I) and applies mitigation and management actions approved by SynergyRED (Appendix J), with additional considerations provided if required.

The preliminary risk assessment considered the indicative infrastructure layout comprising wind turbines and meteorological towers, and construction activities of the Proposal, which may cause changes to surface water and hydrogeology, impacting potentially sensitive ecological and social receptors:

- Ecological receptors, including known and potential groundwater dependent ecosystems (GDEs) comprising obligate and facultative phreatophytes and three wetland types (seasonally inundated paperbark woodland, seasonally inundated shrubland and seasonally inundated sedgeland).
- Social receptors, including local stakeholders such as adjacent landowners or bore users (pastoralists), tenure holders (BHP), and Traditional Owner groups.

The potential impacts of the Proposal (Table 7-1), which may pose a risk to these receptors are summarised as follows:

- Surface water: changes to the hydrological regime and flow patterns of the area due to the infrastructure layout, contamination from spills of hazardous material, sedimentation or erosion, excavation and exposure of ASS and runoff;
- Groundwater: temporary drawdown associated with construction dewatering leading to reduced levels (quantity), contamination of groundwater from chemicals, and excavation and exposure of ASS, as well as possible cumulative impacts; and
- Interaction: reduced interaction of surface and groundwater causing a decrease in the hydroperiod of wetlands or waterways, or interactive effects from acidified groundwater drawn from the adjacent historic Beenup Titanium Mine.

Table 7-1: Preliminary risk assessment for the Proposal, in relation to potential impacts on the surface water and hydrogeological regimes of the Study Area and surrounds

(risk rankings: Red = High, Orange = Moderate, Green = Low and Blue = Negligible).

#	Hazard Type	Hazard	Risk Event Description	Causes and Impacts	Inherent Risk			Considerations and Mitigation Measures	Residual Risk		
					Like.	Cons.	Risk		Like.	Cons.	Risk
1	Natural Environment / Ecosystem and Social	Ecosystem Change	Infrastructure will modify the existing hydrological characteristics.	Proposed infrastructure (including planned access roads) will interfere with existing flow paths, and/or inadequate sizing and location of surface water management infrastructure which may cause the following hydrological changes: (1) Increased surface water inundation; (2) Increased duration of inundation; (3) Decreased flow to downstream ecological receptors; (4) Waterlogging of adjacent upstream ecological receptors; and (5) Increased erosion and sedimentation.	Almost Certain (L5)	C2	R19 (Mod.)	**Considerations** • Modelling indicates that frequent flow regimes (50% AEP) correspond to a minor inundation extent and limited number of flow paths discharging from the Study Area, and most areas with inundation depths >0.5 m occur upstream. • Areas with flood depths exceeding 0.3m are categorised as being of likely risk to infrastructure and public safety should be avoided as part of infrastructure resilience planning. • Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed. • There is no flood extent data available for Scott River and the downstream tailwater condition is unknown and has been compensated for by establishing a 500mm buffer zone from the Scott River. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where practicable (J.2.1). • There will be no diversion of the key waterways (J.2.2). • Runoff from substation, office and concrete batching areas will be captured and directed to an on-site retention basin for settlement before infiltrating internally and/or controlled discharge through the stormwater overflow designed to manage sediment removal and reduce stormwater velocity (J.2.2). • Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed (J.2.3). • Where possible, velocities will be maintained below erosion threshold, and sediment management aligned with the CEMP (J.2.3). • Suitable erosion protection will be installed in line with relevant guidelines (J.2.3). • Exposed soils will be vegetated or have engineered erosion protection where velocities exceed 1m/s and remain below 2m/s (J.2.3). • Design and construction works will ensure that local grading and excavation areas do not create areas of pooled water (J.2.3). • Modification of existing drainage structures that contain or control the movement of soil or water (e.g. drains) will be avoided unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors (J.2.3). • Drainage control structures (e.g. drains and culverts) will be appropriately located, designed and constructed and maintained to maintain surface water flow regimes and minimise erosion (J.2.3 & J.2.4). • Implementation of hazardous material containment and sediment barriers to prevent runoff into wetlands and waterways during construction (J.1.5) • Development and implementation of a CEMP and ASSDMP, applying suitable mitigation measures (J.2.5 & J.2.6). • Adhere to the relevant SynergyRED mandatory environment and cultural heritage management measures (SYN-STD-ENV-0001 Rev. 2 July 2024) to maintain surface and groundwater regimes (J.2.6).	Unlikely (L2)	C2	R5 (Negl.)
2	Natural Environment / Ecosystem and Social	Ecosystem Change	Construction activities, including dewatering, leading to change in groundwater flows and/or reduced groundwater levels (quantity), adversely impacting ecological	Dewatering drawdown in support of constructing the concrete foundations for the Project infrastructure will cause a temporary reduction in groundwater levels (quantity) within the Superficial Aquifer, potentially impacting the hydroperiod and health of GDEs.	Likely (L4)	C3	R18 (Mod.)	**Considerations** • Dewatering for excavation is estimated at approximately four weeks per foundation, and if interaction occurs with the Superficial Aquifer, expected recovery is the subsequent winter period, with no anticipated interaction with the Leederville Aquifer. • Modelling indicates drawdown will be constrained to the Superficial Aquifer (which is known to dry out in some areas during the dry season) and is typically within natural seasonal variation.	Unlikely (L2)	C3	R8 (Low)

#	Hazard Type	Hazard	Risk Event Description	Causes and Impacts	Inherent Risk			Considerations and Mitigation Measures	Residual Risk		
					Like.	Cons.	Risk		Like.	Cons.	Risk
			and social receptors in the Study Area and immediate surrounds.					• Proposed drawdown modelling intercepts 0.04 ha of known and potential GDEs. This drawdown modelling conservatively assumes ground water level at surface (i.e. drawdown when the water table is at its highest). • Cumulative impacts are not expected, with no interaction of drawdown between infrastructure. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where practicable to minimise volume of dewatering (J.2.1). • Alternative turbine foundation design will reduce the dewatering requirement from 5-6m to 2m (J.2.5). • Dewater will not be discharged to local waterways/wetlands (J.2.5). • Dewatering to be undertaken in line with ASSDMP prepared in accordance with relevant regulatory guidelines and objectives, including any pumping, storage, treatment, discharge procedures, testing and monitoring requirements (J.2.5).			
				Dewatering during construction may reduce groundwater and surface water interactions or baseflow to nearby wetlands or rivers, leading to a temporary reduction in groundwater quantity and decrease in the duration of inundation (hydroperiod) of waterbodies, adversely impacting sensitive ecological receptors.	Likely (L4)	C3	R18 (Mod.)	**Considerations** • Dewatering for excavation is estimated at approximately four weeks per foundation, and if interaction occurs with the Superficial Aquifer, expected recovery is the subsequent winter period, with no anticipated interaction with the Leederville Aquifer. • Modelling indicates drawdown will be constrained to the Superficial Aquifer (which is known to dry out in some areas during the dry season) and is typically within natural seasonal variation. • Proposed drawdown modelling intercepts 0.04 ha of known and potential GDEs. This drawdown modelling conservatively assumes ground water level at surface (i.e. drawdown when the water table is at its highest). • Cumulative impacts are not expected, with no interaction of drawdown between infrastructure. • Waterways and wetlands are seasonal and typically dry during periods of low rainfall. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where practicable (J.2.1). • Alternative turbine foundation design will reduce the dewatering requirement from 5-6m to 2m (J.2.5). • Dewatering to be undertaken in line with ASSDMP prepared in accordance with relevant regulatory guidelines and objectives, including any pumping, storage, treatment, discharge procedures, testing and monitoring requirements (J.2.5). This includes infiltration of dewater as close to the source as possible, to limit drawdown.	Unlikely (L2)	C3	R8 (Low)
				Dewatering in support of constructing the concrete foundations for project infrastructure may lead to temporary reduced downstream water security impacting social receptors, due to a temporary reduction in groundwater quantity within the Superficial Aquifer.	Likely (L4)	C3	R18 (Mod.)	**Considerations** • Dewatering for excavation is estimated at approximately four weeks per foundation, and if interaction occurs with the Superficial Aquifer, expected recovery is the subsequent winter period, with no anticipated interaction with the Leederville Aquifer. • Modelling indicates drawdown will be constrained to the Superficial Aquifer (which is known to dry out in some areas during the dry season) and is typically within natural seasonal variation. • Cumulative impacts are not expected, with no interaction of drawdown between infrastructure. • There are no expected impacts to local stakeholders (i.e., 0.5 m contour does not intercept other shallow groundwater users), with SynergyRED continuing to consult extensively to communicate mitigation and management measures. • There is no expected interaction with the acidic plume from the historic Beenup Titanium Mine, which is in the Leederville Aquifer.	Unlikely (L2)	C4	R12 (Low)

#	Hazard Type	Hazard	Risk Event Description	Causes and Impacts	Inherent Risk			Considerations and Mitigation Measures	Residual Risk		
					Like.	Cons.	Risk		Like.	Cons.	Risk
								Summary of Mitigation Measures (Appendix J) • Land next to waterbodies will remain undisturbed for as long as possible, to prevent sedimentation into drainage systems (J.1.6). • Construction activities will be undertaken during the dry season, where possible (J.2.1). • Alternative foundation design will reduce the dewatering requirement from 5-6m to 1.2m (J.2.5). • Dewatering will not be discharged to local waterways/wetlands (J.2.5). • Development and implementation of a suitable CEMP and ASSDMP, applying suitable mitigation measures (J.2.5 & J.2.6). • Adhere to the relevant SynergyRED mandatory environment and cultural heritage management measures (SYN-STD-ENV-0001 Rev. 2 July 2024) to maintain surface and groundwater regimes (J.2.6).			
				Excavation of foundations for project infrastructure penetrates an aquitard (ferricrete or clay layers) causing excessive leakage from the Superficial Aquifer, and reducing the hydroperiod and health of any associated GDEs.	Unlikely (L2)	C3	R8 (Low)	**Considerations** • Penetration of the aquitard considered unlikely to occur due to shallow nature of foundations. • Ferricrete is not consistent (locally confined) across the Study Area. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where practicable (J.2.1). • Alternative foundation design will reduce the excavation requirement from 4.5-5 m to 0.8-1.2m (J.2.5). • Dewatering to be undertaken in line with ASSDMP prepared in accordance with relevant regulatory guidelines and objectives, including any pumping, storage, treatment, discharge procedures, testing and monitoring requirements (J.2.5). This includes infiltration of dewater as close to the source as possible, to limit drawdown.	Rare (L1)	C3	R4 (Negl.)
				Dewatering during construction may draw in the adjacent acid mine plume, potentially redirecting mine-impacted groundwater adversely affecting the groundwater quality of the superficial aquifer and reducing the health or causing the death of GDEs	Possible (L3)	C4	R17 (Mod.)	**Considerations** • There is no expected interaction with the acidic plume from the historic Beenup Titanium Mine, which is in the Leederville Aquifer. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where practicable (J.2.1). • Alternative turbine foundation design will reduce the dewatering requirement from 5-6m to 2m (J.2.5). • Dewatering to be undertaken in line with ASSDMP prepared in accordance with relevant regulatory guidelines and objectives, including any pumping, storage, treatment, discharge procedures, testing and monitoring requirements (J.2.5). This includes infiltration of dewater as close to source as possible, particularly between dewatering location and any sensitive ecological receptor to limit cone of depression.	Rare (L1)	C4	R7 (Low)
				The concrete foundations for project infrastructure may alter groundwater flow in the Superficial Aquifer (i.e., mounding upstream of the foundation, and groundwater shadow downstream of the foundation) impacting the health of GDEs or downstream ecological receptors.	Unlikely (L2)	C1	R3 (Negl.)	**Considerations** • The footprint of the foundations is minor compared to the size of the Study Area. • Any potential mounding or flow disruption is expected to be less than the seasonal variations. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where possible (J.2.1).	Rare (L1)	C1	R1 (Negl.)

#	Hazard Type	Hazard	Risk Event Description	Causes and Impacts	Inherent Risk			Considerations and Mitigation Measures	Residual Risk		
					Like.	Cons.	Risk		Like.	Cons.	Risk
								• Alternative turbine foundation design will reduce the excavation requirement from 4.5-5m to 0.8-1.2m (J.2.5).			
3	Natural Environment / Ecosystem and Social	Ecosystem Change	Construction activities adversely impact surface water and/or groundwater quality, and sensitive receptors in the Study Area and immediate surrounds.	Excavation of foundations may penetrate an aquitard and cause alterations in groundwater quality leading to the reduced health or death of sensitive ecological receptors.	Unlikely (L2)	C3	R8 (Low)	**Considerations** • Penetration of the aquitard considered unlikely to occur due to shallow nature of foundations. • Ferricrete is not consistent (locally confined) across the Study Area. **Summary of Mitigation Measures (Appendix J)** • Construction activities will be undertaken during the dry season, where possible (J.2.1). • Alternative foundation design will reduce the dewatering requirement from 5-6m to 1.2m (J.2.5). • Development and implementation of CEMP and ASSDMP, applying suitable mitigation measures (J.2.5 & J.2.6). • Adhere to the relevant SynergyRED mandatory environment and cultural heritage management measures (SYN-STD-ENV-0001 Rev. 2 July 2024) to maintain surface and groundwater regimes (J.2.6).	Rare (L1)	C3	R4 (Negl.)

				Potential for contamination of soils, surface water and/or groundwater due to disturbance and/or inappropriate handling of ASS or other materials (e.g., chemicals/hydrocarbons), impacting sensitive ecological or social receptors.	Possible (L3)	C4	R17 (Mod.)	**Considerations** • While the Study Area has a high to moderate potential of containing ASS, the Leederville Aquifer poses the greatest risk and is not anticipated to be disturbed. • **Summary of Mitigation Measures (Appendix J)** • Appropriate management of hazardous substances and materials will be undertaken on site, including storage (J.1.8). • Hydrocarbons to be managed at appropriate fuel locations, with practicable containment and remediation measures (J.1.8). • Areas that may contain contaminants will be bunded and stormwater will be captured (J.1.8). • Implementation of hazardous material containment, sediment barriers and buffers, to prevent runoff into wetlands and waterways during construction (J.1.8 and J.2.4). • Runoff from substation, office and concrete batching areas will be captured and directed to the on-site retention basin for settlement and infiltration (J.1.8). • Alternative turbine foundation design adopted to reduce the excavation and dewatering requirement from 4.5-5 to 0.8-1.2 and 5-6m to 2m respectively (J.2.3). • Dewatering to be undertaken in line with ASSDMP prepared in accordance with relevant regulatory guidelines and objectives, including any pumping, storage, treatment, discharge procedures, testing and monitoring requirements (J.2.5). • Dewater will not be discharged to local waterways/wetlands (J.2.5) and no fuelling or servicing within 50 m of waterways/wetlands (J.1.8). • Development and implementation of a CEMP (J.2.6) to appropriately manage construction activities.	Unlikely (L2)	C4	R12 (Low)

#	Hazard Type	Hazard	Risk Event Description	Causes and Impacts	Inherent Risk			Considerations and Mitigation Measures	Residual Risk		
					Like.	Cons.	Risk		Like.	Cons.	Risk
4	Natural Environment / Ecosystem and Social	Ecosystem Change	Construction activities that disturb soil and may result in adverse impacts to sensitive receptors within the Study Area and its immediate surrounds.	Mobilisation of existing nitrogen and phosphorus in soils during construction and runoff into wetlands and waterways, adversely impacting sensitive ecological receptors.	Likely (L4)	C2	R14 (Mod.)	**Considerations** • Existing and surrounding land has been cleared due to pastoral and agricultural activities, and contains elevated levels of nitrogen, phosphorus. **Summary of Mitigation Measures (Appendix J)** • Implementation of sediment barriers to prevent runoff into wetlands and waterways during construction (J.1.8). • Construction activities will be undertaken during the dry season, where possible, to minimise runoff (J.2.1) and drainage features will be appropriately located, designed and constructed (J.2.3). • Development and implementation of a CEMP and ASSDMP, applying suitable mitigation measures (J.2.5 & J.2.6). • Adhere to the relevant SynergyRED mandatory environment and cultural heritage management measures (SYN-STD-ENV-0001 Rev. 2 July 2024) to maintain surface and groundwater regimes (J.2.6).	Unlikely (L2)	C2	R5 (Negl.)

7.2 Key Residual Risks and Mitigation

Following the implementation of mitigation measures (predominantly civil design) to minimise potential impacts to surface water and hydrological regimes throughout the Study Area, the residual risk from the Proposal is predicted to be **Negligible**. (Table 7-1). The remaining key inherent risks are associated with groundwater drawdown, exposure and drainage of ASS and potential contamination, during excavation, dewatering and construction (Table 7-1). These were assigned **Moderate** inherent risk rankings (Table 7-1), however, following the implementation of management and mitigation measures (Appendix J), residual risks were assessed as **Low** (Table 7-1). The key mitigation measures for the Proposal, specific to dewatering, ASS and contamination includes:

- SynergyRED have adopted an alternative foundation design that is shallower and installed using piling technology, reducing the depth of dewatering from 5-6 m to 1-2 m.
- Construction, specifically early civil works and dewatering activities are scheduled to be conducted during the dry season, where practicable, with only temporary dewatering needed for the turbines and meteorological towers.
- All construction and management activities will adhere to an Acid Sulfate Soil and Dewatering Management Plan (ASSDMP) prepared in accordance with relevant DWER guidelines and a Construction and Environmental Management Plan (CEMP) outlining site-specific actions.

Potential impacts to sensitive receptors (Figure 6-7) should be considered in the context of the temporary and spatially constrained nature of the construction activities for the Proposal, the natural seasonal variation of groundwater, and the implementation of management measures. Therefore, it is expected that **environmental risks can be avoided or adequately mitigated**, with no expected long-term impacts to groundwater or GDEs, with the following key considerations (Table 7-1):

- Dewatering for excavation will be temporary and constrained to the Superficial Aquifer.
- The estimated timeframe for excavation is approximately four weeks per foundation, with a targeted drawdown at the edge of the foundations of 2 m for the turbines and 3 m for the meteorological towers.
- Seasonal variation of groundwater for both aquifer systems in the Study Area is approximately 2 m.
- Cumulative impacts are not expected, with no interaction or overlap of predicted drawdown in the Study Area.
- The total area of known and potential GDEs (including vegetation and wetland fauna habitats) that intercepts the predicted drawdown extent is 0.04 ha (within the 0.5 to 2 m drawdown contours), which is well within seasonal variation.
- Predicted drawdown extents will not interact with the acid groundwater plume in the Leederville Aquifer, associated with the historic Beenup Titanium Mine.
- Dewatering is expected to occur in the dry season (where practical), and if intercepted, the Superficial Aquifer is expected to recover during the subsequent winter period (under average rainfall conditions). In addition, while not anticipated, if interaction occurs with the Leederville Aquifer, more rapid recovery is predicted (within weeks to months).

As planning and design for the Proposal progresses, SynergyRED should continue to liaise with local stakeholders including groundwater users and landowners, Traditional Owners and BHP representatives to communicate the expected low risk to sensitive receptors within the Study Area. The final Proposal design specifications will also be outlined in the CEMP and associated ASSDMP, with additional information used to revise this preliminary risk assessment.

8 Conclusions and Gap Analysis

8.1 Assessment Summary

8.1.1 Proposal Features

The Proposal is anticipated to involve construction and operation of up to 20 wind turbine generators across the Study Area, along with supporting infrastructure including meteorological towers, transmission line and associated foundations, concrete batching plant, access roads, borrow pits, offices and electrical substation and switch yard. During construction, dewatering will be required to a maximum depth of 2 to 3 m to support excavation and installation of foundations, with local disposal via sediment tanks/ponds and infiltration basins. Consideration of surface water and hydrogeological characteristics is required to avoid and mitigate impacts to potentially sensitive ecological and social receptors in the vicinity of the Study Area.

8.1.2 Surface Water Characteristics

Key surface water features in the region consist of historically modified catchments with artificial drains to facilitate the agricultural and plantation activities. These drains have not been built in a coordinated way and intersect with roads and natural drainage lines, resulting in several areas of localised ponding due to catchment modification.

The Study Area has a poorly defined ridgeline that runs approximately through the centre of the Study Area, segregating the 11 Blackwood and Scott River headwater catchments that discharge from the Study Area. Sheet flow occurs across cleared land areas, concentrating into more defined streamflow paths towards the Study Area boundary.

There are several areas of natural ponding following rainfall events in areas designated as wetlands and in depressions formed by historical anthropogenic activities. The roads on almost every boundary of the Study Area act as an impediment to flow paths and cause localised upstream ponding, apart from the southernmost catchment which sheet flows across agricultural land.

8.1.3 Hydrogeological Characteristics

The northern part of the Study Area is characterised by a thin layer of dune sands (<2 m) overlying alternating bands of clay and sand as well as peat, while in the central and south sections, dune sands are deeper (up to approximately 6 m) with interbedded ferricrete and/or clay. The Study Area is located within an area of high to moderate ASS potential (supported by preliminary test results) and is partly within DoW Groundwater Management Zone 7 (from the central area to the south); a buffer zone area defined by an acid sulfate soil plume from Beenup mine site used to restrict groundwater extraction.

The Study Area hosts the Superficial and Leederville Aquifers, with the latter identified within the upper 25 m of the profile. The Superficial Aquifer is localised and discontinuous and is generally hosted within the surficial sand. It includes perched groundwater above impermeable beds of the Leederville Formation, and local confinement zones of low permeability in the laterite (dominant sand and ferricrete) profile. The Leederville Aquifer lies beneath the Superficial Aquifer and is shallower in the north and deepens in the southern portion of the Study Area.

The Superficial Aquifer is recharged by direct diffuse rainfall infiltration and localised downward leakage from creeks, wetlands and irrigation through sandy soils. Potential upward leakage from the underlying Leederville Formation may also occur. The Leederville Aquifer is mostly recharged via lateral flow and vertical downward leakage from the Superficial Aquifer. Discharge from the Superficial Aquifer occurs via evapotranspiration, while the Leederville Aquifer discharges to major rivers and creeks. During the wet season the water table in the Superficial Aquifer is shallow and may locally discharge into wetlands or at the ground surface, while during the dry season, the water table is lowered, and some areas may become dry from reduced rainfall. Previous investigations in the area indicate that in winter the Superficial Aquifer may be connected to creeks, indicating that surface-water groundwater interactions may be ephemeral and seasonally influenced, although this has not been verified by this Assessment. It is unlikely that the deeper Leederville Aquifer is in direct connection to ephemeral surface water features in the Study Area. Registered groundwater pumping occurs within and surrounding the Study Area and is used primarily for irrigation.

Groundwater levels in the Superficial Aquifer and the Leederville Aquifer are strongly correlated to rainfall and are shallowest in winter. Continuous monitoring at the Study Area by Stantec indicated the water table fluctuated between March 2024 and September 2024 by approximately 2 m in both aquifer systems. Groundwater flow in both the Superficial and Leederville Aquifer was inferred to flow in a southward direction (southwest in the western Study Area and southeast in the southeastern Study Area).

The Superficial Aquifer and Leederville Aquifer are classified as freshwater, with total dissolved solids (TDS) typically less than 500 mg/L. The pH ranges from acidic to neutral, with elevated turbidity, copper, iron and manganese in both aquifer systems, while the Superficial Aquifer is also characterised by elevated aluminium and nitrogen concentrations.

8.1.4 Surface Water Assessment

Preliminary flood modelling comprised two-dimensional hydraulic modelling for the 50%, 20%, 10%, 5% and 1% Annual Exceedance Probability (AEP) existing climate scenario and 1% AEP climate change high emissions scenario flood events. Surface water modelling was undertaken to characterise the hydrological regime of formalised flow paths and areas of inundation in frequent to extreme rainfall events. The frequent flow regimes such as the 50% AEP demonstrate a minor extent of inundation with only a small number of defined flow paths discharging from the Study Area. The average flow depth is less than 100 mm across the Study Area in frequent flows, with approximately 100mm conveyed along the defined flow paths.

Peak flow rates at the outlets during frequent flow regimes (50% AEP) and rare event regimes (1% AEP) range from 0.5 m³/s to ~20 m³/s, respectively and the maximum discharge rate of ~20 m^3/s in the 1% AEP from the Study Area is south to the Scott River. In addition, during a 50% AEP event maximum ponding depth of ~1.2 m occurred near the south-western boundary of the Study Area. Most areas of inundation with depths greater than 0.5 m in the frequent events (~50% AEP) occur upstream of roads acting as hydraulic controls with some ponding in areas with the appearance of wetlands or perched ponds. There are only a small number of defined flow paths discharging from the Study Area with flow rates of up to 0.5 m^3/s in the 50% AEP event.

The rare (1% and 2% AEP) flow regimes demonstrate a widespread level of inundation with all headwater catchments, other than one sub-catchment in the north-east, showing distinctive flow paths to discharge locations outside of the Study Area. The maximum ponding depth of ~2.8 m occurs in the forested northern-most sub-catchment in the Study Area. The second deepest ponding occurs at ~2.3 m in the same location to the 50% AEP near the south-western boundary of the Study Area. Several areas of inundation in the rare (1% and 2% AEP) events exceed 0.5 m in depth across the Study Area, including behind roads acting as hydraulic controls and in areas with the appearance of wetlands or perched ponds. All headwater catchments other than one in the north-east show distinctive rare event flow paths to the discharge locations outside of the Study Area. The maximum 1% AEP discharge rate of ~20 m^3/s from the Study Area is south of the Scott River.

8.1.5 Preliminary Dewatering Assessment

A hydrogeological conceptual model was developed using available data and investigations from the Study Area and surrounds. The model applied several zones to the Study Area, based on likely aquifer characterisation; Zone 1 (bore group WM01) comprising mostly sandy clay, Zone 2 (all other locations) consisting of predominantly sand, and a transition zone, assigned as an arbitrary boundary between the two zones. Preliminary construction dewatering steady-state modelling estimated the following distances to the 0.5 m and 1 m drawdown contours for the targeted dewatering levels for infrastructure components:

- Zone 1 Turbines: approximately 43 m (0.5 m contour) and 31 m (1.0 m contour).
- Zone 2 Turbines: approximately 117 m (0.5 m contour) and 60 m (1.0 m contour).
- Meteorological tower: approximately 86 m (0.5 m contour) and 34 m (1.0 m contour).

Initial pumping rates to attain the target drawdowns after five days of pumping ranged between 1,525 m^3/d (Zone 2 meteorological tower) and 2,295 m^3/d (zone 2 turbines). Initial dewatering in zone 1 (turbines) was likely to be similar to the steady-state rate (average approximately 75 m^3/day). To maintain target drawdown, daily pumping rates in zone 2 ranged between approximately 296 m^3/d (meteorological tower) and 2,058 m^3/d (turbines).

These predicted pumping rates assumed that no management structures were used to reduce lateral inflow. Based on the current predicted inflow model estimate for Zone 2, a water licence may be required due to the approximate steady-state in-flow volume taken, per excavation, and that the pumping rate may require higher than 10 L/s pumping rate over a period of more than 30 consecutive days.

8.1.6 Sensitive Receptors, Risk and Mitigation

The Assessment identified several potentially sensitive ecological (GDEs) and social receptors that may be impacted by dewatering and excavation during construction. Key impacts from the development of the Proposal include changes to the hydrological regime and flow patterns, contamination of surface water and groundwater, sedimentation and erosion of surface environments, ASS exposure and runoff, and potential interactive effects associated with the acid groundwater plume from the closed Beenup Titanium Mine.

The preliminary risk assessment indicated that following mitigation the risk to hydrology is negligible. Inherent risk rankings of moderate were associated with potential impacts on GDEs from drawdown, exposure and drainage of ASS, and contamination, which were reduced to low following the implementation of mitigation measures including a shallow foundation design and reduced dewatering depth, civil works to be conducted during the dry season, where practicable, and adherence to specific measures in the ASSDMP and CEMP. The temporary and spatially constrained nature of the construction activities will also limit potential impacts to GDEs.

8.2 Information and Data Gaps

The following surface water and hydrogeological information and data gaps were identified during the Assessment, for consideration by SynergyRED as the Proposal progresses:

- Spatial Data
  - Limited spatial coverage of high-resolution topographical data, especially in the northern section of the Study Area. Topographical data is available in varying resolution and accuracy across the Study Area. Two datasets have been merged with the northern area being considered of lower confidence.
- Surface Water
  - There is limited local surface water level correlation to historical rainfall events to provide Study Area-specific validation of modelled flows and water surface elevations.
  - There are no active or continuous water level recordings on the watercourses directly downstream of the Proposal, which may be addressed by the installation of local telemetric water level and rainfall monitoring to validate modelled flows.
  - No availability of local drainage information on culverts or crossovers and therefore baseline flow conditions may not accurately reflect local flow regimes.
  - There is no flood extent data available for Scott River and the downstream tailwater condition is unknown and has been compensated for by establishing a 500 mm buffer zone from the Scott River.
  - Modelling adopted the 2016 Intensity Frequency Duration (IFDs) in line with ARR2019 methodology, as was conducted prior to August 2024 updates regarding climate change considerations.
- Hydrogeology
  - There is limited data for spatial coverage and temporal groundwater level and groundwater quality monitoring data from shallow and deep monitoring bores and natural long-term seasonal variation within the Study Area.
  - There is limited information on the conceptual hydrogeological landscape and understanding of ecological receptors reliance on groundwater to definitively characterise potential impact to the environment associated with drawdown.
  - There is limited understanding of potential surface water and groundwater interactions, due to seasonal monitoring limitations.
  - There is limited geotechnical and acid sulfate soil investigations across the Study Area, which would be required to inform appropriate construction methodologies (e.g., foundation type), dewatering requirements and management during construction.
- Preliminary Risk Assessment and Mitigation
  - A revised hydrological conceptual model and impact assessment based on final layout of the Proposal (e.g., access roads, buildings, turbine and transmission tower foundations) may be required to understand changes to the surface water regime (flow frequency and flow volume).
  - The preliminary risk assessment may require revision following additional ASS or hydrogeological studies and definition of the final layout.

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Appendices

We design with community in mind

Appendix A Aquatic Ecology Assessment Stantec (2024b)

Proposed Scott River Wind Farm

Aquatic Ecology Assessment

Prepared for SynergyRED | August 2025



Stantec

Revision Schedule

Rev No.	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
A	14/02/2025	Draft report for client review	Kate Walker, Brooke Hay,	Brooke Hay	Fiona Taukulis	Joan Deng
B	02/07/2025	Final memo	Fiona Taukulis	Fiona Taukulis	Fiona Taukulis	Joan Deng
C	25/08/2025	Revised final memo	Fiona Taukulis	Fiona Taukulis	Fiona Taukulis	Joan Deng

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Appendix A Database Search Results

1 Introduction

1.1 Assessment Scope and Objective

Synergy Renewable Energy Development (SynergyRED) engaged Stantec Australia Pty Ltd (Stantec) to support the environmental approvals and planning for a proposed 100 MW wind farm in the locality of Scott River (the Project), approximately 15 km north-east of Augusta in the Margaret River region of Western Australia (Figure 1-1). The following scope of works has been completed:

1. Aquatic Ecology Assessment;
2. Surface Water Assessment;
3. Hydrogeological Assessment; and
4. Groundwater and Surface Water Monitoring.

Item 1 is presented in this stand-alone technical memorandum; the Aquatic Ecology Assessment (the Assessment), provided as a technical appendix to items 2 and 3, while Item 4 has also been completed and submitted as a separate deliverable. The objective of this Assessment was to provide an understanding of the aquatic ecology values of the Study Area (Figure 1-1) in relation the Project. To address the objective a desktop review was undertaken including searching relevant databases and literature, with the information summarised in this memorandum.

1.2 Project Layout and Study Area

The Proposal is anticipated to involve construction and operation of up to 20 wind turbine generators, each of which will be up to 250 metres (m) in height. As the Proposal is in its early stages of planning and approvals, the location of infrastructure is yet to be finalised. The configuration of the turbines and the infrastructure layout within the Study Area (equivalent to the Development Envelope) is shown in Figure 1-1. Supporting infrastructure also includes transmission poles and towers and a meteorological mast.

The Study Area (Figure 1-1) for the Project occupies an area of approximately 4,000 hectares (ha) and comprises agricultural properties bound by Dennis Road to the east and Scott River to the south, and west. The northern end is bordered by a fence line approximately 1.5 km south of the Brockman Highway. The Study Area is zoned as general agriculture with conservation areas of remnant vegetation, and neighbours the historical rehabilitated BHP Beenup Titanium Mine. There are several plantations within the Study Area which are also zoned as general agriculture.

1.3 Regulatory Setting

The Assessment has been undertaken considering relevant legislation and guidance including:

- *Biodiversity Conservation Act 2016*;
- *Environmental Protection Act 1986*;
- *Environment Protection and Biodiversity Conservation Act 1999*; and
- Environmental Factor Guideline – Inland Waters (EPA 2018);

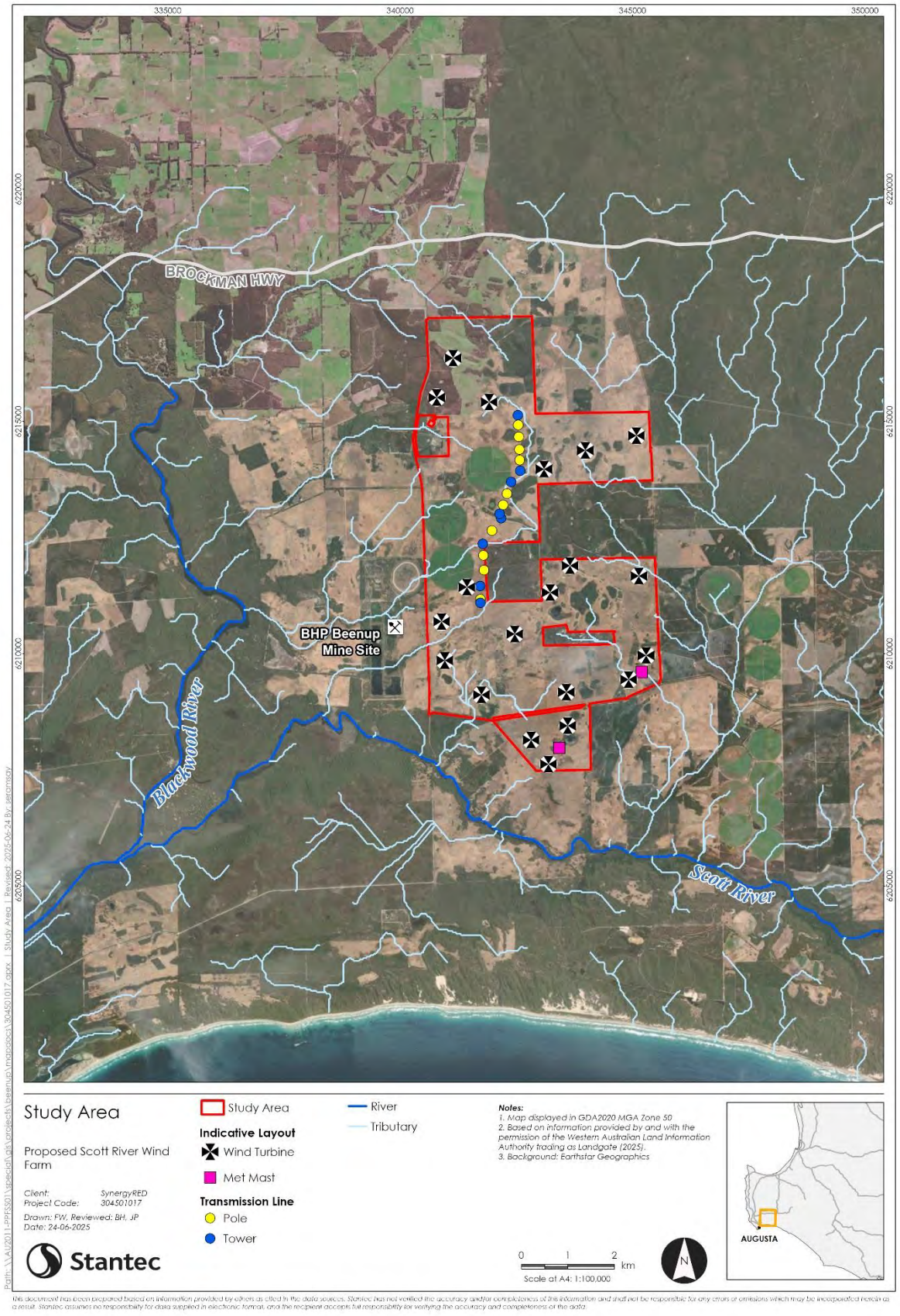

Figure 1-1: Study Area and proposed infrastructure layout for the Project.

2 Approach

A desktop assessment was undertaken to understand the aquatic ecology values of the Study Area and surrounds, comprising database searches and a literature review. The summary of relevant accessed databases and datasets is provided in Table 2-1, while the complete results are provided in Appendix A. Literature reviewed included information on inland waters, hydrology, and hydrogeology studies commissioned by SynergyRED and publicly available literature. The relevant literature review results are discussed in Section 4.

Table 2-1: Summary of databases and datasets accessed as part of the Assessment.

Reference	Database	Search Method	Buffer
DCCEEW (2020)	Australian Ramsar Wetlands: Internationally Important Wetlands	Manual search	-
DCCEEW (2019)	Directory of Important Wetlands: Nationally Important Wetlands	Manual search	-
BirdLife Australia (2024)	Birdata	Central coordinate (34°13'16.43" S 115°17'27.90" E)	50 km
Western Australian Government (2005)	Environmental Protection (Environmentally Sensitive Areas) Notice 2005	Manual search of list	-
WAM (2024a; 2024b; 2024c; 2024d)	Arachnida/Myriopoda, Insecta, Crustacea and Mollusca Databases	Northwest coordinate (33.543032° 114.592429°) Southeast coordinate (34.300442° 115.444722°)	-

3 Existing Environment

3.1 Biogeographic Context & Land Systems

The Study Area is located within the Warren (WAR) bioregion and the Southern Jarrah Forest subregion (Jarrah Forest 2; JF2) of Western Australia (Figure 3-1) (Thackway and Cresswall 1995). The Warren bioregion occurs on the dissected undulating Leeuwin Complex, Southern Perth Basin (Blackwood Plateau), and South-West intrusions of the Yilgarn Craton and western parts of the Albany Orogen (Hearn *et al.* 2001). Loamy soils support Karri forest, laterites support Jarrah-Marri forest, leached sandy soils in depressions and plains supporting low Jarrah woodlands and paperbark/sedge swamps, and Holocene marine dunes are characterised by *Agonis flexuosa* and *Banksia* woodlands and heaths (Hearn *et al.* 2001).

The Southern Jarrah Forest subregion occurs on the duricrusted plateau of the Yilgarn Craton (Hearn *et al*. 2002). South of Collie, the plateau broadens and slopes gently to the south coast. Drainage is still dissected in the west but broadening and levelling of the surface in the east causes poor drainage and large and small wetlands. Vegetation comprises Jarrah–Marri forest in the west and Marri and Wandoo woodlands in the east, with extensive swamp vegetation in the south–east, dominated by Paperbarks and Swamp Yate (Hearn *et al.* 2002). The understory component of the forest and woodland reflects the more mesic nature of this area; however, *Baumea* reed beds within freshwater wetland are a unique feature occurring within forested and adjacent areas (Hearn *et al.* 2002). The majority of the diversity in the communities occurs on the lower slopes or near granite soils where there are rapid changes in site conditions (Hearn *et al.* 2002).

The Southwest of Western Australia is considered to be a highly biodiverse area of the world for vascular plants (Hearn *et al.* 2001) with a high centre of endemism for both plants and aquatic fauna. High concentrations of endemic plants are noted from the Scott River Plains, the Leeuwin Naturaliste Ridge, and the area surrounding Walpole. Aquatic fauna of the Warren bioregion shows a similar endemism, with the freshwater cray genus *Engaewa* endemic to the bioregion (Hearn *et al.* 2001). Both the Warren bioregion and the Southern Jarrah Forest subregion are also considered to be a refugia containing relict taxa representative of a wetter milder climate, characterised by vascular and cryptic flora and invertebrate species normally associated with rainforests of Southeastern Australia (Hearn *et al.* 2001; Hearn *et al.* 2002). For example, *Moggridgea* (genus of tree-dwelling spiders) and Onychophora (velvet worm) taxa residing within Tingle forests, relictual and other aquatic invertebrates within peat/organic wetlands, and the limestone cave and karst systems that support endemic invertebrate fauna on the west coast (Hearn *et al.* 2001).

As with the Warren bioregion, the Southern Jarrah Forest subregion is also characterised by peat swamp communities and fresh to saline wetland systems which support endemic invertebrate fauna (Hearn *et al.* 2002). Other fauna unique to the area includes restricted and rare frogs, comprising the White-bellied Frog (*Anstisia alba*; Critically Endangered, BC Act/EPBC Act), the Orange-bellied Frog (*Anstisia vitellina*, Vulnerable, BC Act/EPBC Act), and the Sunset Frog (*Spicospina flammocaerulea*; Vulnerable, BC Act/EPBC Act) (Hearn *et al.* 2002).

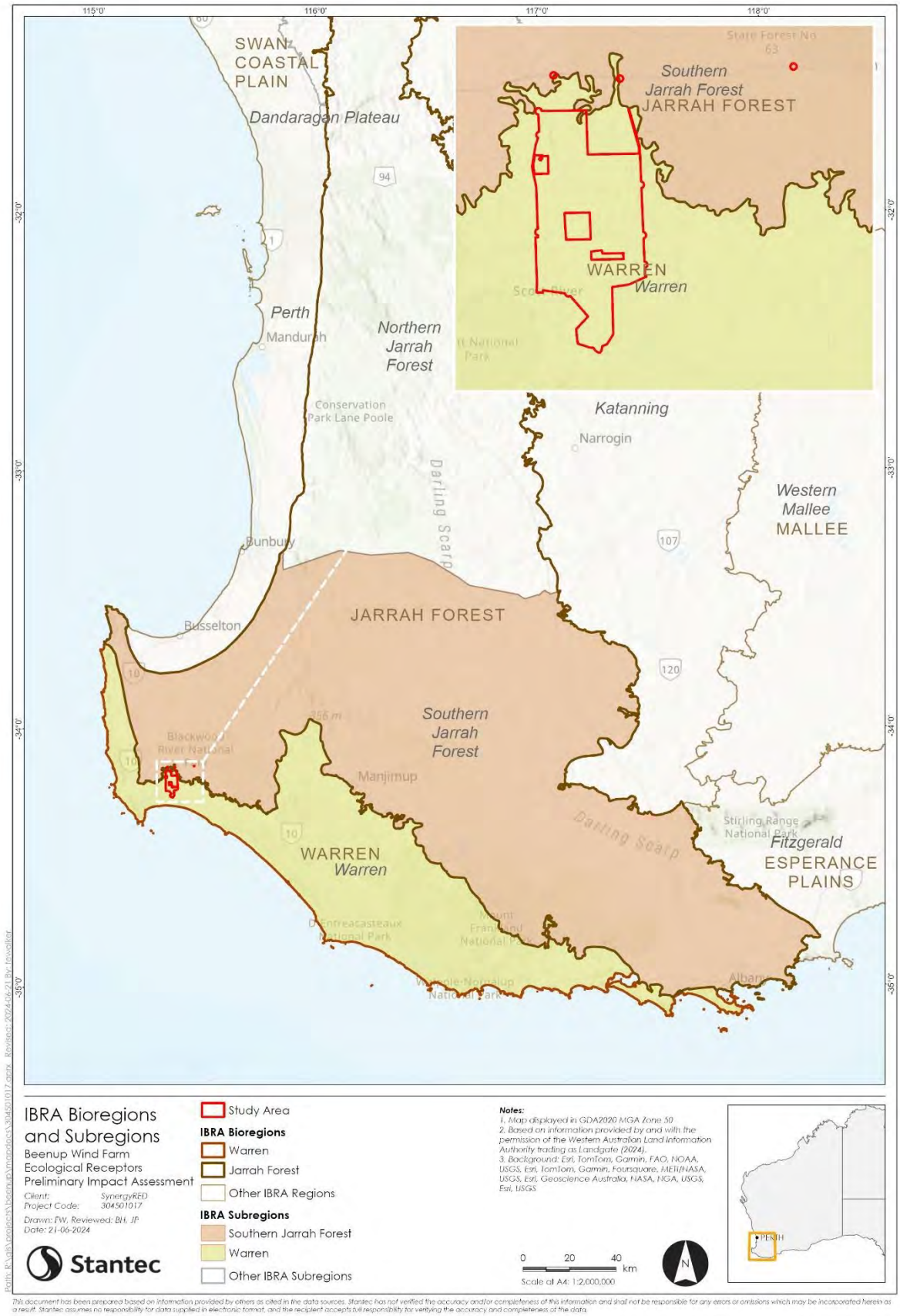

Figure 3-1: Location of the Project within the Warren bioregion and the Southern Jarrah Forest subregion.

3.2 Climate

3.2.1 Rainfall and Temperature

The climate of the Warren Bioregion and the Southern Jarrah Forest Subregion is classified as moderate Mediterranean and warm Mediterranean, respectively, characterised by mild, wet winters and hot, dry summers. The closest Bureau of Meteorology (BoM) stations to the Project are Warner Glen (009613), Alexandra Bridge (009801), and Cape Leeuwin (009518), which record an average annual rainfall of approximately 850 to 900 mm (Figure 3-2), with around 80% of this rainfall typically occurring between May and September. The average annual pan evaporation (based on SILO data) is approximately 1,500 mm, with summer months (December to February) experiencing the highest rates (200 to 300 mm/month), and winter months (June to August) being considerably lower (Figure 3-2).

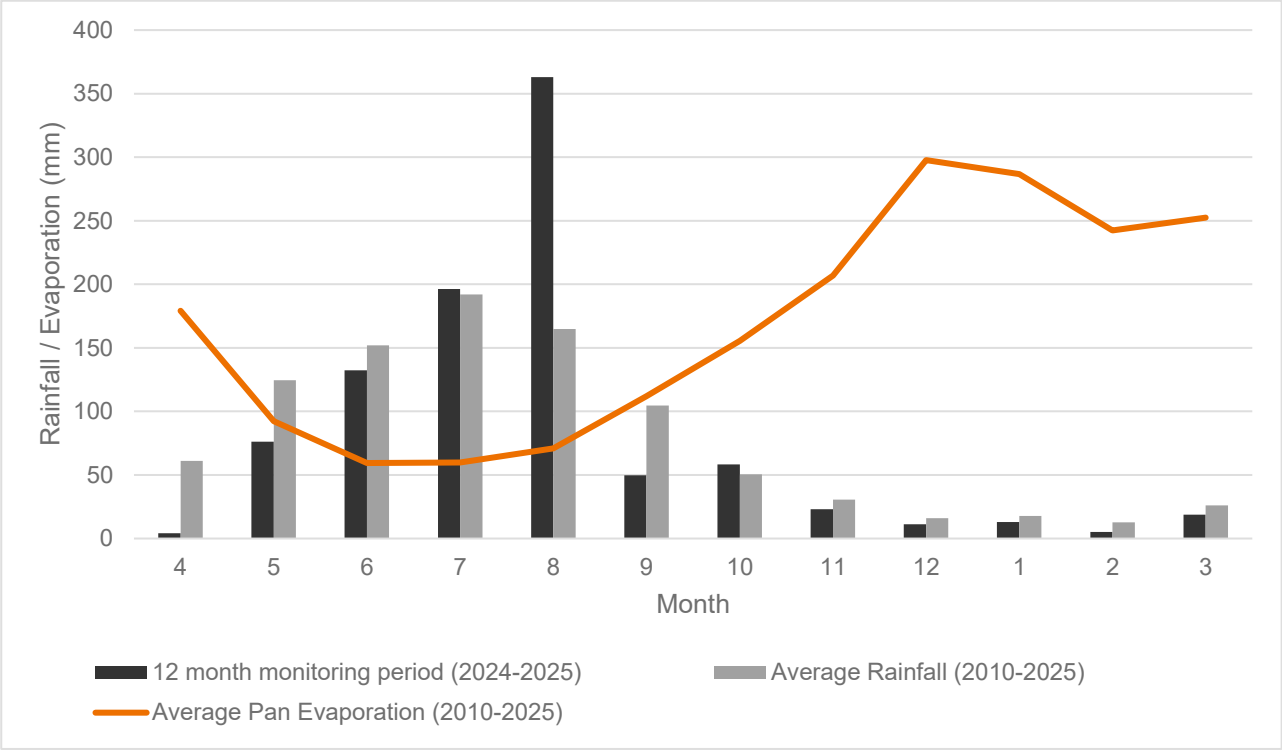

Figure 3-2: Monthly total rainfall and evaporation in 2023 at the Study Area (SILO 2024 - 2025).

3.3 Hydrogeology

Detailed hydrogeological characterisation is provided in the Surface Water and Hydrogeological Assessment (Stantec 2024). The northern part of the Study Area is characterised by a thin layer of dune sands (<2 m) overlying alternating bands of clay and sand as well as peat, while in the central and south sections, dune sands are deeper (up to approximately 6 m) followed by ferricrete and/or clay. The Study Area is also located within an area of high to moderate ASS potential (supported by preliminary test results) and is potentially impacted by an acid rock drainage plume from the Beenup Titanium Mine.

The Study Area comprises the Superficial and Leederville Aquifers, occurring in the upper 25 m of the profile. The Superficial Aquifer is localised and discontinuous and is generally less than 3 m deep. It includes perched groundwater above impermeable beds of the Leederville formations, and local confinement zones of low permeability in the laterite (dominant sand and ferricrete) profile. The Leederville Aquifer lies beneath the Superficial Formation and appears shallower toward the north and deepening in the southern portion of the Study Area.

The Superficial Aquifer is recharged by direct diffuse rainfall infiltration and localised downward leakage from creeks, wetlands and irrigation through alluvial soils. Potential upward leakage from the underlying Leederville Formation may also occur. During winter the water table is shallow and often discharges into wetlands, while during summer, some areas become dry, with reduced rainfall affecting depth to the water table. The Leederville Aquifer is mostly recharged via lateral flow and vertical downward leakage from the Superficial Aquifer. Discharge from the Superficial Aquifer occurs via evapotranspiration, while the Leederville Aquifer discharges to major rivers and creeks. Groundwater pumping is known from both on within and surrounding the Study Area, used primarily for irrigation. The Superficial Aquifer and Leederville Aquifer is generally freshwater, with total dissolved solids (TDS) of less than 500 mg/L.

Groundwater levels in the Superficial Aquifer and the Leederville Aquifer are strongly correlated to rainfall and are shallowest in winter (approximately 0.5 m below land surface for the former) and typically fluctuate between 1 m and 2 m in summer, generally flowing in a southward direction. Previous investigations in the area indicate that in winter the Superficial Aquifer may be connected to creeks, indicating that surface-water groundwater interactions may be ephemeral and seasonally influenced, although this remains a knowledge gap. It is unlikely that the deeper Leederville Aquifer is in direct connection to ephemeral surface water features in the Study Area.

3.4 Surface Water

The Study Area is split between two main catchment areas with the Blackwood River catchment covering the west and north of the Study Area, and the Scott River catchment covering the east and south of the Study Area. An area of 13.7 km² (43%) of the Study Area drains into the Blackwood River, while 18.3 km² (57%) of the Study Area drains into the Scott River.

Key surface water features in the region consist of historically modified catchments with artificial drains to facilitate the agricultural and plantation activities (Figure 3-3). These drains have not been built in a coordinated way and intersect with roads and natural drainage lines, resulting in several areas of localised ponding due to catchment modification.

Local surface water characteristics are detailed in the Surface Water and Hydrogeological Assessment (Stantec 2024). The Study Area has a poorly defined ridgeline that runs approximately through the centre of the Study Area, segregating the 11 Blackwood and Scott River headwater catchments that discharge from the Study Area (Figure 3-3). Sheet flow occurs across cleared land areas, concentrating into more defined streamflow paths towards the Study Area boundary.

There are several areas of natural ponding following rainfall events in areas designated as wetlands and in depressions formed by historical anthropogenic activities. The roads on almost every boundary of the Study Area act as an impediment to flow paths and cause localised upstream ponding, apart from the southernmost catchment which sheet flows across agricultural land.

Surface water quality, undertaken as part of the Healthy Rivers Program in the vicinity of the Study Area indicates salinity (measured as total suspended solids; TSS) and nutrient concentrations (total nitrogen and total phosphorous) are typically elevated in tributaries compared to Scott River. This has been attributed to catchment clearing and agricultural runoff. Waterways are also subject to increased nutrients and salts following heavy rainfall, while salinity also increases during the summer period. In addition, low flow conditions, high temperatures and algal blooms during the warmer months can result in low dissolved oxygen levels (DWER 2019).

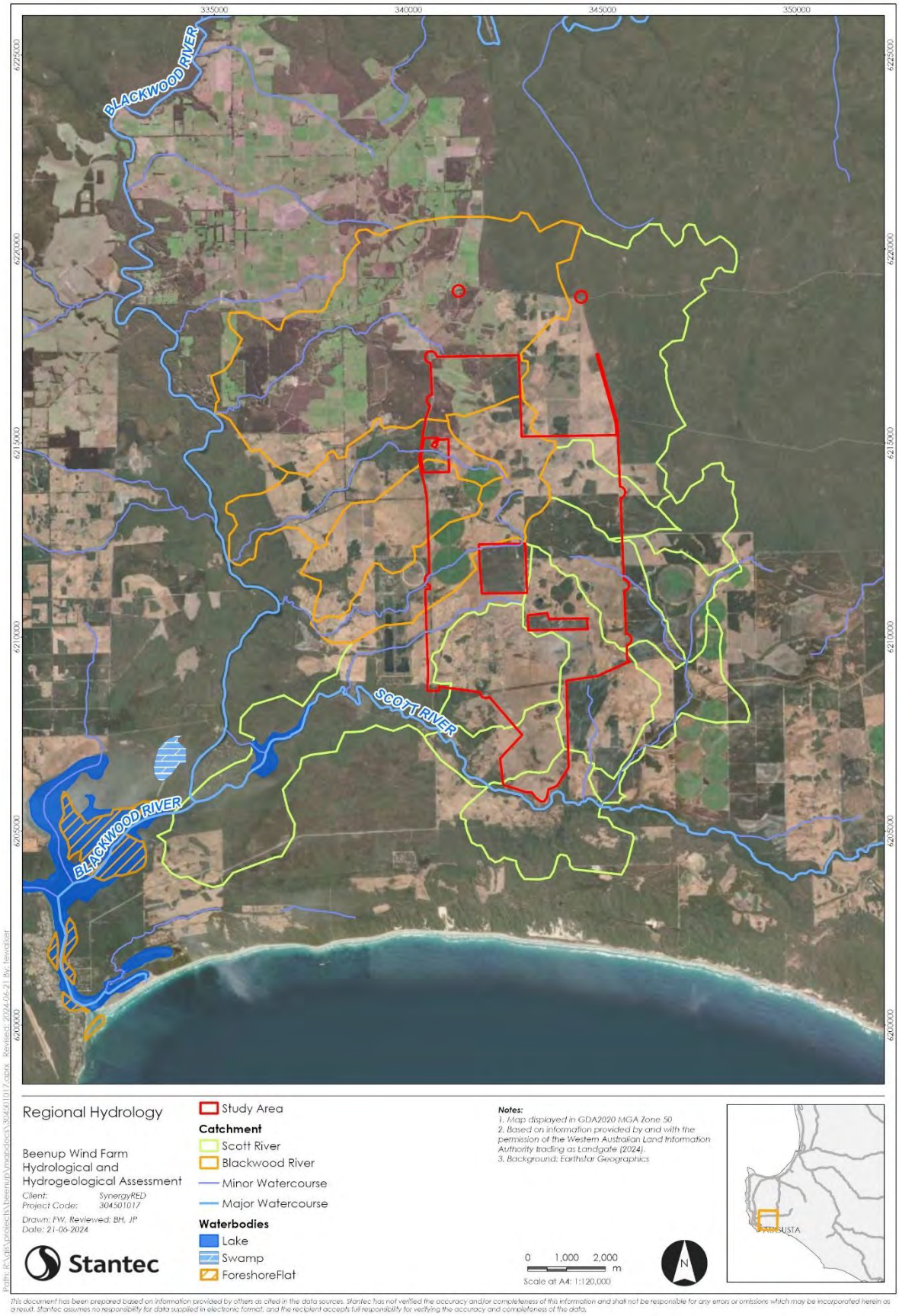

Figure 3-3: Regional hydrology showing the Study Area and catchment divides.

4 Results

4.1 Database Searches

The desktop assessment identified three nationally important wetlands, and one wetland with a nomination to be recognised as an internationally important wetland (Table 4-1) within 20 km of the Study Area. Of these the Spearwood Creek Wetlands were closest and located 3 km to the north and are being considered for Ramsar listing. Spearwood Creek is a tributary of the Blackwood River the wetlands are known for their rich biodiversity and the presence of rare flora and fauna, including the burrowing freshwater crayfish (*Engaewa pseudoreducta*). The Blackwood River and its tributaries, approximately 4 km from the Study Area are listed as nationally important due to their ecological significance, supporting threatened ecological communities and listed flora and fauna. The remaining systems are located more than 10 km from the Study Area.

Table 4-1: Significant ecosystems and communities recorded from the desktop assessment.

Ecosystem/Community	Conservation Significance		Distance From Study Area
	BC Act	EPBC Act	
Spearwood Creek Wetlands	-	*Internationally Important Wetland	3 km north
Blackwood River (Lower Reaches) and Tributaries System	-	Nationally Important Wetland	4 km west
Cape Leeuwin System	-	Nationally Important Wetland	17 km southwest
Gingilup-Jasper Wetland System	-	Nationally Important Wetland	13 km southeast

*Note: *Spearwood Creek Wetlands is a draft proposed wetland of international significance.*

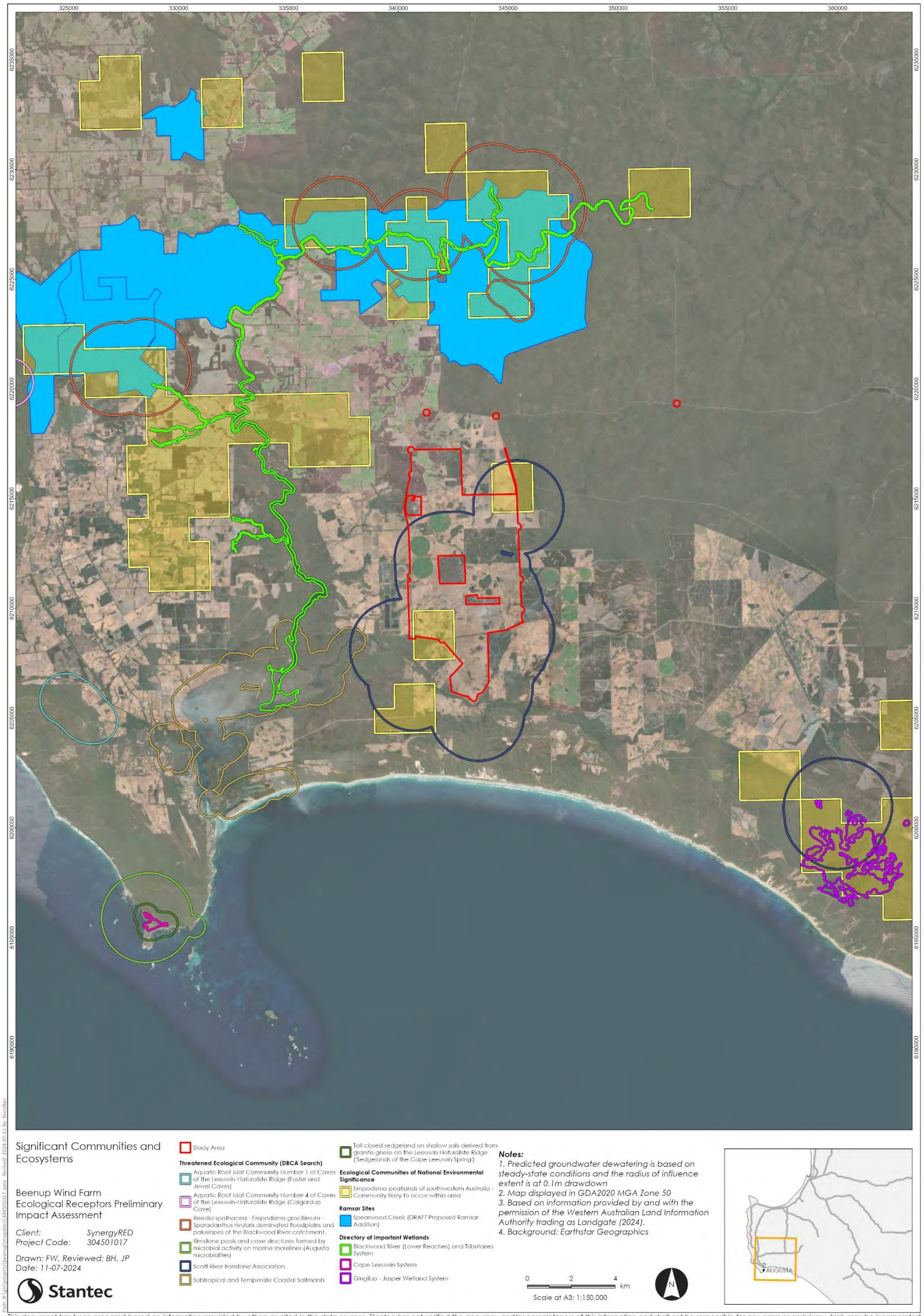

Figure 4-1: Significant wetlands in relation to the Study Area.

4.2 Literature Review

4.2.1 Wetlands and Waterways

There are several ephemeral waterways and wetlands located within the Study Area (Figure 4-2). The Scott River, which flows into the Blackwood River, is located in the southwest section of the Study Area. A number of minor waterways also traverse the Study Area, primarily flowing from northeast to southwest towards Blackwood River (Figure 4-2), with a smaller proportion flowing in a southeasterly direction towards Scott River. The Lower Scott River sub-catchment area, that parts of the Study Area discharge into, is in better condition that the upper reaches of the Scott River. The biodiversity in the main channel is in good condition in terms of the number and diversity of flora and fauna species, although there are signs of stress associated with upstream nutrient runoff along some sections (LBLCDC 2020).

The Blackwood River is a major river system within the catchment. During the dry summer months, groundwater from the Yarragadee and Leederville Aquifers contribute to 30% to 100% of the discharge into the Blackwood River. During this period, surrounding tributaries either contract or dry completely (Beatty et al. 2009).

The ecological values of the Blackwood River include a high native species richness and endemism of fish and crayfish as well as a diverse macroinvertebrate community. The Blackwood River is also an important nursery and spawning ground. Parts of the catchment also support extensive riparian vegetation. Groundwater influence plays an important role in maintaining aquatic biota and the riparian communities. However, the Blackwood River is subject to threats including salinisation (from land clearing) and reduced rainfall due to climate change (Beatty et al. 2009; Department of Water, Water Science Technical Series 2015).

Within the Study Area, waterways and wetlands are surrounded by agricultural land with only remnant riparian vegetation remaining (Figure 4-2). While it is likely that there is some groundwater dependency and interaction with surface water and groundwater in the Study Area, the degree to which this occurs is unknown. Three geomorphic wetland types have been mapped based on Semeniuk and Semeniuk (1995; 1997), which classifies wetlands according to their features and inundation regime (Figure 4-2).

- sumpland – located within a basin landform and defined as seasonally inundated, of which 30 are Conservation category;
- dampland – located within a basin landform and defined as seasonally waterlogged, of which nine are Conservation category; and
- palusplain – located on a flat landform and defined as seasonally waterlogged, of which two are Conservation category.

The geomorphic wetlands are further classified by Semeniuk and Semeniuk (1995) into the following categories; Conservation (defined as supporting a high level of attributes and functions), Resource Enhancement, Multiple Use, Intensive Dairy Farm Paddock (Table 4-2). Within the Study Area, the majority of Palusplain wetland types (>200) that are part of the Intensive Dairy Farm Paddock category occur in the Study Area, and also comprise the largest area (>3,900 ha), equivalent to 90% of the total wetlands (Table 4-2). The remaining geomorphic wetlands under the various classifications contribute to only a minor proportion of the study Area (approximately 400 ha), or less than 10% of the total wetlands.

The Study Area was historically a wetland environment and is predominantly palusplain (seasonally waterlogged flats), characterised by a series of damplands and sumplands in varying condition (Phoenix in prep.-a; V & C Semeniuk Research Group 1997). On the northern boundary of the Study Area there is a mosaic of remnant bushland and wetlands that are largely cohesive and provide important habitat for flora and fauna (Phoenix in prep.-a). In the centre of the Study Area, wetlands are separated by paddocks and are generally in poor condition, while to the south there is an isolated group of fenced wetlands. In the southern section there is one larger, unfenced wetland which, when inundated, supports waterbirds including the Wood Sandpiper (*Tringa glareola*), which is listed under the BC Act and EPBC Act as Migratory (Phoenix in prep.-a).

4.2.2 Aquatic Habitat and Waterbirds

Ten fauna habitat types have been identified from the Study Area, including three wetland types (Phoenix in prep.-b). The wetlands comprised seasonally inundated paperbark woodland, shrubland and sedgeland (Phoenix in prep.-a; b) (**Figure 4-3**). They are sporadically distributed throughout the Study Area and are mostly ephemeral (seasonally inundated), with relatively shallow water levels when flooded (typically less than 1 m). In addition, there was one larger wetland south of Governor Broome Road and a wetland cluster in the northern section of the Study Area where surface water persisted into summer, suggesting a potential perennial regime (Phoenix in prep.-a).

The northern boundary of the Study Area contains a mosaic of remnant bushland and wetlands that are largely cohesive and provide important habitat for flora and fauna (Phoenix in prep.-b) (**Figure 4-3**). In the centre of the Study Area, wetlands are separated by paddocks and are generally in poor condition, while to the south there is an isolated group of fenced wetlands and one larger, unfenced wetland (Phoenix in prep.-b).

The wetlands, paddocks and floodplains of the Study Area provide seasonal foraging habitat for waterbirds including migratory species (Phoenix 2025; in prep.-b). During the wetter months (May to September), large aggregations of waterbirds such as Straw-necked Ibis, Australian White Ibis, Australian Shelduck, Grey Teal, Black Swan, Pacific Black Duck and White-faced Heron are prevalent in the local waterways and wetlands, while from spring to early summer (September to November) there is an influx of migratory shorebirds (Phoenix 2025; in prep.-b). There have been seven significantly listed waterbird species (State and Commonwealth) that have also been recorded from the Study Area during prolonged periods of inundation (Phoenix in prep.-b). This includes several Sandpipers (Common Sandpiper, Wood Sandpiper and Marsh Sandpiper), as well as the Double-banded Plover, Blue-billed Duck, Osprey and Common Greenshank (Table 4-3).

Table 4-2: Number of wetlands located within the Study Area and their wetland management category, geomorphic classification, and area.

Wetland Management Category	Wetland Geomorphic Classification	No. of Wetlands	Mean Area (ha)	Total Area (ha)
Conservation	Dampland	9	4	36.4
	Palusplain	2	3.4	6.9
	Sumpland	30	5.1	152
Resource Enhancement	Dampland	6	7.4	44.2
	Palusplain	4	1.5	6.1
	Sumpland	24	3.5	83.5
Multiple Use	Creek [1]	6	0.3	1.6
	Dampland	12	1.7	20.9
	Palusplain	9	2.4	21.6
	Sumpland	22	1.3	29.7
Intensive dairy farm paddock	Palusplain	210	18.7	3,920.40
Total		**334**	**49.3**	**4,323.30**

[1] *Seasonally inundated channel.*

Table 4-3: Significant waterbird and migratory species recorded within the vicinity of the Study Area (Source (Phoenix in prep.-b).

Common name	Scientific Name	Habitat and Records	EPBC / BC Act
Actitis hypoleucos	Common Sandpiper	Inhabits a wide variety of coastal wetlands, waterways and inland wetlands. Typically found at small ponds, large inlets, and mudflats where they forage on the shoreline (DCCEEW 2024b). • *A. hypoleucos* migrates to the Southwest in September to October (DCCEEW 2024b).	MI
Anarhynchus bicinctus	Double-banded Plover	Found on littoral, estuarine and fresh or saline terrestrial wetlands, rivers, saltmarshes, lagoons, grasslands and pasture. Also occurs on muddy, sandy, shingled or rocky beaches, bays and inlets (DCCEEW 2024a).	MI
Oxyura australis	Blue-billed Duck	Endemic to Australia's temperate regions, inhabiting terrestrial wetlands (fresh or saline) with extensive bordering vegetation, including artificial wetlands (Birdlife International 2015; del Hoyo *et al.* 2014). Located at the larger lakes in the seasonally inundated sedgeland (Ninox 2011).	P4
Pandion haliaetus	Osprey	Recorded in the vicinity of the Study Area. *P. haliaetus* has a broad habitat ranging from littoral and coastal habitats to the terrestrial wetlands of tropical and temperate Australia.	MI
Tringa glareola	Wood Sandpiper	Commonly observed foraging in shallow, freshwater wetlands, typically where grasses or aquatic plants are present in the Study Area.	MI
Tringa nebularia	Common Greenshank	Recorded in the vicinity of the Study Area (principally associated with the Blackwood River, Scott River and the artificial wetlands to the west) (DCCEEW 2024c) (BirdLife Australia 2019). • *T. nebularia* migrate to the south-west in August and become common throughout October in the vicinity of the Study Area. • These waterbirds benefit from the suitable foraging habitat present at coastal wetlands, lakes and swamps.	EN / MI
Tringa stagnatilis	Marsh Sandpiper	This waterbird forages a wide variety of habitats, including wetlands and inundated floodplains within the vicinity of the Study Area. • *T. stagnatilis* commence their migration into the Southwest during September, with numbers peaking during November to February.	MI



Figure 4-2: Waterways, wetlands and geomorphic wetlands mapped within the Study Area.

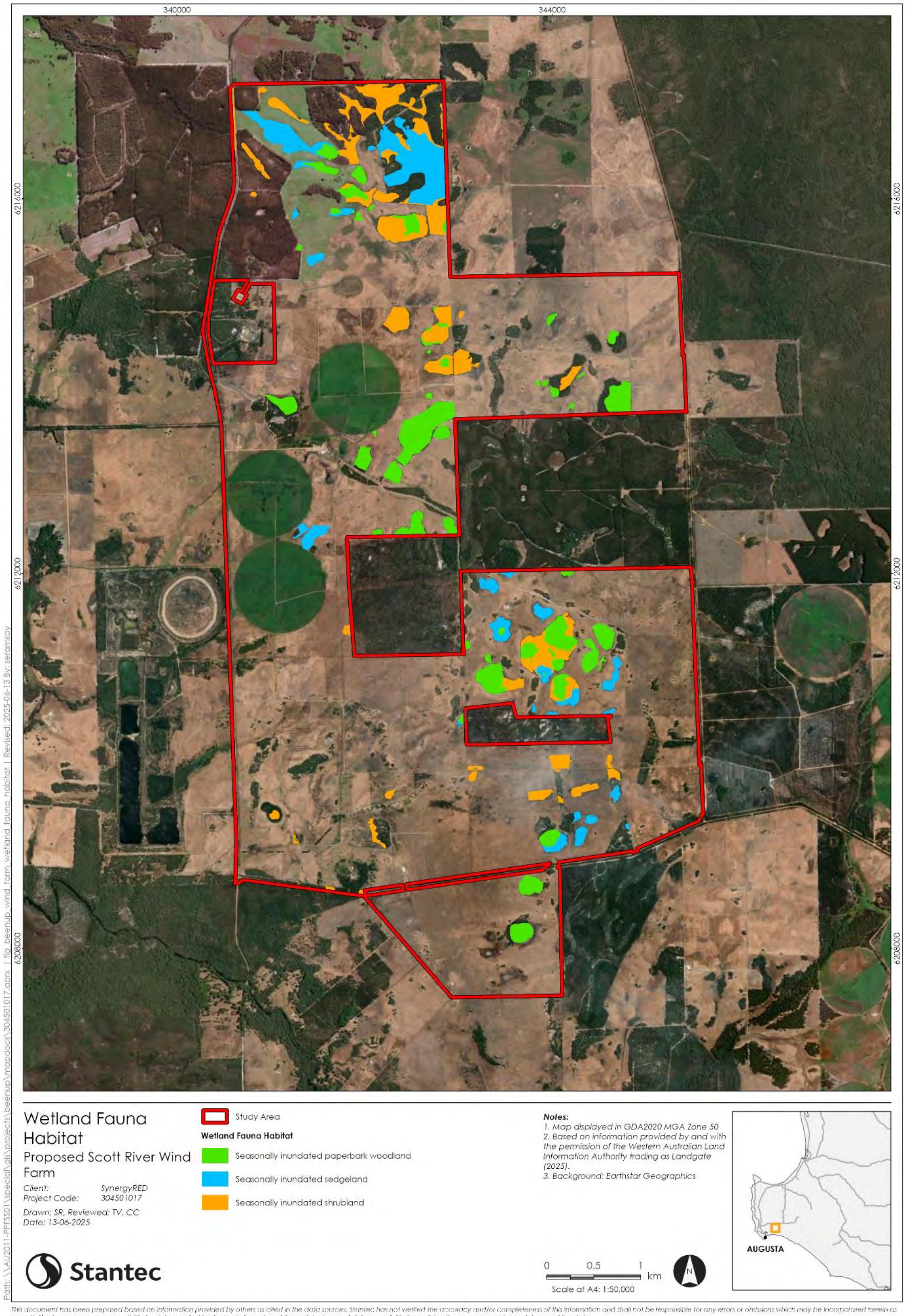

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Figure 4-3: Wetland fauna habitat types, within the Study Area (Spatial Data Source: Phoenix in prep.-b).

4.2.3 Aquatic Ecology

4.2.3.1 Surface Water Quality

As part of the DWER's Healthy Rivers and Estuaries Program, monitoring data from 2005 is available for several locations near the Study Area. This includes Brennans Bridge on the Scott River, Woodhouse on a tributary of the Scott River, and at Paynes Road on the Scott River (DWER 2023a; b).

The following catchment-scale water quality influences and trends were identified, as follows (DWER 2019):

- Nutrients enter waterways within the local catchment as a result of agricultural land use, exacerbated by native vegetation clearing (particularly within the riparian zone of wetlands).
- High nutrient concentration is likely to cause algal blooms in waterways, associated with fertiliser use and dairy farming.
- Most of the soil in the cleared area of the catchment has a low capacity to bind phosphorus.
- Low dissolved oxygen concentration has been measured due to increasing temperature, algal bloom and reduced surface water flow.
- Monitored sites show a first flush effect where nutrients, suspended solids, and salts are mobilised following heavy rainfall. This is likely due to mineralisation of organic nitrogen in soil and drains over the summer period, and runoff of high-concentration water from upstream agricultural areas.
- Salinity shows a slight inverse seasonal relationship, with concentration being highest at the start and end of the flow year. At the start of winter, rain likely wash salts into the stream from surrounding land and mobilises salts left behind in dry stream beds from the previous summer.

The monitoring data comprises four key metrics against which water quality parameters have been assessed, which comprise total nitrogen (TN), total phosphorus (TP), pH, salinity and total suspended solids (TSS). The results are summarised as follows:

- ANZECC & ARMCANZ (2000) trigger values:
  - Payne Road mean TN concentration exceeds trigger value 2005-1010 and 2012-2019.
  - Payne Road mean TP concentration exceeds trigger value 2017-2018.
  - Long-term Woodhouse TN or TP mean not reported against trigger values.
  - All annual pH medians at all sites were between the upper and lower trigger values.
- Statewide River Water Quality Assessment (SWRWQA) classification bands of low, moderate, high and very high:
  - Woodhouse mean TN classified as high (2005-2018) and very high (2019); appears that TN concentrations increased at Woodhouse between 2016 to 2019.
  - Woodhouse mean TP classified as high (2005-2019).
  - Payne Road mean TN classified as high (2005-2019).
  - Payne Road mean TP classified as moderate (2005-2019).
  - All sites were recorded as having low mean TSS (2005-2019).
  - All sites were reported as having low mean salinity (up to 2018; SWRWQA approach).
- Water Quality Improvement Plan (WQIP) targets:
  - Woodhouse mean TN and TP exceeds targets 2016-2019 from when they were established.
- Water Resources Inventory 2014 salinity ranges for fresh, marginal, brackish or saline in the 2019 nutrient report (2018 nutrient report used the SWRWQA bands):
  - All sites were reported as freshwater.

4.2.3.2 Aquatic Biota

The desktop assessment reviewed information available on aquatic biota (including semi-aquatic biota), and identified three crustaceans, one mollusc, five fish, and two frog species with the potential to occur within, or adjacent to, the Study Area (Table 4-4). Crustaceans recorded as having the potential to occur within, or adjacent to, the Study Area comprised the Margaret River Hairy Marron (*Cherax tenuimanus*) (Cr, BC Act; Cr, EPBC Act), the Margaret River Burrowing Crayfish (*Engaewa pseudoreducta*) (Cr, BC Act; Cr, EPBC Act), and the Dunsborough Burrowing Crayfish (*Engaewa reducta*) (En, BC Act; Cr, EPBC Act) (Table 4-4) (DBCA 2024b; WAM 2024b).

Carter's Freshwater Mussel (*Westralunio carteri*), which is endemic to the southwest of Western Australia and listed as Vulnerable under both the BC Act and the EPBC Act is known to occur in slow flowing permanent and semi-permanent riverine habitats, pools and dams between Moore River and Esperance (Klunzinger *et al.* 2015). However, its extent of occurrence is estimated to have declined by 49% in the last 50 years (Klunzinger *et al.* 2015; Walker *et al.* 2014), leading to its listing as Vulnerable. While *Westralunio carteri* is the listed entity, the species has recently been revised into three distinct and separate species within the southwest of Western Australia; *Westralunio carteri*, *Westralunio inbisi inbisi*, and *Westralunio inbisi meridiemus* (Klunzinger *et al.* 2022). In the vicinity of the Study Area, there is potential for both *Westralunio inbisi inbisi*, and *Westralunio inbisi meridiemus* to occur in Scott River, Chapman Brook, and St. John Brook (Klunzinger *et al.* 2022).

A baseline study on the aquatic fauna of the Blackwood River and its tributaries indicates that, due to salinisation, the forested tributaries of this system are integral to the conservation of aquatic biota, in particular for significant fish species (Morgan and Beatty 2005). Balston's Pygmy Perch (*Nannatherina balstoni*) (Vu, BC Act; Vu, EPBC Act) is known from the Scott River, restricted to tributaries and/or a perennial section of the main channel of the Blackwood River that receives freshwater baseflow from associated groundwater aquifers (Beatty *et al.* 2011). The Salamanderfish (*Lepidogalaxias salamandroides*) (En, BC Act) and Black-stripe Minnow (*Galaxiella nigrostriata*) (En, BC Act; Enn, EPBC Act) have also been documented from the Blackwood River catchment in pools across the Scott River floodplain (Morgan and Beatty 2005). A reduction in groundwater levels has the potential to impact on this species during their aestivation phase. Similarly, the Black-stripe Minnow is generally restricted to ephemeral pools during dry conditions, burrowing into the substrate when pools dry out in warmer months (Morgan and Beatty 2005).

Other fish species documented from the local catchment of the Study Area include the Western Galaxias (*Galaxias occidentalis*), considered widespread, and the Western Pygmy Perch (*Nannoperca vittate*), restricted to the Blackwood River and the lower catchment, and the Western Dwarf Galaxias (*Galaxiella munda*) (Beatty *et al.* 2011; Morgan and Beatty 2005). The Freshwater Cobler (*Tandanus bostocki*), Nightfish (*Bostockia porosa*), Long-headed Goby (*Afurcagobius suppositus*), Blue-spot Goby (*Pseudogobius olorum*), and the Western Hardyhead (*Leptatherina wallacei*) have also been recorded (Morgan and Beatty 2005).

Four exotic fish species are known from the local catchment of the Study Area including the Goldfish (**Carassius auratus*), the Eastern Mosquitofish (**Gambusia holbrooki*), the Redfin Perch (**Perca fluviatilis*), and the Rainbow Trout (**Oncorhychus mykiss*). Of these, the Rainbow Trout was stocked by the then Western Australian Department of Fisheries (now Department of Primary Industries and Regional development; DPIRD) (Morgan and Beatty 2005).

North of the Brockman Highway are also known to support both the White-bellied Frog and Orange-bellied Frog (Table 4-4), having an extremely restricted and fragmented distribution within the area of occurrence. The White-bellied Frog occurs within an area north and west of the Blackwood River between Margaret River and Augusta (Roberts *et al.* 1999) and the Orange-bellied Frog is confined to a 6.3 km² area east of the Leeuwin-Naturaliste Ridge (Tyler 1997). The White-bellied Frog is predicted to occur over an area of approximately 130 km² with a probable decline of more than 70% of its range. Its current area of occupancy is less than 2.5 km² (Roberts *et al.* 1999), with approximately 80% of both its extent of occurrence and percent of the area of occupancy occurring on private land (Wardell-Johnson *et al.* 1995). The White-bellied Frog occurs in permanently moist sites in relatively dry and seasonal climatic zones.

The Orange-bellied Frog is known from the lower reaches of six waterways that drain south into the Blackwood River (Wardell-Johnson *et al.* 1995). It is considered unlikely that many additional undetected populations exist due to the high survey effort undertaken prior to, and within the first two years of, the implementation of the Orange-bellied and White-bellied Frogs Recovery Plan (DPaW 2015). Only six populations of the Orange-bellied Frog are known (Roberts *et al.* 1999), wholly distributed within State Forests (Tyler 1997), including the Blackwood River National Park. This species occurs in permanently moist sites within six unconnected and undisturbed areas of riparian vegetation at an elevation of 120 m, and is abundant at seepages (Tyler 1997).

The males of both frog species call from small depressions in clay under dense vegetation cover. There is no free swimming or feeding stage and eggs are deposited as a jelly mass in small depressions, with eggs hatching and tadpoles developing without the need for surface water (Roberts *et al.* 1990). The majority of waterways and winter-wet depressions are characterised by dominant plant species including *Homalospermum firmum*, *Taraxis grossa*, *Boronia molloyae*, *Acacia uliginosa*, *Taxandria linearifolia*, and *Astartea fascicularis* (Wardell-Johnson *et al.* 1995).

All aquatic and semi-aquatic fauna species have the potential to be groundwater-dependent, where wetlands in the Study Area are supported by the shallow groundwater aquifer, and where there is connectivity between the shallow aquifer and the deep aquifer. However, the level of connectivity between surface water and groundwater is currently unknown.

Table 4-4: Significant aquatic fauna species with the potential to occur within, or adjacent to, the Study Area.

Common Name	Scientific Name	BC Act	EPBC Act
Crustacean			
Margaret River Hairy Marron	*Cherax tenuimanus*	Cr	Cr
Margaret River Burrowing Crayfish	*Engaewa pseudoreducta*	Cr	Cr
Dunsborough Burrowing Crayfish	*Engaewa reducta*	En	Cr
Mollusc			
Carter's Freshwater Mussel	*Westralunio carteri*	Vu	Vu
Fish			
Black-stripe Minnow	*Galaxiella nigrostriata*	En	En
Balston's Pygmy Perch	*Nannatherina balstoni*	Vu	Vu
Salamanderfish	*Lepidogalaxias salamandroides*	En	-
Western Dwarf Galaxias	*Galaxiella munda*	Vu	-
Pouched Lamprey	*Geotria australis*	P3	-
Frog			
White-bellied Frog	*Anstisia alba*	Cr	Cr^
Orange-bellied Frog	*Anstisia vitellina*	Vu	Vu*

*Note: ^ indicates that this species is listed under the EPBC Act as Geocrinia alba under the EPBC Act; * indictes that this species is listed under the EPBC Act as Geocrinia vitellina.*

5 Conclusions

There are several ephemeral waterways and wetlands located within the Study Area including the Scott River, which flows into the Blackwood River. The ecological values of both river systems is considered high, with some sections supporting diverse fish, crayfish and macroinvertebrate communities. However, waterways and wetlands in the local catchment have also been impacted by elevated nutrients, salinisation, and sedimentation, attributed to clearing and agricultural land use.

The Study Area was historically a wetland environment and is predominantly palusplain (seasonally waterlogged flats), characterised by a series of damplands and sumplands in varying condition. Three wetland fauna habitat types have also been identified from the Study Area including seasonally inundated paperbark woodland, shrubland and sedgeland.

There have been seven significantly listed waterbird species (State and Commonwealth) recorded from the Study Area in low numbers during prolonged periods of inundation. This includes several Sandpipers (Common Sandpiper, Wood Sandpiper and Marsh Sandpiper), as well as the Double-banded Plover, Blue-billed Duck, Osprey and Common Greenshank. A total of 11 State and Commonwealth listed significant aquatic and semi-aquatic species also have the potential to occur in wetlands and waterways across the Study Area. This comprises three crustaceans (two crayfish and one marron), one mollusc (Carter's Freshwater Mussel), five fish (including two *Galaxiella* species), and two frog (White and Orange Bellied Frog) species.

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Appendices

We design with community in mind

Appendix A Database Search Results

Table A- 1: Crustacea results from WAM database search in the vicinity of the Study Area.

Order	Taxa
Amphipoda	*Amphipoda sp.*
	Ampithoe geographe
	Austrothoe ochos
	Exemption vasse
	Melita oba
	Paragrubia dongara
	Paranexes yallingup
	Sunamphitoe jonathani
	Sunamphitoe naturaliste
	Sunamphitoe stevesmithi
	Totgammarus eximius
	Wesniphargus nichollsi
Arguloidea	*Argulus macropterus*
Cyclopoida	*Bomolochidae sp.*
	Neocyclops australiensis
Decapoda	*Actaea calculosa*
	Actaemorpha sp.
	Alpheus novaezealandiae
	Alpheus parasocialis
	Alpheus sp.
	Aniculus sp.
	Calcinus dapsiles
	Calcinus sp.
	Caridea sp.
	Ceratoplax glaberrima
	Cherax bicarinatus
	Cherax cainii
	Cherax crassimanus
	Cherax glaber

	Cherax glabrimanus
	Cherax neocarinatus
	Cherax preissii
	Cherax quinquecarinatus
	Cherax sp.
	Cherax spp.
	Cherax tenuimanus
	Clibanarius taeniatus
	Cryptodromia hilgendorfi
	Dromiidae sp.
	Engaewa pseudoreducta
	Engaewa reducta
	Engaewa similis
	Eplumula australiensis
	Fultodromia nodipes
	Gomeza bicornis
	Heteropanope serratifrons
	Latreillia sp.
	Leptomithrax sternocostulatus
	Lomis hirta
	Majidae sp.
	Megametope carinatus
	Metapenaeopsis novaeguineae
	Naxia tumida
	Naxia spinosa
	Nectocarcinus spinifrons
	Ocypode convexa
	Ovalipes punctatus
	Ozius truncatus
	Paguristes purpureantennatus
	Paguristes sulcatus

	Pagurus sinuatus
	Palaemonetes australis
	Paraxiopsis brocki
	Pilumnopeus serratifrons
	Pilumnus rufopunctatus
	Portunus armatus
	Stenopus?
	Trachypenaeus curvirostris
	Trigonoplax longirostris
	Upogebia bowerbankii
Diplostraca	*Lynceus tatei*
Euphausiacea	*Euphausia mutica*
	Stylocheiron carinatum
	Stylocheiron micropthalma
	Thysanopoda tricuspidata
Harpacticoida	*Kinnecaris eberhardi*
Isopoda	*Buddelundia `sp. 6 (Judd 2002)`*
	Buddelundia nigripes
	Eurygastor? sp.
	Hanoniscus `sp. 1 (Judd 2002)`
	Isopoda sp.
	Laevophiloscia `sp. 1 (Judd 2002)`
	Laevophiloscia `sp. 2 (Judd 2002)`
	Marine isopod
	Philosciidae sp.
	Platyarthridae `sp. 1 (Judd 2002)`
	Pseudodiploexochus `sp. 1 (Judd 2002)`
	Pseudodiploexochus `sp. 2 (Judd 2002)`
	Pseudolaureola wilsmorei
	Spherillo `sp. 5 (Judd 2002)`
	Styloniscidae sp.

	Styloniscus `sp. 1 (Judd 2002)`
	Styloniscus `sp. 7 (Judd 2002)`
Pedunculata	*Ibla quadrivalvis*
	Smilium peronii
Podocopida	*Acandona admiratio*
	Entocytheridae sp.
Sessilia	*Acasta sp.*
	Amphibalanus sp.
	Austromegabalanus nigrescens
	Balanus trigonus
	Elminius covertus
	Epopella simplex
	Tetraclitella purpurascens
	Tetrapachylasma ferrugomaculosa
Siphonostomatoida	*Caligus pelamydis*
	Hatschekia sp.

Table A- 2: Arachnida results from WAM Database search in the vicinity of the Study Area.

Order	Scientific Name
Acari	*Acari sp.*
	Neopilionidae sp.
	Oribatida sp.
Araneae	*sp.*
	`570 group` `sp.`
	`cf. Oreo` sp.
	`Chenistonia` sp.
	`Ctenopalpus` `sp.`
	`Diaea` sp.
	`Dipoena` `HMS group C` `setosa (hadC7?)`
	`Fissidentati` sp.
	`Forsterina?` `Glenbourne sp. 2`
	`Forsterina?` `sp. A`
	`Genus 2` `Glenbourne sp. 1`
	`Genus indet.` `HMS group D`
	`Genus indet.` `sp. A?`
	`Genus indet.` `sp. B`
	`Genus indet.` `sp. C`
	`Genus indet.` `sp. D`
	`Genus indet.` `sp. E`
	`Genus indet.` `sp. F`
	`Genus indet.` `sp. G`
	`Genus indet.` `sp. H`
	`Genus indet.` `sp. indet. (juvenile)`
	`Genus indet.` sp.
	`Heurodes` `sp. 03(VWF790)`
	`Heurodes` `turritus`
	`HMS group B` `HadB5`
	`HMS group C` `HadC13`

	`HMS group D`
	`HMS group G` sp.
	`Holoplatys spp. grp` sp.
	`Jotus` michaelseni
	`Laperousea?` `sp. D`
	`Lepthyphantes?` `sp. E`
	`Lycidas` `big embolus`
	`Lycidas` sp.
	`Maratus` `sp.`
	`Miturgopelma` `WA247`
	`Miturgopelma` sp.
	`New Genus A` sp.
	`Pelicinus?` sp.
	`Phoroncidia?` sp.
	`Rebilus`
	`sp. G` sp.
	`Zoridae?` sp.
	Achaearanea sp.
	Adoxotoma sexmaculata
	Amaurobiidae sp.
	Aname `mainae`
	Aname `MYG010`
	Aname `MYG036`
	Aname `MYG184`
	Aname sp.
	Anapidae sp.
	Anzacia sp.
	Arachnura higginsi
	Arachnura sp.
	Araneae sp.
	Araneus eburneiventris

	Argiope `trifasciata (juvenile)`
	Argiope protensa
	Argiope trifasciata
	Argoctenus `sp. A`
	Argyrodes `antipodianus spp. group`
	Argyrodes `fissifrons spp. group.`
	Argyrodes sp.
	Ariadna sp.
	Arkys sp.
	Arkys walckenaeri
	Artoria `sp. (VWF142)`
	Artoria `sp. (VWF142)`
	Artoria `sp.`
	Artoria cingulipes
	Artoria flavimana
	Artoria linnaei
	Artoria sp.
	Artoria taeniifera
	Artoriopsis expolita
	Asadipus kunderang
	Asianopis schomburgki
	Austracantha minax
	Australomimetus diabolicus
	Australomimetus djuka
	Australomimetus sp.
	Australomimetus tasmaniensis
	Australomisidia sp.
	Baalzebub sp.
	Backobourkia `sp. indet. (juvenile)`
	Backobourkia brounii
	Backobourkia heroine

	Badumna microps
	Badumna sp.
	Baiami `sp. indet. (juvenile)`
	Baiami `sp.`
	Baiami `tegenarioides?`
	Baiami sp.
	Baiami tegenarioides
	Baiami torbayensis
	Baiami volucripes
	Bertmainius opimus
	Carepalxis `sp. 4`
	Carepalxis `sp. 7`
	Carepalxis `sp. indet. (juvenile)`
	Carepalxis `sp.`
	Chasmocephalon sp.
	Cheiracanthium `sp. A`
	Cheiracanthium `sp. A`
	Cheiracanthium `sp. A`
	Chenistonia boranup
	Clubiona `sp. 91`
	Clubiona `sp. A`
	Clubiona sp.
	Corasoides `Glenbourne sp. 1`
	Corasoides occidentalis
	Corasoides sp.
	Crustulina bicruciata
	Cyatholipidae sp.
	Cyclosa `sp. (VWF720)`
	Cyclosa `sp. (VWF792)`
	Cyclosa trilobata
	Cyrtophora parnasia

	Cytaea `sp.`
	Damoetas sp.
	Delena lapidicola
	Delena sp.
	Deliochus zelivira
	Desidae sp.
	Diaea `pilula?`
	Dingosa `sp. indet. (juvenile)`
	Dolophones `sp. (VWF771)`
	Dolophones `sp. (VWF774)`
	Emertonella maga
	Encoptarthria
	Encoptarthria `sp. A`
	Encoptarthria `sp. B`
	Encoptarthria echemophthalma
	Episinus `sp. A`
	Episinus sp.
	Eriophora `pustulosa group`
	Eriophora pustulosa
	Euoplos sp.
	Euryopis `sp. 1`
	Euryopis `sp. A`
	Euryopis `sp. B`
	Euryopis sp.
	Forsterina sp.
	Gnaphosidae sp.
	Grymeus `platnicki`
	Grymeus `sp. A`
	Grymeus sp.
	Habronestes `sp. A, australiensis group`
	Habronestes `sp. B, pictus group`

	Habronestes `sp. B`
	Habronestes sp.
	Hestimodema `Gen. 1, sp. 1`
	Hestimodema `Glenbourne`
	Hestimodema `McKenzie1`
	Hestimodema sp.
	Holasteron aspinosum
	Holoplatys sp.
	Hortophora biapicata
	Idiosoma sp.
	Isopeda leishmanni
	Kangarosa properipes
	Karaops ellenae
	Lampona brevipes
	Lampona cylindrata
	Lamponella ainslie
	Latrodectus hasseltii
	Leucauge sp.
	Linyphiidae sp.
	Lycidas `speckled`
	Lycidas chlorophthalmus
	Lycidas michaelseni
	Lycosa gilberta
	Lycosidae sp.
	Maratus boranup
	Maratus fletcheri
	Maratus madelineae
	Maratus pavonis
	Maratus pinniger
	Matilda `sp. A`
	Micropholcomma `sp. A`

	Micropholcommatinae sp.
	Missulena granulosa
	Missulena hoggi
	Missulena occatoria
	Missulena sp.
	Mituliodon tarantulinus
	Miturga sp.
	Miturgidae sp.
	Molycriinae sp.
	Myrmarachne `sp. indet. (juvenile)`
	Myrmopopaea sp.
	Nanometa sp.
	Neoscona `sp.`
	Neosparassus `sp. A`
	Neosparassus `sp. B`
	Neosparassus diana
	Neosparassus sp.
	Neosparassus sp.
	Neostorena `sp. A`
	Neostorena `sp. B`
	Nicodamus mainae
	Nyssus coloripes
	Nyssus sp.
	Oecobius navus
	Opisthoncus `Glenbourne sp. 1`
	Opopaea sp.
	Orchestina sp.
	Ornodolomedes nicholsoni
	Orsolobidae sp.
	Oxyopes `sp.`
	Oxyopes gracilipes

	Ozarchaea harveyi
	Paraplectanoides crassipes
	Pelicinus `sp. A`
	Pelicinus sp.
	Pentasteron `sp. A`
	Pentasteron `sp. nov.`
	Pentasteron intermedium
	Pholcomma sp.
	Pholcus phalangioides
	Phonognatha melania
	Phonognatha sp.
	Phoroncidia `sp. 1`
	Phryganoporus `sp. A`
	Phryganoporus nigrinus
	Phycosoma `L1-complex`
	Phycosoma sp.
	Pinkfloydia `sp. indet. (juvenile)`
	Pinkfloydia harveii
	Plebs cyphoxis
	Plebs eburnus
	Prionosternum nitidiceps
	Prodidomidae sp.
	Proshermacha `MYG434`
	Proshermacha `MYG434` `voucher MYG434`
	Proshermacha `MYG488`
	Proshermacha `MYG488` `voucher MYG494`
	Proshermacha `sp. indet. (female)`
	Proshermacha `sp. indet. (juvenile)`
	Proshermacha sp.
	Raveniella peckorum
	Salsa recherchensis

	Salticidae sp.
	Salticidae sp.
	Scytodes thoracica
	Servaea spinibarbis
	Sidymella `Glenbourne sp. 1`
	Sidymella `Glenbourne sp. 2`
	Sidymella `Glenbourne sp. 3`
	Sidymella `Machado sp. nov. 1`
	Sidymella `sp.`
	Simaetha tenuior
	Socca pustulosa
	Socca senicaudata
	Sondra `Glenbourne sp. 1`
	Sondra sp.
	Sparassidae sp.
	Steatoda `native sp.`
	Steatoda `sp. A`
	Steatoda grossa
	Stephanopis `sp.`
	Stephanopis barbipes
	Stephanopis sp.
	Storena formosa
	Storosa `grayi`
	Storosa `sp. A`
	Storosa `sp. B`
	Storosa sp.
	Storosa tetrica
	Synothele `new sp. 91`
	Tamopsis perthensis
	Tamopsis sp.
	Taphiassa robertsi

	Taphiassa robertsi
	Tasmanicosa leuckartii
	Tasmanoonops `augusta`
	Tetragnatha sp.
	Tharpyna sp.
	Theridiidae sp.
	Theridiosomatidae sp.
	Toxops `sp.`
	Trachycosmus sculptilis
	Trachytrema castaneum
	Trichonephila edulis
	Venator `cf. immansuetus`
	Venator `VWF sp. 138`
	Venator `VWF sp. 139`
	Venator `VWF sp. 140`
	Venator immansuetus
	Venatrix pullastra
	Westrarchaea pusilla
	Xestaspis `sp. A`
	Xestaspis sp.
	Zephyrarchaea janineae
	Zodariidae sp.
	Zoridae sp.
Cephalostigmata	*Cephalostigmata sp.*
Chordeumatida	*Australeuma sp.*
Euonychorphora	*Kumbadjena occidentalis*
	Kumbadjena sp.
Geophilida	*Chilenophilidae sp.*
	Geophilida sp.
	Mecistocephalidae sp.
Ixodida	*`Haemaphysalis?` `sp. indet. (larva)`*

	Amblyomma `sp. indet. (larva)`
	Amblyomma triguttatum triguttatum
	Bothriocroton hydrosauri
	Ixodes australiensis
	Ixodes sp.
Julida	*Ommatoiulus moreleti*
Lithobiida	*Henicops dentatus*
	Lithobiida sp.
Opiliones	*`?Neopilionidae` sp.*
	`Calliuncus?` `sp. indet. (juvenile)`
	`Calliuncus?` sp.
	`Genus 3` sp.
	`Genus 5` sp.
	`Genus 7?` sp.
	`Genus 8` sp.
	`Genus indet.` sp.
	`Nunciella?` `sp.`
	`Perthacantha?` sp.
	Ballarra longipalpus
	Calliuncus labyrinthus
	Calliuncus sp.
	Megalopsalis `sp.`
	Megalopsalis minima
	Megalopsalis porongorupensis
	Megalopsalis sp.
	Megalopsalis walpolensis
	Neopilionidae sp.
	Nunciella `sp. 3`
	Nunciella `sp. 4`
	Nunciella aspera
	Nunciella sp.

	Opiliones sp.
	Perthacantha `sp.`
	Perthacantha sp.
	Triaenobunus `sp. nov.`
	Triaenonychidae sp.
Pantopoda	*Ammothea australiensis*
Polydesmida	*`Akamptogonus?` sp.*
	`Paradoxosomatidae?` sp.
	Akamptogonus novarae
	Antichiropodini `sp. indet. (juveniles)`
	Antichiropodini sp.
	Antichiropus `DIP080, GB1`
	Antichiropus `DIP080, GB1`
	Antichiropus `DIP110`
	Antichiropus `DIP238`
	Antichiropus `DIP238` `voucher DIP238`
	Antichiropus `DIP244`
	Antichiropus `sp. indet. (female)`
	Antichiropus `sp. indet. (juvenile)`
	Antichiropus `sp. indet. (male)`
	Antichiropus sp.
	Dalodesmidae sp.
	Oxidus gracilis
	Paradoxosomatidae sp.
	Polydesmida sp.
	Solaenodolichopus pruvoti
Polyzoniida	*`DIPAAG` `DIP193`*
	Polyzoniida sp.
	Siphonotidae sp.
	Siphonotus flavomarginatus
Pseudoscorpiones	*Austrochthonius*

	Austrochthonius `PSE188, similis`
	Austrochthonius `PSE189, austini`
	Austrochthonius `sp. indet. (juvenile)`
	Austrochthonius sp.
	Beierolpium `sp.`
	Calymmachernes angulatus
	Chthoniidae sp.
	Conicochernes crassus
	Geogarypus taylori
	Lagynochthonius australicus
	Lagynochthonius australicus `australicus`
	Nesidiochernes
	Nesidiochernes `sp.`
	Oratemnus curtus
	Protochelifer `sp.`
	Protochelifer cavernarum
	Protochelifer sp.
	Pseudotyrannochthonius `Northern Warren`
	Pseudotyrannochthonius giganteus
	Solinus `sp. indet.`
	Synsphyronus magnus
Sarcoptiformes	*Acaridae sp.*
	Cytostethum tasmaniense
Scolopendrida	*Cormocephalus aurantiipes*
	Cormocephalus hartmeyeri
	Cormocephalus novaehollandiae
	Cormocephalus strigosus
	Cryptopidae sp.
	Cryptops sp.
	Scolopendra laeta
Scorpiones	*Cercophonius `sp.`*

	Cercophonius `sulcatus?`
	Cercophonius granulosus
	Cercophonius sp.
	Cercophonius sulcatus
	Lychas `austroccidentalis`
	Scorpiones sp.
	Urodacus `armatus`
	Urodacus `sp. A`
	Urodacus novaehollandiae
	Urodacus sp.
Scutigerida	*Allothereua maculata*
	Allothereua sp.
	Prothereua `sp.`
Spirostreptida	*Atelomastix nigrescens*
	Iulomorphidae sp.
	Podykipus sp.
	Spirostreptida sp.
	Spirostreptida sp.
	Spirostreptida sp.
Trombidiformes	*Australotiphys barmutai*
	Chaussieria warregense
	Chyzeriidae sp.
	Neocaeculus sp.
	Trombidiidae sp.
	Diplopoda sp.
	Diplopoda sp.
	Diplopoda sp.

Table A- 3: WA Herbarium Database search in the vicinity of the Study Area.

Group/Plant Family	Scientific Name	Common Name	BC Act
Fabaceae	*Acacia inops*		P3
Fabaceae	*Acacia lateriticola var. Glabrous variant (B.R. Maslin 6765)*		P3
Fabaceae	*Acacia tayloriana*		P4
Apiaceae	*Actinotus repens*		P3
Proteaceae	*Adenanthos detmoldii*	Scott River Jugflower	P4
Proteaceae	*Adenanthos x pamela*		P4
Amanitaceae	*Amanita fibrillopes*		P3
Ericaceae	*Andersonia ferricola*		P1
Ericaceae	*Andersonia sp. Amabile (N. Gibson & M. Lyons 355)*		P3
Fabaceae	*Aotus carinata*		P4
Myrtaceae	*Astartea onycis*		P4
Proteaceae	*Banksia meisneri subsp. Ascendens*	Scott River Banksia	P4
Proteaceae	*Banksia nivea subsp. uliginosa*	Swamp Honeypot	T
Proteaceae	*Banksia sessilis var. cordata*		P4
Asteraceae	*Blennospora doliiformis*		P3
Rutaceae	*Boronia anceps*		P3
Rutaceae	*Boronia exilis*	Scott River Boronia	T
Orchidaceae	*Caladenia abbreviata*	Coastal Spider Orchid	P3
Myrtaceae	*Calothamnus lateralis var. crassus*		P3
Cyperaceae	*Caustis sp. Boyanup (G.S. McCutcheon 1706)*		P3
Restionaceae	*Chordifex gracilior*		P3
Restionaceae	*Chordifex jacksonii*		P3
Fabaceae	*Chorizema carinatum*		P3
Proteaceae	*Conospermum quadripetalum*		T
Cyperaceae	*Cyathochaeta stipoides*		P3
Cyperaceae	*Cyathochaeta teretifolia*		P3
Goodeniaceae	*Dampiera heteroptera*		P3
Myrtaceae	*Darwinia ferricola*	Scott River Darwinia	T

Orchidaceae	*Diuris heberlei*	Heberle's Donkey Orchid	P2
Orchidaceae	*Drakaea micrantha*	Dwarf Hammer-orchid	T
Droseraceae	*Drosera binata*		P2
Droseraceae	*Drosera fimbriata*	Manypeaks Sundew	P4
Fabaceae	*Gastrolobium formosum*		P3
Haloragaceae	*Gonocarpus pusillus*		P4
Haloragaceae	*Gonocarpus simplex*		P4
Proteaceae	*Grevillea brachystylis subsp. australis*		T
Proteaceae	*Grevillea manglesioides subsp. ferricola*		P3
Proteaceae	*Grevillea papillosa*		P3
Lamiaceae	*Hemigenia obovata*		P1
Lamiaceae	*Hemigenia sp. Nillup (R.D. Royce 98)*		P2
Restionaceae	*Hypolaena robusta*		P4
Proteaceae	*Isopogon formosus subsp. dasylepis*		P3
Proteaceae	*Lambertia orbifolia subsp. Scott River Plains (L.W. Sage 684)*		T
Proteaceae	*Lambertia orbifolia subsp. vespera*	Scott River Honeysuckle	T
Asteraceae	*Leptinella drummondii*		P3
Santalaceae	*Leptomeria dielsiana*	Diels' Currant Bush	EX
Santalaceae	*Leptomeria furtiva*		P2
Restionaceae	*Lepyrodia extensa*		P2
Restionaceae	*Lepyrodia heleocharoides*		P3
Ericaceae	*Leucopogon alternifolius*		P3
Ericaceae	*Leucopogon incisus*		P2
Ericaceae	*Leucopogon wheelerae*		P3
Stylidiaceae	*Levenhookia preissii*	Preiss's Stylewort	P1
Restionaceae	*Loxocarya magna*		P3
Cyperaceae	*Machaerina ascendens*		P2
Myrtaceae	*Melaleuca basicephala*		P4
Haloragaceae	*Myriophyllum trifidum*	Three-lobed Meziella	P4
Myrtaceae	*Pericalymma megaphyllum*		P1

Philydraceae	*Philydrella pygmaea subsp. Minima*		P1
Violaceae	*Pigea volubilis*		P2
Restionaceae	*Platychorda rivalis*		P1
Fabaceae	*Pultenaea pinifolia*		P3
Fabaceae	*Pultenaea skinneri*		P4
Cyperaceae	*Reedia spathacea*	Reedia	T
Cyperaceae	*Schoenus indutus*		P1
Cyperaceae	*Schoenus loliaceus*		P2
Rhamnaceae	*Stenanthemum sublineare*		P2
Stylidiaceae	*Stylidium leeuwinense*		P4
Stylidiaceae	*Stylidium sp. Scott River Plain (N.G. Marchant 74/23)*		P1
Stylidiaceae	*Stylidium trudgenii*		P3
Ericaceae	*Styphelia intricata*		P2
Proteaceae	*Synaphea macrophylla*		P1
Proteaceae	*Synaphea nexosa*		P1
Proteaceae	*Synaphea otiostigma*		P3
Proteaceae	*Synaphea petiolaris subsp. Simplex*		P3
Asparagaceae	*Thysanotus formosus*		P1
Cyperaceae	*Tricostularia davisii*	Davis' Tricostularia	P3
Celastraceae	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4
Myrtaceae	*Verticordia lehmannii*		P4
Myrtaceae	*Verticordia plumosa var. vassensis*	Vasse Featherflower	T
Xyridaceae	*Xyris maxima*		P2

Table A- 4: Birdata Database search results in the viscintiy of the Study Area.

Common Name	Scientific Name	EPBC Act
Inland Thornbill	*Acanthiza apicalis*	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	
Western Thornbill	*Acanthiza inornata*	
Western Spinebill	*Acanthorhynchus superciliosus*	
Collared Sparrowhawk	*Accipiter cirrocephalus*	
Brown Goshawk	*Accipiter fasciatus*	
Australian Reed-Warbler	*Acrocephalus australis*	
Common Sandpiper	*Actitis hypoleucos*	
Australian Owlet-nightjar	*Aegotheles cristatus*	
Grey Teal	*Anas gracilis*	
Pacific Black Duck	*Anas superciliosa*	
Australasian Darter	*Anhinga novaehollandiae*	
Red Wattlebird	*Anthochaera carunculata*	
Western Wattlebird	*Anthochaera lunulata*	
Australasian Pipit	*Anthus novaeseelandiae*	
Wedge-tailed Eagle	*Aquila audax*	
Great Egret	*Ardea alba*	
White-necked Heron	*Ardea pacifica*	
Flesh-footed Shearwater	*Ardenna carneipes*	
Wedge-tailed Shearwater	*Ardenna pacifica*	
Short-tailed Shearwater	*Ardenna tenuirostris*	
Ruddy Turnstone	*Arenaria interpres*	
Black-faced Woodswallow	*Artamus cinereus*	
Dusky Woodswallow	*Artamus cyanopterus*	
Hardhead	*Aythya australis*	
Australian Ringneck	*Barnardius zonarius*	
Musk Duck	*Biziura lobata*	
Cattle Egret	*Bubulcus ibis*	
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	

Sharp-tailed Sandpiper	*Calidris acuminata*	VU
Sanderling	*Calidris alba*	
Red Knot	*Calidris canutus*	VU
Curlew Sandpiper	*Calidris ferruginea*	CR
Red-necked Stint	*Calidris ruficollis*	
Long-toed Stint	*Calidris subminuta*	
Great Knot	*Calidris tenuirostris*	VU
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	VU
Brown Skua	*Catharacta antarctica*	
Horsfield's Bronze-Cuckoo	*Chalcites basalis*	
Shining Bronze-Cuckoo	*Chalcites lucidus*	
Greater Sand Plover	*Charadrius leschenaultii*	VU
Red-capped Plover	*Charadrius ruficapillus*	
Australian Wood Duck	*Chenonetta jubata*	
Whiskered Tern	*Chlidonias hybrida*	
Swamp Harrier	*Circus approximans*	
Banded Stilt	*Cladorhynchus leucocephalus*	
Rufous Treecreeper	*Climacteris rufus*	
Grey Shrike-thrush	*Colluricincla harmonica*	
Rock Dove	*Columba livia*	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	
Australian Raven	*Corvus coronoides*	
Stubble Quail	*Coturnix pectoralis*	
Grey Butcherbird	*Cracticus torquatus*	
Black Swan	*Cygnus atratus*	
Laughing Kookaburra	*Dacelo novaeguineae*	
Varied Sittella	*Daphoenositta chrysoptera*	
Wandering Albatross	*Diomedea exulans*	
Emu	*Dromaius novaehollandiae*	
Little Egret	*Egretta garzetta*	
White-faced Heron	*Egretta novaehollandiae*	

Eastern Reef Egret	*Egretta sacra*	
Black-shouldered Kite	*Elanus axillaris*	
Black-fronted Dotterel	*Elseyornis melanops*	
Galah	*Eolophus roseicapilla*	
Western Yellow Robin	*Eopsaltria griseogularis*	
White-fronted Chat	*Epthianura albifrons*	
Brown Falcon	*Falco berigora*	
Nankeen Kestrel	*Falco cenchroides*	
Australian Hobby	*Falco longipennis*	
Peregrine Falcon	*Falco peregrinus*	
Crested Shrike-tit	*Falcunculus frontatus*	
Eurasian Coot	*Fulica atra*	
Dusky Moorhen	*Gallinula tenebrosa*	
Singing Honeyeater	*Gavicalis virescens*	
Western Gerygone	*Gerygone fusca*	
Tawny-crowned Honeyeater	*Gliciphila melanops*	
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	
Magpie-lark	*Grallina cyanoleuca*	
Australian Magpie	*Gymnorhina tibicen*	
Sooty Oystercatcher	*Haematopus fuliginosus*	
Australian Pied Oystercatcher	*Haematopus longirostris*	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	
Whistling Kite	*Haliastur sphenurus*	
Pallid Cuckoo	*Heteroscenes pallidus*	
Little Eagle	*Hieraaetus morphnoides*	
Pied Stilt	*Himantopus leucocephalus*	
Welcome Swallow	*Hirundo neoxena*	
Caspian Tern	*Hydroprogne caspia*	
Australian Little Bittern	*Ixobrychus dubius*	
Black Bittern	*Ixobrychus flavicollis*	
White-winged Triller	*Lalage tricolor*	

Kelp Gull	*Larus dominicanus*	
Silver Gull	*Larus novaehollandiae*	
Pacific Gull	*Larus pacificus*	
Brown Honeyeater	*Lichmera indistincta*	
Bar-tailed Godwit	*Limosa lapponica*	EN
Black-tailed Godwit	*Limosa limosa*	
Square-tailed Kite	*Lophoictinia isura*	
Southern Giant-Petrel	*Macronectes giganteus*	EN
Red-winged Fairy-wren	*Malurus elegans*	
Splendid Fairy-wren	*Malurus splendens*	
White-naped Honeyeater	*Melithreptus lunatus*	
Rainbow Bee-eater	*Merops ornatus*	
Little Pied Cormorant	*Microcarbo melanoleucos*	
Black Kite	*Milvus migrans*	
Australasian Gannet	*Morus serrator*	
Restless Flycatcher	*Myiagra inquieta*	
Elegant Parrot	*Neophema elegans*	
Rock Parrot	*Neophema petrophila*	
Southern Boobook	*Ninox boobook*	
Barking Owl	*Ninox connivens*	
Whimbrel	*Numenius phaeopus*	
Helmeted Guineafowl	*Numida meleagris*	
Nankeen Night-Heron	*Nycticorax caledonicus*	
Crested Pigeon	*Ocyphaps lophotes*	
Bridled Tern	*Onychoprion anaethetus*	
Blue-billed Duck	*Oxyura australis*	
Golden Whistler	*Pachycephala pectoralis*	
Rufous Whistler	*Pachycephala rufiventris*	
Slender-billed Prion	*Pachyptila belcheri*	
Osprey	*Pandion haliaetus*	
Spotted Pardalote	*Pardalotus punctatus*	

Striated Pardalote	*Pardalotus striatus*	
White-faced Storm-Petrel	*Pelagodroma marina*	
Australian Pelican	*Pelecanus conspicillatus*	
Fairy Martin	*Petrochelidon ariel*	
Tree Martin	*Petrochelidon nigricans*	
Scarlet Robin	*Petroica boodang*	
Red-capped Robin	*Petroica goodenovii*	
Great Cormorant	*Phalacrocorax carbo*	
Black-faced Cormorant	*Phalacrocorax fuscescens*	
Little Black Cormorant	*Phalacrocorax sulcirostris*	
Great Pied Cormorant	*Phalacrocorax varius*	
Common Bronzewing	*Phaps chalcoptera*	
Brush Bronzewing	*Phaps elegans*	
White-cheeked Honeyeater	*Phylidonyris niger*	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	
Yellow-billed Spoonbill	*Platalea flavipes*	
Royal Spoonbill	*Platalea regia*	
Western Rosella	*Platycercus icterotis*	
Glossy Ibis	*Plegadis falcinellus*	
Pacific Golden Plover	*Pluvialis fulva*	
Grey Plover	*Pluvialis squatarola*	
Tawny Frogmouth	*Podargus strigoides*	
Hoary-headed Grebe	*Poliocephalus poliocephalus*	
Regent Parrot	*Polytelis anthopeplus*	
Little Grassbird	*Poodytes gramineus*	
Purple Swamphen	*Porphyrio porphyrio*	
Little Shearwater	*Puffinus assimilis*	
Hutton's Shearwater	*Puffinus huttoni*	
Red-capped Parrot	*Purpureicephalus spurius*	
White-breasted Robin	*Quoyornis georgianus*	
Red-necked Avocet	*Recurvirostra novaehollandiae*	

Grey Fantail	*Rhipidura albiscapa*	
Willie Wagtail	*Rhipidura leucophrys*	
White-browed Scrubwren	*Sericornis frontalis*	
Weebill	*Smicrornis brevirostris*	
Australasian Shoveler	*Spatula rhynchotis*	
Laughing Dove	*Spilopelia senegalensis*	
Red-eared Firetail	*Stagonopleura oculata*	
Pomarine Jaeger	*Stercorarius pomarinus*	
Little Tern	*Sternula albifrons*	
Fairy Tern	*Sternula nereis*	VU
Southern Emu-wren	*Stipiturus malachurus*	
Grey Currawong	*Strepera versicolor*	
Brown Quail	*Synoicus ypsilophorus*	
Australasian Grebe	*Tachybaptus novaehollandiae*	
Australian Shelduck	*Tadorna tadornoides*	
Indian Yellow-nosed Albatross	*Thalassarche carteri*	
Shy Albatross	*Thalassarche cauta*	
Black-browed Albatross	*Thalassarche melanophris*	
Greater Crested Tern	*Thalasseus bergii*	
Hooded Plover	*Thinornis cucullatus*	
Australian White Ibis	*Threskiornis moluccus*	
Straw-necked Ibis	*Threskiornis spinicollis*	
Sacred Kingfisher	*Todiramphus sanctus*	
Wood Sandpiper	*Tringa glareola*	
Common Greenshank	*Tringa nebularia*	EN
Marsh Sandpiper	*Tringa stagnatilis*	
Painted Button-quail	*Turnix varius*	
Barn Owl	*Tyto alba*	
Masked Owl	*Tyto novaehollandiae*	
Banded Lapwing	*Vanellus tricolor*	

Baudin's Black-Cockatoo	*Zanda baudinii*	EN
Carnaby's Black-Cockatoo	*Zanda latirostris*	EN
Baillon's Crake	*Zapornia pusilla*	
Spotless Crake	*Zapornia tabuensis*	
Silvereye	*Zosterops lateralis*	

DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and Project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in Projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN.
Visit us at stantec.com or find us on social media.

Ground Floor, 226 Adelaide Terrace, PERTH WA 6000

Tel: +61 8 6222 7000 | www.stantec.com

Appendix B Hydrogeology Borelogs

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S01

Job No: 304501017 **Sheet:** 1 of 2

Position: E340844.970 N6215378.790 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 35.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		35.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; pale brown, mottled orange-brown; trace silt, non-plastic; trace rootlets to 0.2m depth. (Aeolian)	Uc						0.00: Stickup: 0.5m		WM1-W-S01
			34.5	1.0			1.00m									
			34.0	1.5			Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz & iron oxide; grey, mottled yellow-brown; clay, low plasticity. (Aeolian)									
			33.5	2.0												
			33.0	2.5			2.50m									
			32.5	3.0	Leederville Formation		Sandy CLAY (Cl): medium plasticity; grey; sand, fine to medium grained, sub-rounded to angular, quartz & lithics. (Residual)	Wk								
			32.0	3.5			3.50m									
			31.5				Organic CLAY (OH): medium to high plasticity; dark grey to black; trace sand, fine-grained, quartz & lithics. (Residual).									
							4.00m									

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 XBEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 17:00 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S01

Job No: 304501017 **Sheet:** 2 of 2

Position: E340844.970 N6215378.790 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 35.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			31.0	4.5	Leederville Formation		Organic CLAY (OH): high plasticity; black. (Residual)	Wk								
			30.5													
			30.0	5.0												
			29.5	5.5												
			29.0	6.0												
			28.5	6.5												
				7.0			7.00m									
			28.0				TERMINATED AT 7.00 m Target depth Soil Logging									
			27.5	7.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 XBEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 17:00 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

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CORE BOX - PHOTO SHEET Hole ID: WM1-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM1-W-S01: 0 - 7m, Boxes 1

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB GrfcText CORE BOX PHOTO 2 PHOTOS PER PAGE BEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 15:27

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S02

Job No: 304501017 **Sheet:** 1 of 2

Position: E341131.110 N6215376.110 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 36.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		36.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets to 0.8m depth (Aeolian).	Uc						0.00: Stickup: 0.65m		WM1-W-S02
			35.5	1.0												
			35.0	1.5												
			34.5	2.0			2.00m									
			34.0	2.5	Leederville Formation		Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz; grey; clay, low to medium-plasticity. (Residual)								Whilst Drilling	
			33.5	3.0												
			33.0	3.5												
			32.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 XBEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 17:00 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S02

Job No: 304501017 **Sheet:** 2 of 2

Position: E341131.110 N6215376.110 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 36.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			32.0	4.5	Leederville Formation		Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz; grey; clay, low to medium-plasticity. (Residual) *(continued)*	Uc								
							4.20m Sandy CLAY (Cl): medium plasticity; dark grey; sand, fine to course-grained, sub-rounded to angular, quartz & lithics. (Residual)									
			31.5	5.0			4.50m Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz & lithics; grey; clay, high-plasticity. (Residual)									
			31.0	5.5												
			30.5	6.0												
			30.0	6.5												
			29.5	7.0			7.00m TERMINATED AT 7.00 m Target depth Soil Logging									
			29.0	7.5												
			28.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S01

Job No: 304501017 **Sheet:** 1 of 2

Position: E343226.910 N6208201.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 28.920 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		28.5	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz; grey; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM2-W-S01
							0.80m									
			28.0	1.0			Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; pale brown; trace clayey fines, low plasticity. (Aeolian)									
			27.5	1.5			1.80m									
			27.0	2.0	Dll Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
							2.20m									
			26.5	2.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz & organics; black; with clay, low-plasticity. (Aeolian)	Wk							Whilst Drilling	
			26.0	3.0												
			25.5	3.5												
			25.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S01

Job No: 304501017 **Sheet:** 2 of 2

Position: E343226.910 N6208201.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 28.920 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			24.5	4.5			SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz & organics; black; with clay, low-plasticity. (Aeolian) *(continued)*	Wk								
							4.30m									
							Sandy CLAY (Cl): medium plasticity; dark brown to dark grey; sand, fine to medium-grained, sub-rounded to rounded, quartz & organics. (Alluvial).	Uc								
							4.50m									
							TERMINATED AT 4.50 m Target Water Contact Soil Logging									
			24.0	5.0												
			23.5	5.5												
			23.0	6.0												
			22.5	6.5												
			22.0	7.0												
			21.5	7.5												
			21.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM2-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM2-W-S01: 0 - 4.5m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S02

Job No: 304501017 **Sheet:** 1 of 2

Position: E342827.500 N6208156.170 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 27.450 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		27.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; brown; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM2-W-S02
							0.80m									
			26.5	1.0	DII Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
			26.0	1.5												
			25.5	2.0												
							2.30m									
			25.0	2.5	Quaternary Dune Deposits		Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz; mottled white-brown to grey; clay, low plasticity. (Aeolian)	Wk								
							2.90m									
			24.5	3.0			Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz & organics; dark grey to black; clay, low plasticity. (Aeolian)								Whilst Drilling	
			24.0	3.5												
			23.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S02

Job No: 304501017 **Sheet:** 2 of 2

Position: E342827.500 N6208156.170 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 27.450 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			23.0	4.5	Quaternary Dune Deposits		Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz & organics; dark grey to black; clay, low plasticity. (Aeolian) *(continued)*	Wk								
			22.5	5.0				Uc								
			22.0	5.5												
			21.5	6.0			6.00m									
							TERMINATED AT 6.00 m Target depth Soil Logging									
			21.0	6.5												
			20.5	7.0												
			20.0	7.5												
			19.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
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- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Hole ID: WM2-W-S02

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM2-W-S02: 0 - 6m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S01

Job No: 304501017 **Sheet:** 1 of 1

Position: E343246.590 N6211039.500 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.840 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; grey; trace silt, non-plastic; trace rootlets to 0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S01
			33.0	1.0			1.00m									
			32.5	1.5			SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; dark brown; with silt/clay, low plasticity. (Aeolian) From 1.4m... mottled orange-brown									
			32.0	2.0			1.80m Clayey SAND (SC): fine to medium-grained, sub-rounded to sub-angular; quartz & organics; black; clay, low plasticity. (Laucustrine) 2.00m	Wk								
			31.5	2.5			TERMINATED AT 2.00 m Refusal Soil Logging								Whilst Drilling	
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
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- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
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ROUGHNESS
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- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S01: 0 - 2m

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB GrfcText CORE BOX PHOTO 2 PHOTOS PER PAGE BEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 15:27

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S02 (A)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343265.730 N6211102.080 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.710 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level
DPP	N/A		33.5	0.5	QDD		SAND (SP): fine to medium grained; sub-angular to sub-rounded; quartz; yellow, mottled orange; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian) 0.20m	Uc							
					DII		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust). 0.40m							0.40: Well Install	
			33.0	1.0			TERMINATED AT 0.40 m Refusal Soil Logging							NO WELL INSTALLATION DEPTH TOO SHALLOW	
			32.5	1.5											
			32.0	2.0											
			31.5	2.5											
			31.0	3.0											
			30.5	3.5											
			30.0												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S02 (A)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S02 (A): 0 - 0.4m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S02 (B)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343265.730 N6211102.080 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.710 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0	QDD		Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz; orange-brown; trace clay, low to medium plasticity. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S02
				0.30m												
AD/V			33.0	0.5	DI - DII Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
				1.00m												
				1.0			TERMINATED AT 1.00 m Refusal Soil Logging									
			32.5	1.5												
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET

Hole ID: WM3-N-S02 (B)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S02 (B): 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S03

Job No: 304501017 **Sheet:** 1 of 1

Position: E343304.400 N6211216.990 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 34.000 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): medium to fine-grained; sub-angular to sub-rounded; quartz; pale grey to grey; trace silt, non-plastic; trace rootlets to 0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S03
			33.0	1.0			0.50m SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; pale brown; with clayey fines; low plasticity. (Aeolian)									
			32.5	1.5			1.40m 1.50m Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; brown to red brown; clay, low to medium plasticity. (Aeolian)	Wk							Whilst Drilling	
			32.0	2.0			Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz & organics; dark brown; clay, medium plasticity. (Aeolian)									
			31.5	2.5												
			31.0	3.0			3.00m TERMINATED AT 3.00 m Target depth Soil Logging									
			30.5	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S03

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S03: 0 - 3m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S04

Job No: 304501017 **Sheet:** 1 of 1

Position: E343223.940 N6211480.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 34.790 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		34.5	0.5			SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; pale grey; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S04
			34.0	1.0												
			33.5	1.5			1.50m									
			33.0				Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz & organics; dark brown; silty/clayey fines, low to medium plasticity. (Aeolian)	Wk							Whilst Drilling	
				1.90m												
			32.5	2.0			TERMINATED AT 1.90 m Refusal Soil Logging									
			32.0	2.5												
			31.5	3.0												
			31.0	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S04

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S04: 0 - 1.9m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S01

Job No: 304501017 **Sheet:** 1 of 1

Position: E343118.740 N6210924.010 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.670 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets to 0.6m depth (Aeolian).	Uc						0.00: Stickup: 0.6m		WM3-W-S01
			33.0				0.80m									
				1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).	Wk								
							1.00m									
			32.5	1.5			TERMINATED AT 1.00 m Refusal Soil Logging									
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S01: 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S02 (A)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343059.020 N6210916.440 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.340 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.5			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz and ferricrete fragments; orange-brown. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S02a
			32.5	1.0			0.30m FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust). 1.00m									
			32.0	1.5			TERMINATED AT 1.00 m Target depth Soil Logging									
			31.5	2.0												
			31.0	2.5												
			30.5	3.0												
			30.0	3.5												
			29.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET

Hole ID: WM3-W-S02 (A)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S02 (A): 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S02 (B)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343058.710 N6210917.830 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.0			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; greay; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S02b
			32.5	1.0			1.00m									
			32.0	1.5			SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; pale to dark orange-brown; with silty fines, low plasticity. (Aeolian)									
			31.5	2.0												
			31.0	2.5			2.50m								Whilst Drilling	
			30.5	3.0			Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; grey; clay, low to medium plasticity. (Aeolian).	Wk								
							3.00m									
			30.0	3.5			TERMINATED AT 3.00 m Target depth Soil Logging									
			29.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-W-S02 (B)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S02 (B): 0 - 3m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S03

Job No: 304501017 **Sheet:** 1 of 1

Position: E342987.260 N6210892.360 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.870 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; greay; trace silt, non-plastic. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S03
							0.60m									
			33.0	1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
							1.00m									
							TERMINATED AT 1.00 m Target depth Soil Logging									
			32.5	1.5												
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-W-S03

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S03: 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S04

Job No: 304501017 **Sheet:** 1 of 1

Position: E342901.620 N6210922.540 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.5			SAND (SP): fine to medium-grained, sub-rounded to sub-angular, quartz; grey; trace silt, non-plastic; rootlets to 0.1m depth (Aeolian).	Uc						0.00: Stickup: 0.6m		WM3-W-S04
			32.5				0.80m								Whilst Drilling	
AD/V			32.0	1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
			31.5	1.5			1.80m									
							SAND (SP): fine to medium-grained; sub-rounded to sub-angular, quartz & organics; black; with silt, non-plastic. (Aeolian)	Wk								
				2.0			2.00m									
			31.0				TERMINATED AT 2.00 m Target depth Soil Logging									
			30.5	2.5												
			30.0	3.0												
			29.5	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-W-S04

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S04: 0 - 2m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S05

Job No: 304501017 **Sheet:** 1 of 2

Position: E342692.990 N6210889.200 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 32.500 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		32.0	0.5			SAND (SP): fine to medium-grained, subangular to rounded; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets <0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S05
			31.5	1.0												
			31.0	1.5			1.60m SAND (SP): fine to medium-grained; sub-angular to rounded; quartz &organics; dark brown-black; with silt and clay, low plasticity. (Aeolian)									
			30.5	2.0			2.30m									
			30.0	2.5			Clayey SAND (SC): fine to medium-grained, sub-angular to sub-rounded, quartz; brown; trace silt, low to medium plasticity. (Aeolian)	Wk							Whilst Drilling	
			29.5	3.0												
			29.0	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S05

Job No: 304501017 **Sheet:** 2 of 2

Position: E342692.990 N6210889.200 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 32.500 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			32.5	0.0			Clayey SAND (SC): fine to medium-grained, sub-angular to sub-rounded, quartz; brown; trace silt, low to medium plasticity. (Aeolian) *(continued)*	Wk								
							4.30m									
			28.0	4.5			SAND (SP): fine to medium-grained, sub-angular to sub-rounded, quartz & organics; dark brown-black; trace silt, non-plastic. (Aeolian)	Uc								
							4.50m TERMINATED AT 4.50 m Target Water Contact Soil Logging									
			27.5	5.0												
			27.0	5.5												
			26.5	6.0												
			26.0	6.5												
			25.5	7.0												
			25.0	7.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-W-S05

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S05: 0 - 4.5m

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Appendix C Hydrogeology Figures



Beenup Wind Farm

Preliminary Geotechnical and Baseline Contamination Investigation

Test Location Plan

Project Code: 304501017

Drawn By: Singh, Edvinder, Checked By: BP

Date: (2024-06-21)

Appendix A - Figure 1.1 - Site Plan Overview

Stantec

Legend

Boundary Extents

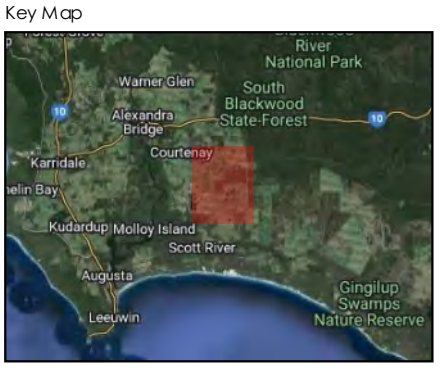
Geotechnical Investigation Type

- Geotechnical Boreholes (WM)
- Shallow Wells
- Geotechnical Test Pits (TP)

0 500 1,000 m

Scale at A3: 1:30000

Key Map



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Beenup Wind Farm

Preliminary Geotechnical and Baseline Contamination Investigation

Test Location Plan

Project Code: 304501017

Drawn By: Singh, Edvinder, Checked By: BP

Date: (2024-06-21)

Appendix A - Figure 1.2 - WM01 Overview

Stantec

Legend

Boundary Extents

Geotechnical Investigation Type

- Geotechnical Boreholes (WM)
- Shallow Wells
- Geotechnical Test Pits (TP)

0 100 200 m

Scale at A3: 1:10000

Key Map



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Beenup Wind Farm

Preliminary Geotechnical and Baseline Contamination Investigation

Test Location Plan

Project Code: 304501017

Drawn By: Singh, Edvinder, Checked By: BP

Date: (2024-06-21)

Appendix A - Figure 1.3 - WM02 Overview

Stantec

Legend

- Boundary Extents

Geotechnical Investigation Type

- Geotechnical Boreholes (WM)
- Shallow Wells
- Geotechnical Test Pits (TP)

0 100 200 m

Scale at A3: 1:10000

Key Map



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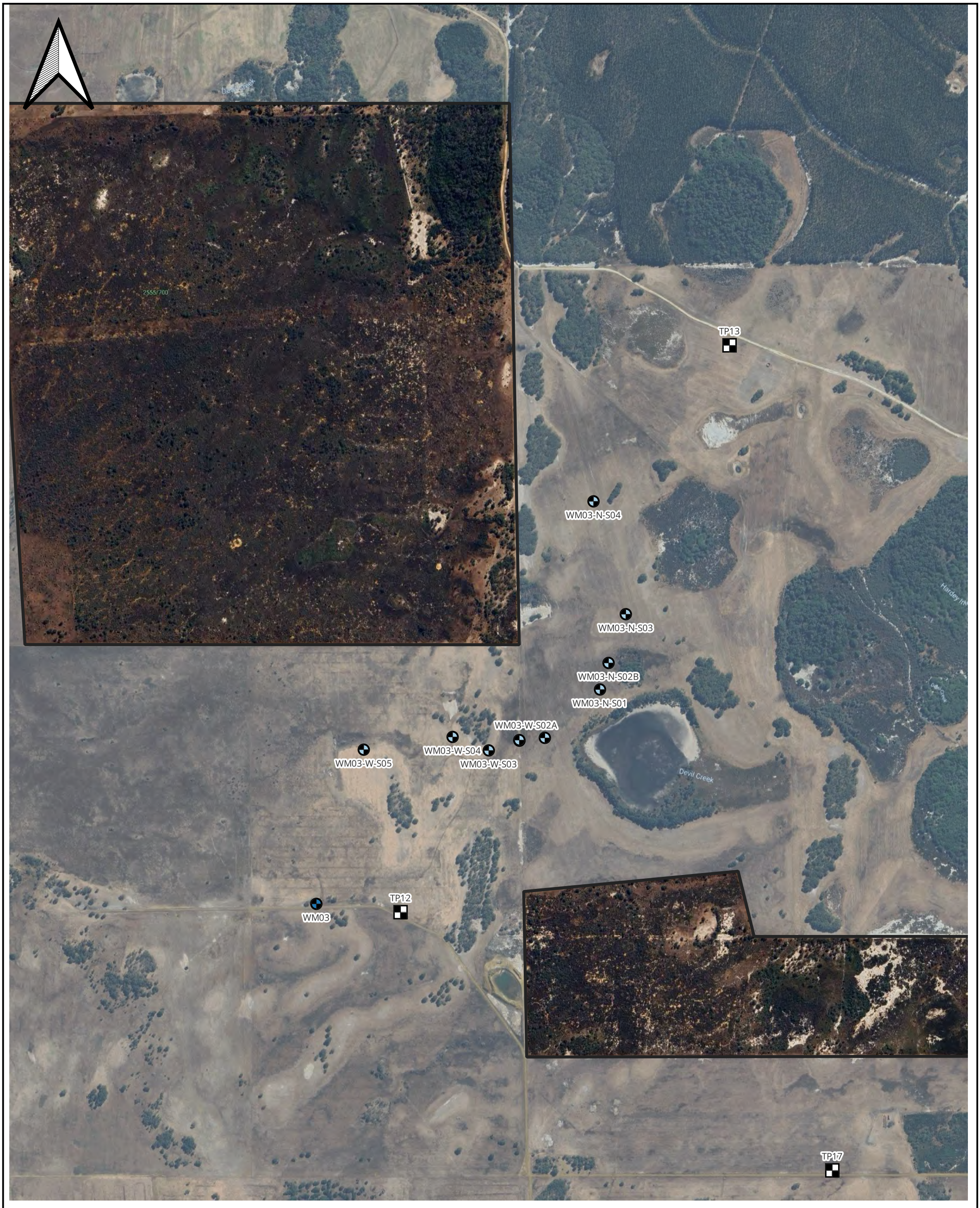


Beenup Wind Farm

Preliminary Geotechnical and Baseline Contamination Investigation

Test Location Plan

Project Code: 304501017

Drawn By: Singh, Edvinder, Checked By: BP

Date: (2024-06-21)

Appendix A - Figure 1.4 - WM03 Overview

Stantec

Legend

Boundary Extents

Geotechnical Investigation Type

- Geotechnical Boreholes (WM)
- Shallow Wells
- Geotechnical Test Pits (TP)

0 100 200 m

Scale at A3: 1:10000

Key Map



This document has been prepared based on information provided by others as cited in the data sources. Stantec has not verified the accuracy and/or completeness of this information as shall not be help responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Appendix D Hydrogeology Tables

Table E-1: Soil profile chemistry.

ID	Depth (m)	pH (Units)	Chloride (mg/kg)	Sulfate (mg/kg)
TP11	2.0	5.2	51	790
WM01	17.0 - 18.0	5.4	26	810
WM01	22.0 - 23.0	5.1	41	190
WM02	4.5 - 5.0	3.6	34	5,200
WM02	10.0 - 11.0	2.6	20	18,000
WM02	16.0 - 17.0	4.1	54	1100
WM03	4.0 - 5.0	4.0	50	1800
WM03	24.0 - 24.95	5.3	33	110

Table E-2: Test pit excavation profile.

Test Pit ID	Sand (Top - metres)	Sand (Bottom - metres)	Notes
TP01	0.1	2.1	Water encountered
TP02	0.1	0.9	Ferricrete at 0.9m - 1.0m (refusal)
TP03	0.15	2	0.0 to 0.15m gravelly SAND (fill)
TP04	0.15	2	-
TP05	0.1	0.85	Ferricrete at 0.85m - 0.9m (refusal)
TP06	0.1	0.65	Ferricrete at 0.65m - 0.7m (refusal)
TP07	0.1	1.7	Water encountered
TP08	0.1	2	Water encountered
TP09	0.1	1.5	Water encountered
TP10	0.1	1.1	Ferricrete at 1.1m - 1.2m
TP11	0.1	2	-
TP12	0.1	0.15	Ferricrete at 0.15m - 0.2m, refusal at 0.2m
TP13	0.1	2	-
TP14	0.1	0.35	Ferricrete at 0.35m - 0.4m, refusal at 0.4m
TP15	0.1	0.95	Ferricrete at 0.95m - 1.00m, refusal at 1m
TP16	0	0	0m - 0.1m topsoil, 0.1m - 0.15m Ferricrete.
TP17	0.1	0.45	Ferricrete at 0.45m - 0.5m
TP18	0	0	Ferricrete at 0.1m - 0.15m
TP19	0.1	0.55	Ferricrete at 0.55m - 0.6m
TP20	0.1	0.85	Ferricrete at 0.85m - 0.9m

Table E-3: Groundwater monitoring bores and screened aquifer units.

Bore ID	Depth (mbgl)	RL Depth (mAHD)	Screened Interval (mbgl)	Screened Lithology	Aquifer Unit
Stantec 2024					
WM01	24.95	15.05	18.50 – 24.50	Clayey SAND, SAND	Leederville (Warnbro)
WM01-W-S01	7.00	29.0	2.5 – 5.5	Sandy CLAY, Organic CLAY	Superficial Aquifer and Leederville (Warnbro)
WM01-W-S02	7.00	46.0	4.0 – 7.0	Clayey SAND, Sandy CLAY	Superficial Aquifer
WM02	24.95	6.05	12.50 – 24.50	CLAY, SAND	Leederville (Warnbro)
WM02-W-S01	4.50	28.5	1.5 – 4.0	Clayey SAND, Ferricrete, SAND, Sandy CLAY	Superficial Aquifer
WM02-W-S02	6.0	30.0	3.0 – 6.0	Clayey SAND	Superficial and Leederville (Warnbro)
WM03	24.95	7.05	18.50 – 24.50	SAND, Sandy CLAY	Leederville (Warnbro)
WM03-N-S01	2.0	36.0	1.0 – 2.0	SAND, Clayey SAND	Superficial
WM03-N-S03	3.0	31.0	1.5 – 3.0	Clayey SAND	Superficial
WM03-N-S04	1.90	36.1	0.9 – 1.90	SAND, Clayey SAND	Superficial
WM03-W-S01	1.00	37.0	0.4 – 1.00	SAND, Ferricrete	Superficial
WM03-W-S03	1.00	34.0	0.4 – 1.00	SAND, Ferricrete	Superficial
WM03-W-S04	2.00	30.0	1.5 – 2.00	Ferricrete, SAND	Superficial
WM03-W-S05	4.5	32.5	1.5 – 4.5	SAND, Clayey SAND	Superficial
EW17B	3.9		0.9-3.9	SAND/Ferricrete	Superficial
Mohsenzadeh and Diamond (2000)					
SM41	12	-	-	Sand, Clay	Leederville (Warnbro)
SM42	9	-	-	Sand, Clay	Leederville (Warnbro)
SM43	16.4	-	-	Sand, Clay	Leederville (Warnbro)
SM44	0.9	-	-	Sand	Superficial
SM45	2.2	-	-	Sand	Superficial
SM46D	18	-	-	Sand, Clay, Coal	Leederville (Warnbro)
SM46S	3	-	-	Sand	Superficial

Table E-4: Gauging information of deep and shallow groundwater bores.

Bore ID	Date	Surface RL (m AHD)	SWL (mbTOC)	SWL RL (mAHD)	Bore Depth (mbls)	Bore Bottom (mAHD)
Deep Bores						
WM01	16/04/2024	36.04	2.94	33.79	24.95	11.09
	23/07/2024	36.04	2.07	34.66	24.95	11.09
	26/09/2024	36.04	1.22	35.52	24.95	11.09
WM02	16/04/2024	28.57	1.09	28.13	24.95	3.62
	23/07/2024	28.57	0.72	28.50	24.95	3.62
	26/09/2024	28.57	1.20	28.03	24.95	3.62
WM03	17/04/2024	32.43	2.49	30.57	24.95	7.48
	23/07/2024	32.43	0.98	32.09	24.95	7.48
	27/09/2024	32.43	1.22	31.84	24.95	7.48
Shallow Bores						
WM01-W-S01	16/04/2024	35.14	3.43	32.17	7.00	28.14
	23/07/2024	35.14	2.76	32.84	7.00	28.14
	26/09/2024	35.14	1.37	34.23	7.00	28.14
WM01-W-S02	16/04/2024	36.35	3.75	33.2	7.00	29.35
	23/07/2024	36.35	3.43	33.52	7.00	29.35
	26/09/2024	36.35	1.64	35.32	7.00	29.35
WM02-W-S01	16/04/2024	28.92	1.94	27.58	4.50	24.42
	23/07/2024	28.92	0.68	28.84	4.50	24.42
	26/09/2024	28.92	1.27	28.25	4.50	24.42
WM02-W-S02	16/04/2024	27.45	1.84	26.25	6.00	21.45
	23/07/2024	27.45	0.64	27.45	6.00	21.45
	26/09/2024	27.45	1.33	26.76	6.00	21.45
WM03-N-S01	17/04/2024	33.84	2.15	32.38	2.00	31.84
	24/07/2024	33.84	0.78	33.75	2.00	31.84
	26/09/2024	33.84	1.30	33.24	2.00	31.84
WM03-N-S02B	17/04/2024	33.71	1.51	32.87	1.00	32.71
	24/07/2024	33.71	0.97	33.41	1.00	32.71
	26/09/2024	33.71	1.00	33.38	1.00	32.71
WM03-N-S03	17/04/2024	34.00	2.00	32.65	3.00	31.00
	24/07/2024	34.00	0.83	33.82	3.00	31.00
	27/09/2024	34.00	0.95	33.71	3.00	31.00
WM03-N-S04	17/04/2024	34.79	1.98	33.41	1.90	32.89
	24/07/2024	34.79	1.02	34.37	1.90	32.89
	26/09/2024	34.79	1.18	34.21	1.90	32.89

Bore ID	Date	Surface RL (m AHD)	SWL (mbTOC)	SWL RL (mAHD)	Bore Depth (mbls)	Bore Bottom (mAHD)
WM03-W-S01	17/04/2024	33.67	Dry	-	1.00	32.67
	24/07/2024	33.67	0.85	33.52	1.00	32.67
	26/09/2024	33.67	1.38	32.99	1.00	32.67
WM03-W-S02A	17/04/2024	33.34	Dry	-	1.00	32.34
	24/07/2024	33.34	0.59	33.47	1.00	32.34
	25/09/2024	33.34	0.64	33.41	1.00	32.34
WM03-W-S02B	17/04/2024	33.35	1.98	32.04	3.00	30.35
	24/07/2024	33.35	0.56	33.46	3.00	30.35
	25/09/2024	33.35	0.61	33.42	3.00	30.35
WM03-W-S03	17/04/2024	33.87	Dry	-	1.00	32.87
	24/07/2024	33.87	1.12	33.39	1.00	32.87
	25/09/2024	33.87	1.30	33.21	1.00	32.87
WM03-W-S04	17/04/2024	33.14	1.55	32.15	2.00	31.14
	24/07/2024	33.14	0.69	33.70	2.00	31.14
	27/09/2024	33.14	0.79	32.91	2.00	31.14
WM03-W-S05	17/04/2024	32.50	1.77	31.30	4.50	28.00
	24/07/2024	32.50	0.74	32.34	4.50	28.00
	25/09/2024	32.50	1.04	32.03	4.50	28.00

Table E-5: Summary of groundwater field parameters.

Bore ID	Date	Pump Rate (L/min)	Temp. (°C)	DO (mg/L)	EC (µS/cm)	pH	ORP (mV)
Deep Bores							
WM01	16/04/2024	0.34	19.60	0.06	314.64	5.38	15.12
	23/07/2024	0.1	15.87	0.21	326.50	5.34	106.60
	26/09/2024	0.11	19.40	1.63	341.69	5.67	155.70
WM02	16/04/2024	0.1	20.02	0.10	651.12	6.06	5.58
	23/07/2024	0.107	13.66	0.41	722.24	5.92	19.20
	26/09/2024	0.1	19.20	1.04	700.53	5.86	16.60
WM03	17/04/2024	0.1	21.53	0.22	523.95	6.08	5.55
	23/07/2024	0.105	16.17	2.89	481.62	6.15	70.90
	27/09/2024	0.115	15.76	0.93	461.85	5.79	52.60
Shallow Bores							
WM01-W-S01	16/04/2024	0.1	22.08	1.05	455.14	5.93	-13.98
	23/07/2024	0.1	14.22	0.79	422.81	4.57	284.10
	26/09/2024	0.105	15.51	0.81	372.56	4.61	317.30
WM01-W-S02	16/04/2024	0.05	23.88	0.17	468.75	6.42	-160.74

Bore ID	Date	Pump Rate (L/min)	Temp. (ºC)	DO (mg/L)	EC (µS/cm)	pH	ORP (mV)
	23/07/2024	0.1	14.85	1.03	342.12	5.51	26.90
	26/09/2024	0.11	18.14	0.87	449.12	5.22	47.40
WM02-W-S01	16/04/2024	0.1	24.83	0.11	513.17	6.41	-134.75
	23/07/2024	0.115	12.85	0.22	449.52	5.95	22.50
	26/09/2024	0.112	18.61	0.58	419.83	5.62	70.80
WM02-W-S02	16/04/2024	0.1	21.83	0.11	670.93	6.42	-111.70
	23/07/2024	0.105	14.48	0.37	551.48	5.68	141.20
	26/09/2024	0.112	19.29	0.43	587.25	5.85	48.60
WM03-N-S03	17/04/2024	0.1	25.42	0.86	417.52	5.51	50.53
	24/07/2024	0.096	17.79	0.55	793.12	4.58	264.90
	26/09/2024	0.115	16.45	0.57	983.14	5.87	4.60
WM03-W-S02B	17/04/2024	0.1	27.14	0.31	3050.72	6.08	-39.44
WM03-W-S04	24/07/2024	0.1	20.23	0.25	1034.30	5.63	60.70
	26/09/2024	0.115	16.99	0.49	1291.40	5.52	54.90

Note: all parameters are mg/L, except where shown.

Table E-6: April 2024 groundwater quality results.

		Phosphate total (as P)	Aluminium (filtered)	Arsenic (filtered)	Cadmium (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Potassium (filtered)	Electrical conductivity *(lab)	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrate & Nitrite (as N)	Nitrogen (Total)	Salinity
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	g/kg
EQL		0.01	0.01	0.001	0.0001	0.001	0.01	0.001	0.5	0.5	1	0.1	0.01	0.01	0.01	0.1	0.01
ADWG 2022 Aesthetic						1	0.3										
ADWG 2022 Health				0.01	0.002	2		0.01									
ANZG Freshwater Toxicant DGVs LOSP 80% (July 2023)			0.15		0.0008	0.0025		0.0094									
ANZG Freshwater Toxicant DGVs LOSP 90% (July 2023)			0.08		0.0004	0.0018		0.0056									
ANZG Freshwater Toxicant DGVs LOSP 95% (July 2023)			0.055		0.0002	0.0014		0.0034									
ANZG Freshwater Toxicant DGVs LOSP 99% (July 2023)			0.027		0.00006	0.001		0.001									
NHMRC & NRMMC (2011) ADWG 6. Version 3.4 (2017)													50				
ANZECC 2000 Irrigation - Short-term trigger value			20	2	0.05	5	10	5								25	
ANZECC 2000 Irrigation - Long-term trigger value			5	0.1	0.01	0.2	0.2	2								5	
ANZECC 2000 Livestock drinking water			5	0.5	0.01	0.4		0.1					338.7	9.13			
Managing Risks in Recreational Water 2008 (Health)				0.07	0.02	20		0.1					113	9			
Managing Risks in Recreational Water 2008 (Aesthetic)						1	0.3										
DoH 2014 - Non-Potable Use			0.2	0.1	0.02	20	0.3	0.1					113	9			
Field ID	**Date**																
SW2	**17 Apr 2024**	0.16	<0.01	<0.001	<0.0001	0.002	1.46	<0.001	20	18	903	7.2	0.02	<0.01	0.02	7.2	0.44
WM01	**17 Apr 2024**	0.04	0.02	<0.001	<0.0001	0.004	2.62	<0.001	5	7	266	0.3	<0.01	<0.01	<0.01	0.3	0.12
WM02	**17 Apr 2024**	0.1	0.01	0.002	<0.0001	0.004	11.4	<0.001	9	5	528	0.3	<0.01	<0.01	<0.01	0.3	0.25
WM03	**17 Apr 2024**	0.06	0.05	<0.001	<0.0001	0.003	6.48	<0.001	8	3	450	0.3	<0.01	<0.01	<0.01	0.3	0.22
WM01-W-S01	**17 Apr 2024**	0.93	<0.01	0.003	<0.0001	0.004	7.16	<0.001	8	4	354	2.3	<0.01	<0.01	<0.01	2.3	0.17
WM01-W-S02	**17 Apr 2024**	0.28	0.03	<0.001	<0.0001	0.003	17.8	<0.001	12	6	341	1.1	0.01	<0.01	0.01	1.1	0.16
WM02-W-S01	**17 Apr 2024**	0.04	0.1	<0.001	<0.0001	0.002	22.4	<0.001	7	14	394	2.1	<0.01	<0.01	<0.01	2.1	0.19
WM02-W-S02	**17 Apr 2024**	0.08	0.02	<0.001	<0.0001	0.002	30.2	<0.001	10	9	545	0.6	<0.01	<0.01	<0.01	0.6	0.26
WM03-N-S03	**17 Apr 2024**	0.02	0.34	0.002	<0.0001	0.006	11	<0.001	8	3	376	1.2	0.14	<0.01	0.14	1.3	0.18
WM03-W-S02B	**17 Apr 2024**	0.03	<0.01	<0.001	<0.0001	0.005	17.4	<0.001	54	27	2,740	0.6	0.01	<0.01	0.01	0.6	1.42

Table E-7: July 2024 groundwater metals results.

		Metals																			
		Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Boron (filtered)	Cadmium (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Potassium (filtered)	Selenium (filtered)	Vanadium (filtered)	Zinc (filtered)
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL		0.01	0.001	0.001	0.05	0.0001	1	0.001	0.001	0.001	0.05	0.001	1	0.001	0.0001	0.001	0.001	1	0.01	0.01	0.005
ADWG 2022 Aesthetic										1	0.3			0.1							3
ADWG 2022 Health			0.01	2	4	0.002				2		0.01		0.5	0.001	0.05	0.02		0.01		
ANZG Freshwater Toxicant DGVs LOSP 80% (July 2023		0.15			2.5	0.0008				0.0025		0.0094		3.6	0.0054		0.017		0.034		0.031
ANZG Freshwater Toxicant DGVs LOSP 90% (July 2023		0.08			1.5	0.0004				0.0018		0.0056		2.5	0.0019		0.013		0.018		0.015
ANZG Freshwater Toxicant DGVs LOSP 95% (July 2023		0.055			0.94	0.0002				0.0014		0.0034		1.9	0.0006		0.011		0.011		0.008
ANZG Freshwater Toxicant DGVs LOSP 99% (July 2023		0.027			0.34	0.00006				0.001		0.001		1.2	0.00006		0.008		0.005		0.0024
NHMRC & NRMMC (2011) ADWG 6. Version 3.4 (2017)																					
ANZECC 2000 Irrigation - Short-term trigger value		20	2		0.5	0.05		1	0.1	5	10	5		10	0.002	0.05	2		0.05	0.5	5
ANZECC 2000 Irrigation - Long-term trigger value		5	0.1		0.5	0.01		0.1	0.05	0.2	0.2	2		0.2	0.002	0.01	0.2		0.02	0.1	2
ANZECC 2000 Livestock drinking water		5	0.5		5	0.01	1,000	1	1	0.4		0.1			0.002	0.15	1		0.02		20
Managing Risks in Recreational Water 2008 (Health)			0.07	7	40	0.02				20		0.1		5	0.01	0.5	0.2		0.1		
Managing Risks in Recreational Water 2008 (Aesthetic)										1	0.3			0.1							3
DoH 2014 - Non-Potable Use		0.2	0.1	20	40	0.02				20	0.3	0.1		5	0.01	0.5	0.2		0.1		3
Field ID	**Date**																				
Dup01	**23 Jul 2024**	0.04	<0.001	0.078	<0.05	<0.0001	4	<0.001	0.003	0.001	0.09	<0.001	10	0.378	<0.0001	0.002	0.003	3	<0.01	<0.01	0.032
Dup 02	**23 Jul 2024**	0.77	<0.001			<0.0001				0.001	0.13	<0.001	<1					4			
Dup04	**24 Jul 2024**	0.37	0.001			<0.0001				0.002	0.99	<0.001	25					22			
Field Blank 1	**24 Jul 2024**	<0.01	<0.001			<0.0001				<0.001	<0.05	<0.001	<1					<1			
Field Blank 2	**25 Jul 2024**	<0.01	<0.001	<0.001	<0.05	<0.0001	<1	<0.001	<0.001	<0.001	<0.05	<0.001	<1	<0.001	<0.0001	<0.001	<0.001	<1	<0.01	<0.01	<0.005
SW02	**22 Jul 2024**	0.02	<0.001			<0.0001				0.006	2.82	<0.001	21					26			
SW03	**22 Jul 2024**	0.04	<0.001			<0.0001				0.005	0.28	<0.001	9					9			
SW04	**22 Jul 2024**	0.12	<0.001			<0.0001				0.007	0.45	<0.001	8					9			
SW05	**22 Jul 2024**	0.05	0.001			<0.0001				0.006	1.34	<0.001	13					25			
WM01	**23 Jul 2024**	0.03	<0.001	0.143	<0.05	<0.0001	2	<0.001	<0.001	0.004	2.58	<0.001	6	0.087	<0.0001	0.002	0.002	8	<0.01	<0.01	<0.005
WM01 Wetland	**23 Jul 2024**	0.60	<0.001			<0.0001				0.004	0.12	<0.001	<1					4			
WM01-W-S01	**23 Jul 2024**	0.01	<0.001	0.069	<0.05	<0.0001	4	<0.001	0.003	0.005	0.07	<0.001	8	0.324	<0.0001	0.002	0.003	4	<0.01	<0.01	0.030
WM01-W-S02	**25 Jul 2024**	0.07	0.002	0.085	<0.05	<0.0001	1	<0.001	<0.001	0.003	4.19	<0.001	6	0.048	<0.0001	0.002	<0.001	5	<0.01	<0.01	<0.005
WM02	**23 Jul 2024**	<0.01	<0.001	0.093	<0.05	<0.0001	2	<0.001	<0.001	0.004	14.9	<0.001	12	0.195	<0.0001	0.002	<0.001	6	<0.01	<0.01	<0.005
WM02 Wetland	**23 Jul 2024**	0.03	<0.001			<0.0001				0.004	0.16	<0.001	18					12			
WM02-W-S01	**23 Jul 2024**	0.09	<0.001	0.018	<0.05	<0.0001	11	<0.001	<0.001	0.004	6.05	<0.001	8	0.128	<0.0001	0.003	<0.001	14	<0.01	<0.01	<0.005
WM02-W-S02	**25 Jul 2024**	<0.01	<0.001	0.094	<0.05	<0.0001	11	<0.001	<0.001	0.004	0.20	<0.001	11	0.141	<0.0001	0.003	<0.001	12	<0.01	<0.01	<0.005
WM03	**24 Jul 2024**	0.01	<0.001	0.106	<0.05	<0.0001	5	<0.001	0.002	0.005	2.94	<0.001	8	0.607	<0.0001	0.002	0.008	4	<0.01	<0.01	0.013
WM03-N-S03	**24 Jul 2024**	0.36	<0.001	0.016	<0.05	<0.0001	34	<0.001	<0.001	0.002	2.70	<0.001	18	0.045	<0.0001	0.001	<0.001	18	<0.01	<0.01	<0.005
WM03 Wet Land	**24 Jul 2024**	0.36	0.001			<0.0001				0.006	0.93	<0.001	23					22			
WM03-W-S04	**24 Jul 2024**	1.02	<0.001	0.032	0.06	<0.0001	10	0.001	0.004	0.005	17.5	<0.001	18	0.289	<0.0001	0.001	0.002	57	<0.01	<0.01	<0.005

Table E-8: July 2024 groundwater inorganics results.

		Inorganics																								
		Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)_	Phosphate total (as P)	Reactive Phosphorus as P (Orthophosphate as P)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Ammonia as N	Anions Total	Cations Total	Chloride	Electrical Conductivity (Lab)	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	pH (Lab)	Salinity	Silicon as SiO2 (filtered)	Sodium (filtered)	Sulphur as S (filtered)	Total Dissolved Solids (Lab)	Turbidity (Lab)	Sulfate as SO4 - Turbidimetric (filtered)
		mg/L	MG/L	MG/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	µS/cm	%	mg/L	mg/L	mg/L	mg/L	mg/L	pH_Units	g/kg	mg/L	mg/L	mg/L	mg/L	NTU	mg/L
EQL		1	1	0.01	0.01	1	1	0.01	0.01	0.01	1	1	0.01	0.1	0.01	0.01	0.01	0.1	0.01	0.01	0.1	1	1	10	0.1	1
ADWG 2022 Aesthetic											250								6.5-8.5			180		600	5	
ADWG 2022 Health																										
ANZG Freshwater Toxicant DGVs LOSP 80% (July 2023)							2.3																			
ANZG Freshwater Toxicant DGVs LOSP 90% (July 2023)							1.43																			
ANZG Freshwater Toxicant DGVs LOSP 95% (July 2023)							0.9																			
ANZG Freshwater Toxicant DGVs LOSP 99% (July 2023)							0.32																			
NHMRC & NRMMC (2011) ADWG 6. Version 3.4 (2017)															50											500
ANZECC 2000 Irrigation - Short-term trigger value																		25								
ANZECC 2000 Irrigation - Long-term trigger value																		5								
ANZECC 2000 Livestock drinking water															338.7	9.13								3,000		
Managing Risks in Recreational Water 2008 (Health)															113	9			6.5-8.5							
Managing Risks in Recreational Water 2008 (Aesthetic)							0.4			250												180				
DoH 2014 - Non-Potable Use							0.4			250					113	9			6.5-8.5			180		600		
Field ID	**Date**																									
Dup01	**23 Jul 2024**	<1	<1	<0.01	<0.01	<1	<1	<0.01	3.52	3.36	93	360	2.29	0.2	0.05	<0.01	0.05	0.2	5.14		17.2	52	16	238	38.0	43
Dup 02	**23 Jul 2024**			0.30								83		2.8	0.04	<0.01	0.04	2.8		0.04						
Dup04	**24 Jul 2024**			1.71								1,190		3.8	0.09	0.01	0.10	3.9		0.59						
Field Blank 1	**24 Jul 2024**			<0.01								<1		<0.1	<0.01	<0.01	<0.01	<0.1		<0.01						
Field Blank 2	**25 Jul 2024**	<1	<1	<0.01	<0.01	<1	<1	<0.01	<0.01	<0.01	<1	1	<0.01	<0.1	<0.01	<0.01	<0.01	<0.1	5.46		<0.1	<1	<1	<10	0.2	<1
SW02	**22 Jul 2024**			0.23								919		6.0	0.64	0.07	0.71	6.7		0.45						
SW03	**22 Jul 2024**			0.06								504		1.3	0.02	<0.01	0.02	1.3		0.24						
SW04	**22 Jul 2024**			0.10								483		2.2	<0.01	<0.01	<0.01	2.2		0.23						
SW05	**22 Jul 2024**			0.22								731		3.8	0.76	0.47	1.23	5.0		0.36						
WM01	**23 Jul 2024**	11	<1	0.03	<0.01	<1	11	0.15	2.71	2.67	84	295	0.85	0.6	<0.01	<0.01	<0.01	0.6	5.90		22.9	43	2	185	12.0	6
WM01 Wetland	**23 Jul 2024**			0.43								85		3.5	0.03	<0.01	0.03	3.5		0.04						
WM01-W-S01	**23 Jul 2024**	<1	<1	<0.01	<0.01	<1	<1	<0.01	3.48	3.26	93	370	3.13	0.2	0.04	<0.01	0.04	0.2	5.00		17.5	53	16	245	45.0	41
WM01-W-S02	**25 Jul 2024**	5	<1	1.06	<0.01	<1	5	0.08	2.78	2.67	92	296	1.94	2.8	<0.01	<0.01	<0.01	2.8	5.30		16.4	46	1	688	7,000	4
WM02	**23 Jul 2024**	16	<1	0.04	<0.01	<1	16	0.11	6.33	6.26	202	623	0.56	0.2	<0.01	<0.01	<0.01	0.2	6.12		10.7	97	4	332	90.0	15
WM02 Wetland	**23 Jul 2024**			0.17								832		2.7	0.04	<0.01	0.04	2.7		0.41						
WM02-W-S01	**23 Jul 2024**	24	<1	0.03	<0.01	<1	24	0.85	3.75	3.57	91	390	2.57	1.6	0.02	<0.01	0.02	1.6	6.42		2.8	46	13	230	70.0	34
WM02-W-S02	**25 Jul 2024**	24	<1	0.02	<0.01	<1	24	0.25	4.91	4.59	135	506	3.41	0.6	0.11	0.02	0.13	0.7	6.29		7.0	65	12	283	400	30
WM03	**24 Jul 2024**	30	<1	0.01	<0.01	<1	30	0.17	4.40	3.97	128	434	5.13	0.4	0.09	<0.01	0.09	0.5	6.56		10.7	68	3	234	21.0	9
WM03-N-S03	**24 Jul 2024**	<1	<1	0.04	<0.01	<1	<1	0.70	6.87	6.68	180	747	1.36	3.0	5.95	0.02	5.97	9.0	4.18		4.8	70	28	442	80.0	86
WM03 Wet Land	**24 Jul 2024**			1.75								1,220		3.8	0.10	0.01	0.11	3.9		0.60						
WM03-W-S04	**24 Jul 2024**	4	<1	0.16	0.05	<1	4	0.51	9.49	9.55	287	943	0.35	4.6	<0.01	<0.01	<0.01	4.6	5.43		5.6	119	24	714	65.0	63

Table E-9: September 2024 groundwater metals results.

		Metals																			
		Aluminium (filtered)	Arsenic (filtered)	Barium (filtered)	Boron (filtered)	Cadmium (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Cobalt (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	Potassium (filtered)	Selenium (filtered)	Vanadium (filtered)	Zinc (filtered)
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL		0.01	0.001	0.001	0.05	0.0001	1	0.001	0.001	0.001	0.05	0.001	1	0.001	0.0001	0.001	0.001	1	0.01	0.01	0.005
ADWG 2022 Aesthetic										1	0.3			0.1							3
ADWG 2022 Health			0.01	2	4	0.002				2	[#1]	0.01		0.5	0.001	0.05	0.02		0.01		[#1]
ANZG Freshwater Toxicant DGVs LOSP 80% (July 2023		0.15[#3]			2.5[#4]	0.0008[#4]				0.0025[#4]		0.0094[#5]		3.6[#5]	0.0054[#6]		0.017[#6]		0.034[#6]		0.031[#7]
ANZG Freshwater Toxicant DGVs LOSP 90% (July 2023		0.08[#3]			1.5[#4]	0.0004[#9]				0.0018[#4]		0.0056[#3]		2.5[#5]	0.0019[#6]		0.013[#6]		0.018[#6]		0.015[#7]
ANZG Freshwater Toxicant DGVs LOSP 95% (July 2023		0.055[#3]			0.94[#11]	0.0002[#9]				0.0014[#9]		0.0034[#3]		1.9[#5]	0.0006[#6]		0.011[#6]		0.011[#6]		0.008[#7]
ANZG Freshwater Toxicant DGVs LOSP 99% (July 2023		0.027[#3]			0.34[#9]	0.00006[#9]				0.001[#9]		0.001[#3]		1.2[#3]	0.00006[#6]		0.008[#6]		0.005[#6]		0.0024[#7]
NHMRC & NRMMC (2011) ADWG 6. Version 3.4 (2017)																					
ANZECC 2000 Irrigation - Short-term trigger value		20[#15]	2[#15]		0.5[#16]	0.05[#15]		1[#15]	0.1[#15]	5[#15]	10[#15]	5[#15]		10[#15]	0.002[#15]	0.05[#15]	2[#15]		0.05[#15]	0.5[#15]	5[#15]
ANZECC 2000 Irrigation - Long-term trigger value		5[#18]	0.1[#18]		0.5[#18]	0.01[#18]		0.1[#18]	0.05[#18]	0.2[#18]	0.2[#18]	2[#18]		0.2[#18]	0.002[#18]	0.01[#18]	0.2[#18]		0.02[#18]	0.1[#18]	2[#18]
ANZECC 2000 Livestock drinking water		5	0.5		5	0.01	1,000[#19]	1	1	0.4[#20]		0.1			0.002	0.15	1		0.02		20
Managing Risks in Recreational Water 2008 (Health)			0.07[#22]	7[#22]	40[#22]	0.02[#22]				20[#22]		0.1[#22]		5[#22]	0.01[#22]	0.5[#22]	0.2[#22]		0.1[#22]		
Managing Risks in Recreational Water 2008 (Aesthetic)										1	0.3			0.1							3
DoH 2014 - Non-Potable Use		0.2[#24]	0.1	20	40	0.02				20	0.3	0.1		5	0.01	0.5	0.2		0.1		3
Field ID	Date																				
Dup02	26 Sep 2024	<0.01	<0.001	0.058	<0.05	<0.0001	4	<0.001	0.002	<0.001	<0.05	<0.001	7	0.206	<0.0001	<0.001	0.002	3	<0.01	<0.01	0.024
DUP01	25 Sep 2024	<0.01	<0.001	0.012	<0.05	<0.0001	45	<0.001	<0.001	<0.001	1.12	<0.001	24	0.157	<0.0001	<0.001	0.001	18	<0.01	<0.01	0.006
FB2	27 Sep 2024	<0.01	<0.001	<0.001	0.38	<0.0001	<1	<0.001	<0.001	<0.001	<0.05	<0.001	<1	<0.001	<0.0001	<0.001	<0.001	<1	<0.01	<0.01	<0.005
Field Blank 1	26 Sep 2024	<0.01	<0.001	<0.001	0.38	<0.0001	<1	<0.001	<0.001	<0.001	<0.05	<0.001	<1	<0.001	<0.0001	<0.001	<0.001	<1	<0.01	<0.01	<0.005
SW01	25 Sep 2024	0.06	<0.001	0.008	<0.05	<0.0001	58	<0.001	<0.001	<0.001	2.03	<0.001	11	<0.001	<0.0001	<0.001	<0.001	3	<0.01	<0.01	<0.005
SW02	25 Sep 2024	<0.01	<0.001	0.013	<0.05	<0.0001	46	<0.001	<0.001	<0.001	0.98	<0.001	24	0.141	<0.0001	<0.001	<0.001	18	<0.01	<0.01	<0.005
SW03	25 Sep 2024	0.07	<0.001	0.013	<0.05	<0.0001	38	<0.001	<0.001	<0.001	1.39	<0.001	10	0.002	<0.0001	<0.001	<0.001	16	<0.01	<0.01	<0.005
SW04	25 Sep 2024	0.14	<0.001	0.013	<0.05	<0.0001	27	<0.001	<0.001	<0.001	8.63	<0.001	10	0.011	<0.0001	<0.001	<0.001	4	<0.01	<0.01	<0.005
SW05	25 Sep 2024	0.01	0.001	0.006	<0.05	<0.0001	44	<0.001	<0.001	<0.001	2.20	<0.001	15	0.177	<0.0001	<0.001	<0.001	42	<0.01	<0.01	<0.005
WM01	26 Sep 2024	<0.01	<0.001	0.203	<0.05	<0.0001	8	<0.001	<0.001	0.002	0.06	<0.001	6	0.061	<0.0001	<0.001	0.005	7	<0.01	<0.01	0.009
WM01 Wetland	26 Sep 2024	0.76	<0.001	0.001	<0.05	<0.0001	4	0.001	<0.001	<0.001	0.34	<0.001	5	0.022	<0.0001	<0.001	<0.001	8	<0.01	<0.01	<0.005
WM01-W-S01	26 Sep 2024	<0.01	<0.001	0.061	<0.05	<0.0001	4	<0.001	0.001	<0.001	<0.05	<0.001	7	0.209	<0.0001	<0.001	0.002	3	<0.01	<0.01	0.021
WM1-W-S02	26 Sep 2024	0.04	<0.001	0.104	<0.05	<0.0001	4	<0.001	<0.001	<0.001	0.58	<0.001	11	0.052	<0.0001	<0.001	<0.001	4	<0.01	<0.01	<0.005
WM02	26 Sep 2024	<0.01	<0.001	0.098	<0.05	<0.0001	3	<0.001	<0.001	<0.001	3.11	<0.001	12	0.222	<0.0001	<0.001	<0.001	6	<0.01	<0.01	<0.005
WM 02 Wetland	26 Sep 2024	0.06	<0.001	0.003	<0.05	<0.0001	24	<0.001	<0.001	<0.001	2.07	<0.001	10	0.023	<0.0001	<0.001	<0.001	7	<0.01	<0.01	<0.005
WM02-W-S02	26 Sep 2024	<0.01	<0.001	0.105	<0.05	<0.0001	9	<0.001	<0.001	<0.001	<0.05	<0.001	12	0.245	<0.0001	<0.001	<0.001	8	<0.01	<0.01	<0.005
WM02-W-S02	26 Sep 2024	0.04	<0.001	0.013	<0.05	<0.0001	14	<0.001	<0.001	<0.001	0.23	<0.001	8	0.038	<0.0001	<0.001	<0.001	12	<0.01	<0.01	<0.005
WM03	27 Sep 2024	<0.01	<0.001	0.078	<0.05	<0.0001	3	<0.001	<0.001	<0.001	6.76	<0.001	8	0.334	<0.0001	<0.001	0.004	3	<0.01	<0.01	0.008
WM03-N-S03	27 Sep 2024	2.24	0.006	0.014	<0.05	<0.0001	18	0.004	0.002	0.006	15.3	<0.001	10	0.119	<0.0001	<0.001	0.002	36	<0.01	<0.01	<0.005
WM03 Wetland	27 Sep 2024	0.31	<0.001	0.001	<0.05	<0.0001	8	<0.001	<0.001	<0.001	0.86	<0.001	18	0.009	<0.0001	<0.001	<0.001	11	<0.01	<0.01	<0.005
WM03-W-S04	27 Sep 2024	0.78	<0.001	0.023	0.06	<0.0001	12	<0.001	0.004	<0.001	13.0	<0.001	24	0.186	<0.0001	<0.001	0.001	79	<0.01	<0.01	<0.005

Table E-10: September 2024 groundwater inorganics results.

		Inorganics																							
		Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)_	Phosphate total (as P)	Reactive Phosphorus as P (Orthophosphate as P)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Ammonia as N	Anions Total	Cations Total	Chloride	Electrical Conductivity (Lab)	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	Nitrogen (Total)	pH (Lab)	Silicon as SiO2 (filtered)	Sodium (filtered)	Sulphur as S (filtered)	Total Dissolved Solids (Lab)	Turbidity (Lab)	Sulfate as SO4 - Turbidimetric (filtered)
		mg/L	MG/L	MG/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	µS/cm	%	mg/L	mg/L	mg/L	mg/L	mg/L	pH_Units	mg/L	mg/L	mg/L	mg/L	NTU	mg/L
EQL		1	1	0.01	0.01	1	1	0.01	0.01	0.01	1	1	0.01	0.1	0.01	0.01	0.01	0.1	0.01	0.1	1	1	10	0.1	1
ADWG 2022 Aesthetic											250								6.5-8.5		180		600	5	
ADWG 2022 Health											#1								#1		#2		#2	#1	
ANZG Freshwater Toxicant DGVs LOSP 80% (July 2023)								2.3[#8]																	
ANZG Freshwater Toxicant DGVs LOSP 90% (July 2023)								1.43[#10]																	
ANZG Freshwater Toxicant DGVs LOSP 95% (July 2023)								0.9[#10]																	
ANZG Freshwater Toxicant DGVs LOSP 99% (July 2023)								0.32[#12]																	
NHMRC & NRMMC (2011) ADWG 6. Version 3.4 (2017)															50[#13]										500[#14]
ANZECC 2000 Irrigation - Short-term trigger value																		25[#17]							
ANZECC 2000 Irrigation - Long-term trigger value																		5[#18]							
ANZECC 2000 Livestock drinking water															338.7	9.13							3,000[#21]		
Managing Risks in Recreational Water 2008 (Health)															113[#22]	9[#22]			6.5-8.5[#23]						
Managing Risks in Recreational Water 2008 (Aesthetic)								0.4			250										180				
DoH 2014 - Non-Potable Use								0.4			250				113	9			6.5-8.5		180		600		
Field ID	Date																								
Dup02	26 Sep 2024	<1	<1	<0.01	<0.01	<1	<1	<0.01	3.40	2.90	89	342	7.94	0.1	<0.01	<0.01	<0.01	0.1	4.42	14.2	47	16	199	1.7	43
DUP01	25 Sep 2024	103	<1	0.49	0.06	<1	103	3.85	12.1	10.6	322	1,100	6.70	8.5	0.12	0.10	0.22	8.7	7.11	1.4	136	17	660	50.0	47
FB2	27 Sep 2024	1	<1	<0.01	<0.01	<1	1	<0.01	0.08	0.09	2	7	6.48	<0.1	<0.01	<0.01	<0.01	<0.1	6.14	1.1	2	<1	<10	0.4	<1
Field Blank 1	26 Sep 2024	1	<1	<0.01	<0.01	<1	1	<0.01	0.08	0.09	2	7	6.48	<0.1	<0.01	<0.01	<0.01	<0.1	6.13	1.1	2	<1	<10	0.3	<1
SW01	25 Sep 2024	175	<1	0.06	0.01	<1	175	0.01	5.08	4.83	56	402	2.45	1.6	0.01	<0.01	0.01	1.6	7.83	4.8	22	1	269	34.0	<5
SW02	25 Sep 2024	100	<1	0.50	0.04	<1	100	3.83	12.0	10.7	320	1,100	5.58	8.4	0.13	0.07	0.20	8.6	7.05	1.6	138	18	686	65.0	47
SW03	25 Sep 2024	72	<1	0.68	0.02	<1	72	0.04	7.78	6.70	190	667	7.47	6.0	0.01	0.01	0.02	6.0	6.91	1.5	82	10	440	110	47
SW04	25 Sep 2024	55	<1	0.54	0.33	<1	55	0.03	5.44	5.27	145	486	1.54	3.2	<0.01	<0.01	<0.01	3.2	7.07	2.1	58	5	367	21.0	12
SW05	25 Sep 2024	165	<1	6.23	0.09	<1	165	0.37	9.64	8.72	207	864	4.97	12.6	0.01	<0.01	0.01	12.6	7.04	2.8	97	8	570	180	24
WM01	26 Sep 2024	24	<1	<0.01	<0.01	<1	24	<0.01	3.40	2.95	100	317	7.20	0.1	0.18	<0.01	0.18	0.3	6.46	23.2	43	2	189	7.0	5
WM01 Wetland	26 Sep 2024	17	<1	0.31	0.15	<1	17	0.50	2.76	2.47	86	272	5.67	3.6	0.01	<0.01	0.01	3.6	6.69	1.8	38	2	214	18.0	<10
WM01-W-S01	26 Sep 2024	<1	<1	<0.01	<0.01	<1	<1	<0.01	3.46	2.90	91	323	8.89	0.1	<0.01	<0.01	<0.01	0.1	4.90	14.2	47	16	186	2.5	43
WM1-W-S02	26 Sep 2024	<1	<1	<0.01	<0.01	<1	<1	0.15	4.22	3.46	123	413	9.84	0.4	<0.01	<0.01	<0.01	0.4	4.59	6.8	51	12	234	60.0	36
WM02	26 Sep 2024	17	<1	0.03	<0.01	<1	17	0.08	6.12	5.56	197	617	4.84	0.2	<0.01	<0.01	<0.01	0.2	6.11	11.6	94	4	322	110	11
WM 02 Wetland	26 Sep 2024	60	<1	0.59	0.09	<1	60	0.03	4.25	4.16	103	416	1.11	8.0	<0.01	<0.01	<0.01	8.0	7.37	<0.1	45	5	266	55.0	7
WM02-W-S02	26 Sep 2024	34	<1	0.02	<0.01	<1	34	0.11	5.67	4.91	166	543	7.20	0.3	0.01	<0.01	0.01	0.3	6.65	10.4	75	5	280	55.0	15
WM02-W-S02	26 Sep 2024	17	<1	<0.01	<0.01	<1	17	1.15	4.00	3.46	104	395	7.26	1.7	<0.01	<0.01	<0.01	1.7	6.38	2.5	39	12	212	24.0	35
WM03	27 Sep 2024	26	<1	<0.01	<0.01	<1	26	0.15	4.84	3.97	148	419	9.91	0.3	<0.01	<0.01	<0.01	0.3	6.39	9.3	62	2	225	11.0	7
WM03-N-S03	27 Sep 2024	59	<1	0.28	0.12	<1	59	35.1	8.62	9.14	209	892	2.94	41.9	0.07	<0.02	0.07	42.0	6.73	4.4	67	27	414	28.0	74
WM03 Wetland	27 Sep 2024	29	<1	2.14	2.15	<1	29	0.04	8.22	7.56	242	808	4.20	3.1	0.02	<0.01	0.02	3.1	6.65	0.2	124	14	560	2.1	39
WM03-W-S04	27 Sep 2024	10	<1	0.68	0.32	<1	10	0.44	11.5	10.6	395	1,200	4.27	5.3	0.02	<0.02	0.02	5.3	5.97	6.3	137	39	422	37.0	109

Appendix E Groundwater Hydrographs

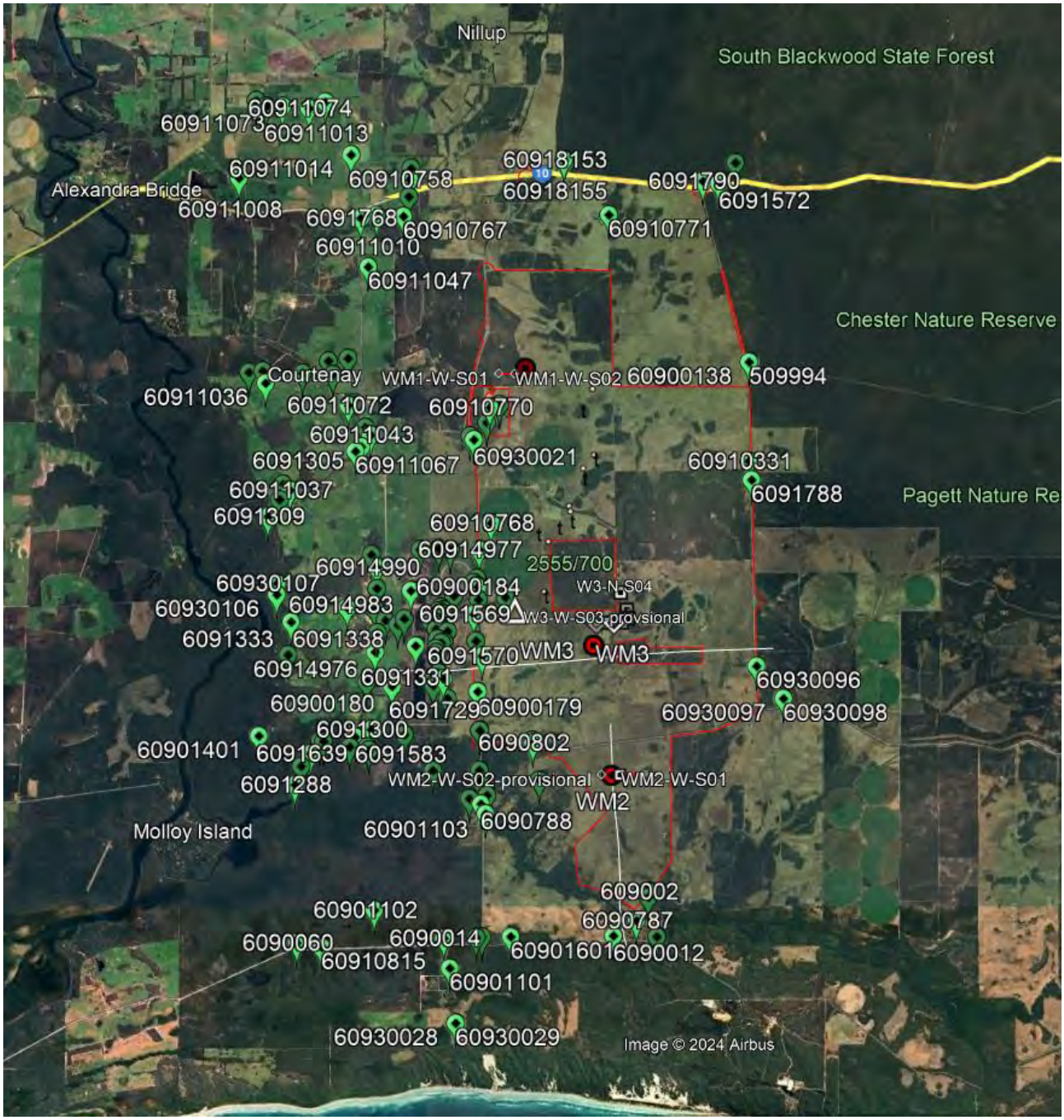
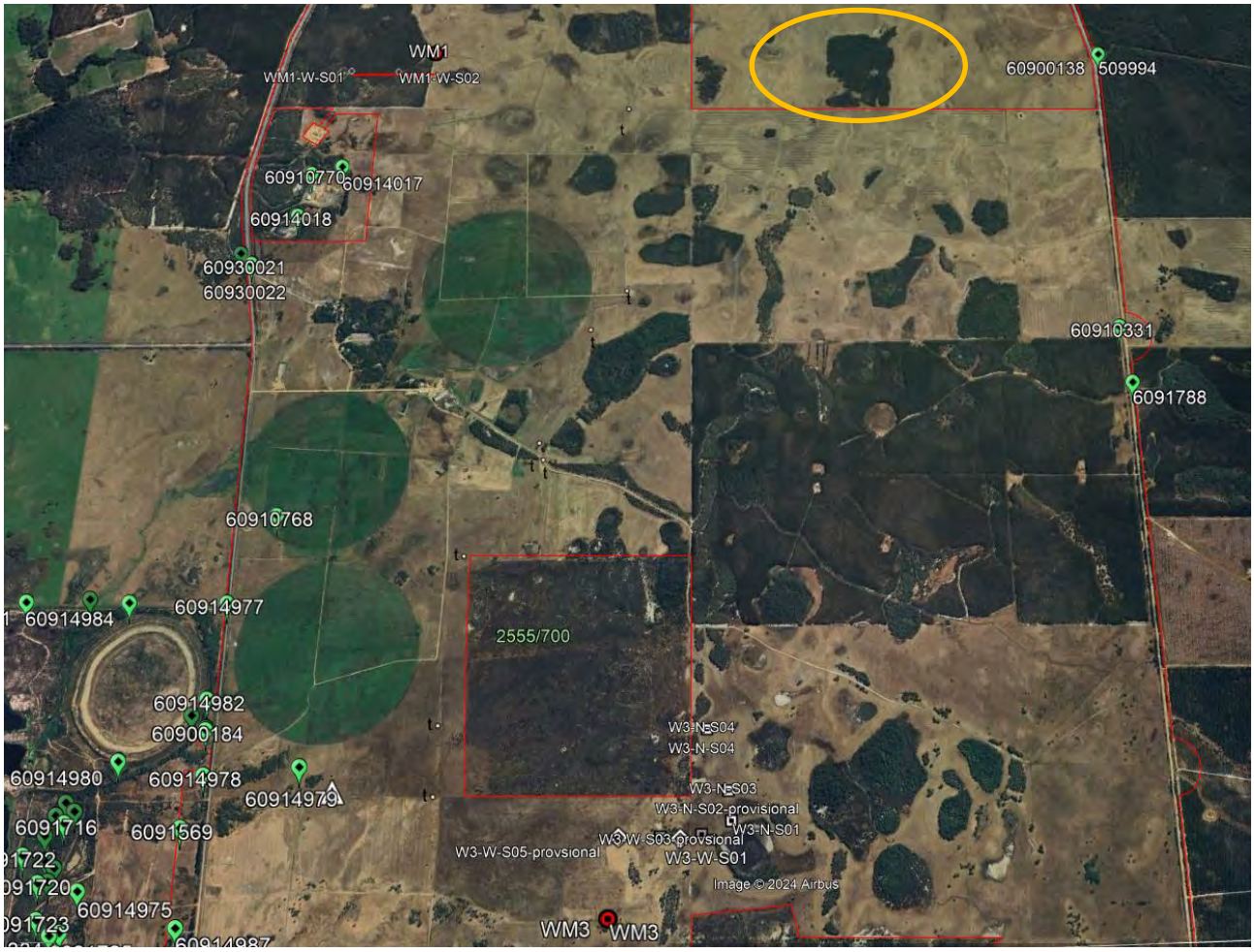


Figure F-1: WMIS Registered Bores (Study Area indicated by red polygon).



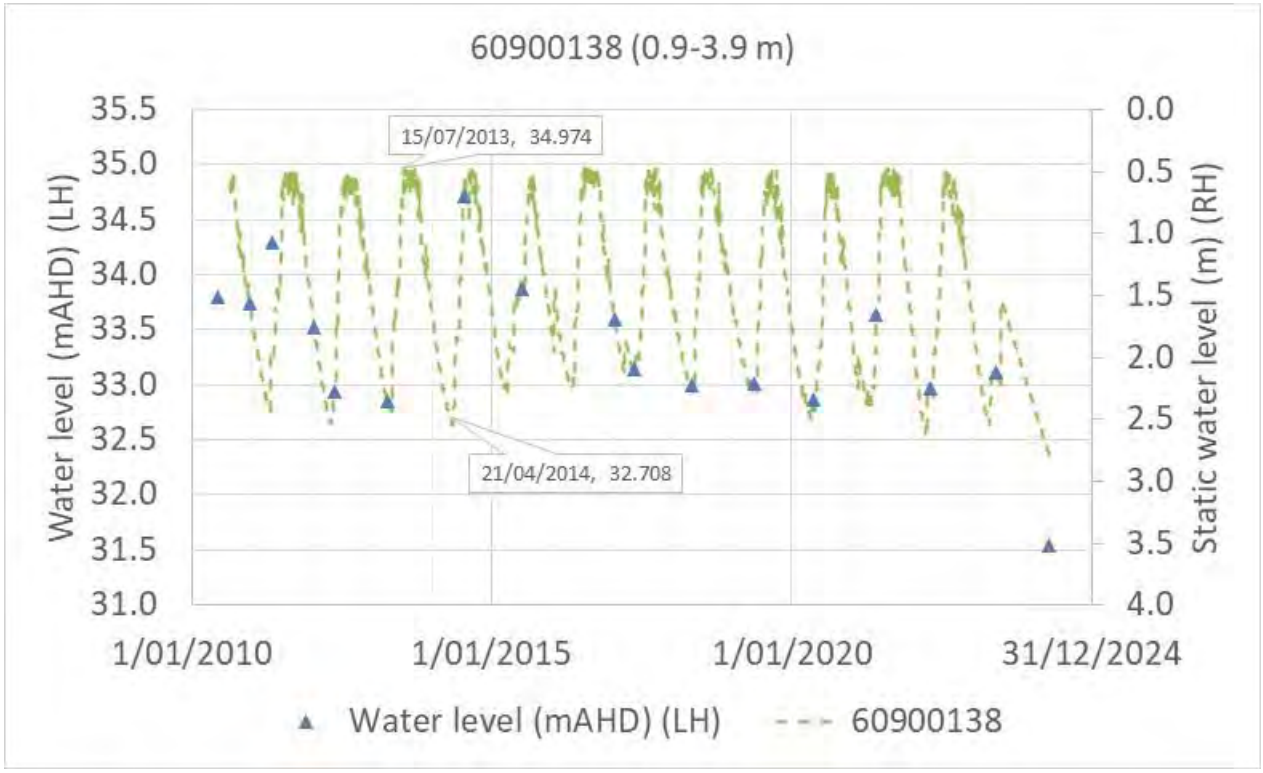


Figure F-2: Bore 60900138 Hydrograph (east boundary east of WM01)



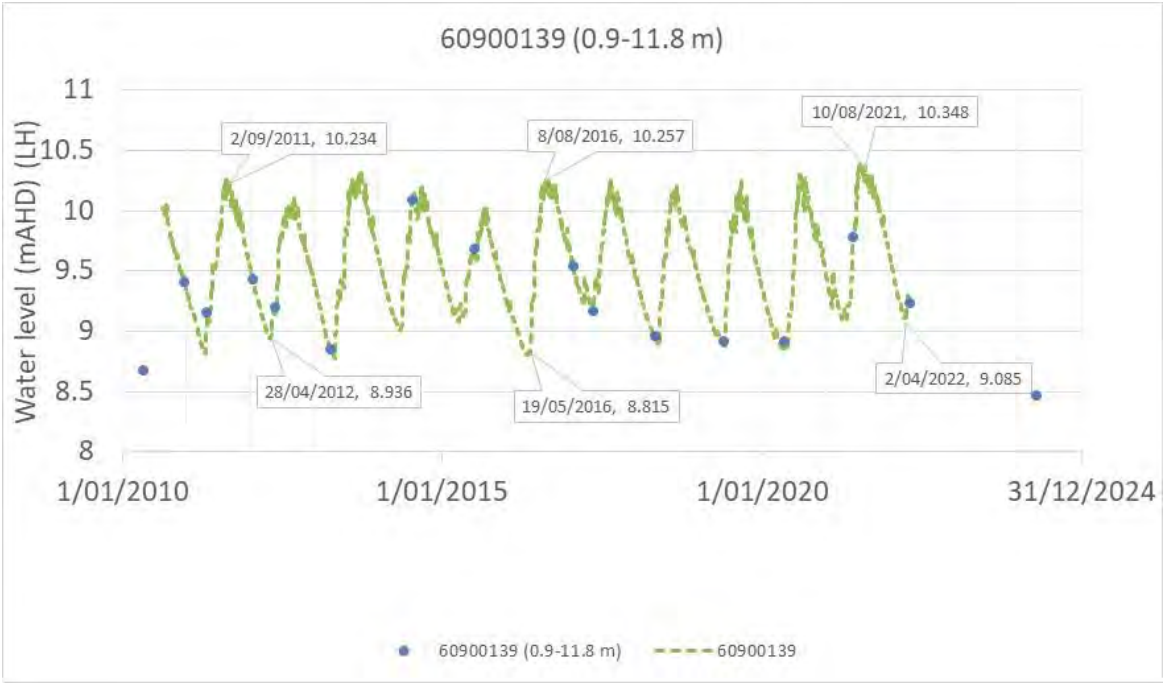
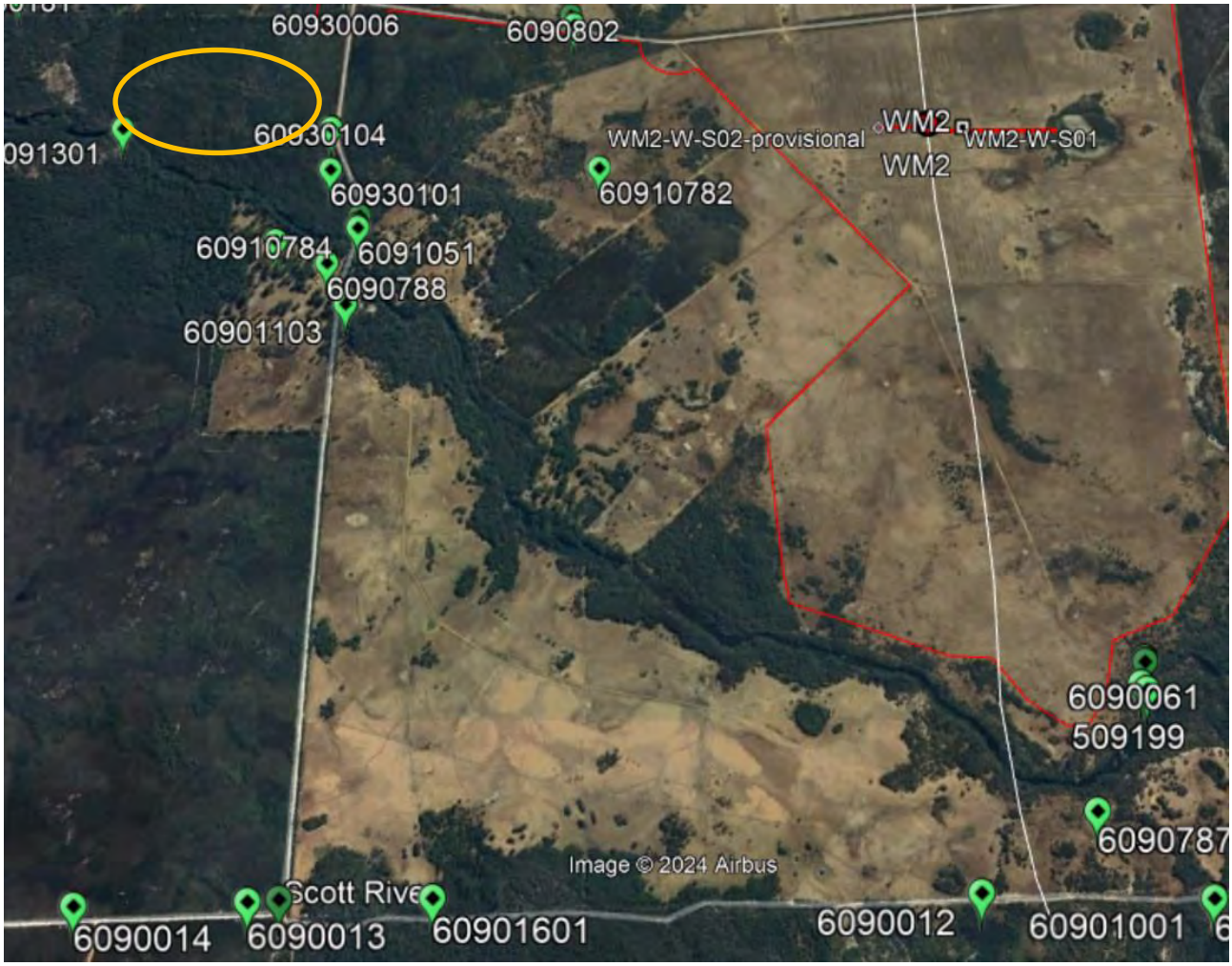


Figure F-3: Bore 60900139 Hydrograph (southwest of WM02)



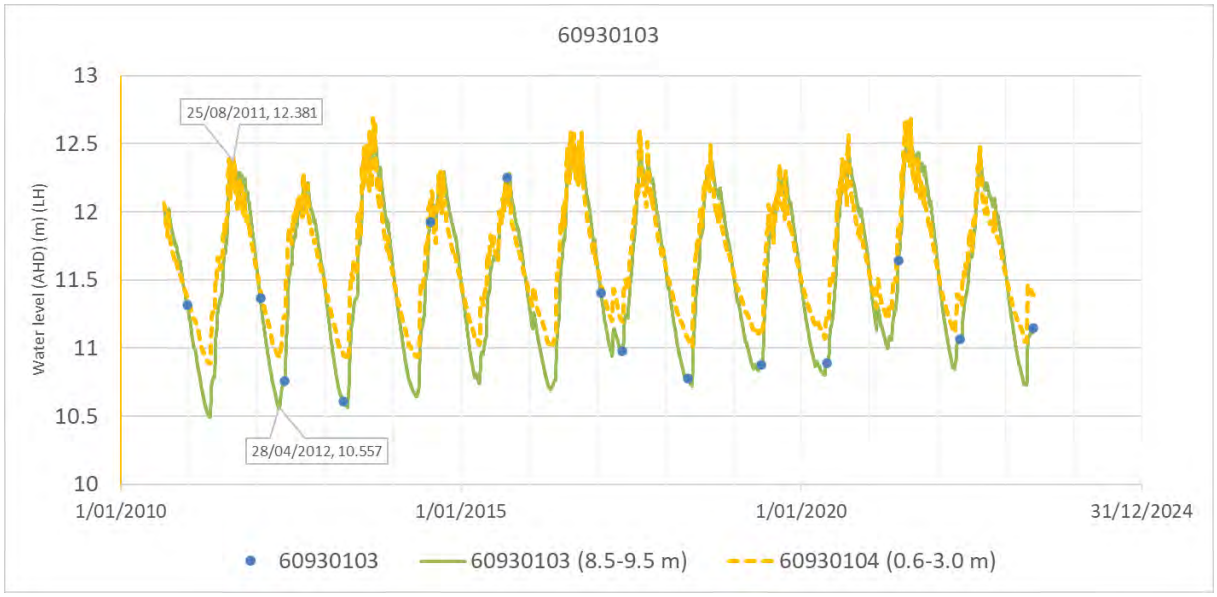


Figure F-4: Bores 60930103 & 60930104 Hydrographs (west of WM02)

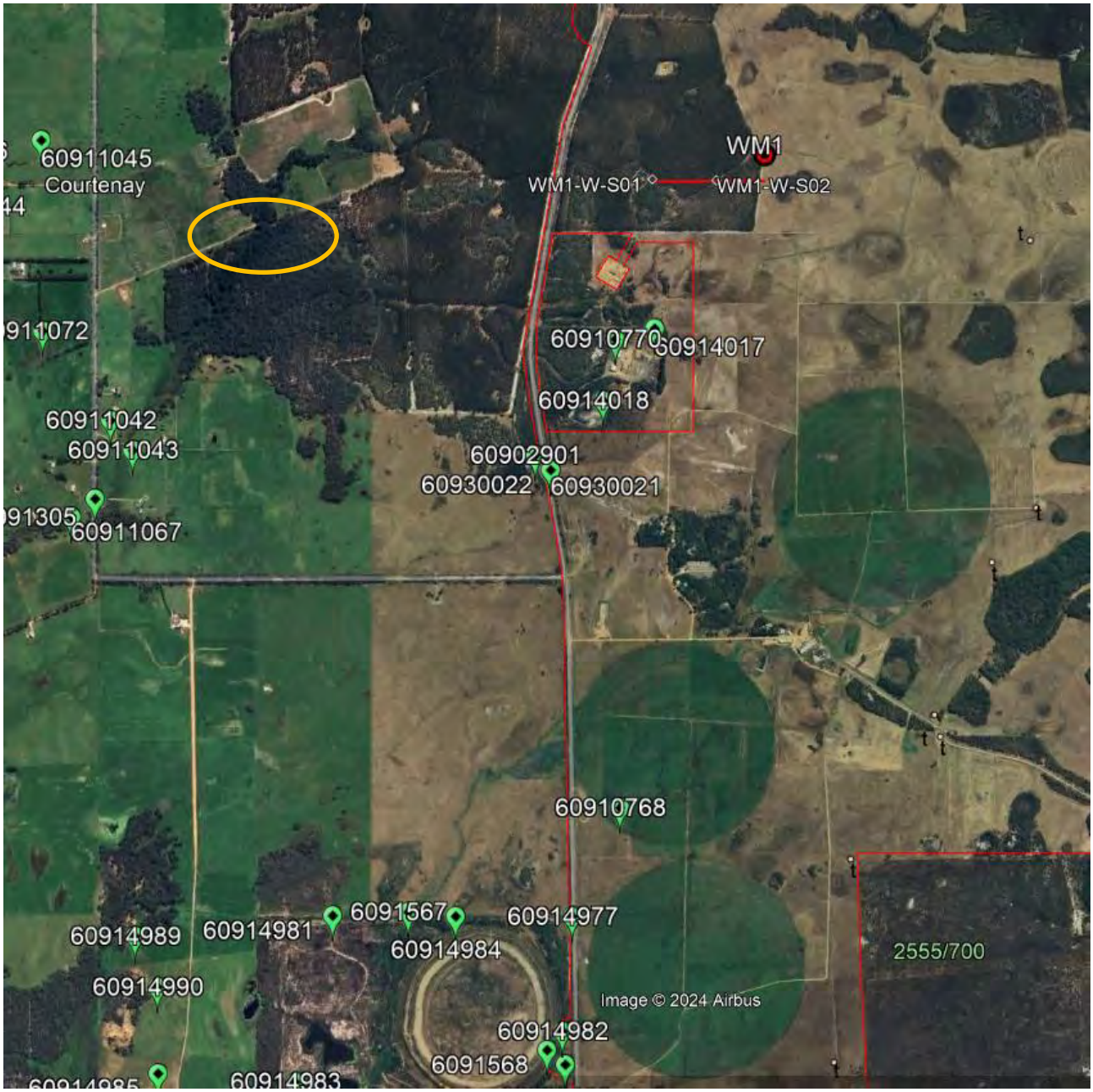

60911045
Courtenay
WM1
WM1-W-S01
WM1-W-S02
60910770
60914017
60914018
60911042
60911043
60902901
60930022
60930021
60911067
60910768
60914989
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Image © 2024 Airbus
60914982
6091568
60914983

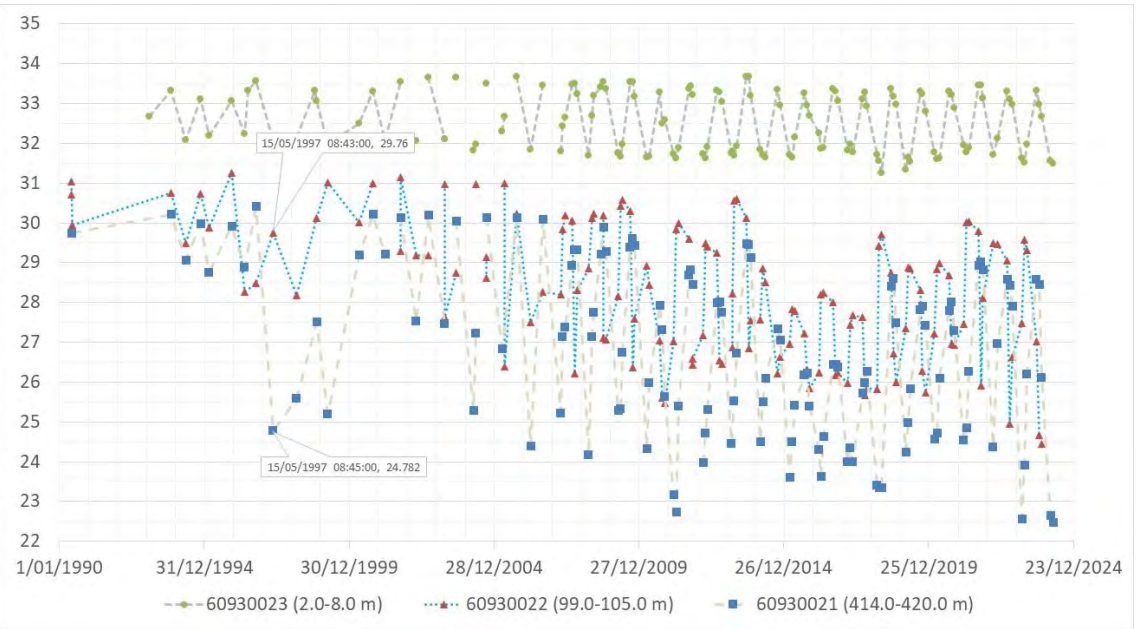


Figure F-5: Bore 60930021, 60930022, and 60930023 Hydrographs (west of WM01).

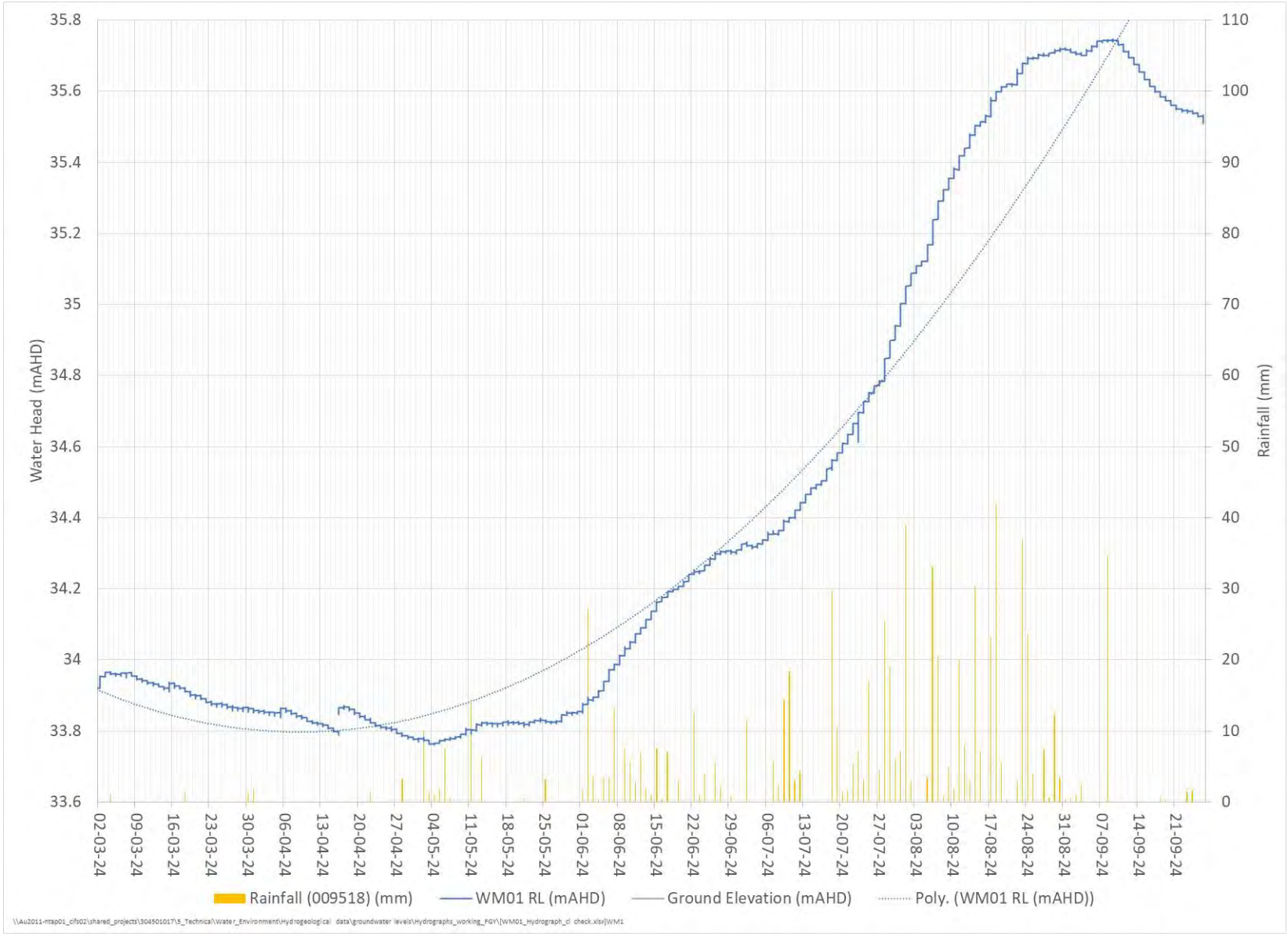


Figure F-6: Bore WM01 Hydrograph.

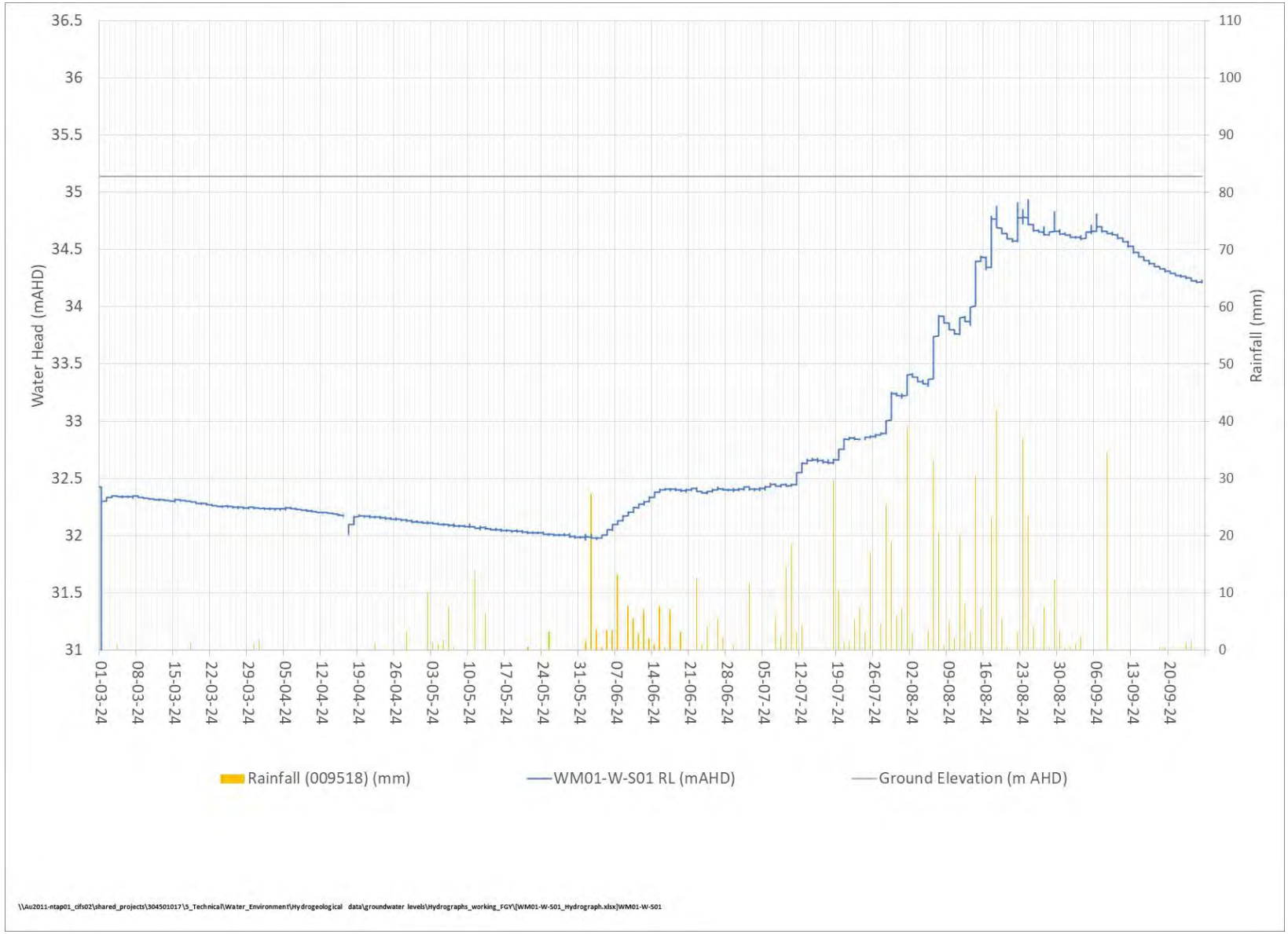


Figure F-7: Bore WM01-S01 Hydrograph

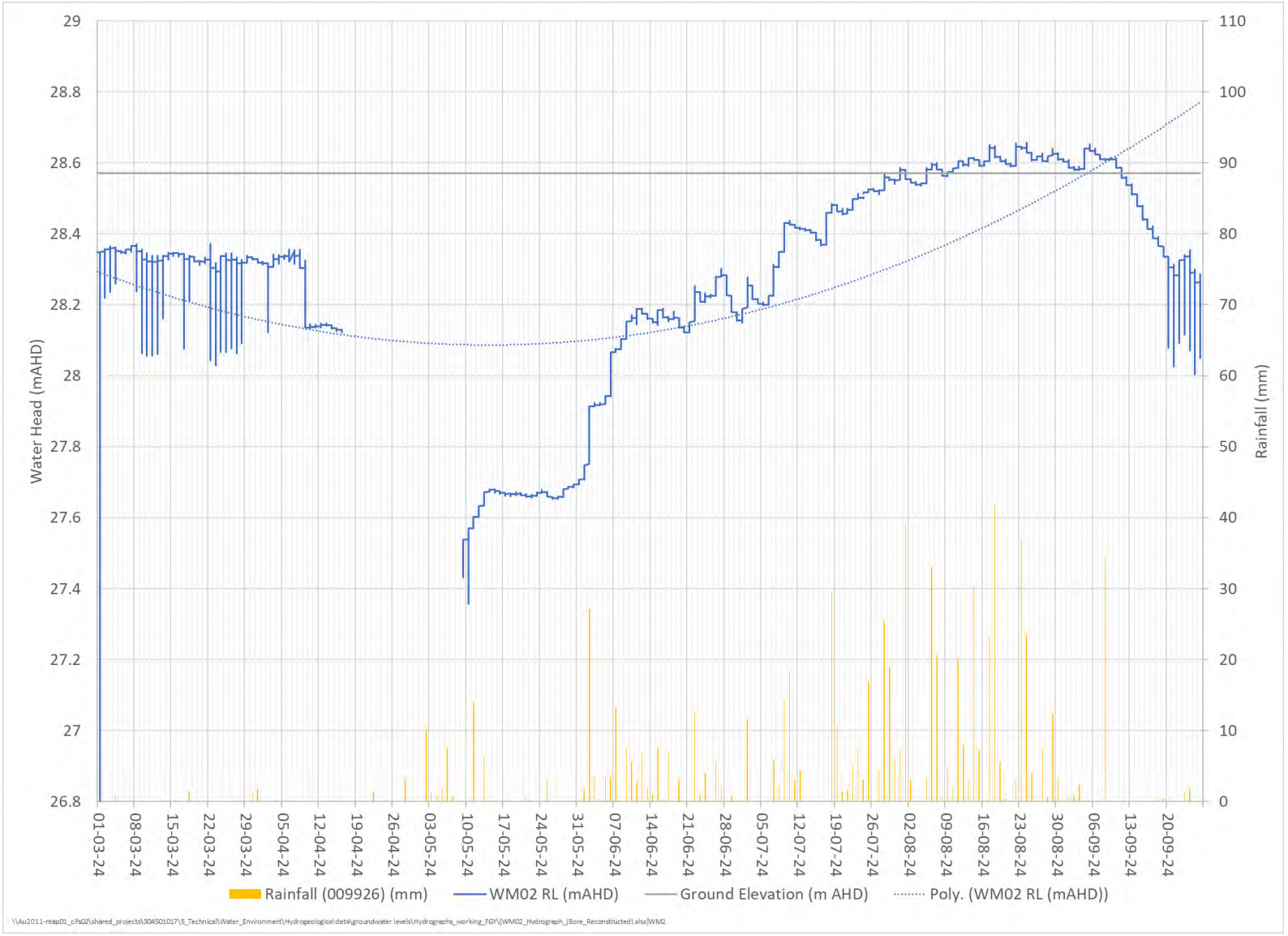


Figure F-8: Bore WM02 Hydrograph

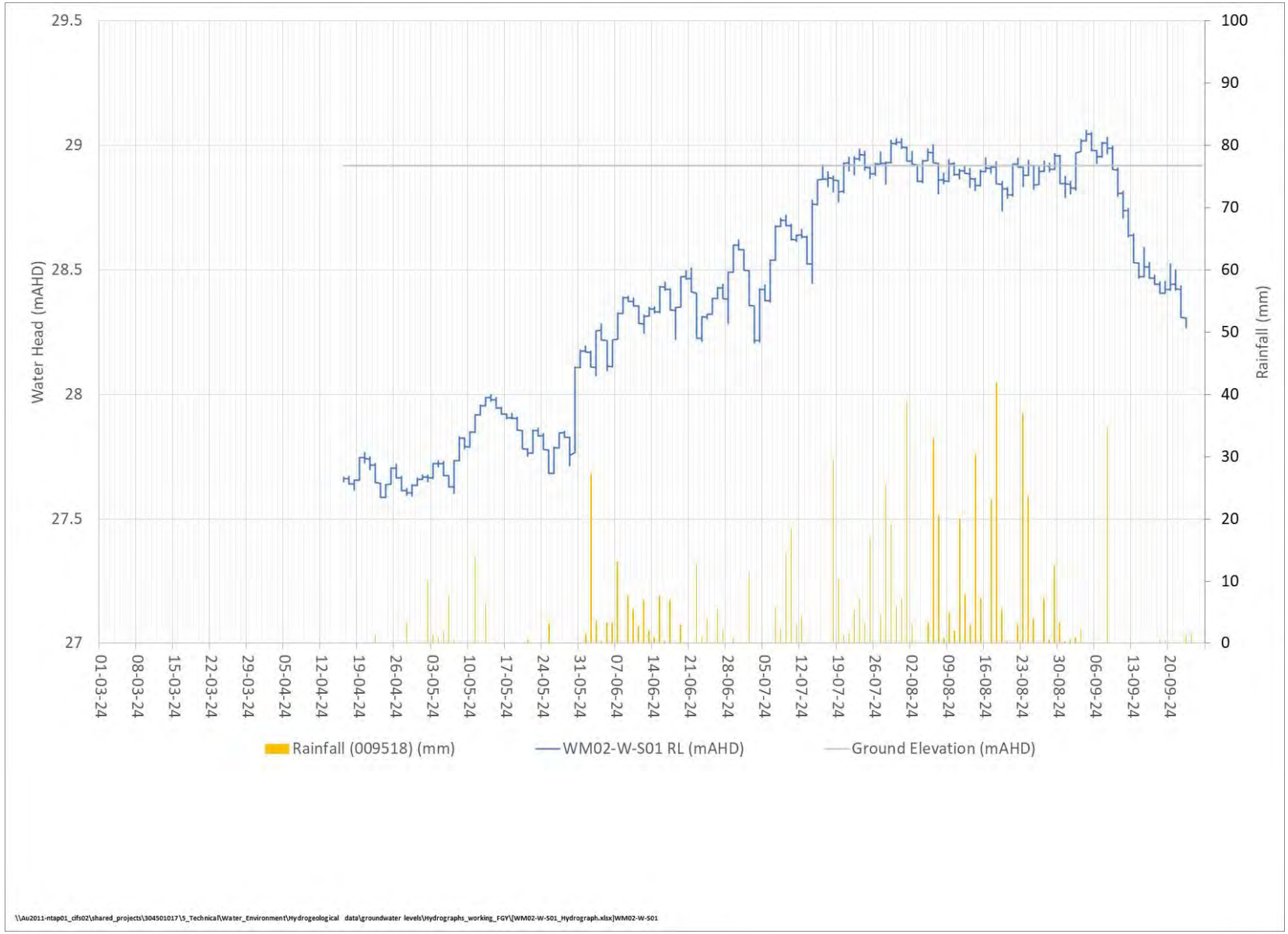


Figure F-9: Bore WM02-W-S01 Hydrograph

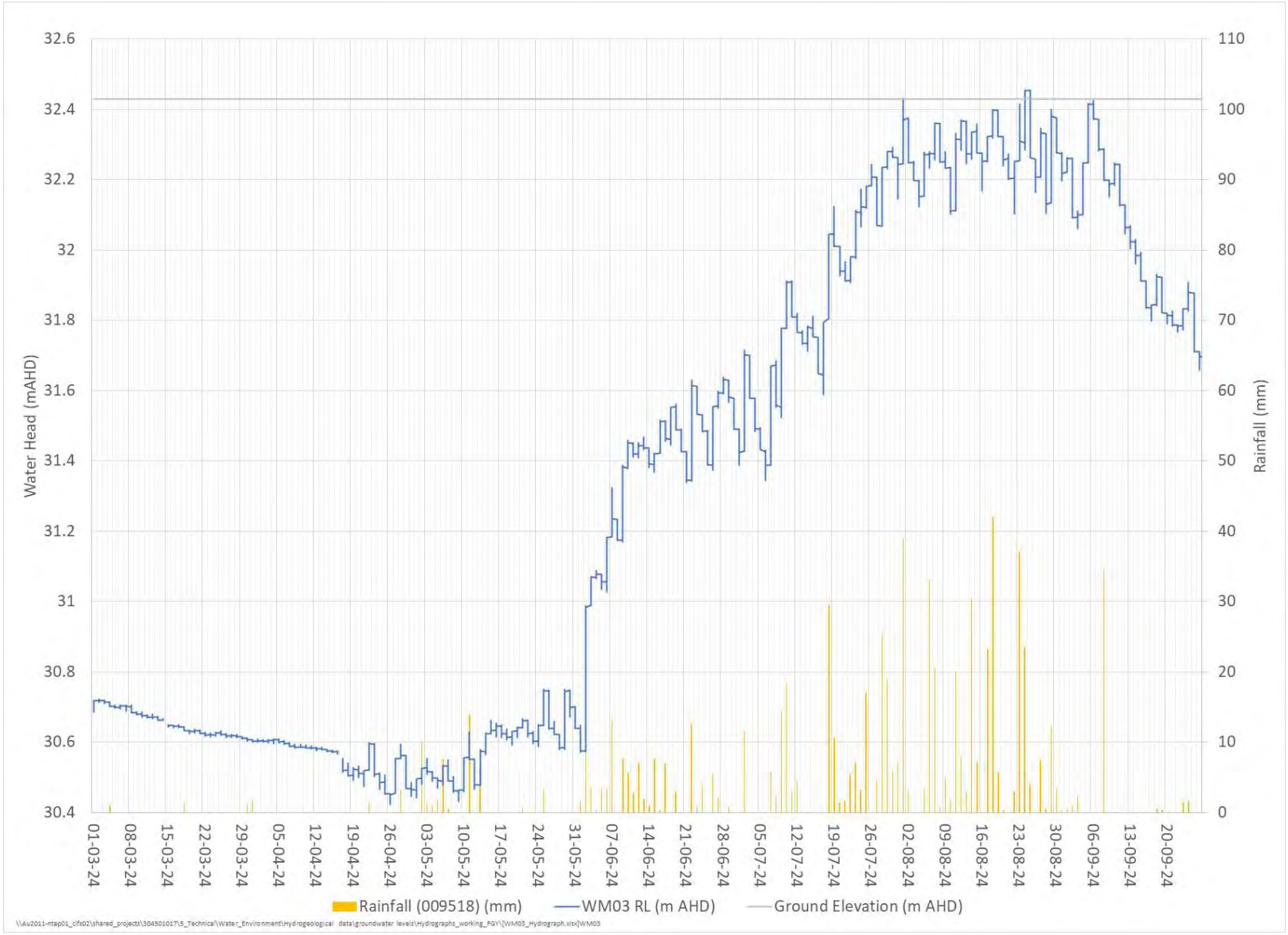


Figure F-10: Bore WM03 Hydrograph

Appendix F Hydrological Details

Table B-1: Sub-catchment E, H, and I outlet and ponding areas results.

Catchment E			Catchment H			Catchment I		
Maximum Depth (m)								
ID	50% AEP	1% AEP	ID	50% AEP	1% AEP	ID	50% AEP	1% AEP
E1	0.98	2.01	H1	0.11	0.36		-	-
E2	0.11	0.37		-	-		-	-
E3	0.20	0.63		-	-		-	-
Maximum Flow (m^3/s)								
E4	0.3	20.1	H2	0.2	1.9	I1	0.23	2.13
E5	0.3	20.6	H3	0.2	2.8		-	-

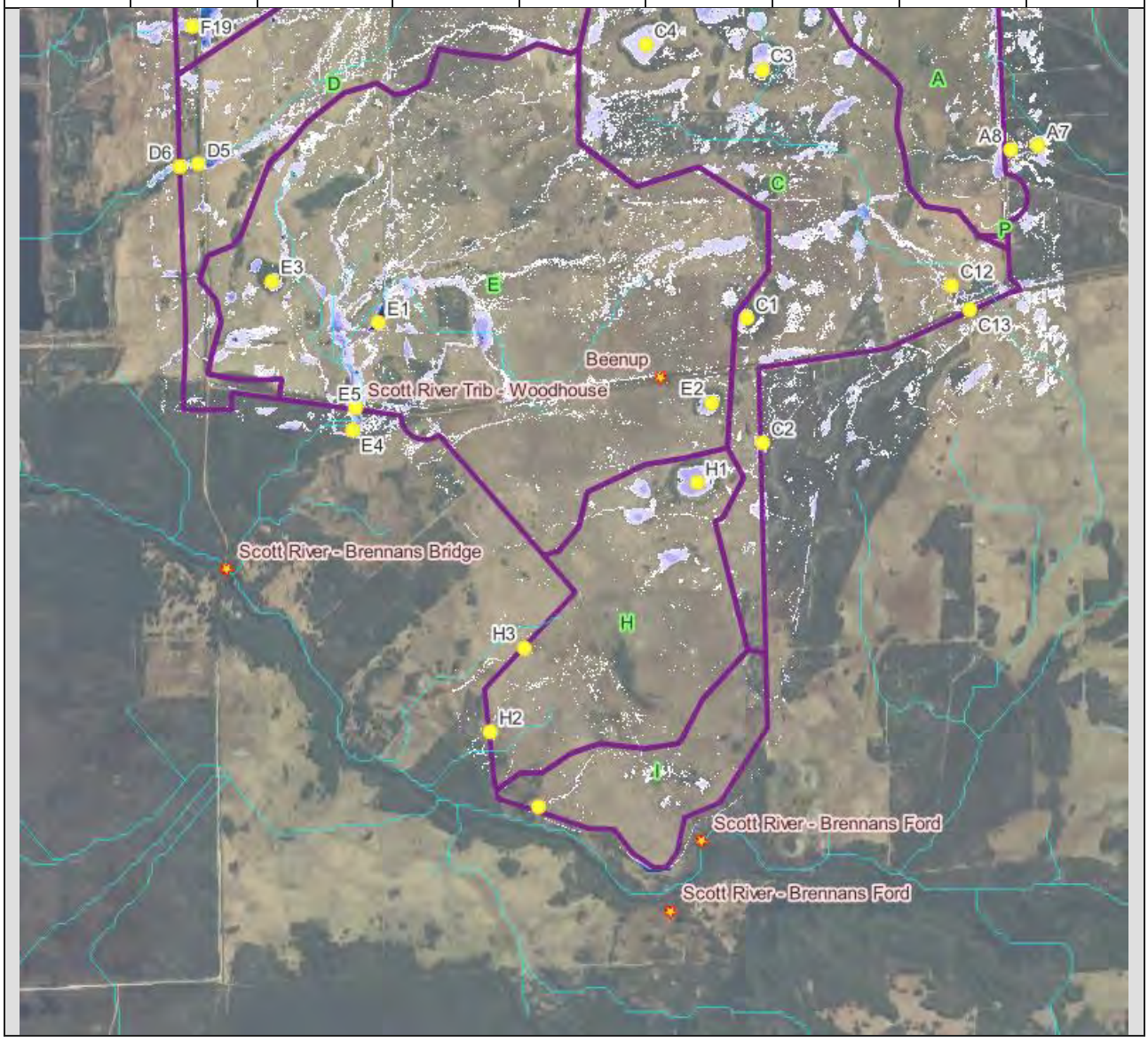


Table B-2: Sub-catchment A and C outlet and ponding areas results.

Catchment A			Catchment C		
		Maximum Depth (m)			
ID	50% AEP	1% AEP	ID	50% AEP	1% AEP
A1	0.13	0.65	C1		0.36
A2	0.07	0.15	C2	0.13	0.55
A3	0.11	0.76	C3	0.18	0.55
A4	0.20	0.54	C4	-	0.11
A5	0.18	0.59	C5	-	0.24
A6	0.10	0.20	C6	0.09	0.28
	-	-	C7	-	0.15
	-	-	C8	-	1.13
	-	-	C9	-	0.08
	-	-	C10	0.15	0.31
	-	-	C11	-	0.42
Maximum Flow (m^3/s)					
A7	0.20	4	C12	0.31	3.02
A8	0.28	3.65	C13	0.39	5.8
	0.46	7.96		-	-
	0.41	7.81		-	-

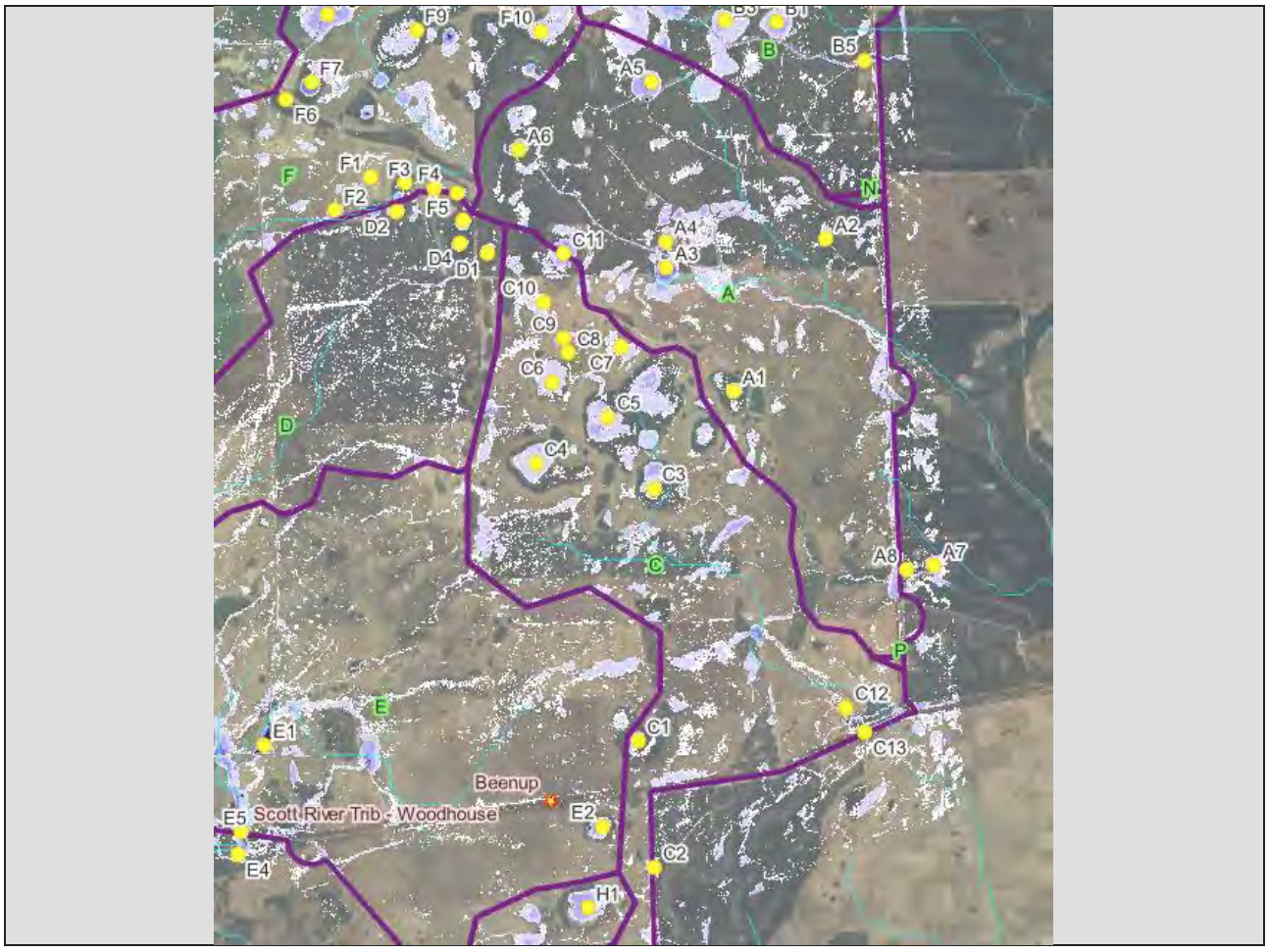

F9
F10
F7
F6
A5
B5
A6
F1
F3
F4
F2
F5
D2
D4
D1
C11
A4
A3
A2
C10
C9
C8
C7
C6
A1
C5
C4
C3
A8
A7
C12
C1
C13
E1
Beenup
E5
Scott River Trib - Woodhouse
E2
E4
C2
H1
F
B
N
A
D
C
P
E

Table B-3: Sub-catchment K, J and G outlet and ponding areas results.

Catchment K			Catchment J			Catchment G		
Maximum Depth (m)								
ID	50% AEP	1% AEP	ID	50% AEP	1% AEP	ID	50% AEP	1% AEP
K1	0.19	0.56		-	-	G1	-	0.95
K2	0.14	0.81		-	-	G2	0.064	0.34
K3	0.35	1.30		-	-		-	-
k4	0.09	1.12		-	-		-	-
K5	0.16	0.82		-	-		-	-
K6	0.46	2.82		-	-		-	-
K7	0.14	1.00		-	-		-	-
K8	0.27	1.89		-	-		-	-
K9	0.26	0.72		-	-		-	-
K10	0.30	0.70		-	-		-	-
K11	0.18	0.64		-	-		-	-
K12	0.24	0.62		-	-		-	-
K12	0.22	0.64		-	-		-	-
Maximum Flow (m^3/s)								
K14	0.11	1.59	J1	0.05	1.8	G3	0.06	0.8
	-	-		-	-	G4	0.38	11.6

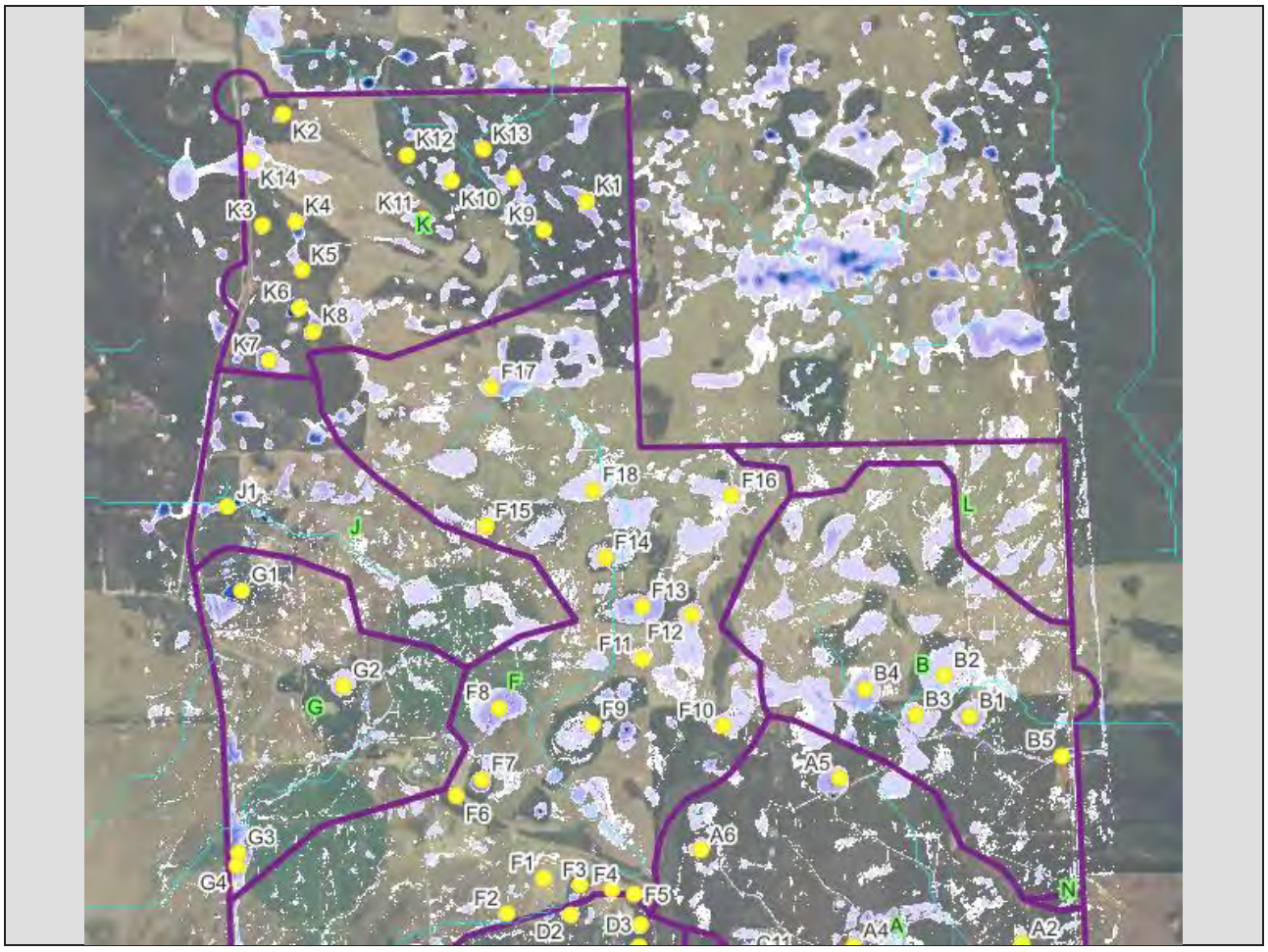
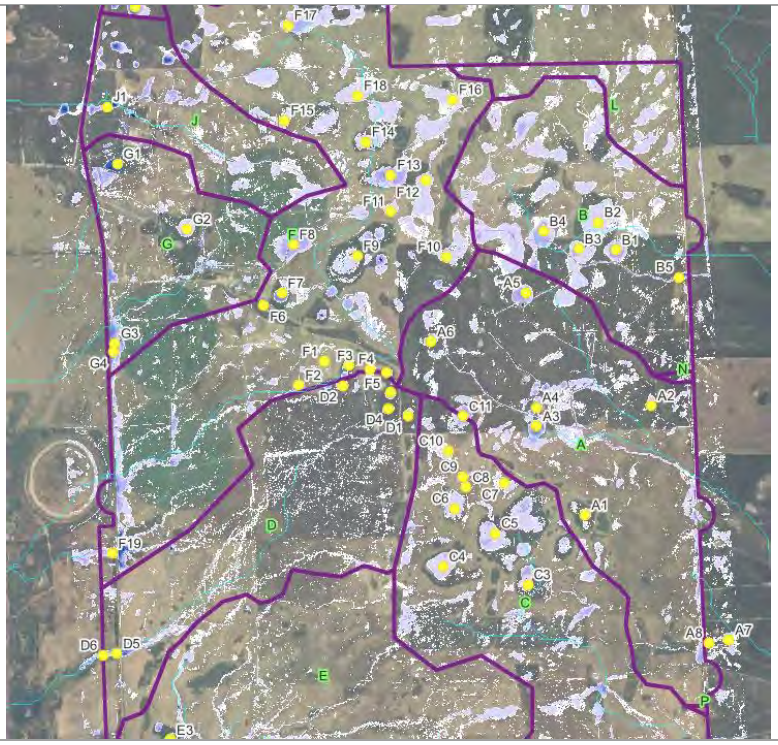
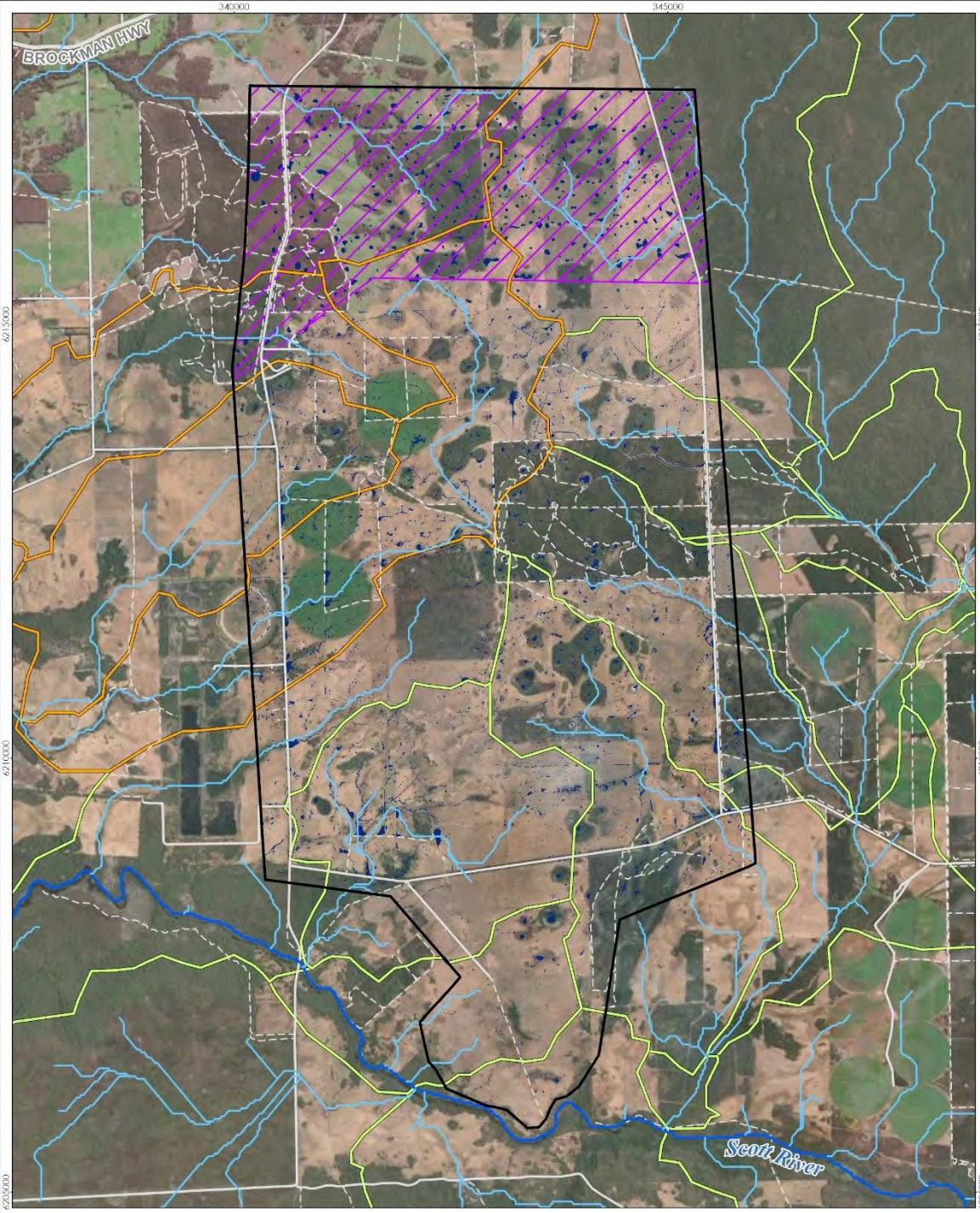

K2
K12
K13
K14
K1
K3
K4
K11
K10
K9
K
K5
K6
K8
K7
F17
F18
F16
J1
F15
J
L
F14
G1
F13
F12
F11
B4
B
B2
G2
F8
F
F9
F10
B3
B1
G
B5
A5
F7
F6
G3
A6
F1
F3
F4
G4
F5
N
F2
D2
D3
A4
A
A2

Table B-4: Sub-catchment B, F and D outlet and ponding areas results.

Catchment B			Catchment F			Catchment D		
Maximum Depth (m)								
ID	50% AEP	1% AEP	ID	50% AEP	1% AEP	ID	50% AEP	1% AEP
B1	-	0.35	F1	0.49	1.16	D1	0.18	0.26
B2	-	0.30	F2	0.14	0.74	D2	0.13	0.60
B3	-	0.48	F3	0.08	0.56	D3	0.17	0.54
B4	-	0.34	F4	0.07	0.18	D4	0.03	0.26
	-	-	F5	0.06	0.29		-	-
	-	-	F6	0.17	0.68		-	-
	-	-	F7	-	0.62		-	-
	-	-	F8	0.11	0.53		-	-
	-	-	F9	0.04	0.21		-	-
	-	-	F10	0.20	0.45		-	-
	-	-	F11	-	0.17		-	-
	-	-	F12	0.35	0.56		-	-
	-	-	F13	-	0.33		-	-
	-	-	F14	0.06	0.31		-	-
	-	-	F15	0.14	0.32		-	-
	-	-	F16	0.07	0.18		-	-
	-	-	F17	0.16	0.32		-	-
	-	-	F118	0.19	0.57		-	-
Maximum Flow (m3/s)								
B5	0.12	1.99	F19	0.02	11.87	D5	0.21	7.57
	-	-		-	-		0.21	7.89


F17
F18
F16
J1
F15
J
L
F14
G1
F13
F12
F11
G2
B4
B
B2
F
F8
B3
B1
G
F9
F10
B5
F7
A5
F6
A6
G3
F1
F3
F4
G4
F2
F5
N
D2
A4
A2
C11
D4
D1
A3
C10
A
C9
C8
C7
C6
A1
D
C5
F19
C4
C3
C
A8
A7
D6
D5
E
P
E3

Appendix G Flood Result Figures



50% AEP Maximum Velocity

Proposed Scott River Wind Farm

Client: SynergyRED
Project Code: 304501017

Drawn: FW, Reviewed: SV, JP
Date: 07-11-2024

Stantec

Model Extent

Catchment Plan

- Scott River
- Blackwood River
- Low DEM Confidence
- River
- Tributary
- Major Road
- Minor
- Track

Maximum Velocity (m/s)

- <0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 3.0

Notes:

1. Map displayed in GDA2020 MGA Zone 50
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2024).
3. Background: Earthstar Geographics

0 750 1,500 m

Scale at A4: 1:60,000

N



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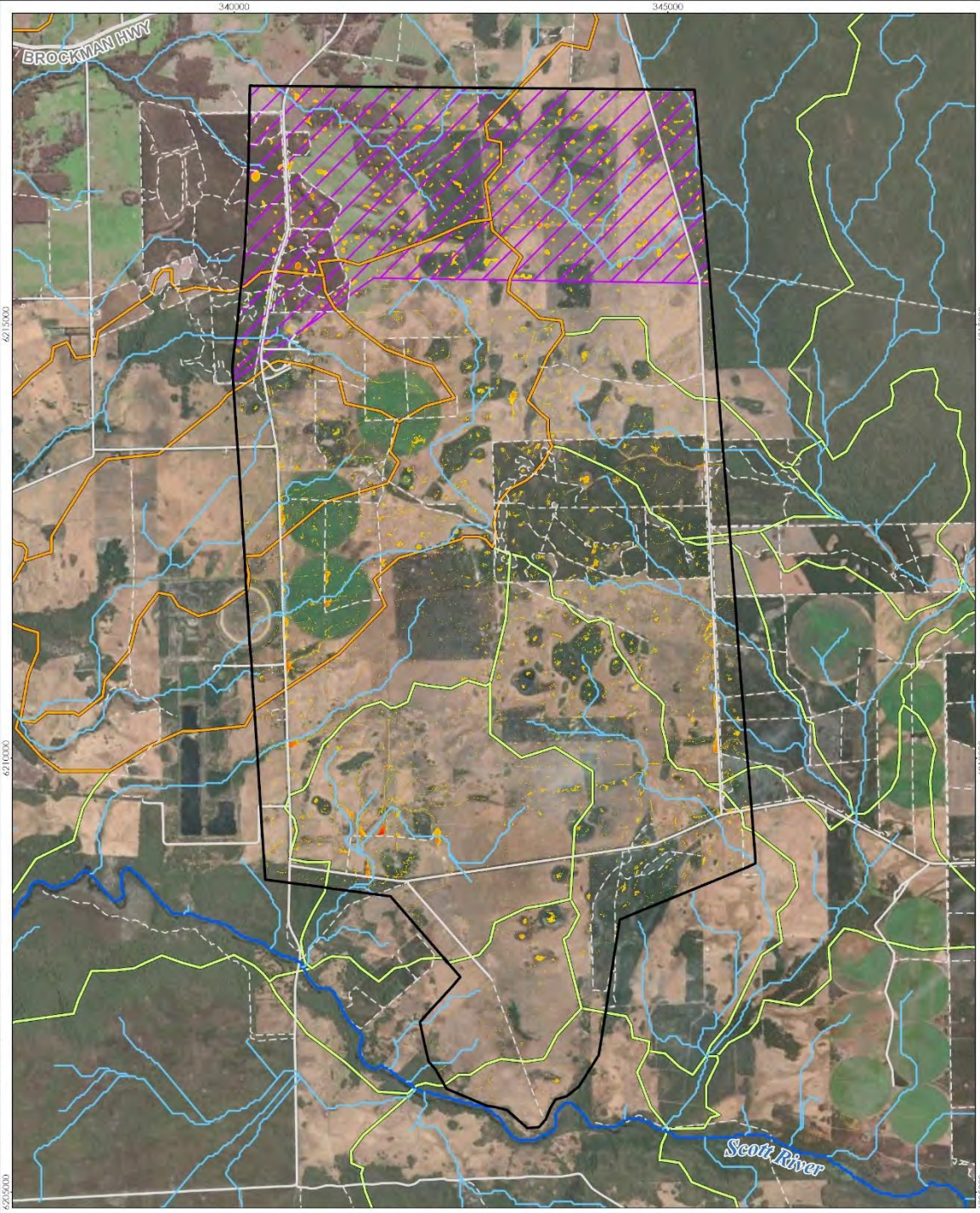

50% AEP Maximum Depth

Proposed Scott River Wind Farm

Client: SynergyRED
Project Code: 304501017
Drawn: FW, Reviewed: SV, JP
Date: 07-11-2024

Stantec

Model Extent

Catchment Plan

- Scott River
- Blackwood River
- Low DEM Confidence
- River
- Tributary
- Major Road
- Minor
- Track

Maximum Depth (m)

- 0.0 - 0.03
- 0.03 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5
- 0.5 - 0.7
- 0.7 - 1.0
- 1.0 - 1.5
- >1.5

Notes:
1. Map displayed in GDA2020 MGA Zone 50
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2024).
3. Background: Earthstar Geographics

0 750 1,500 m
Scale at A4: 1:60,000



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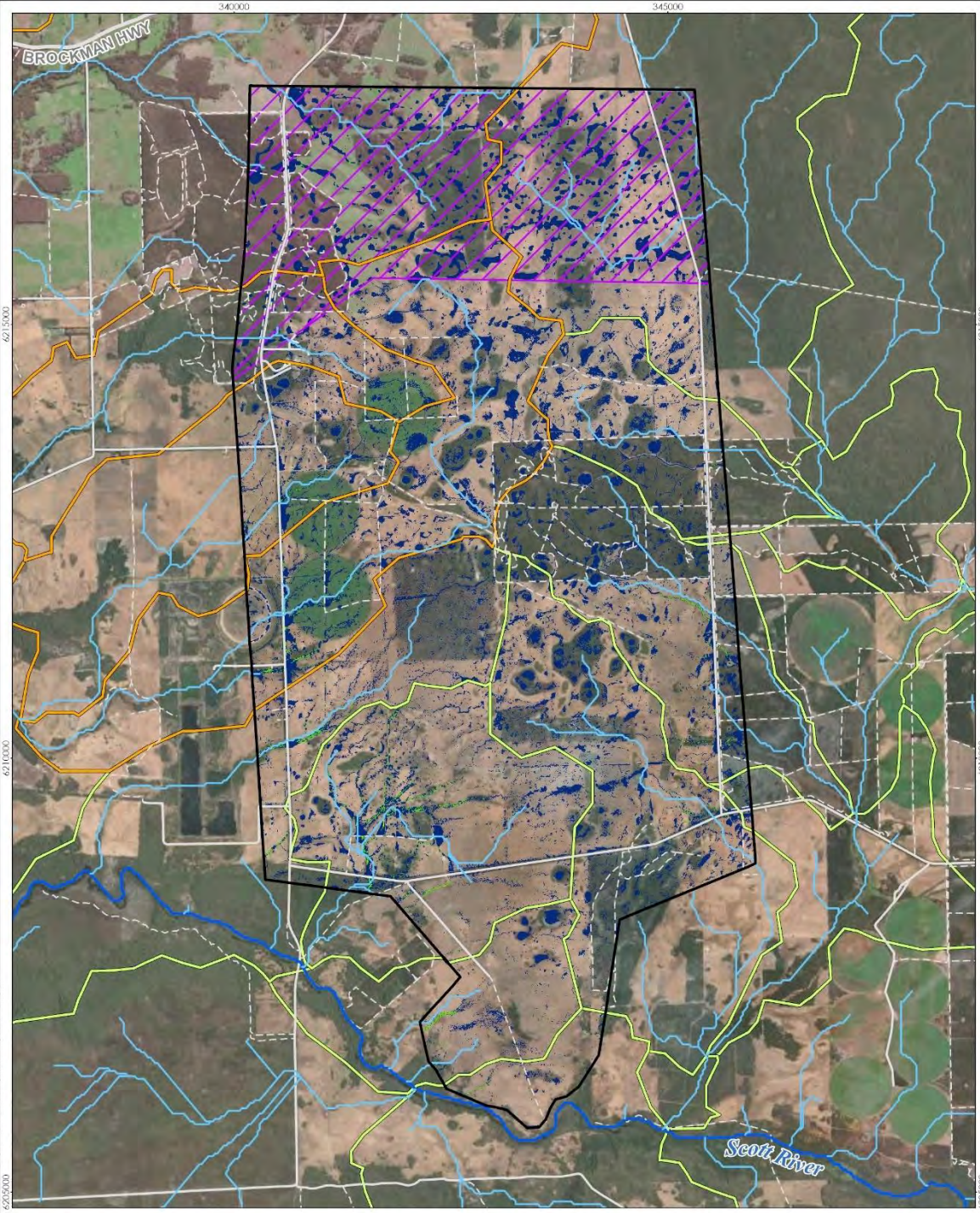

10% AEP Maximum Velocity

Proposed Scott River Wind Farm

Client: SynergyRED
Project Code: 304501017

Drawn: FW, Reviewed: SV, JP
Date: 07-11-2024

Stantec

Model Extent

Catchment Plan

- Scott River
- Blackwood River
- Low DEM Confidence
- River
- Tributary
- Major Road
- Minor
- Track

Maximum Velocity (m/s)

- <0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 3.0

Notes:

1. Map displayed in GDA2020 MGA Zone 50
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2024).
3. Background: Earthstar Geographics

0 750 1,500 m

Scale at A4: 1:60,000

N



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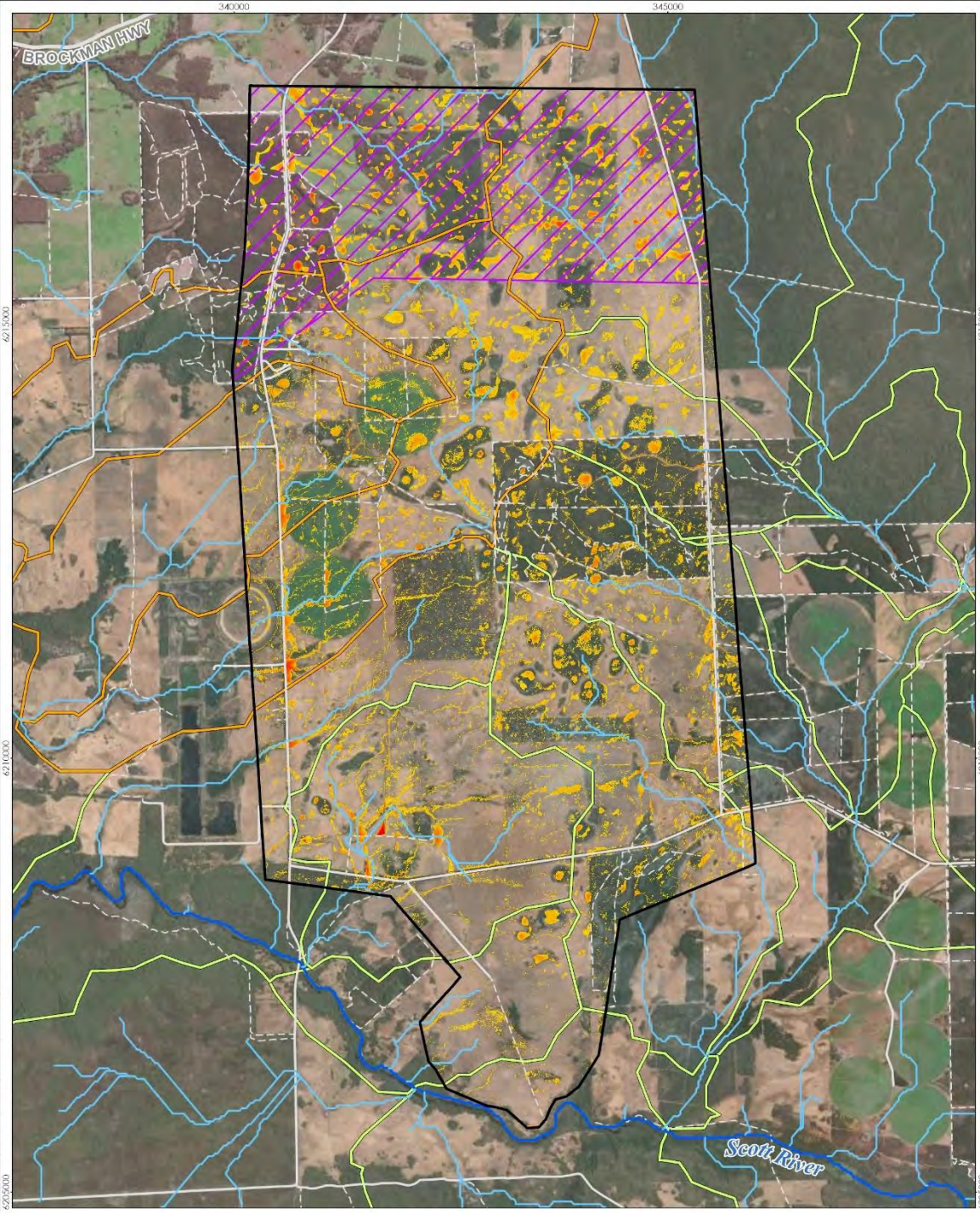

10% AEP Maximum Depth

Proposed Scott River Wind Farm

Client: SynergyRED
Project Code: 304501017

Drawn: FW, Reviewed: SV, JP
Date: 07-11-2024

Stantec

Model Extent

Catchment Plan

- Scott River
- Blackwood River
- Low DEM Confidence
- River
- Tributary
- Major Road
- Minor
- Track

Maximum Depth (m)

- 0.0 - 0.03
- 0.03 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5
- 0.5 - 0.7
- 0.7 - 1.0
- 1.0 - 1.5
- >1.5

Notes:
1. Map displayed in GDA2020 MGA Zone 50
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2024).
3. Background: Earthstar Geographics

0 750 1,500 m
Scale at A4: 1:60,000



Path: R:\gis\projects\beenup\mapdocs\304501017.aprx | Modelling | Revised: 2024-11-07 By: fewalker

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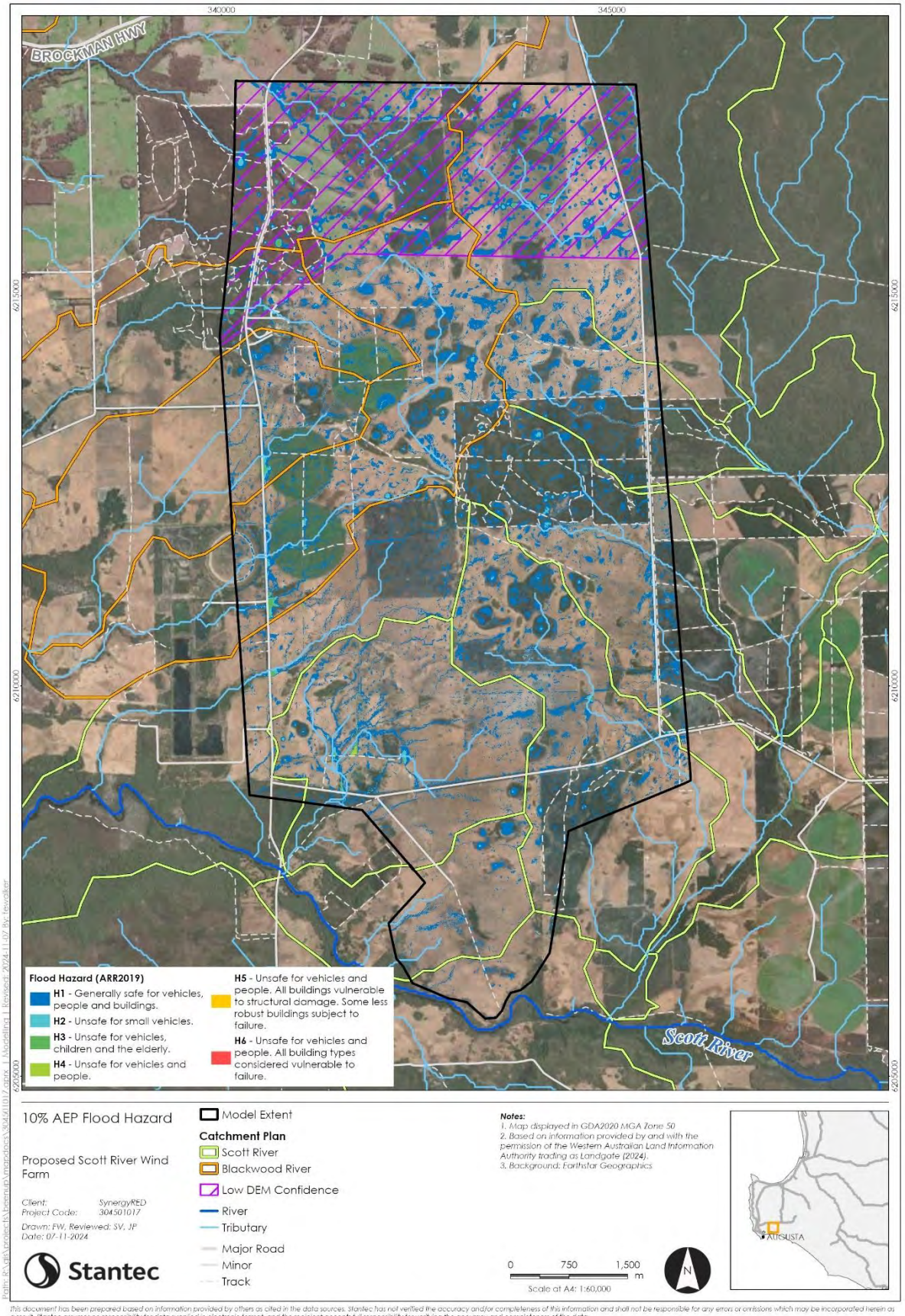

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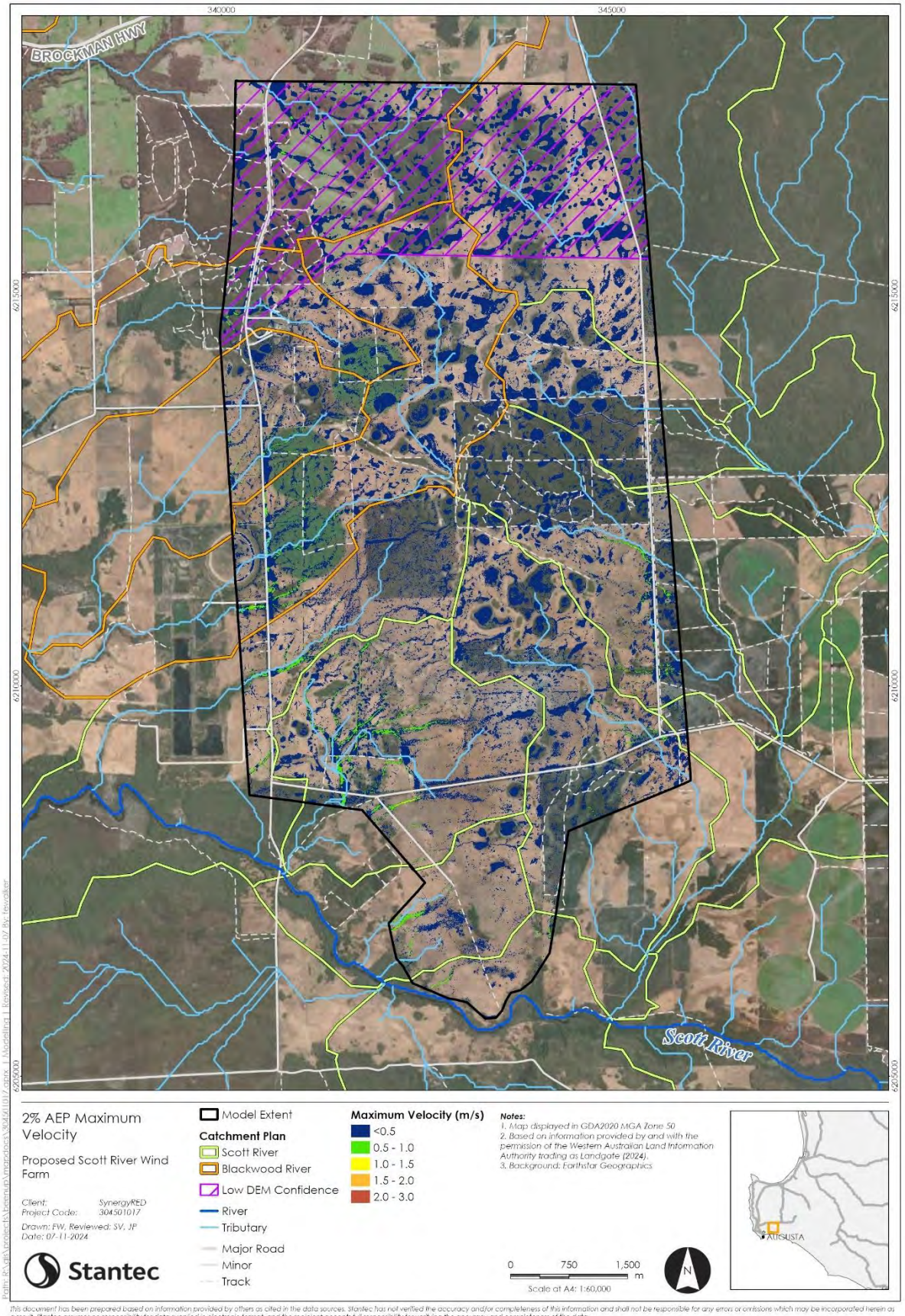

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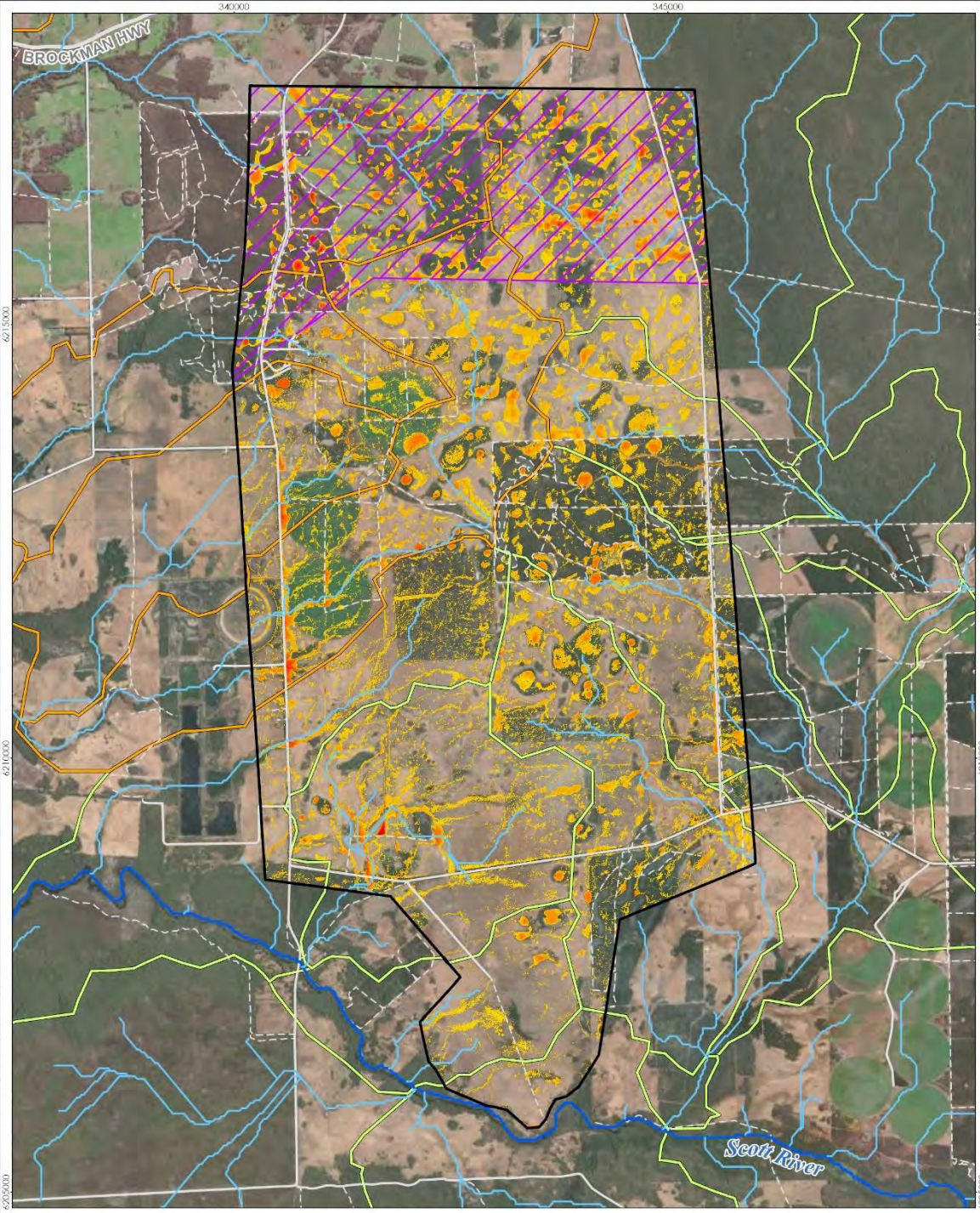

2% AEP Maximum Depth

Proposed Scott River Wind Farm

Client: SynergyRED
Project Code: 304501017

Drawn: FW, Reviewed: SV, JP
Date: 07-11-2024

Stantec

Model Extent

Catchment Plan

- Scott River
- Blackwood River
- Low DEM Confidence
- River
- Tributary
- Major Road
- Minor
- Track

Maximum Depth (m)

- 0.0 - 0.03
- 0.03 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5
- 0.5 - 0.7
- 0.7 - 1.0
- 1.0 - 1.5
- >1.5

Notes:
1. Map displayed in GDA2020 MGA Zone 50
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2024).
3. Background: Earthstar Geographics

0 750 1,500 m
Scale at A4: 1:60,000



Path: R:\gis\projects\beenup\mapdocs\304501017.aprx | Modelling | Revised: 2024-11-07 By: fewalker

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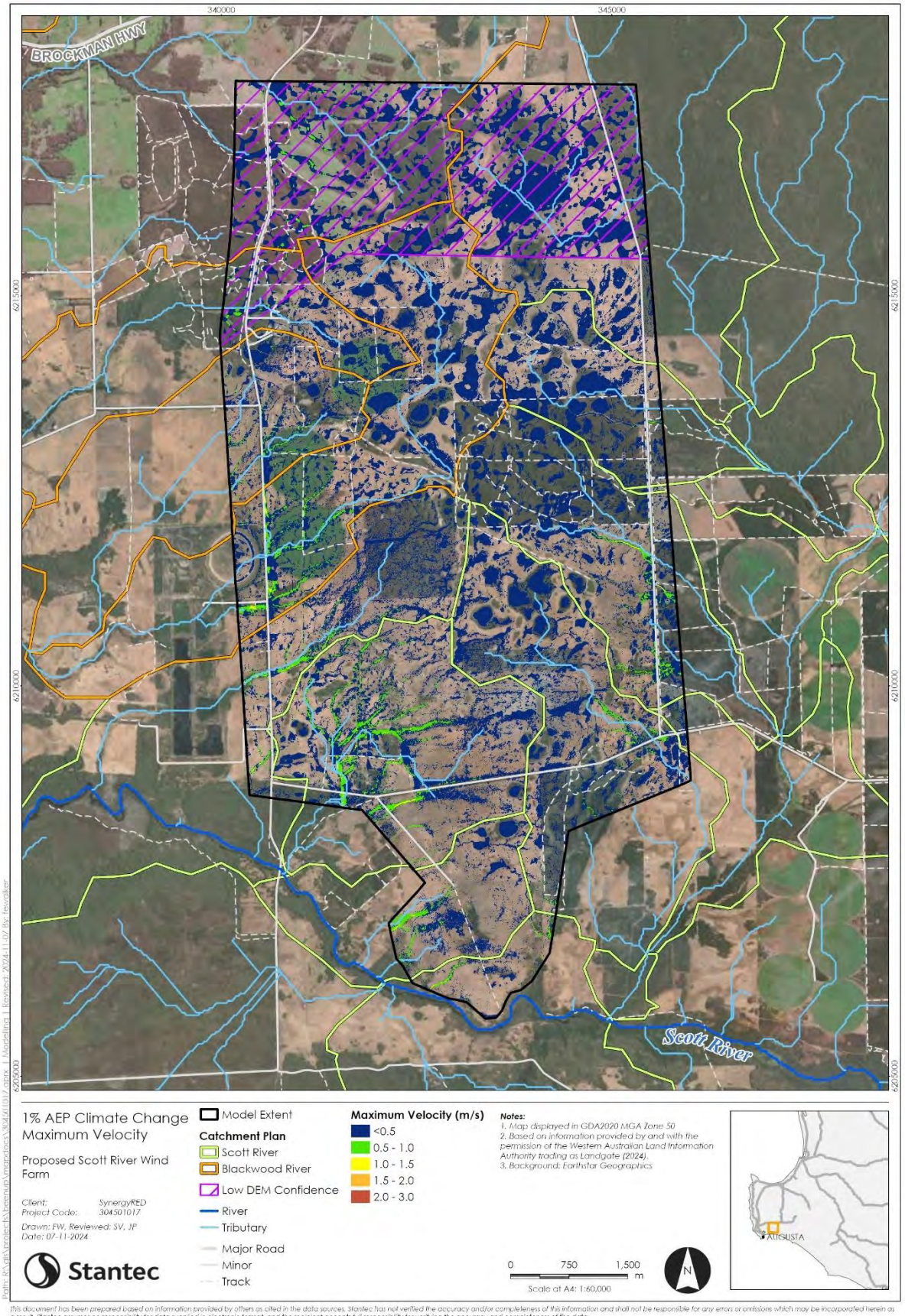

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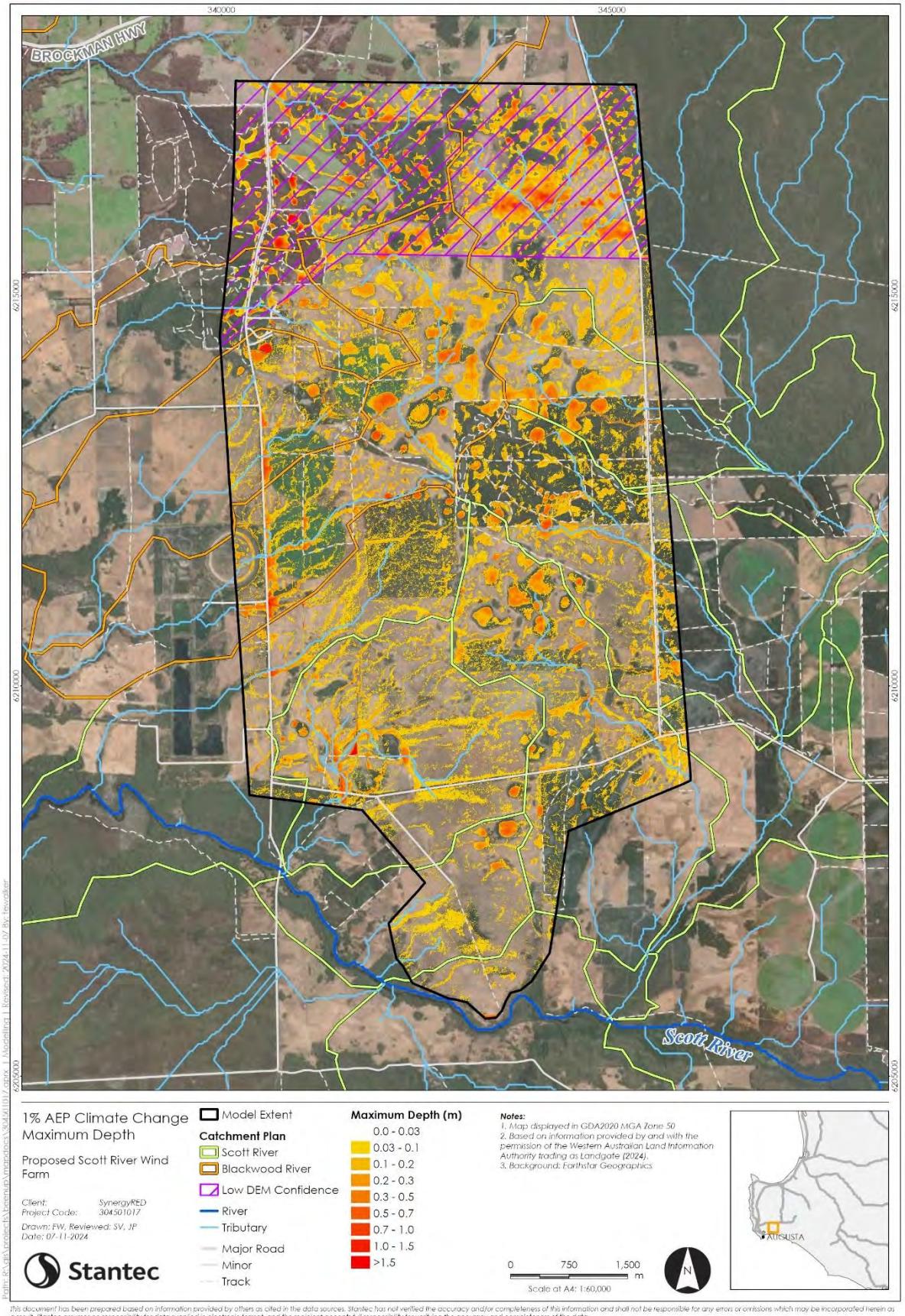

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Appendix H Hydrogeology Model Inputs and Outputs

Should

5) Cooper Jacob (Time-variant unconfined aquifer)

(Based on Theis equation)

$$Q = \frac{4\pi Ts}{2.3\log\left(\frac{2.25Tt}{r^2 S}\right)}$$

$$s_c = \left(1 - \frac{s_a}{2b}\right)s_a$$

$$u = \frac{r^2 S}{4Tt}$$

Essential input
Optional input
Calculated

For assessing drawdown, s, at a distance, r, from a pumping well and a time, t

		expected		min	max	
Transmissivity of aquifer	T	400	m^2/d			m^2/d
Time from start of abstraction	t	5	d			
Storage coefficient	S	0.2				
To find Q if s is known						
Height of water table at radius of influence	H	20	m			m
Height of water table at radius r	h	12.6	m			m
Measured drawdown = (H-h_r)	s_a	7.4	m	7.4	7.4	m
Original saturated thickness of aquifer	b	20	m			
Corrected drawdown	s_c	6.0	m	6.0	6.0	m
Distance from centre of well at r	r	13.82	m			
Use well function to determine if equation is valid	u	0.00477		0.00477	0.00477	
Is equation valid ?		Yes		Yes	Yes	
Total discharge from well	Q	6363.75	m^3/d	6363.75	6363.75	m^3/d

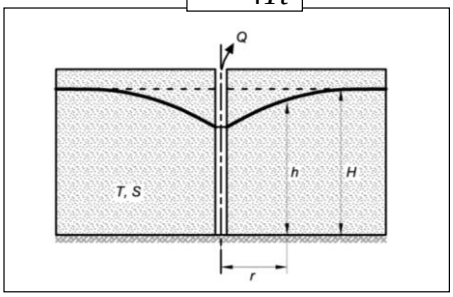
To find s if Q is known

$$s = \frac{2.3Q}{4\pi T}\log\frac{2.25Tt}{r^2 S}$$

Total discharge from well	Q	3491.92	m3/d
Distance from centre of well at r	r	90.00	m
Drawdown at distance r			
Calculated drawdown	s_c	0.7	m
Actual drawdown	s_a	0.7	m

Note: To check validity of this arrangement of equation, enter value for r in cell C19 as well

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	Assume water table at ground surface
Height of water table at radius r	h	Turbine/tower foundation 5 m deep, dewater to 6 m
Transmissivity of aquifer	T	K=10 m/d to 20 m/d (sand); b = 28 m
Time from start of abstraction	t	5 days to lower to target drawdown then 28 days of dew
Storage coefficient	S	Estimated based on SAND geology
Original saturated thickness of aquifer	b	8 m saturated thickness of dune sands in WM02
Distance from centre of well at r	r	r for drawdown extent at 2, 1, 0.5-m drawdown
Total discharge from well	Q	From total discharge from well (m3/d)



The following assumptions apply to this equation

- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the water removed from storage is discharged instantaneously with decline of head
- the diameter of the well is small, i.e. the storage in the well can be ignored
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer

(from Kruseman & de Ridder, 1994)

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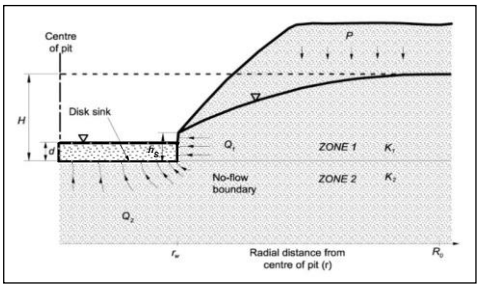
Radius of Influence Calculation for Transmission Towers and Central \ Southern Turbines

19) Radius of influence (Niccoli et al, 1998) - Method to estimate radius of influence if other parameters can be estimated with reasonable accuracy

$$H = \sqrt{h_s^2 + \frac{P}{K_{h1}}\left[R_0^2 \ln\left(\frac{R_0}{r_w}\right) - \frac{R_0^2 - r_w^2}{2}\right]}$$

Essential input
Optional input
Calculated

Height of water table at radius of influence	H	6.1	m	6.1	6.1 m
Saturated thickness to seepage face	h_s	0.1	m	0.1	0.1 m
Drawdown = (H-h_p)	s	6	m	6	6 m
Layer 1 horizontal hydraulic conductivity	K_{h1}	20	m/d	0.1	100 m/d
Recharge	P	0.00079	m/d	0.00079	0.00079 m/d
Radius of quarry	r_w	13.82	m		
Effective radius	R_0	545.06		65.94	1102.63



The following assumptions apply to this equation
- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- the static water table is horizontal
- groundwater flow is horizontal
- groundwater flow to the pit is axially symmetric

(Niccoli et al, 1998)

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Saturated thickness to seepage face	h_s	Nominal 0.1 m high face in excavation
Layer 1 horizontal hydraulic conductivity	K_{h1}	SAND: 10 m/d assumed.
Recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Me
Radius of quarry	r_w	20 m by 20 m excavation ~5 m deep for 6-m dewatered

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Steady-state Inflow Modelling (Marinelli and Niccoli Model) for Transmission Towers and Central \ Southern Turbines

20) Flow to a pit (Marinelli and Niccoli, 1998)

$$Q_1 = P\pi\left(R_0^{\,2} - r_w^{\,2}\right)$$

$$Q_2 = A\left(\frac{K_{h2}}{m_2}\right) r_w (H - d)$$

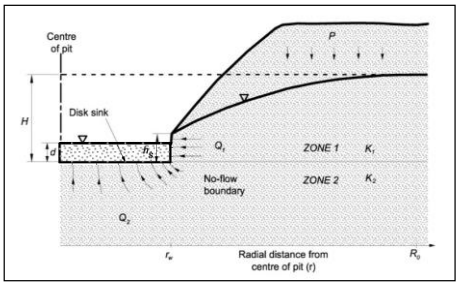
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

Essential input
Optional input
Calculated

Flow into a pit using separate solutions for the sides and the base.

(Follow on from ROI spreadsheet 19. To find Radius of influence for this procedure)

		expected		min	max	
Head						
Height of wt at radius of influence	H	6.1	m	6.1	6.1	m
Depth of Ponded Area	d	0.1	m	0.1	0.1	m
Layer 2						
Horizontal Conductivity	K_{h2}	2.31E-04	m/s	2.31E-06	2.31E-03	m/s
		2.0E+01	m/d	0.2	200	m/d
Vertical Conductivity	K_{v2}	1.16E-04	m/s	1.16E-06	1.16E-03	m/s
Anistropy	m_2	1.4		0.0	44.7	
Distributed recharge	P	9.13E-09	m/s	9.13E-09	9.13E-09	m/s
		7.9E-04	m^3/d	0.00079	0.0007887	m/d
Radius of quarry	r_w	13.8	m			
Radius of influence	R_o	545.1	m	65.94	1102.63	m
Can be taken from ROI worksheet or other sources						
Inflow						
Inflow through Seepage Face	Q_1	8.51E-03	m^3/s	1.19E-04	3.49E-02	m^3/s
		(735.7	m^3/d	10.301	3012.013	m^3/d
Inflow through Mine base	Q_2	5.43E-02	m^3/s	1.72E-05	1.72E+01	m^3/s
		(4690.6	m^3/d	1.5	1483292.9	m^3/d
Total Inflow	**Qt**	**0.063**	**m^3/s**	0.000	17.203	m^3/s
		(5426.3	m^3/d	11.8	1486304.9	m^3/d



The following assumptions apply to this equation

- There is no groundwater flow between zones 1 and 2

Zone 1

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- initial static water table and groundwater flow are both horizontal
- groundwater flow to the pit is axially symmetric

Zone 2

- steady state flow to one side of a circular disk sink of constant and uniform drawdown
- hydraulic head is initially uniform throughout Zone 2.
- initial head is equal to the elevation of the initial water table in Zone 1
- disk sink has a constant hydraulic head equal to the elevation of the pit lake water surface
- flow to the disk sink is three-dimensional and axially symmetric
- materials are anisotropic, prinicipal directions for K are horizontal and vertical

(Marinelli & Niccoli, 1998)

Data sources (to complete an audit trail)		
Height of wt at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Depth of Ponded Area	d	Nominal 0.1 m high face in excavation
Layer 2 Horizontal Conductivity	K_{h2}	SAND: 20 m/d from PSD hydrosieve Excel file.
Layer 2 Vertical Conductivity	K_{v2}	SAND: 10 m/d assumed.
Distributed recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Mean 959.6 mm
Radius of quarry	r_w	20 m by 30 m excavation ~5 m deep for 6-m dewatered
Radius of influence	R_o	From cell content at: 19.Radius of influence N (UC)'!C20

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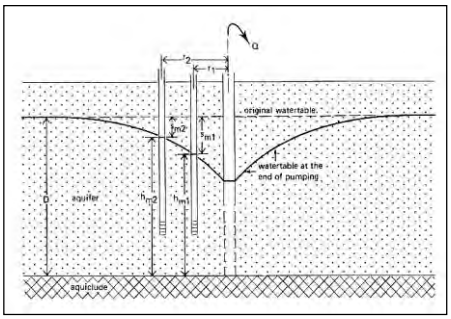
2) Dupuit-Thiem (Unconfined)

(also known as Dupuit-Forcheimer or Thiem-Dupuit)
Steady state flow to a well in an unconfined aquifer

$$Q = \Pi K \frac{(h_2^{\,2} - h_1^{\,2})}{2.3\log(\frac{r_2}{r_1})}$$

Essential input
Optional input
Calculated

		expected		min	max	
Height of water table at observation well 1	h_1	14	m			m
Distance to observation well 1	r_1	13.82	m			
Height of water table at observation well 2	h_2	20	m	28	32	m
Distance to observation well 2	r_2	545.06	m			
Hydraulic conductivity of aquifer	K	20	m/d			m/d
Total discharge from well	Q	3491.92	m^3/d	3491.92	########	m^3/d



(Figure taken from Kruseman & de Ridder, 1994)

To find the drawdown at a given radius

Discharge	Q	3491.92	m^3/d	$h_2 = \sqrt{\frac{2.3Q\log(r_2/r_1)}{\pi K} + h_1^{\,2}}$
Radius of interest	r_2	138	m	
WT height at radius of interest	h	18.0	m	
Drawdown at radius r	s_r	2.0	m	

To find the radius of a specific water level

Discharge	Q	3491.92	m^3/d	$r_2 = r_1 10\text{^}\left[\frac{\pi K(h_2^{\,2} - h_1^{\,2})}{2.3Q}\right]$
WT height at radius of interest	h_2	18	m	
Radius of required drawdown	r_2	138.6	m	

The following assumptions apply to this equation

- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the well is in a steady state

(from Kruseman & de Ridder, 1994)

Data sources (to complete an audit trail)

Height of water table at observation well 1	h_1
Distance to observation well 1	r_1
Height of water table at observation well 2	h_2
Distance to observation well 2	r_2
Hydraulic conductivity of aquifer	K

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Transient Inflow Modelling (Cooper-Jacob Model) for Northern Turbines (Kh = 0.5 m/d)

5) Cooper Jacob (Time-variant unconfined aquifer)
(Based on Theis equation)

$$Q = \frac{4\pi Ts}{2.3\log\left(\frac{2.25Tt}{r^2 S}\right)}$$

$$s_c = \left(1 - \frac{s_a}{2b}\right)s_a$$

$$u = \frac{r^2 S}{4Tt}$$

Essential input
Optional input
Calculated

For assessing drawdown, s, at a distance, r, from a pumping well and a time, t

		expected		min	max	
Transmissivity of aquifer	T	10	m^2/d			m^2/d
Time from start of abstraction	t	28	d			
Storage coefficient	S	0.05				
To find Q if s is known						
Height of water table at radius of influence	H	20	m			m
Height of water table at radius r	h	12.6	m			m
Measured drawdown = (H-h_r)	s_a	7.4	m	7.4	7.4	m
Original saturated thickness of aquifer	b	20	m			
Corrected drawdown	s_c	6.0	m	6.0	6.0	m
Distance from centre of well at r	r	13.82	m			
Use well function to determine if equation is valid	u	0.00853		0.00853	0.00853	
Is equation valid ?		Yes		Yes	Yes	
Total discharge from well	Q	181.11	m^3/d	181.11	181.11	m^3/d

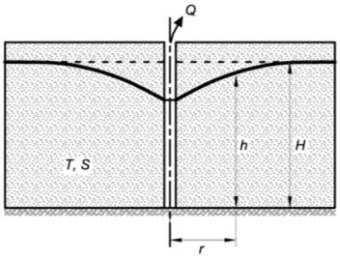
To find s if Q is known

$$s = \frac{2.3Q}{4\pi T}\log\frac{2.25Tt}{r^2 S}$$

Total discharge from well	Q	148.91	m3/d
Distance from centre of well at r	r	90.00	m
Drawdown at distance r			
Calculated drawdown	s_c	0.5	m
Actual drawdown	s_a	0.5	m

Note: To check validity of this arrangement of equation, enter value for r in cell C19 as well

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	Assume water table at ground surface (DD=20-12.6 mbls
Height of water table at radius r	h	Turbine foundation 5 m deep, dewater to 6 m
Transmissivity of aquifer	T	K=0.5 m/d (clayey sand); b = 20 m
Time from start of abstraction	t	28 days to lower to target drawdown
Storage coefficient	S	Estimated based on clayey SAND geology
Original saturated thickness of aquifer	b	8 m saturated thickness of dune sands in WM02
Distance from centre of well at r	r	For assessment of 0.1 m drawdown extent
Total discharge from well	Q	From total discharge from well (m3/d) '23.Effective radius



The following assumptions apply to this equation
- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the water removed from storage is discharged instantaneously with decline of head
- the diameter of the well is small, i.e. the storage in the well can be ignored
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer

(from Kruseman & de Ridder, 1994)

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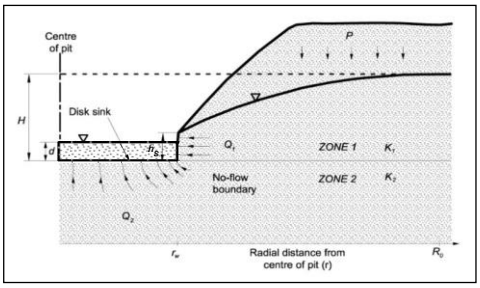
Radius of Influence Calculation Northern Turbines (Kh = 0.5 m/d)

19) Radius of influence (Niccoli et al, 1998) - Method to estimate radius of influence if other parameters can be estimated with reasonable accuracy

$$H = \sqrt{h_s^2 + \frac{P}{K_{h1}}\left[R_0^2 \ln\left(\frac{R_0}{r_w}\right) - \frac{R_0^2 - r_w^2}{2}\right]}$$

Essential input
Optional input
Calculated

Height of water table at radius of influence	H	6.1	m	6.1	6.1 m
Saturated thickness to seepage face	h_s	0.1	m	0.1	0.1 m
Drawdown = (H-h_p)	s	6	m	6	6 m
Layer 1 horizontal hydraulic conductivity	K_{h1}	0.5	m/d	0.1	100 m/d
Recharge	P	0.00079	m/d	0.00079	0.00079 m/d
Radius of quarry	r_w	13.82	m		
Effective radius	R_0	119.15		65.94	1102.63



The following assumptions apply to this equation

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- the static water table is horizontal
- groundwater flow is horizontal
- groundwater flow to the pit is axially symmetric

(Niccoli et al, 1998)

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Saturated thickness to seepage face	h_s	Nominal 0.1 m high face in excavation
Layer 1 horizontal hydraulic conductivity	K_{h1}	SAND: 10 m/d assumed.
Recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Me
Radius of quarry	r_w	20 m by 20 m excavation ~5 m deep for 6-m dewatered

Index

Steady-state Inflow Modelling (Marinelli and Niccoli Model) Northern Turbines (Kh = 0.5 m/d)

20) Flow to a pit (Marinelli and Niccoli, 1998)

$$Q_1 = P\pi\left(R_0^{\,2} - r_w^{\,2}\right)$$

$$Q = 4\left(\frac{K_{h2}}{m_2}\right) r_w (H - d)$$

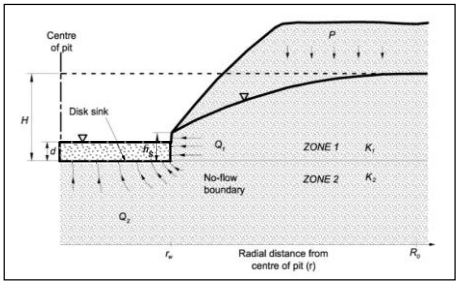
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

Essential input
Optional input
Calculated

Flow into a pit using separate solutions for the sides and the base.

(Follow on from ROI spreadsheet 19. To find Radius of influence for this procedure)

Head		expected		min	max	
Height of wt at radius of influence	H	6.1	m	6.1	6.1	m
Depth of Ponded Area	d	0.1	m	0.1	0.1	m
Layer 2						
Horizontal Conductivity	K_{h2}	5.79E-06	m/s	5.79E-08	5.79E-05	m/s
		5.0E-01	m/d	0.005	5	m/d
Vertical Conductivity	K_{v2}	2.89E-06	m/s	2.89E-08	2.89E-05	m/s
Anistropy	m_2	1.4		0.0	44.7	
Distributed recharge	P	9.13E-09	m/s	9.13E-09	9.13E-09	m/s
		7.9E-04	m^3/d	0.00079	0.0007887	m/d
Radius of quarry	r_w	13.8	m			
Radius of influence	R_o	119.2	m	65.94	1102.63	m
Can be taken from ROI worksheet or other sources						
Inflow						
Inflow through Seepage Face	Q_1	4.02E-04	m^3/s	1.19E-04	3.49E-02	m^3/s
		(34.7	m^3/d	10.301	3012.013	m^3/d
Inflow through Mine base	Q_2	1.36E-03	m^3/s	4.29E-07	4.29E-01	m^3/s
		(117.3	m^3/d	0.0	37082.3	m^3/d
Total Inflow	**Qt**	**0.002**	**m^3/s**	0.000	0.464	m^3/s
		(152.0	m^3/d	10.3	40094.3	m^3/d



The following assumptions apply to this equation

- There is no groundwater flow between zones 1 and 2

Zone 1

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- initial static water table and groundwater flow are both horizontal
- groundwater flow to the pit is axially symmetric

Zone 2

- steady state flow to one side of a circular disk sink of constant and uniform drawdown
- hydraulic head is initially uniform throughout Zone 2.
- initial head is equal to the elevation of the initial water table in Zone 1
- disk sink has a constant hydraulic head equal to the elevation of the pit lake water surface
- flow to the disk sink is three-dimensional and axially symmetric
- materials are anisotropic, prinicipal directions for K are horizontal and vertical

(Marinelli & Niccoli, 1998)

Data sources (to complete an audit trail)		
Height of wt at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Depth of Ponded Area	d	Nominal 0.1 m high face in excavation
Layer 2 Horizontal Conductivity	K_{h2}	SAND: 20 m/d from PSD hydrosieve Excel file.
Layer 2 Vertical Conductivity	K_{v2}	SAND: 10 m/d assumed.
Distributed recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Mean 959.6 mr
Radius of quarry	r_w	20 m by 30 m excavation ~5 m deep for 6-m dewatered
Radius of influence	R_o	From cell content at: 19.Radius of influence N (UC)'!C20

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Steady-state Inflow Modelling (Thiem-Dupuit Model) for Northern Turbines (Kh = 0.5 m/d)

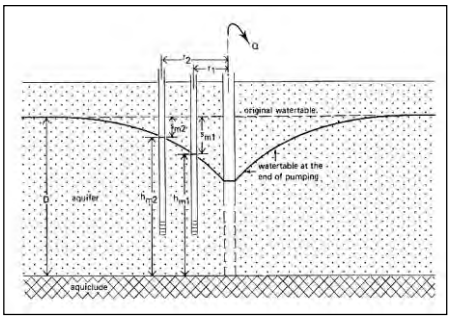
2) Dupuit-Thiem (Unconfined)

(also known as Dupuit-Forcheimer or Thiem-Dupuit)
Steady state flow to a well in an unconfined aquifer

$$Q = \Pi K \frac{(h_2^{\,2} - h_1^{\,2})}{2.3\log(\frac{r_2}{r_1})}$$

Essential input
Optional input
Calculated

		expected		min	max	
Height of water table at observation well 1	h_1	14	m			m
Distance to observation well 1	r_1	13.82	m			
Height of water table at observation well 2	h_2	20	m	28	32	m
Distance to observation well 2	r_2	119.15	m			
Hydraulic conductivity of aquifer	K	0.5	m/d			m/d
Total discharge from well	Q	148.91	m^3/d	148.91	604.41	m^3/d



(Figure taken from Kruseman & de Ridder, 1994)

To find the drawdown at a given radius

Discharge	Q	148.91	m^3/d	$h_2 = \sqrt{\frac{2.3Q\log(r_2/r_1)}{\pi K} + h_1^{\,2}}$
Radius of interest	r_2	95	m	
WT height at radius of interest	h	19.5	m	
Drawdown at radius r	s_r	0.5	m	

To find the radius of a specific water level

Discharge	Q	148.91	m^3/d	$r_2 = r_1 10\text{^}\left[\frac{\pi K(h_2^{\,2} - h_1^{\,2})}{2.3Q}\right]$
WT height at radius of interest	h_2	18	m	
Radius of required drawdown	r_2	53.4	m	

The following assumptions apply to this equation
- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the well is in a steady state

(from Kruseman & de Ridder, 1994)

Data sources (to complete an audit trail)

Height of water table at observation well 1	h_1
Distance to observation well 1	r_1
Height of water table at observation well 2	h_2
Distance to observation well 2	r_2
Hydraulic conductivity of aquifer	K

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Transient Inflow Modelling (Cooper-Jacob Model) for Transmission Poles (Kh = 10 m/d)

5) Cooper Jacob (Time-variant unconfined aquifer)
(Based on Theis equation)

$$Q = \frac{4\pi Ts}{2.3\log\left(\frac{2.25Tt}{r^2 S}\right)}$$

$$s_c = \left(1 - \frac{s_a}{2b}\right)s_a$$

$$u = \frac{r^2 S}{4Tt}$$

Essential input
Optional input
Calculated

For assessing drawdown, s, at a distance, r, from a pumping well and a time, t

		expected		min	max	
Transmissivity of aquifer	T	200	m^2/d			m^2/d
Time from start of abstraction	t	5	d			
Storage coefficient	S	0.2				
To find Q if s is known						
Height of water table at radius of influence	H	20	m			m
Height of water table at radius r	h	13.4	m			m
Measured drawdown = (H-h_r)	s_a	6.6	m	6.6	6.6	m
Original saturated thickness of aquifer	b	20	m			
Corrected drawdown	s_c	5.5	m	5.5	5.5	m
Distance from centre of well at r	r	0.56	m			
Use well function to determine if equation is valid	u	1.6E-05		1.6E-05	1.6E-05	
Is equation valid ?		Yes		Yes	Yes	
Total discharge from well	Q	1324.02	m^3/d	1324.02	1324.02	m^3/d

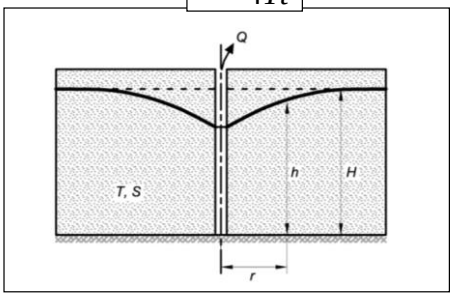
To find s if Q is known

$$s = \frac{2.3Q}{4\pi T}\log\frac{2.25Tt}{r^2 S}$$

Total discharge from well	Q	1324.02	m3/d
Distance from centre of well at r	r	1	m
Drawdown at distance r			
Calculated drawdown	s_c	4.9	m
Actual drawdown	s_a	5.7	m

Note: To check validity of this arrangement of equation, enter value for r in cell C19 as well

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	Assume water table at ground surface
Height of water table at radius r	h	Transmiss. tower foundation 4.5m deep, dewater to 5.5m
Transmissivity of aquifer	T	K=10 m/d (sand); b = 20 m
Time from start of abstraction	t	5 days of initial dewatering to attain target drawdown
Storage coefficient	S	Estimated based on SAND geology
Original saturated thickness of aquifer	b	General saturated thickness of MW02-MW03
Distance from centre of well at r	r	For assessment of distance versus drawdown
Total discharge from well	Q	From total discharge from well (m3/d)



The following assumptions apply to this equation
- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the water removed from storage is discharged instantaneously with decline of head
- the diameter of the well is small, i.e. the storage in the well can be ignored
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer

(from Kruseman & de Ridder, 1994)

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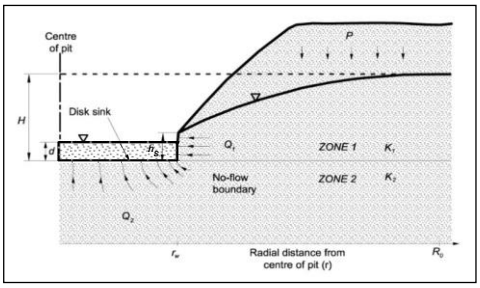
Radius of Influence Calculation for Transmission Poles (Kh = 10 m/d)

19) Radius of influence (Niccoli et al, 1998) - Method to estimate radius of influence if other parameters can be estimated with reasonable accuracy

$$H = \sqrt{h_s^2 + \frac{P}{K_{h1}}\left[R_0^2 \ln\left(\frac{R_0}{r_w}\right) - \frac{R_0^2 - r_w^2}{2}\right]}$$

Essential input
Optional input
Calculated

Height of water table at radius of influence	H	5.6	m	4.1	4.1 m
Saturated thickness to seepage face	h_s	0.1	m	0.1	0.1 m
Drawdown = (H-h_p)	s	5.5	m	4	5.5 m
Layer 1 horizontal hydraulic conductivity	K_{h1}	10	m/d	0.1	100 m/d
Recharge	P	0.00079	m/d	0.00079	0.00079 m/d
Radius of quarry	r_w	0.56	m		
Effective radius	R_0	265.17		25.38	769.22



The following assumptions apply to this equation

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- the static water table is horizontal
- groundwater flow is horizontal
- groundwater flow to the pit is axially symmetric

(Niccoli et al, 1998)

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Saturated thickness to seepage face	h_s	Nominal 0.1 m high face in excavation
Layer 1 horizontal hydraulic conductivity	K_{h1}	SAND: 10 m/d assumed.
Recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Me
Radius of quarry	r_w	1 m diameter excavation ~4.5 m deep for 5.5-m dewatered

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Steady-state Inflow Modelling (Marinelli and Niccoli Model) for Transmission Poles (Kh = 10 m/d)

20) Flow to a pit (Marinelli and Niccoli, 1998)

$$Q_1 = P\pi\left(R_0^{\,2} - r_w^{\,2}\right)$$

$$Q = 4\left(\frac{K_{h2}}{m_2}\right) r_w (H - d)$$

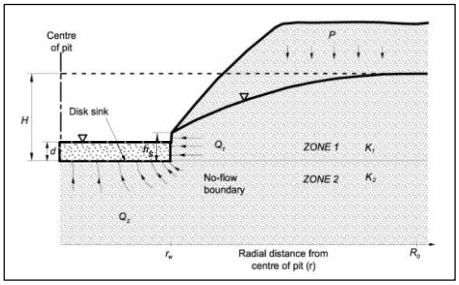
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

Flow into a pit using separate solutions for the sides and the base.

Essential input
Optional input
Calculated

(Follow on from ROI spreadsheet 19. To find Radius of influence for this procedure)

Head		expected		min	max	
Height of wt at radius of influence	H	5.6	m	4.1	4.1	m
Depth of Ponded Area	d	0.1	m	0.1	0.1	m
Layer 2						
Horizontal Conductivity	K_{h2}	1.16E-04	m/s	1.16E-06	1.16E-03	m/s
		1.0E+01	m/d	0.1	100	m/d
Vertical Conductivity	K_{v2}	5.79E-05	m/s	5.79E-07	5.79E-04	m/s
Anistropy	m_2	1.4		0.0	44.7	
Distributed recharge	P	9.13E-09	m/s	9.13E-09	9.13E-09	m/s
		7.9E-04	m^3/d	0.00079	0.0007887	m/d
Radius of quarry	r_w	0.6	m			
Radius of influence	R_o	265.2	m	25.38	769.22	m
Can be taken from ROI worksheet or other sources						
Inflow						
Inflow through Seepage Face	Q_1	2.02E-03	m^3/s	1.85E-05	1.70E-02	m^3/s
		(174.2	m^3/d	1.595	1466.102	m^3/d
Inflow through Mine base	Q_2	1.02E-03	m^3/s	2.34E-07	3.21E-01	m^3/s
		(87.8	m^3/d	0.0	27754.5	m^3/d
Total Inflow	**Qt**	**0.003**	**m^3/s**	0.000	0.338	m^3/s
		(262.0	m^3/d	1.6	29220.6	m^3/d



The following assumptions apply to this equation

- There is no groundwater flow between zones 1 and 2

Zone 1

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- initial static water table and groundwater flow are both horizontal
- groundwater flow to the pit is axially symmetric

Zone 2

- steady state flow to one side of a circular disk sink of constant and uniform drawdown
- hydraulic head is initially uniform throughout Zone 2.
- initial head is equal to the elevation of the initial water table in Zone 1
- disk sink has a constant hydraulic head equal to the elevation of the pit lake water surface
- flow to the disk sink is three-dimensional and axially symmetric
- materials are anisotropic, prinicipal directions for K are horizontal and vertical

(Marinelli & Niccoli, 1998)

Data sources (to complete an audit trail)		
Height of wt at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Depth of Ponded Area	d	Nominal 0.1 m high face in excavation
Layer 2 Horizontal Conductivity	K_{h2}	SAND: 10 m/d assumed.
Layer 2 Vertical Conductivity	K_{v2}	SAND: 10 m/d/2 assumed.
Distributed recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Mean 959.6 mr
Radius of quarry	r_w	1 m diameter excavation ~4.5 m deep for 5.5-m dewatered
Radius of influence	R_o	Niccoli et al (1998) = 265.2 m

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Steady-state Inflow Modelling (Thiem-Dupuit Model) for Transmission Poles (Kh = 10 m/d)

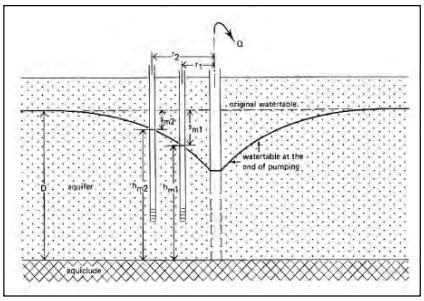
2) Dupuit-Thiem (Unconfined)

(also known as Dupuit-Forcheimer or Thiem-Dupuit)
Steady state flow to a well in an unconfined aquifer

$$Q = \Pi K \frac{(h_2^{\,2} - h_1^{\,2})}{2.3\log(\frac{r_2}{r_1})}$$

Essential input
Optional input
Calculated

		expected		min	max	
Height of water table at observation well 1	h_1	14.5	m			m
Distance to observation well 1	r_1	0.56	m			
Height of water table at observation well 2	h_2	20	m	28	32	m
Distance to observation well 2	r_2	265.17	m			
Hydraulic conductivity of aquifer	K	10	m/d			m/d
Total discharge from well	Q	969.95	m^3/d	969.95	4159.68	m^3/d



(Figure taken from Kruseman & de Ridder, 1994)

To find the drawdown at a given radius

Discharge	Q	969.95	m^3/d	$h_2 = \sqrt{\frac{2.3Q\log(r_2/r_1)}{\pi K} + h_1^{\,2}}$
Radius of interest	r_2	140	m	
WT height at radius of interest	h	19.5	m	
Drawdown at radius r	s_r	0.5	m	

To find the radius of a specific water level

Discharge	Q	969.95	m^3/d	$r_2 = r_1 10\text{^}\left[\frac{\pi K(h_2^{\,2} - h_1^{\,2})}{2.3Q}\right]$
WT height at radius of interest	h_2	20	m	
Radius of required drawdown	r_2	265.2	m	

The following assumptions apply to this equation

- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the well is in a steady state

(from Kruseman & de Ridder, 1994)

Data sources (to complete an audit trail)

Height of water table at observation well 1	h_1
Distance to observation well 1	r_1
Height of water table at observation well 2	h_2
Distance to observation well 2	r_2
Hydraulic conductivity of aquifer	K

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Transient Inflow Modelling (Cooper-Jacob Model) for Meteorological Tower (Kh = 10 m/d)

5) Cooper Jacob (Time-variant unconfined aquifer)
(Based on Theis equation)

$$Q = \frac{4\pi Ts}{2.3\log\left(\frac{2.25Tt}{r^2 S}\right)}$$

$$s_c = \left(1 - \frac{s_a}{2b}\right)s_a$$

$$u = \frac{r^2 S}{4Tt}$$

Essential input
Optional input
Calculated

For assessing drawdown, s, at a distance, r, from a pumping well and a time, t

		expected		min	max	
Transmissivity of aquifer	T	200	m^2/d			m^2/d
Time from start of abstraction	t	5	d			
Storage coefficient	S	0.2				
To find Q if s is known						
Height of water table at radius of influence	H	20	m			m
Height of water table at radius r	h	15.5	m			m
Measured drawdown = (H-h_r)	s_a	4.5	m	4.5	4.5	m
Original saturated thickness of aquifer	b	20	m			
Corrected drawdown	s_c	4.0	m	4.0	4.0	m
Distance from centre of well at r	r	1.24	m			
Use well function to determine if equation is valid	u	7.7E-05		7.7E-05	7.7E-05	
Is equation valid ?		Yes		Yes	Yes	
Total discharge from well	Q	1129.58	m^3/d	1129.58	1129.58	m^3/d

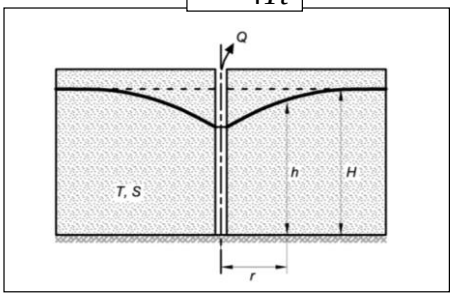
To find s if Q is known

$$s = \frac{2.3Q}{4\pi T}\log\frac{2.25Tt}{r^2 S}$$

Total discharge from well	Q	1129.58	m3/d
Distance from centre of well at r	r	1	m
Drawdown at distance r			
Calculated drawdown	s_c	4.2	m
Actual drawdown	s_a	4.8	m

Note: To check validity of this arrangement of equation, enter value for r in cell C19 as well

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	Assume water table at ground surface
Height of water table at radius r	h	Met mast foundation 3.0 m deep, dewater to at least 4 m
Transmissivity of aquifer	T	K=10 m/d (sand); b = 20 m
Time from start of abstraction	t	5 days of initial dewatering to attain target drawdown
Storage coefficient	S	Estimated based on SAND geology
Original saturated thickness of aquifer	b	General saturated thickness of MW02-MW03
Distance from centre of well at r	r	For assessment of distance versus drawdown
Total discharge from well	Q	From total discharge from well (m3/d)



The following assumptions apply to this equation
- the aquifer is unconfined
- the aquifer has infinite areal extent
- the aquifer is homogeneous, and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the water removed from storage is discharged instantaneously with decline of head
- the diameter of the well is small, i.e. the storage in the well can be ignored
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer

(from Kruseman & de Ridder, 1994)

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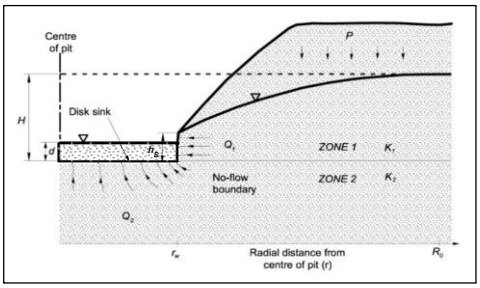
Radius of Influence Calculation for Meteorological Tower (Kh = 10 m/d)

19) Radius of influence (Niccoli et al, 1998) - Method to estimate radius of influence if other parameters can be estimated with reasonable accuracy

$$H = \sqrt{h_s^2 + \frac{P}{K_{h1}}\left[R_0^2 \ln\left(\frac{R_0}{r_w}\right) - \frac{R_0^2 - r_w^2}{2}\right]}$$

Essential input
Optional input
Calculated

Height of water table at radius of influence	H	4.1	m	4.1	4.1 m
Saturated thickness to seepage face	h_s	0.1	m	0.1	0.1 m
Drawdown = (H-h_p)	s	4	m	4	4 m
Layer 1 horizontal hydraulic conductivity	K_{h1}	10	m/d	0.1	100 m/d
Recharge	P	0.00079	m/d	0.00079	0.00079 m/d
Radius of quarry	r_w	1.24	m		
Effective radius	R_0	214.03		28.44	611.33



The following assumptions apply to this equation
- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- the static water table is horizontal
- groundwater flow is horizontal
- groundwater flow to the pit is axially symmetric

(Niccoli et al, 1998)

Data sources (to complete an audit trail)		
Height of water table at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Saturated thickness to seepage face	h_s	Nominal 0.1 m high face in excavation
Layer 1 horizontal hydraulic conductivity	K_{h1}	SAND: 10 m/d assumed.
Recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Me
Radius of quarry	r_w	1 m diameter excavation ~4.5 m deep for 5.5-m dewatered

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Steady-state Inflow Modelling (Marinelli and Niccoli Model) for Meteorological Tower (Kh = 10 m/d)

20) Flow to a pit (Marinelli and Niccoli, 1998)

$$Q_1 = P\pi\left(R_0^{\,2} - r_w^{\,2}\right)$$

$$Q = 4\left(\frac{K_{h2}}{m_2}\right) r_w (H - d)$$

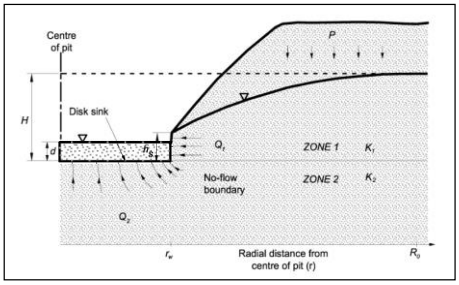
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

Flow into a pit using separate solutions for the sides and the base.

Essential input
Optional input
Calculated

(Follow on from ROI spreadsheet 19. To find Radius of influence for this procedure)

Head		expected		min	max	
Height of wt at radius of influence	H	4.1	m	4.1	4.1	m
Depth of Ponded Area	d	0.1	m	0.1	0.1	m
Layer 2						
Horizontal Conductivity	K_{h2}	1.16E-04	m/s	1.16E-06	1.16E-03	m/s
		1.0E+01	m/d	0.1	100	m/d
Vertical Conductivity	K_{v2}	5.79E-05	m/s	5.79E-07	5.79E-04	m/s
Anistropy	m_2	1.4		0.0	44.7	
Distributed recharge	P	9.13E-09	m/s	9.13E-09	9.13E-09	m/s
		7.9E-04	m^3/d	0.00079	0.0007887	m/d
Radius of quarry	r_w	1.2	m			
Radius of influence	R_o	214.0	m	28.44	611.33	m
Can be taken from ROI worksheet or other sources						
Inflow						
Inflow through Seepage Face	Q_1	1.31E-03	m^3/s	2.32E-05	1.07E-02	m^3/s
		(113.5	m^3/d	2.001	926.013	m^3/d
Inflow through Mine base	Q_2	1.63E-03	m^3/s	5.14E-07	5.14E-01	m^3/s
		(140.4	m^3/d	0.0	44407.1	m^3/d
Total Inflow	**Qt**	**0.003**	**m^3/s**	0.000	0.525	m^3/s
		(253.9	m^3/d	2.0	45333.1	m^3/d



The following assumptions apply to this equation

- There is no groundwater flow between zones 1 and 2

Zone 1

- steady-state, unconfined, horizontal radial flow
- uniformly distributed recharge at the water table
- pit walls are approximated as a right circular cylinder
- initial static water table and groundwater flow are both horizontal
- groundwater flow to the pit is axially symmetric

Zone 2

- steady state flow to one side of a circular disk sink of constant and uniform drawdown
- hydraulic head is initially uniform throughout Zone 2.
- initial head is equal to the elevation of the initial water table in Zone 1
- disk sink has a constant hydraulic head equal to the elevation of the pit lake water surface
- flow to the disk sink is three-dimensional and axially symmetric
- materials are anisotropic, prinicipal directions for K are horizontal and vertical

(Marinelli & Niccoli, 1998)

Data sources (to complete an audit trail)		
Height of wt at radius of influence	H	WM02/MW03 area: GW ~34.0 mAHD (WM01-W-S02)
Depth of Ponded Area	d	Nominal 0.1 m high face in excavation
Layer 2 Horizontal Conductivity	K_{h2}	SAND: 10 m/d assumed.
Layer 2 Vertical Conductivity	K_{v2}	SAND: (10 m/d)/2 assumed.
Distributed recharge	P	30% of Scott River BOM 9926: Median Annual 933 mm; Mean 959.6 mr
Radius of quarry	r_w	1 m diameter excavation ~4.5 m deep for 5.5-m dewatered
Radius of influence	R_o	Niccoli et al (1998) = 265.2 m

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Steady-state Inflow Modelling (Thiem-Dupuit Model) for Meteorological Tower (Kh = 10 m/d)

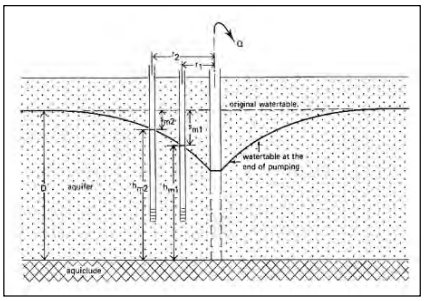
2) Dupuit-Thiem (Unconfined)

(also known as Dupuit-Forcheimer or Thiem-Dupuit)
Steady state flow to a well in an unconfined aquifer

$$Q = \Pi K \frac{(h_2^{\,2} - h_1^{\,2})}{2.3\log(\frac{r_2}{r_1})}$$

Essential input
Optional input
Calculated

		expected		min	max	
Height of water table at observation well 1	h_1	16	m			m
Distance to observation well 1	r_1	1.24	m			
Height of water table at observation well 2	h_2	20	m	28	32	m
Distance to observation well 2	r_2	214.03	m			
Hydraulic conductivity of aquifer	K	10	m/d			m/d
Total discharge from well	Q	879.41	m^3/d	879.41	4690.20	m^3/d



(Figure taken from Kruseman & de Ridder, 1994)

To find the drawdown at a given radius

Discharge	Q	879.41	m^3/d	$h_2 = \sqrt{\frac{2.3Q\log(r_2/r_1)}{\pi K} + h_1^{\,2}}$
Radius of interest	r_2	180	m	
WT height at radius of interest	h	19.9	m	
Drawdown at radius r	s_r	0.1	m	

To find the radius of a specific water level

Discharge	Q	879.41	m^3/d	$r_2 = r_1 10\text{^}\left[\frac{\pi K(h_2^{\,2} - h_1^{\,2})}{2.3Q}\right]$
WT height at radius of interest	h_2	31	m	
Radius of required drawdown	r_2	#######	m	

The following assumptions apply to this equation

- the aquifer has infinite areal extent
- the aquifer is homogeneous, isotropic and of uniform thickness
- flat initial water table
- the aquifer is pumped at a constant discharge rate
- the pumping well is fully penetrating, therefore receiving water from the entire saturated thickness of the aquifer
- the flow to the well is in a steady state

(from Kruseman & de Ridder, 1994)

Data sources (to complete an audit trail)

Height of water table at observation well 1	h_1	
Distance to observation well 1	r_1	
Height of water table at observation well 2	h_2	
Distance to observation well 2	r_2	
Hydraulic conductivity of aquifer	K	

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Appendix I SynergyRED Risk Assessment Framework

SynergyRED risk assessment framework likelihood matrix.

Level	Likelihood	Control effectiveness description	Frequency	Probability
5	Almost Certain	Less than 20% of the critical controls associated with the risk are rated as effective. One or more control gaps and/or weaknesses exist. It is almost certain this risk may eventuate.	Likely to happen more than once per annum	>80% chance of occurrence
4	Likely	20%-39% of the critical controls associated with the risk are rated as effective. One or more controls gaps and/or weaknesses exist. It is likely this risk may eventuate.	Likely to happen once per annum	61% to 80% chance of occurrence
3	Possible	40%-59% of the critical controls associated with the risk are rated as effective. One or more control gaps and/or weaknesses exist. It is possible this risk may eventuate.	Likely to happen once every 5 years	41% to 60% chance of occurrence
2	Unlikely	60%-79% of the critical controls associated with the risk are rated as effective. A control weakness may exist. It is unlikely this risk may eventuate.	Likely to happen once every 10 years	21% to 40% chance of occurrence
1	Rare	80% or more of the critical controls associated with the risk are rated as effective. No control weakness exists. It is rare for this risk to eventuate.	Likely to happen once every 25 years	<20% chance of occurrence

SynergyRED risk assessment framework risk matrix.

Risk Matrix						
	Consequences					
Likelihood	LEVEL	C1	C2	C3	C4	C5
	L5 Almost certain	15	19	22	24	25
	L4 Likely	10	14	18	21	23
	L3 Possible	6	9	13	17	20
	L2 Unlikely	3	5	8	12	16
	L1 Rare	1	2	4	7	11

Key to risk matrix colour scheme: Red = High, Orange = Moderate, Green = Low, Blue = Negligible.

SynergeyRED risk assessment framework consequence table.

Consequences	Health, Safety and Wellbeing	Reputation & Customer Confidence	Legal and Compliance	Financial (incl. Production Loss)	Environment	Security of Critical Infrastructure [SoCI Act]
C5	Multiple fatalities, severe impact on health leading to multiple fatalities.	Catastrophic reputational impact with widespread condemnation by a broad range of stakeholders, loss of customers, shareholder confidence or right to offer services. Sustained impact to the community (>12 months) with irreparable damage to relationships and/or widespread impact to communities. Consistent negative media attention (months - years).	Material regulatory breach or significant systemic breaches. Immediate notification to a regulator and may result in; - material regulator intervention - fines and penalties - loss of license(s) - and/or imprisonment of director/s and/or officer/s. Significant litigation, contractual exposure, or value leakage	>$50M	Catastrophic long-term environmental impact that cannot be credibly managed or remediated with current technology/techniques.	Catastrophic operational impact (>110% of the defined maximum tolerable downtime) to critical infrastructure assets and critical components. **[This category is only applicable to assets and critical components registered under the Security of Critical Infrastructure Act]**
C4	Single fatality / Irreversible disabling injury, illness, or distress, including psychosocial. Exposure to health hazards resulting in irreversible impact on health with loss of quality of life.	Major reputational impact with sustained outcry and action by customer advocacy groups, external stakeholders, public ministerial criticism, and direct intervention. Major impact to the community (6 to 12 months) with significant damage to relationships and widespread impact to communities. Consistent negative media attention (weeks).	Material regulatory breach or significant systemic breaches. Immediate notification to a regulator and may result in; - material regulator intervention - fines and penalties - loss of a license - and/or prosecution of the company or directors/officers. Major litigation, contractual exposure, or value leakage.	$10M to $50M	Major environmental impact or harm requiring long-term recovery (>5 years)	Major operational impact (90% - 110% of the defined maximum tolerable downtime) to critical infrastructure assets and critical components. **[This category is only applicable to assets and critical components registered under the Security of Critical Infrastructure Act]**
C3	Lost time injury / Reversible impact on health, including psychosocial. Exposure to health hazards resulting in reversible impact on health.	Moderate reputational impact with external stakeholder criticism, considerable consumer complaints and ministerial involvement. Moderate impact to the community (3 to 6 months) with significant damage to relationships across multiple communities. Negative media attention (days).	Multiple breaches of legislation and regulations that may result in moderate fines, penalties and/or regulator intervention. Moderate litigation, contractual exposure, or value leakage.	$5M to $10M	Moderate environmental impact or harm that is not immediately recoverable (3 months - 5 years)	Moderate operational impact (50% - 90% of the defined maximum tolerable downtime) to critical infrastructure assets and critical components. **[This category is only applicable to assets and critical components registered under the Security of Critical Infrastructure Act]**
C2	Medical treatment injury / exposure to major health risk, including psychosocial. Exposure to health hazards requiring medical intervention.	Minor reputational impact with complaints from some stakeholders, customers, or community members. Limited impact to the community (1 to 3 months) with some damage to relationships in local communities. Once off or occasional negative media attention.	Breach of obligation or regulation that may result in minor fines, and penalties or regulatory intervention. Minor litigation, contractual exposure, or value leakage.	$500K to $5M	Minor environmental impact that is immediately recoverable (<3 months)	Minor operational impact (10% - 50% of the defined maximum tolerable downtime) to critical infrastructure assets and critical components. **[This category is only applicable to assets and critical components registered under the Security of Critical Infrastructure Act]**
C1	First aid injury / exposure to minor health risk, including psychosocial. Exposure to health hazards resulting in minor discomfort.	Isolated negative customer or local public attention and complaints. Short-term community impact with little or no damage to relationships - restricted to localised complaints/impacts	Breach of a low-level reportable obligation with no fines, penalties, or regulatory intervention. Legal issue causing inefficiency or immaterial financial impact	<$500K	Negligible or undetectable environmental impact with no or minimal clean-up required	Negligible operational impact (<10% of the defined maximum tolerable downtime) to critical infrastructure assets and critical components. **[This category is only applicable to assets and critical components registered under the Security of Critical Infrastructure Act]**

Appendix J Mitigation Measures and Proposal Specifications

This document contains a comprehensive list of mitigation and management actions derived from the Synergy Environment and Heritage Management Standard for Contractors (SYN-STD-ENV-0001, Revision 2 July 2024) which specifies SynergyRED's minimum mandatory expectations for contractors for managing environmental and cultural heritage risk. Contractors must prepare an Environmental Management Plan (EMP), aligning with these mitigation and management strategies. For the Proposal, this will comprise the preparation of a Construction and Environment Management Plan (CEMP), and associated Groundwater and ASS Management Plan.

Management strategies and mitigation measures will be driven by the EPA mitigation hierarchy (avoid, minimise and rehabilitate) and applicable regulatory guidance.

J.1.1 Ground Disturbance, Native Vegetation Clearing and Fauna Disturbance

- No clearing or ground disturbance will occur without an active SynergyRED ground disturbance permit (SYN-PRT-ENV-0001), requiring clearly pegged and demarked clearance areas by a qualified surveyor to minimise the risk of disturbance outside the designated area.

J.1.2 Soil Reuse and Stockpile Management

- Topsoil stockpiling sites will consider locations that are not going to be disturbed in future operations, are remote from weed hygiene occurrences, do not lie in areas likely to receive surface water flow, have surrounding vegetation that is consistent with the original vegetation from the stripped area (where practical) and are as close as practicable to the area of final use.
- All topsoil stockpiles will have windrows placed around the base. This will be of sufficient height to prevent erosion and loss of the stockpile during heavy rainfall.
- Topsoil stockpiles will be inspected regularly and maintained to prevent weed establishment, soil erosion and dust emissions.

J.1.3 Biosecurity

- Where declared weeds or known dieback infestations exist on a project site a Weed and/or Dieback Management Plan will be developed. Access to affected locations will be strictly managed to minimise spread, including the completion of the vehicle-machinery hygiene checklist (SYN-FRM-ENV-0002), or similar contractor hygiene checklist for all vehicles, equipment and machinery.
- Clean down points located at each access point will be established in accordance with the Arrive Clean, Leave Clean Guidelines (Department of Environment, 2015).

J.1.4 Excavation, Trenching and Dewatering

- Works will be undertaken in accordance with an approved work permit and excavations/trenches backfilled overnight if possible. Excavated materials will be stockpiled in a stable location such that they remain within the construction footprint, and do not erode or wash away into drainage or vegetation, in line with the Stockpile Management actions above.
- Where water is likely to be encountered, or is unexpectedly encountered during excavation or trenching works, no dewatering will proceed without written approval from SynergyRED's project environmental advisor and will be undertaken in compliance with WQPN-13 Dewatering of Soils at Construction Sites (DWER, 2012) and will be subject to licensing under the *Rights in Water and Irrigation Act 1914 (WA).*
- In the event demolition or excavation works encounter unexpected and suspected contaminated materials, excavation works will be stopped, reported to the SynergyRED contract representative and advice sought from a qualified subject matter expert. If required, the suspected contamination will be sampled and analysed to determine the appropriate remediation and disposal.

J.1.5 Dust, Erosion and Sedimentation Control

- Driving will be restricted to designated access tracks to prevent and minimise dust and erosion. All access tracks will be stabilised and wet down to prevent dust. Internal speed limits will be enforced where required to minimise the production of dust.
- Dust will be minimised through staged clearing to minimise exposed ground and wetting down/compacting of soils. Where required stabilisation additives may also be applied to exposed surfaces or stockpiles, and/or sediment fences or geofabric may be used to prevent sedimentation of waterways and directing runoff into controlled/treated onsite drainage.
- If sedimentation or erosion does occur immediate action will be taken to prevent further damage occurring, all eroded material will be recovered, and accessways/drains cleaned and returned to service and remaining exposed ground and stockpiles will be assessed.

- At all stages of construction, contractors will ensure exposed soils and stockpiles are maintained to prevent windblown dust, erosion and sedimentation into drainage, remnant vegetation or outside the construction footprint.

J.1.6 Stormwater and Waterway Protection

- Drainage systems will be established as early as possible. Water will be conveyed at appropriate velocities by implementing drainage stabilisation, for example lining drains or creating rock check dams to prevent scouring. Proposal specific risk conditions and requirements are outlined below.
- Land next to waterbodies will remain undisturbed for as long as possible, at least until the installation of culverts and drainage controls or if required sediment barriers and silt curtains will be used to prevent sedimentation into drainage systems.
- Any potentially contaminated water will be treated on-site before being discharged into stormwater drainage or contained and removed as contaminated waste if treatment is unavailable. All potentially contaminated water will be tested and reported to SynergyRED to verify the disposal option is suitable. Contaminated water including stormwater collected in storage bunds and water used in concrete washout, will be managed as controlled waste in accordance with relevant legislation.

J.1.7 Wet Weather

- Contractors will ensure that an inspection is undertaken at the site prior to and post inclement weather events. The inspection checks for any potential hazards and that materials are stowed away, secured and protected from stormwater and high winds.
- All drainage systems, trenching and chemical storage bunding will be inspected post heavy rainfall to ensure the integrity of these systems and assess where stormwater or contaminated water may need to be removed. The site boundary will be inspected to ensure any impacts to the surrounding environment external to the project footprint are identified and able to be responded to.

J.1.8 Hazardous Material, Contaminant and Emissions Containment

- Contractors will have a hazardous substances and dangerous goods process onsite that includes pre-authorisation of chemicals, maintenance of a hazardous substances register, dangerous goods manifest and safety data sheets (SDS).
- Where possible, chemicals will be stored in shaded locations protected from inclement weather, with liquid chemicals stored in impermeable bunds with a capacity of 110% the largest container stored. Bunding, chemical and fuel containing facilities will be inspected regularly for evidence of leaks or spills and be kept clean and free of residue, litter and stormwater.
- Hazardous substances and dangerous good inventories will be maintained such that only the minimum necessary quantities are maintained on-site. Spill response equipment suitable for the type, volume of chemicals and site conditions will be available and accessible at the storage and use locations.
- Work areas for painting and coating works will be established and appropriately contained so that no dust/fugitive paint escapes from the work area, in line with the *Environmental Protection (Metal Coating) Regulations 2001 (WA)*. Materials for abrasive blasting will be scrutinised prior to the activity commencing to identify possible contaminants from the activity.
- Contractors will undertake daily prestart inspections and regular maintenance of all vehicles, plant and equipment.
- Contractors will undertake refuelling at fuel stations or at designated refuelling locations on-site wherever practicable with spill containment measures in place throughout the activity, in addition to having a hydrocarbon spill kit available. No refuelling or servicing will occur within 50 m of a watercourse or wetland.
- All liquid fuel containing equipment such as generators, lighting towers, compressors and pumps will be bunded (or self-bunded), with hoses and connections that contain hydrocarbons being contained with bunding or double skinned with breakaway couplings/one-way valves. All mobile equipment with hydraulic hoses (e.g. cranes, elevated work platforms, bulldozers, excavators, drill rigs) will have a mobile spill kit onboard.
- No plant or vehicle servicing is to occur onsite unless unavoidable. Where unavoidable servicing on-site will be done in an area protected from stormwater ingress, with appropriate hydrocarbon containment, disposal and spill response equipment in place.
- If a spill were to occur on soil or other permeable surface, the contractor will remediate the site and provide evidence of adequate remediation, including photographs of clean up, soil analysis certificates by a NATA accredited laboratory of the removed soil and soil validation sampling and analysis.

J.2 Proposal Specifications

SynergyRED will implement the following design criteria and specifications to mitigate impacts on surface water and groundwater in relation to the construction and operation of the Proposal.

J.2.1 Construction Timing

- Construction, specifically early civils and dewatering activities will be scheduled to take place during the dry season (e.g between November to February and potentially through to April depending on conditions), where practicable. This is to minimise potential runoff, dewatering volumes and associated sediment control and vehicle access track requirements that accompany wet weather site management.

J.2.2 Stormwater Diversions

- There will be no diversion of key tributaries that currently flow through the Study Area and discharge to Scott River or Blackwood River (Figure 3-9).
- Stormwater flows will be diverted around the substation, office and concrete batching areas. Internal stormwater captured within these facilities will be directed to an on-site retention basin to intercept sediment before infiltrating internally and/or controlled discharge through the stormwater overflow designed to manage sediment removal and reduce stormwater velocity. This will ensure that surface water quality is not significantly impacted by construction or operational activities specific to the Proposal.

J.2.3 Civil and Drainage Design

- Alignment and design of access roads from public road to wind farm substation, turbines and other infrastructure will work to utilise existing tracks as much as possible and will be optimised with consideration for areas of inundation and key streams to limit hydrological impacts and potential road closure.
- Civil infrastructure will be located and designed to ensure specific risk-based flood vulnerability requirements have been addressed. Works within the 1% AEP flood extent filtered to 50 mm will be avoided where practicable. Where practicable, key infrastructure (substations, office buildings) to be located outside 1% AEP inundation area and have finished floor levels at least 300 mm above the 1% AEP flood level. Where any infrastructure (roads, buildings, substations) intercepts the flood extent, civil design will ensure predevelopment flow rates are maintained. Areas with flood depths exceeding 0.3 m are categorised as being of likely risk to infrastructure and public safety and will be considered as part of infrastructure resilience planning (Section 5.5.3).
- Drainage control structures (e.g., drains and culverts) will be appropriately located, designed, constructed and maintained to maintain the existing hydrological regime and minimise erosion.
- Velocities will be maintained below 2 m/s for areas upstream and downstream of disturbance areas, including at culvert inlet and outlets. Suitable erosion protection is to be installed in line with Austroads culvert apron sizing and stream stabilisation methodologies, as well as the recommended erosion threshold limits in Section 5.5.2. Where practicable, exposed soils are to be stabilised through suitable vegetation cover or protected using engineered erosion control measures where flow velocities exceed 1 m/s." Any temporary works during construction are to follow the Construction Environmental Management Plan.
- Design and construction works will ensure that local grading and excavation areas do not create areas of pooling water adjacent to constructed infrastructure that may lead to stagnation or eutrophication, including localised grading of access tracks and pads.
- Evacuation routes to vulnerable infrastructure such as substations and offices will be designed such that flooding over roads does not exceed a depth times velocity (D x V) of 0.6 (i.e. less than 0.5m flood depth and 2m/s velocity).
- Modification of existing drainage structures that contain or control the movement of soil or water (i.e. drains/levees/weirs/dam walls) will be avoided unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors.
- Suitable erosion protection will be installed in line with Austroads culvert apron sizing and stream stabilisation methodologies, as well as the recommended erosion threshold limits.

J.2.4 Waterway Protection Works

- Concrete batching areas, as well as areas for agitator washout and vehicle/plant washdown will be bunded and captured to prevent contamination of runoff to streams. No concrete slurry will be dumped on site or placed anywhere other than explicitly specified as part of the infrastructure development plan. Local stormwater runoff diversions to onsite retention basins will be implemented as above. Any liquid admixtures are to be stored as per Hazardous Material Containment specifications outlined in the section above.

- Location of any gravel borrow pits will avoid key streams, native vegetation and wetlands. Sediment barriers, silt curtains and geofabrics are to be installed to prevent exposed soils or gravel from being transported to key streams. Rehabilitation plans for the borrow pits are to be in line with the CEMP.
- The electrical substation and switchyard, operation and maintenance building and workshop, concrete batching area will be situated at least 50 m from known and potential GDE.

J.2.5 ASS & Dewatering Management

Any dewatering and/or acid sulfate management will be managed by the Acid Sulfate Soils and Dewatering Management Plan (ASSDMP), outlining suitable mitigation measures. This plan is expected to be in line with the relevant regulatory guidelines and objectives

- Synergy will adopt an alternative foundation design that requires shallower foundation supported by ground improvement via controlled modulus columns, these are installed using piling technology reducing the depth of dewatering from 5-6 m to 1-2 m.
- Synergy will infiltrate dewater as close to the source as possible, to limit drawdown.
- Synergy will not discharge any dewatered groundwater directly or indirectly to local waterways/wetlands.

J.2.6 Environmental and cultural heritage

- The constructionAdhere to the relevant SynergyRED mandatory environment and cultural heritage management measures to maintain surface and groundwater regimes (SYN-STD-ENV-0001 Rev. 2 July 2024).
- Develop, implement, and adhere to the appropriate Construction and Environmental Management Plan (CEMP), outlining suitable mitigation measures to reduce environmental harm during construction.

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Attachment 4 (RSD) -Appendix B

Preliminary Acid Sulfate Soils and Dewatering Management Plan

Proposed Wind Farm in Scott River

Preliminary Acid Sulfate Soils and Dewatering Management Plan

Synergy Renewable Energy Diversion

PTG/01489 | Rev E
10 September 2025

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Acronyms and Abbreviations

Abbreviations	Full Name
~	Approximately
>	Greater than
<	Less than
%	Per cent
%S	Percentage sulfur
µS/cm	Micro Siemens per centimetre
AASS	Actual acid sulfate soils
AHD	Australian Height Datum
ANC	Acid neutralising capacity
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guideline
AS/NZS	Australian Standard/New Zealand Standard
ASS	Acid sulfate soils
ASSDMP	Acid Sulfate Soils and Dewatering Management Plan
ASLP	Australian Standard Leaching Procedure
ATT	Attention
BSR	Basic summary of records
$CaCO_3$	Calcium carbonate
CF	Conversion Factor
Cl^-	Chloride
cm	Centimetre
CO_3^{2-}	Carbonate
DBCA	Department of Biodiversity, Conservation and Attractions
DO	Dissolved oxygen
DoH	Department of Health
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EC	Electrical conductivity
EIL	Ecological Investigation Level
ENV	Effective neutralising value
EPBC Act	*Environmental Protection, Biodiversity and Conservation Act 1999*
FWG	Freshwater Guidelines
GDA	Geocentric Datum of Australia
GDE	Groundwater Dependent Ecosystem
H^+/tonne	Hydrogen per tonne

Abbreviations	Full Name
HCO_3^-	Bicarbonate
HIL-A	Health Investigation Levels for residential
kL	Kilolitres
km	Kilometres
km^2	Square kilometres
L/s	Litres per second
LDWG	Livestock Drinking Water Guidelines
LIWG	Long-term Irrigation Water Guidelines
LOR	Limit of reporting
m	Metres
m^3	Cubic metres
m/d	Metres per day
m^3/d	Cubic metres per day
mbgl	Metres below ground level
mg/L	Milligrams per litre
MGA	Map Grid of Australia
mm	Millimetres
mol H^+/tonne	Moles of hydrogen per tonne
MW	MegaWatt
NASS	Non-acid Sulfate Soils
NATA	National Associated of Testing Authorities
NO_X-N	Nitrates and nitrites as nitrogen
NPUG	Non-potable Drinking Water Guidelines
PASS	Potential Acid Sulfate Soils
pH_F	Field pH
pH_{FOX}	Field peroxide pH
pH_{KCl}	Potassium chloride pH
pH_{OX}	Peroxide oxidised pH
PTG	PTG Consulting Pty Ltd
Pty Ltd	Proprietary Limited
PVC	Polyvinyl chloride
QAQC	Quality Assurance and Quality Control
Redox	Oxidation and reduction potential
RP	Reactive phosphorus
RPD	Relative percentage difference
SF	Safety factor
S_{NAS}	Sulfur – Net Acid Soluble

Abbreviations	Full Name
SO_4^{2-}	Sulfate
SPOS	Sulfur – Peroxide Oxidisable Sulfur
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
TA	Total alkalinity
TAA	Titratable actual acidity
TDS	total dissolved solids
TEC	Threatened Ecological Community
TKN	Total Kjeldahl nitrogen
TP	Total phosphorus
TSS	Total suspended solids
tonne/m^3	Tonne per cubic metre
the project	Proposed wind farm in Scott River
the site	Project area for the proposed wind farm in Scott River
TPA	Titratable peroxide acidity
TTA	Titratable total acidity
USEPA	United States Environmental Protection Agency
V	Volts
VEPA	Victorian Environmental Protection Agency

EXECUTIVE SUMMARY

Introduction

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) engaged PTG Consulting Pty Ltd (PTG) to support environmental approvals and management, with respect to Acid Sulfate Soils (ASS), for the proposed 100 MW wind farm (the "project") on the Scott River Plain, ~15 km northeast of Augusta, Western Australia (Figure 1, Appendix A).

The project site (Figure 1, Appendix A) occupies an area of ~3,596.8 hectares (ha) and comprises agricultural properties bound by Dennis Road to the east and Scott River Road to the west. The northern end is bordered by a fence line approximately 1.5 km south of the Brockman Highway, and the southern boundary extends approximately 1.5 km south of Governor Broome Road (the 'site').

The infrastructure for the project has not been finalised however the proposed works for the project are anticipated to include excavation of soil and potentially dewatering for the following:

- Construction of up to 20 wind turbine generators, up to 250 m in height, with two primary foundations being explored:
  - primary concrete foundations up to 0.8-1.2 metres below ground level (mbgl), supported by a series of concrete piles.
  - primary concrete foundations at the surface, supported by a series of concrete piles.
  - traditional below ground foundations up to 6 mbgl, whilst considered unlikely, may be considered where no dewatering is required and the ASS risk is considered low.
- Construction of a network of access roads for required infrastructure.
- Construction/installation of associated infrastructure including:
  - Electrical substation(s) and switchyard.
  - Operations and maintenance building and workshop.
  - Meteorological mast(s) and transmission poles and or towers and connecting power lines on foundations installed to depths ranging from 0.25-1.5 mbgl.
  - Buried electrical cabling connecting the turbines to substation(s).
- Construction of gravel borrow pits and extraction of associated material.

Proposed locations for the various project infrastructure are presented on Figure 1, Appendix A.

The site is mapped by the Department of Water and Environmental Regulation (DWER) as having a "high to moderate risk of ASS occurring within 3 m of natural soil surface" (NationalMap, 2025a). The site is mapped as being underlaid by alluvium (Qpd), a known ASS and reflected in the ASS risk mapping for the site. Preliminary investigations have identified alluvium across the site throughout the investigated soil profile, with a maximum net acidity of 2.1%S. Layers of ferricrete are also present on the site (Stantec, July 2024).

Due to the presence of ASS and estimated dewatering requirements being potentially high impact activities, i.e. risk to groundwater quality and groundwater dependent ecosystems (GDEs) (Stantec, August 2025), and subsequent development, an Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) is required to identify and manage the potential risks associated with construction in accordance with guidelines developed by the DWER. The ASSDMP has also been prepared to support environmental approvals for the project under the *Environmental Protection Act 1986*.

As the proposed infrastructure and layout for the project has not been finalised, this Preliminary ASSDMP presents the findings of a Preliminary ASS Assessment and details the proposed management framework, controls and monitoring procedures within which soil excavation, dewatering and discharge activities will be undertaken during construction, in-line with current Department of Water and Environmental Regulation (DWER) guidelines.

Upon completion of detailed engineering design, this Preliminary ASSDMP will be revised to reflect the final proposed design and detail additional investigation(s) completed to support the project.

This version of the Preliminary ASSDMP relates specifically to the construction of the project.

The major components of the earthworks and dewatering program are outlined in Table 0-1, providing context for the subsequent sections detailing ASS and groundwater management. This ASSDMP contains Management Strategies specific to the construction of the project.

Table 0-1: Earthworks Program

Component	Description
Turbine Construction	Up to 20 wind turbines, up to 250 m in height, will be constructed onsite. The works will involve the excavation and dewatering of in-situ soils. There are currently two primary foundation options being explored: Option 1 – Partially above ground foundation: would require foundations (~30 x 30 m in area) to be installed to depth of between 0.8-1.2 mbgl. The main gravity foundation would be supported by a series of concrete piles, which would be installed via concrete injected down augers to displace soils. Minimal soil from depth may be recovered when the auger is being removed as concrete is injected. Dewatering requirements would vary depending on the time of year and location of the turbine on-site. There may be up to ~1 m of dewatering required in summer, with up to ~2 m required in winter for a 3–4-week duration at each foundation. Option 2 – Fully above ground foundation: is similar to option 1 except the gravity foundation will be installed at the ground surface. As such there would be minimal excavation and no dewatering requirement. A third option, a traditional below ground foundation: is similar to option 1 except the gravity foundation will be installed completely below the ground surface. While considered unlikely at this stage, this option may be utilised, where it is confirmed prior to construction, through detailed site investigation and further modelling, that the proposed turbine location would not require dewatering that would present any risk to groundwater dependent values (i.e., drawdown greater than natural seasonal variation), and the potential risk associated with disturbance of ASS is considered low.
Underground services (e.g., cabling)	A network of underground electrical cabling will be required to be installed from each wind turbine to the substation(s). The electrical cabling will be installed at a depth of ~1.2 mbgl and require the excavation and potentially dewatering of in-situ soils.
Wind monitoring and communication towers	Foundations for wind monitoring and communication towers will involve the excavation and dewatering of in-situ soils similar to turbine construction but limited to depth of between 0.25-1.5 mbgl. Dewatering requirements would vary depending on the time of year, location and maximum depth of the foundation. There may be up to ~1 m of dewatering required in summer, with up to ~2 m required in winter for a 3–4-week duration at each foundation.
Transmission Poles and Towers	Western Power will be responsible for the installation of transmission poles and towers across the site. Foundations for the pole and towers will be concrete caisson (bored concrete) foundations, with displaced soil managed via the ASSDMP. No dewatering is required for these foundations however displaced water from the injection of concrete will be managed as per dewatering effluent in the ASSDMP.
Substation and Operations and maintenance area	Construction of support infrastructure may require the disturbance of insitu soils, and potentially dewatering for foundations and associated underground infrastructure, e.g. cabling, services.
Other supporting infrastructure (e.g., roads, temporary construction facilities)	A number of other supporting infrastructure will be required in support of the project, including, construction of site entrances and access roads, water storage infrastructure, public viewing area, and temporary construction facilities (e.g., site offices, laydown areas, and concrete batching plant). Minimal disturbance of insitu soils is anticipated in support of these components
Borrow pits	Local sourcing of gravel from borrow pits, should detailed geotechnical investigations confirm suitable source/s. Borrow pits will be excavated above the groundwater table and therefore no dewatering will be required.

Construction works will attempt to be scheduled for summer months where possible.

Findings

Soils across the site are predominately characterised as sand (pale grey) overlying a layer of ferricrete, which is likely discontinuous across the site, with dark brown/grey sands and clayey sands extending to depth. Exceedances of the net acidity management criteria were observed in all soil types, and across all depths, except pale grey sands.

Based upon the available information all soils, except shallow pale grey and white sands (<1 mbgl), will require active management and lime-neutralisation during construction where excavated.

Groundwater is slightly acidic and acidic to slightly acidic within the Leederville and Superficial Aquifers respectively and contain low concentrations of acid buffering capacity. Concentrations for dissolved aluminium (Superficial only), iron, manganese and zinc commonly exceed adopted guideline values, with concentrations of other metals typically below or marginally above the limit of reporting but below relevant guidelines. Dissolved metal concentrations are typically higher in the Superficial then Leederville Aquifer. Total nitrogen, total ammonia and total phosphorous concentrations reported in the Superficial Aquifer commonly exceeded adopted guidelines, with lower concentrations, which are predominately below adopted guidelines, observed in the Leederville Aquifer.

Based upon a review of the water quality results compared against the DWER ASS guidance, there is some evidence of acidification, i.e. low pH, especially in the Superficial Aquifer. The groundwater is recognised as being susceptible to further acidification should soils and dewatering not be managed appropriately during construction.

Surface water is slightly acidic to neutral (7.8 pH units) and contains measurable levels of acid buffering capacity. Concentrations for dissolved aluminium and iron commonly exceed adopted guideline values, with concentration of other metals typically below or marginally above the limit of reporting but below relevant guidelines. Total nitrogen, reactive phosphorous and total phosphorous concentrations reported in both wetland and creekline discharge samples commonly exceeded adopted guidelines, with isolated exceedances on total ammonia and oxidised nitrogen species.

Based upon a review of the surface water quality results compared against the DWER ASS guidance, there is minimal evidence of acidification. It is recognised however that surface water is at risk from impacts from acidification, should soils and dewatering effluent not be managed appropriately during construction.

Management

The outcomes of the preliminary ASS investigations have been assessed and preliminary management plans prepared for groundwater, surface water, dewatering effluent and soils (described herein) for the construction of the project.

Dewatering, Groundwater and Surface Water

Dewatering works will potentially be required during construction to support any excavation activities with the potential to interact with the water table, including the installation of foundations (i.e., wind turbines, wind monitoring and communication towers), and underground cabling, the proposed electrical substation, and operations and maintenance area. Dewatering requirements for other infrastructure is currently unknown. Transmissions poles/towers to be installed by Western Power are unlikely to require dewatering however groundwater will be displaced by concrete during the pouring of piles. The potential/volume of dewatering effluent is dependent on the time of year of construction and water levels at the time of construction.

Any dewatering effluent will likely require treatment in accordance with DWER guidelines (DWER, 2015b). Dewatering effluent would be required to be stored on-site after initial lime treatment (if required) prior to being recharged into the superficial aquifer. Where treatment is required, effluent will be pumped through an automated lime-dosing unit utilising calcium-based neutralising agent, i.e., hydrated lime, and discharged into a limestone lined settlement basin. The settlement basin will then overflow into unlined recharge areas/trenches. Infiltration basins/trenches will be positioned between the area under abstraction and any sensitive receptor(s) to limit potential impacts to receptors.

Monitoring works for groundwater, surface water[1], and dewatering effluent during and after construction have been detailed in accordance with the relevant DWER guidelines. Reporting provisions are also detailed.

Soils

Based upon the current proposed excavation depths, natural soils, except pale grey and white sands, exceed relevant DWER management criteria and will therefore require management and lime neutralisation upon disturbance. A summary of the management requirements, based upon the current proposed construction methodology and available information at the time of reporting, with respect to ASS is presented below in Table 0-2.

[1] Where groundwater decreases are observed >10 cm, 100 m from dewatering activities in the vicinity of surface water bodies

Table 0-2: ASS Management Summary

Soils Requiring Management	Depth* (mbgl)	Management Requirements
Sand – Dark grey/brown/black	All	Lime treatment and reuse onsite where possible Geotechnically unsuitable material to go for off-site disposal at licensed soil treatment facility and or used as non-structural fill.
Sandy clay – Pale and dark grey	>1.75	
Ferricrete	0.5-3.5	

Management Principles

The following management principles are to be promoted to limit the potential impact of oxidation and acid leaching for on-site soils.

1. The majority of the infrastructure for the wind farm will be installed into in-situ soils via open excavation and trenches. Soils requiring treatment will be:
    a. stockpiled prior to treatment on limestone pads. There are likely to be multiple treatment and stockpile locations given the area of development envelope, and distance between excavations.
        i. Where required, limestone pads will be constructed with crushed compacted[2] limestone, in accordance with DWER guidelines (2015b); i.e. ~300 mm thickness, with perimeter bunds (minimum 150 mm high)
        ii. The pad should be graded to a corner such that any leachate generated is contained/captured within the pad.
        iii. Where treatment on a limestone pad occurs, all soils are to be treated within 18 hours. Stockpiles must be <2 m in height;
    b. treated upon excavation (i.e. lime incorporated during excavation) and placed adjacent to the excavation, where possible;
2. Aglime will be incorporated into the material at the prescribed liming rate. Treated soils will either be reinterred, reused on-site.
3. In areas requiring soil management and treatment, soils at the base of excavations will be covered with a thin layer of aglime (~20 mm) as a precautionary measure to provide buffering capacity against minor releases of acidity.
4. Geotechnically unsuitable ASS material, where it cannot be used as non-structural fill onsite, will be disposed of offsite at a licensed soil treatment facility. All trucking and disposal documents must be kept and made available to SynergyRED at the end of works
5. During the works all material excavated and stockpiled, and or material imported to site, is to be stored an adequate distance away from waterways (creek/drainage lines) and wetlands, to minimise the potential for stockpile leachate/runoff entering such water bodies.

Responsibilities and Monitoring Schedule

The monitoring frequency and requirements for groundwater, dewater effluent, surface water, lime-treated soils and accumulated sediments are summarised in Table 0-3.

Table 0-3: Monitoring Program and Responsibilities

Monitoring Activity	Parameters	Responsibility
Dewatering Monitoring		
Daily	Field analysis: pH, EC, total titratable acidity (TTA), total alkalinity (TA) Flow meter reading	Civil Contractor/ Site Environment representative/ Specialist consultant
Weekly	Laboratory: total acidity, total alkalinity, pH	

[2] The level of compaction used should produce an appropriately low permeability to prevent infiltration of leachate (DWER, 2015b)

Monitoring Activity	Parameters	Responsibility
Fortnightly	Laboratory: ▪ DWER Full Analytical Suite[1]	
Groundwater Monitoring		
Pre Construction Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	Civil Contractor/ Site Environment representative/ Specialist consultant
Every second day	Field analysis: pH, EC, TTA, TA, standing water level	
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	
Immediately After Dewatering		
Post-Construction		Site Environment representative/ Specialist consultant
Surface Water Monitoring		
Pre Construction Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: ▪ DWER Full Analytical Suite[1] ▪ Turbidity	Civil Contractor/ Site Environment representative/ Specialist consultant
Level 1[2]		
Every second day	Standing water level	Civil Contractor/ Site Environment representative/ Specialist consultant
Level 2[3]		
Every second day	Standing water level Field analysis: pH, EC, TTA, TA	Civil Contractor/ Site Environment representative/ Specialist consultant
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: ▪ DWER Full Analytical Suite[1] ▪ Turbidity	
Immediately After Dewatering		
Post-Construction[4]		Site Environment representative/ Specialist consultant
Validation of Treated PASS Soils		
Collection of soil samples upon notification from site contractor	Laboratory: pH_F and pH_{FOX}, and SPOCAS[5]	Site Environment representative/ Specialist consultant
Accumulated Sediments		
Upon completion of dewatering, use of each settlement/recharge basin	Heavy metals	Site Environment representative/ Specialist consultant

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, total suspended solids (TSS), total dissolved solids (TDS), and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling. 2. Groundwater levels (at 100 m): >0.1 m at 100 m (outside natural decreases). 3. Groundwater decrease (outside natural decreases) adjacent to wetland and or deterioration in groundwater quality adjacent to wetland. 4. Only if Level 2 monitoring is undertaken. 5. Suspension Peroxide Oxidation Combined Acidity and Sulfur. ^ Within four weeks prior of dewatering commencing.

1. INTRODUCTION

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) engaged PTG Consulting Pty Ltd (PTG) to support environmental approvals and management, with respect to Acid Sulfate Soils (ASS), for the proposed 100 MW wind farm (the "project") on the Scott River Plain, ~15 km northeast of Augusta, Western Australia (Figure 1, Appendix A).

The project (Figure 1, Appendix A) occupies an area of ~3,596.8 hectares (ha) and comprises agricultural properties bound by Dennis Road to the east and Scott River Road to the west. The northern end is bordered by a fence line approximately 1.5 km south of the Brockman Highway, and the southern boundary extends approximately 1.5 km south of Governor Broome Road (the "site").

The infrastructure for the project has not been finalised however the proposed to works for the project are anticipated to include excavation of soil and potentially dewatering for the following:

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  - primary concrete foundations up to 0.8-1.2 metres below ground level (mbgl), supported by a series of concrete piles.
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  - Buried electrical cabling connecting the turbines to substation(s).
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The site is mapped by the Department of Water and Environmental Regulation (DWER) as having a "high to moderate risk of ASS occurring within 3 m of natural soil surface" (NationalMap, 2025a). The site is mapped as being underlaid by alluvium (Qpd), a known ASS and reflected in the ASS risk mapping for the site. Preliminary investigations have identified alluvium across the site throughout the investigated soil profile, with a maximum net acidity of 2.1%S. Layers of ferricrete are also present on the site (Stantec, July 2024).

Due to the presence of ASS and estimated dewatering requirements being potentially high impact activities, i.e. risk to groundwater quality and groundwater dependent ecosystems (GDEs) (Stantec, August 2025), and subsequent development, an Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) is required to identify and manage the potential risks associated with construction in accordance with guidelines developed by the DWER. The ASSDMP has also been prepared to support environmental approvals for the project under the *Environmental Protection Act 1986.*

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Upon completion of detailed engineering design, this ASSDMP will be revised to reflect the final proposed design and detail additional investigation(s) completed to support the project.

This version of the Preliminary ASSDMP relates specifically to the construction of the project.

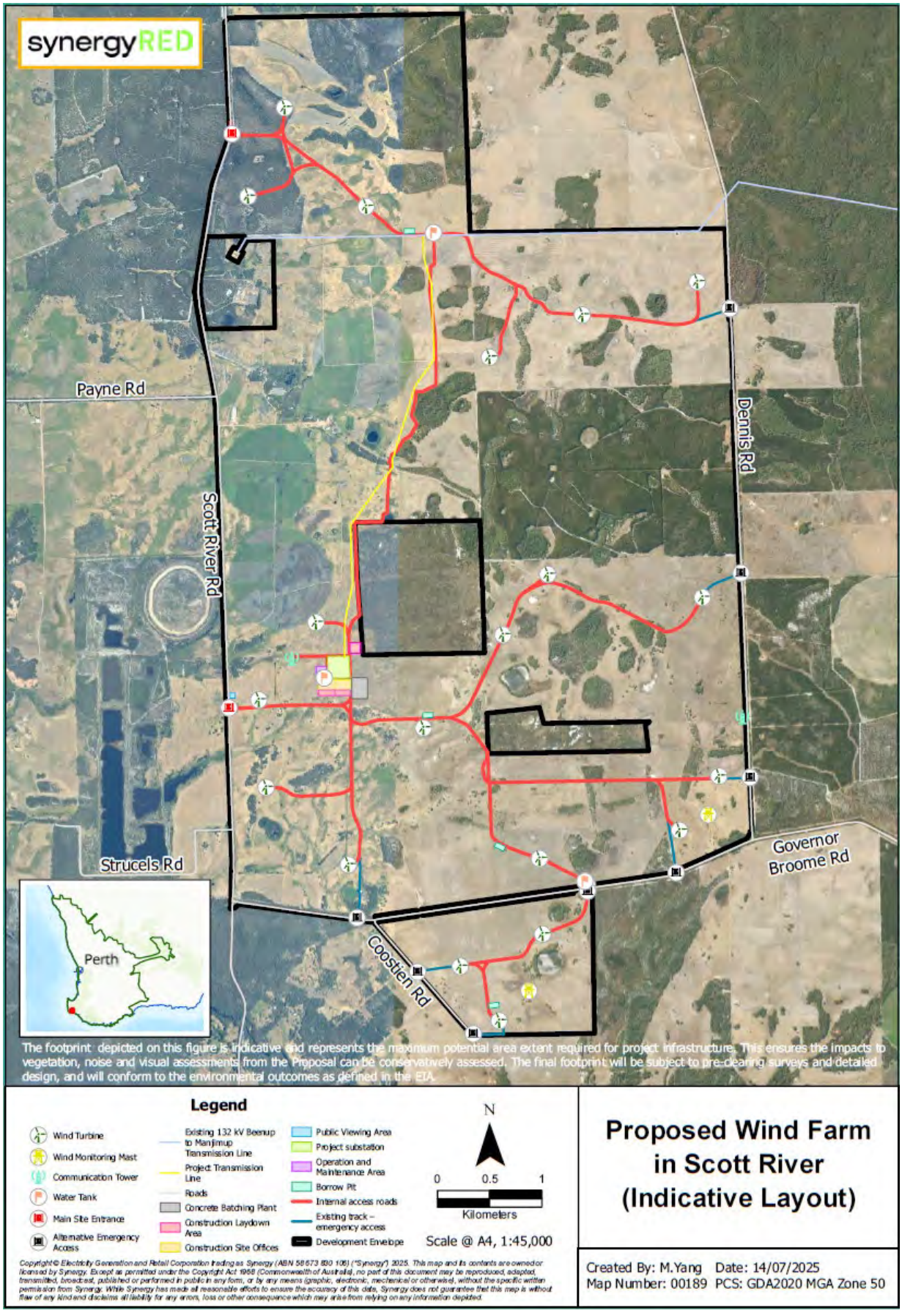

Figure 1-1: Indicative Project Layout

1.2 Acid Sulfate Soils – Definition

ASS are formed naturally under waterlogged, iron and sulfate-rich conditions, being typical of coastal lowlands where the land has been subject to inundation by sea water. These soils contain iron sulfide minerals (most commonly pyrite) or their oxidation products and remain stable under anaerobic conditions. Upon exposure to air however, they may be oxidised, with the result being the formation of sulfuric acid and the subsequent release of iron, aluminium and other heavy metals and nutrients from soils into surface water bodies and groundwater.

ASS as described above are the most commonly occurring form of acid generating soils encountered in Western Australia; however, a range of other acid generating soils that do not fit the traditional description of ASS may also be encountered during site investigations and can release a significant amount of acidity and/or iron when disturbed (DWER, 2015a).

Development of land containing ASS thereby introduces a risk of environmental harm that requires management. Earthmoving, dewatering and drainage works can result in exposure of these soils to oxidation either directly or indirectly through the lowering of the water table.

1.3 Scope and Objectives

The principal objectives for the Preliminary ASSDMP are to;

1. Present relevant soils, groundwater and surface water quality baseline data.
2. Detail the proposed soil and dewatering management programs to be adopted during construction.

Works undertaken for the Preliminary ASSDMP included:

- Detail findings of initial investigations.
- Estimate the potential dewatering rates and volumes based upon empirical groundwater modelling.
- Assess potential environmental impacts from proposed construction works that may result due to disturbing ASS (directly or indirectly) during excavation and or groundwater abstraction or disposal (dewatering effluent).
- Outline ASS and Dewatering Management Strategies for the construction works which detail:
    - Soil excavation, handling and stockpiling operations, including the neutralisation of acidity associated with ASS.
    - Treated soil validation testing programs.
    - Management of dewatering .
    - Soil, groundwater, surface water and dewatering monitoring programs.
    - Potential contingency measures and appropriate responses that may be implemented to rectify any breaches of nominated triggers and management measures.

1.4 Relevant Guidelines

The proposed scope of work was undertaken in accordance with applicable industry standards and guidelines to the extent relevant to an assessment of this type, and have been formulated in reference to the following (not limited to):

- *Assessment and management of contaminated sites – Contaminated Sites Guidelines* (DWER, 2021)
- *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (DWER, June 2015a)
- *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes* (DWER, June 2015b)

1.5 Standards of Assessment and Limitations

This assessment has been undertaken in general accordance with the current industry standards for the purpose, objectives and scope identified in this report.

The agreed scope of this assessment/management plan has been limited for the current purposes of SynergyRED. Conclusions and recommendations presented in this report are derived only from observations and results provided to PTG. Quality Assurance or Quality Control is limited to PTG data. This assessment report is not any of the following:

- A Preliminary Site Investigation (PSI) or Detailed Site Investigation (DSI) for contamination.
- A Voluntary Audit Report (VAR) or Mandatory Audit Report (MAR).

- A Geotechnical Report, and the bore logs or test pit logs may not be suitable as the basis for geotechnical advice.
- A detailed hydrogeological modelling assessment.
- An assessment of groundwater contamination potentially arising from other sources or sites nearby.
- A Remediation Action Plan (RAP) or Site Remediation and Validation (SRV) report.
- A Site Management Plan (SMP).

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 Site Identification

A summary of the site identification details is provided in Table 2-1, with the site layout and location presented on Figure 1, Appendix A.

Table 2-1: Site Identification Details

Element	Details			
Address	**Lot (Number)**	**Plan**	**Street**	**Suburb**
	4265 (598)	208480	Dennis Rd	Scott River
	4260 (119)	208478	Governor Broome Rd	
	1 (399)	D69685		
	4261	208478		
	4154	207769		
	4263	208478		
	100	38071		
	4152 (599)	207770	Scott River Rd	
	6 (527)	33923	Scott River Rd	Courtenay
	4266	208480		
	4269	209300		Scott River
	2	D90280	Scott River Rd	
Certificate of Title	**Lot**	**Volume**	**Folio**	
	4265 (598)	1581	567	
	4260 (119)	1824	96	
	1 (399)	1924	610	
	4261	1726	538	
	4154	1930	228	
	4263	1930	516	
	100	2555	699	
	4152 (599)	2027	165	
	6 (527)	2543	911	
	4266	1818	129	
	4269	1981	387	
	2	2082	107	
Site Boundary Coordinates (Map Grid of Australia (MGA), Geocentric Datum of Australia (GDA) 2020, Zone 50)	**Location**	**Easting**	**Northing**	
	Northwest	340,574	6,217,219	
	Southwest	340,531	6,208,580	
	Northeast	345,393	6,215,205	
	Southeast	345,653	6,209,332	

Element	Details
Site Area	~3,596.8 hectares (ha)
Traditional Owners	Bibulmun and Wardandi Noongar
Local Government Authority	Shire of Augusta-Margaret River
Current Zoning	General agriculture[1]

1. Shire of Augusta-Margaret River Local Planning Scheme 1 (Department of Planning, Lands and Heritage, 2024)

2.2 Site Layout and Surrounding Land Uses

Uhe site predominantly consists of cleared agricultural land and blue gum plantation, with areas of remnant vegetation . Surrounding land uses are presented below in Table 2-2 with the areas presented on Figure 1, Appendix A.

Table 2-2: Surrounding Land Uses

Direction	Land Use
North	General agricultural land (including remnant native vegetation), South Blackwood State Forest and Blackwood River National Park
South	General agricultural land, (including remnant native vegetation), Scott River, native vegetation.
East	General agricultural land (including remnant native vegetation), Blue gum plantation, Chester and Pagett Nature Reserves and South Blackwood State Forest
West	BHP Beenup Mineral Sands mine, general agricultural land (including remnant and native vegetation), Scott National Park, Blackwood River

2.3 Environmental Setting

The key details for the environmental setting, modified from Stantec, November 2024, of the site are summarised in Table 2-3.

Table 2-3: Environmental Setting

Setting	Description
Climate	The climate of the site is described as moderate Mediterranean, with mild wet winters and hot summers (Stantec, Nov 2024). The mean annual rainfall (1974-2024) from DWER rainfall gauge at Breenans Ford, ~1.6 km south of the site on the Scott River, is 949.6 mm (DWER, 2025b), with the majority of rainfall falling between April and September. The nearest Bureau of Meteorology (BoM) (BoM, 2025) weather station is located at Cape Leeuwin (station 9518), ~18.6 km southwest of the site, indicates a mean temperature range (1897 to 2025) of between 14.2 and 19.8°C with an annual mean rainfall (1897 to 2025) of 947.5 mm.
Topography	Locally across the site, there is a gradual increase in elevation from the southwest (as little as 9 m Australian Height Datum (mAHD) to the northeast (as great as 38 mAHD). There is a poorly defined drainage divide that runs approximately through the centre of the site, segregating the Blackwood and Scott River headwater catchments. There is an average slope from north to south of approximately 2.5 m/km and less than 1 m/km from east to west (Stantec, August 2025) (Figure 2, Appendix A)
Geology	The Geological Survey of Western Australia (1967) 1:250,000 scale; Busselton and Augusta map sheet indicate that the site is primarily underlain by Quaternary alluvium, comprising quartz-rich sand dunes and Cainozoic laterite. The Scott Coastal Plain is comprised of alluvial, lake, swamp, estuarine, and shoreline deposits unconformably overlying Mesozoic sediments (Leederville Formation of the Warnbro Group) and basalt flows or marine sediments of the Eocene. The nearby 1:50,000 scale Karridale – Tooker map sheet (The Geological Survey of Western Australia, 2002) suggests that the Leederville Formation, comprising interbedded sedimentary rock and associated units derived via weathering may be encountered during excavation, underlying the dune deposits and

Setting	Description
	laterite (ferricrete) across the site. The Leederville Formation is the only one of the three formations that comprise the Lower Cretaceous Warnbro Group to occur beneath the Scott Coastal Plain (Chan 2011). The Warnbro group was defined by BHP (1998, 2015) as a series of distinct lithological units comprising the Strucel Beds and Beenup Beds, which likely make up the Leederville Formation (Quindalup and Mowen Members) (Figure 2, Appendix A). Geology across the site comprises siliceous dune sands deposited unconformably on the Leederville Formation. Within the dune sands localised diagenetic features comprise organic stained siliceous sands, bleached siliceous sands, and shallow sands overlying ferricrete (also referred to as coffee rock). The main geological stratigraphic units encountered at the site are the Quaternary alluvium, lake and swamp deposits, the Early Cretaceous Leederville Formation and Triassic Lesueur Sandstone (Stantec, Nov 2024).
Acid Sulfate Soil Mapping and Conditions	Based on the DWER regional Acid Sulfate Soil (ASS) risk mapping (NationalMap, 2025a), the site is mapped "high risk of ASS occurring within 3 m of the natural soil surface" (Figure 3, Appendix A)[1]. Investigations by BHP for the adjacent Beenup Mine identified grey/dark grey sands/silts as containing pyrite (only sulfide mineral present) and mainly present as very fine-grained framboidal form, from below ~18 mAHD. Total sulfur concentrations ranged between 0.15 to 6%, with ~70% of samples >1%S, with the majority in the top few metres of the grey/dark grey sands/silts. Minerals effective in neutralising any acidity generated were not present in the grey/dark grey sands/silts (Environmental Geochemistry International Pty Ltd, 1993).
Hydrology	The site intersects the Lower Blackwood, Beenup and Scott Surface Water Management Areas which are known to be influenced by natural groundwater flows, supporting environmental values (DoW, 2016). Key surface water features in the region consist of historically modified catchments with artificial drains to facilitate the agricultural and plantation activities. These drains have not been built in a coordinated way and intersect with roads and natural drainage lines, resulting in several areas of localised ponding due to catchment modification. The site has a poorly defined ridgeline that runs approximately through the centre of the site, segregating 11 Blackwood and Scott River headwater catchments that discharge from the site. Sheet flow occurs across cleared land areas, concentrating into more defined streamflow paths towards the site boundary. There are several areas of natural ponding following rainfall events in areas designated as wetlands and in depressions formed by historical anthropogenic activities. The roads on almost every boundary of the site act as an impediment to flow paths and cause localised upstream ponding, apart from the southernmost catchment which sheet flows across agricultural land (Stantec, November 2024).
Hydrogeology	The regional Study Area is defined by three distinct hydrostratigraphic units within the Vasse Shelf; the Superficial, Leederville and Lesueur aquifers (Diamond, 2000) (Baddock ,1992, BHP, 1998, Schafer et. Al., 2008, Chan, 2011, BHP, 2015). The Superficial and Leederville Aquifer were encountered within the top 25 m of the site (Stantec, August 2025), with the Lesueur Sandstone aquifer a deeper confined aquifer generally ranging from between 50 metres below ground level (mbgl) to 420 mbgl. Regionally, a confining layer known as the Mowen aquitard separates the Superficial Aquifer from the underlying Leederville Aquifer. Excluding the coastal dunes, the Superficial Formation typically has a saturated thickness of less than 10 meters; however, across the western sections of the broader coastal plains, it is only a few meters thick (Diamond, 2000). The occurrence of the Superficial Aquifer is localised, including perched groundwater above impermeable beds of the Leederville Formation, and local confinement zones of low permeability in the laterite (ferricrete) profile (DoW, 2009). Regionally the Leederville Aquifer on the Vasse Shelf (between Busselton and Dunsborough faults) is confined and lies beneath the Superficial Formation of the coastal plains. It can be found at the surface in certain areas of the Blackwood Plateau, where it has been weathered and lateritised. The Mowen Aquitard is composed of the Quindalup and Mowen members, which are primarily made up of clay and silty clay units. As a combined unit, these members effectively integrate into the Leederville Aquifer, as a multi-layered aquifer, comprising discontinuous interbedded sequences of sand and clay, typically up to 100 m thick, and up to 200 m in some places. (DoW 2009).
Groundwater Level and Flow	Regional groundwater flow is generally from north to south, ultimately discharging downwards into the underlying formations, surface-water features such as the Scott River, and into the Southern Ocean (Chan, 2011). Groundwater monitoring undertaken by Stantec (Stantec, April 2025) between April 2024 and January 2025, with groundwater levels in the Superficial Aquifer (shallow bores) ranging from 0.56 m below top of collar (mbtoc) to 3.75 mbtoc (elevation ranged between 26.25 mAHD and 35.32 mAHD).

Setting	Description
	Groundwater level in the Leederville Aquifer (deep bores) ranged from 0.72 mbtoc to 2.94 mbtoc (elevation ranged between 28.03 mAHD and 35.52 mAHD). Groundwater levels recorded in the aquifers suggests a generally south-westerly to southerly flow in the Superficial Aquifer (Figure 2-1) and southern direction of flow in the Leederville Aquifer (Figure 2-2). Groundwater levels recorded in the bores fluctuated by 2 m to 3 m across all bores in response rainfall (Stantec, April 2025).
Groundwater Management Zone	The site intersects the Beenup Groundwater Management Subarea, and is also defined within the Blackwood Groundwater Management Area, Beenup Subarea of the South-West Groundwater Allocation Plan (Blackwood GMA Beenup Subarea). It also intersects with Groundwater Management Zone 7 which is defined as a "buffer zone area defined by acid sulfate soil plume from Beenup mine site" (DoW, 2009). The Beenup Mine has been subject to extensive management, remediation, and rehabilitation as a result of the formation of an acid rock drainage plume, caused by waste rock generating acidic groundwater. In addition, the Leederville Aquifer is now artificially connected to the Lesueur Sandstone formation throughout the Beenup Titanium Mine site as a result of mining activities. The contaminated groundwater flows south towards the Scott River and Hardy Inlet (DoW, 2009). As a consequence of the implementation of Groundwater Management Zone 7, water use from the Superficial, Leederville and Lesueur aquifers is restricted, meaning that no new water allocation and no new bores or excavations are permitted to be constructed in the Superficial or Leederville aquifers, within the management zone boundary, other than for exempt use, replacement of existing bores, monitoring purposes, or remediation (DoW, 2009) (Stantec, August 2025).
Groundwater Bores and License	Two groundwater abstraction licenses are present on the site, both located Lesueur Sandstone south aquifer and across the western lots of the site, with licenses for 1,650,00 kL and 66,300 kL (DWER, 2025d). There are 24 registered groundwater bores on, or within 500 m, of the site. Of these, 11 are registered as being subject to monitoring, one is registered for water supply, one is registered for stock and domestic use, and 11 are registered as Unknown (Stantec, August 2025).
Drinking Water Source Areas	The site is not situated within a public drinking water source area. The closest public drinking water source area is the Fisher Road Wellfield ~8.5 km west of the site which supplies the town of Augusta. Groundwater from the Fisher Road Wellfield is abstracted from the Lesueur Sandstone aquifer (DoW, 2007) The next closest is the Margaret River Catchment Area ~27 km north of the site.
Waterways	There are several ephemeral waterways located within the site primarily flowing from northeast to southwest towards the Blackwood River, located ~3.8 km to the west of the site, with a smaller proportion flowing in a southeasterly direction towards the Scott River located ~1 km south of the site (Figure 4, Appendix A). The Blackwood and Scott River flow into the Hardy Estuary at Augusta, which has a catchment of 23,000 km^2 and has the highest volume of discharge to the ocean of all the south-west estuaries. The majority of the volume comes from the Blackwood (Lower) and Scott Rivers (DWER, 2025b).
Wetlands	The site was historically a widespread wetland environment and was predominantly palusplain (seasonally waterlogged flats), characterised by a series of damplands and sumplands in varying condition (Phoenix in prep.-b; V & C Semeniuk Research Group 1997). Geomorphic wetlands in the site are also designated as an Environmentally Sensitive Area, gazetted under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* (Stantec, August 2025).

1. The most northern portion of the site is outside the DWER mapping area however given the consistent geological units, the area would be considered to have a moderate to high ASS risk.

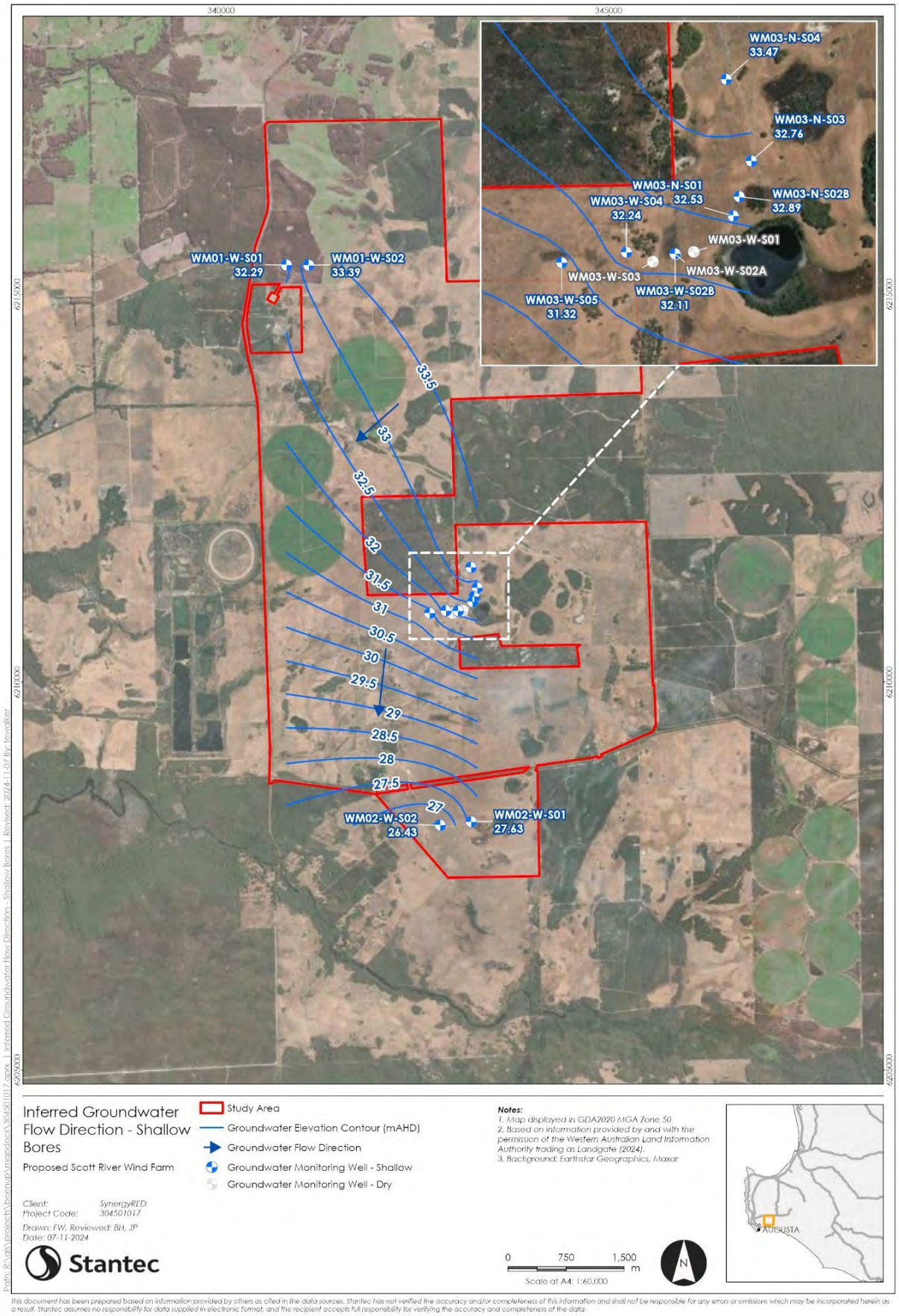

Figure 2-1: Superficial Aquifer Inferred Groundwater Flow Direction (Shallow Bores) (Stantec, August 2025)

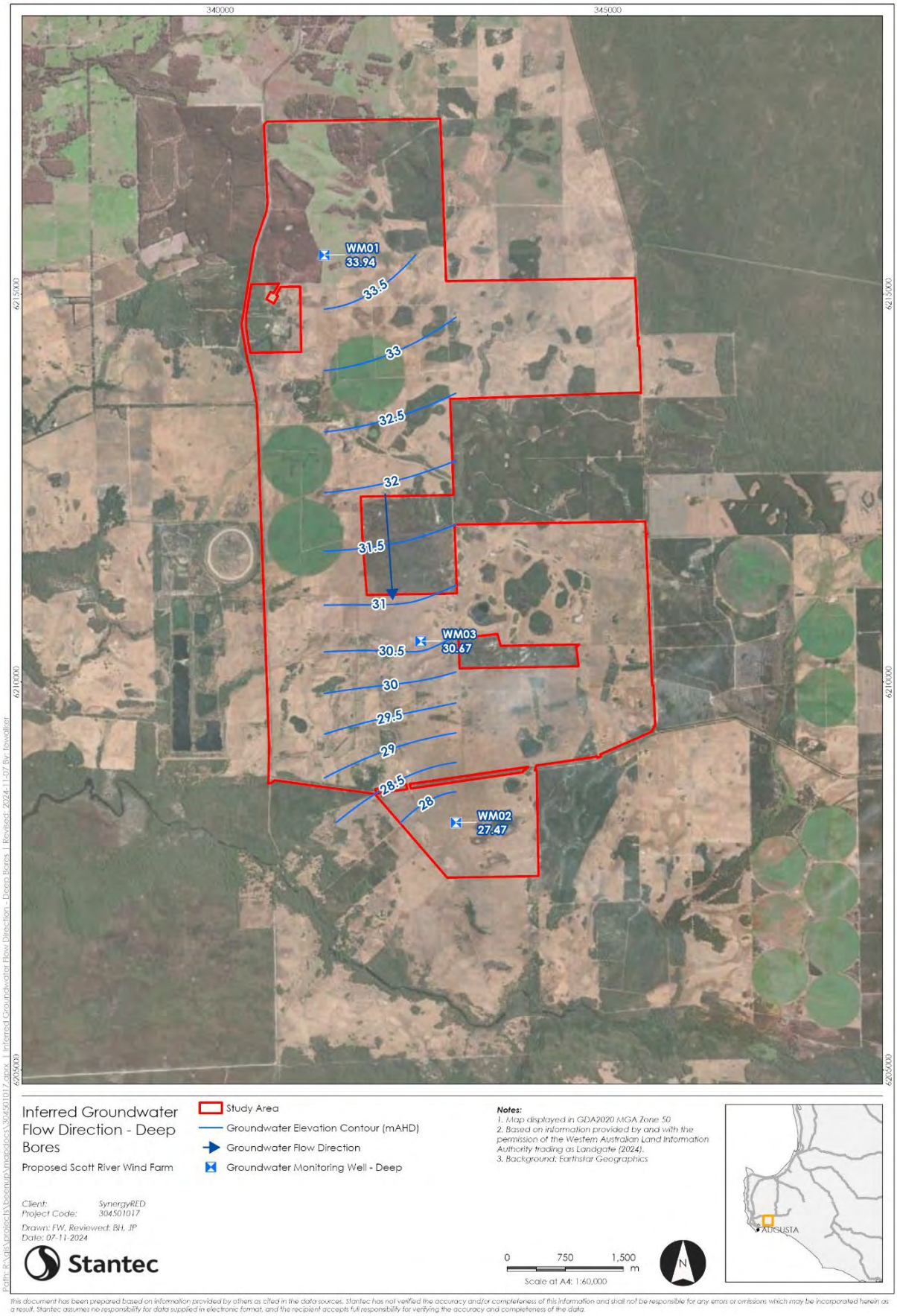

Figure 2-2: Leederville Aquifer Inferred Groundwater Flow Direction (Deep Bores) (Stantec, August 2025)

2.4 Sensitive Environmental Receptors

Table 2-4 below presents the sensitive environmental receptors within and surrounding the site and presented on Figure 2-3.

Table 2-4: Sensitive Environmental Receptors

Setting	Description
Surface Water Bodies	Refer Table 3-3 above for details on wetlands and waterways.
Groundwater Dependent Ecosystems (GDEs)	There are several known or potential GDEs (Figure 2-3), within the site (Stantec, August 2025) including: ▪ Four vegetation types recorded in the site are classified as, or analogous to, Scott River Threatened Ecological Community (TEC) (listed as Endangered), a 'known' obligate GDE (DBCA, 2023). This TEC occurs on red clay to clay loam soils and is seasonally inundated (DBCA, 2023). Vegetation generally includes heaths, shrublands and thickets, with representatives from the *Melaleuca, Hakea and Kunzea* genera dominant, and has a diverse annual flora community that comprises several endemic and restricted taxa. This "Scott River Ironstone Association" community is listed as a critically endangered ecological community under the *Biodiversity Conservation Act 2016* with the TEC are declared environmentally sensitive areas under the *Environmental Protection Act 1986*. Nationally the community is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (DBCA, 2023). ▪ Another three vegetation types recorded within the site have been classified as 'potential' facultative GDE as they were dominated by *Melaleuca preissiana* and *Melaleuca rhaphiophylla*, species considered to be facultative phreatophytes. ▪ The four confirmed and three potential groundwater-dependent vegetation types above, provide habitat for eleven flora taxa listed as either Threatened and Endangered, or Priority 1, Priority 3 or Priority 4. ▪ Several occurrences of another seven vegetation types within the site were recorded with incidental or non-dominant groundwater dependent flora species and where these species occur may have the potential to represent GDE. ▪ Most of the above known and potential groundwater dependent vegetation has been mapped growing in association with wetlands, although the remaining wetlands may also potentially be groundwater-dependent. The degree of connectivity between these wetlands and the shallow aquifer is currently unknown (Stantec, August 2025).
Flora and Fauna	A detailed flora study (Phoenix, 2025) was undertaken on-site. The survey identified 20 vegetation types, comprising of 18 native and 2 non-native vegetation types. Native vegetation covered 20.3% (790 ha) of the site, occurring as remnant patches mainly within farmland, and roadside vegetation corridors. Fifteen of the 18 native vegetation types were designated to have local or regional significance. Significant vegetation within this survey was classified under 4 categories: representative of a Threatened Ecological Community (TEC) (regionally significant), restricted vegetation types (locally significant), habitat for significant flora species types (locally significant) and groundwater dependent ecosystems (GDEs; locally significant). Four vegetation types were identified as analogous to the Scott River Ironstone TEC. Three vegetation types were identified as 'restricted'. Twelve vegetation types were identified as habitat for significant flora species. Seven vegetation types were identified as known or potential GDEs. In terms of vegetation condition, a very large proportion of the study area (79.4%) was classified as Completely Degraded, representing cleared areas and plantations. Native vegetation in the study area was in varying states of condition, with 279.1 ha (7.2% of the study area) containing remnant vegetation in Pristine or Excellent condition, and the rest being impacted by grazing or invasive species (with Very Good to Degraded condition ratings). A target fauna survey was undertaken on site (Phoenix in prep.-a). The fauna survey found that the site comprises mostly cleared areas interspersed with native wetland and woodland habitat remnants of varying size, condition and contribution to fauna values. The larger habitat patches are typically better quality and of higher value for vertebrate fauna than the smaller, more isolated remnants. Key habitat values in the site mainly relate to significant species such as the 3 Threatened black cockatoo species and Western Ringtail Possum, with one main habitat Marri-Jarrah-Peppermint woodland providing the highest value to these species. Even these values are relatively low compared with those likely to be present in the expansive, intact conservation reserves immediately north-east and south-west of the study area.

Setting	Description
	Observed use of the study area by black cockatoos was limited to foraging, with no evidence of breeding or night roosting recorded. Foraging habitat in the study area probably represents supplementary resources to the abundant habitats adjacent to the study area. Use of the site by Western Ringtail Possum appeared to be restricted to Marri-Jarrah-Peppermint woodland near its boundaries, where such habitat is contiguous with, or occurs near, larger intact remnants outside the site. The value of the wetlands in the study area to Migratory shorebirds is low relative to the higher value shorebird habitat elsewhere in the region, such as at the Hardy Inlet. Most wetland habitats in the study area are only of foraging value to Migratory shorebirds in spring and early summer, between their arrival in the Southwest and the drying out of most of the wetlands.

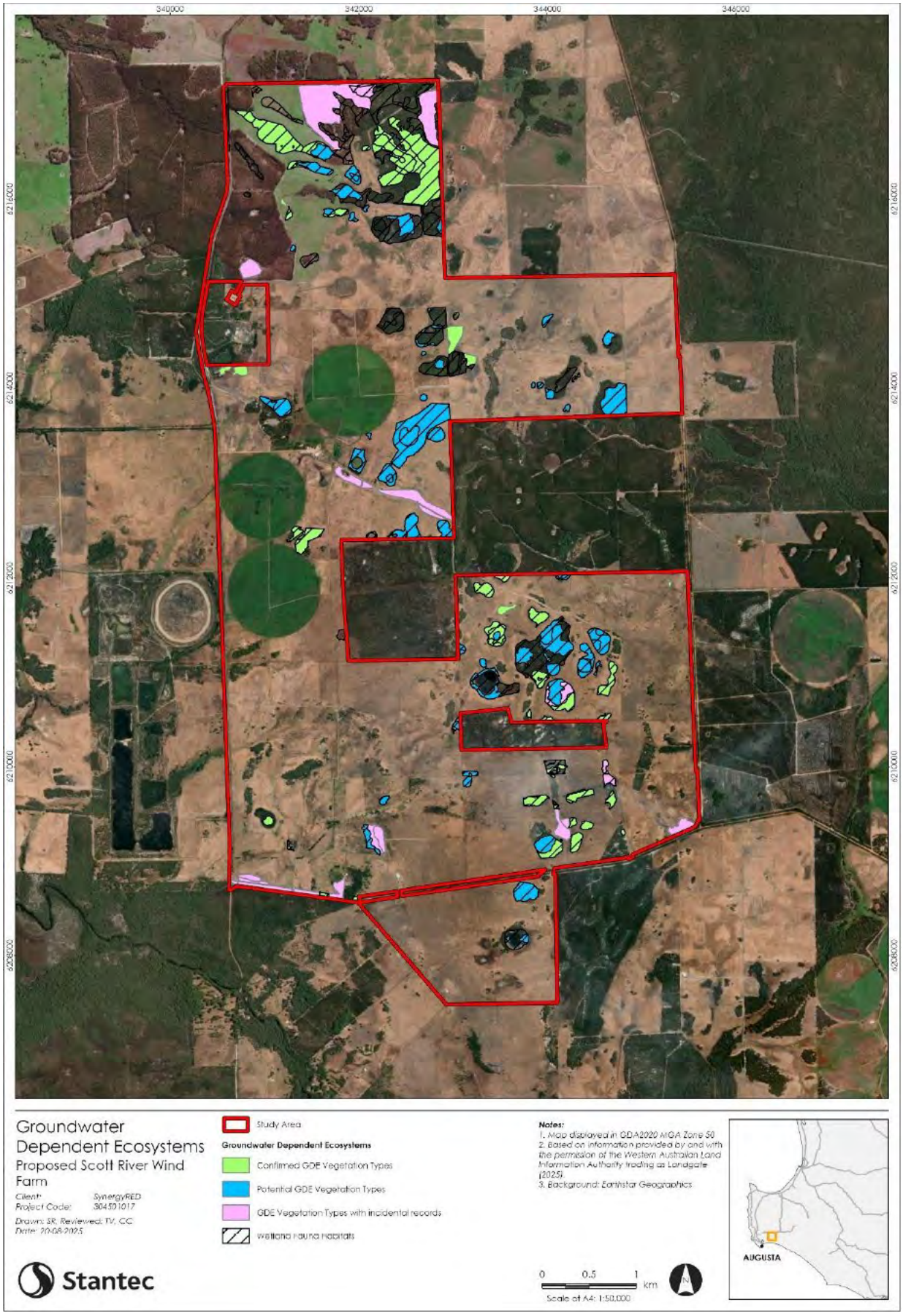

Figure 2-3: Confirmed and Potential Groundwater Dependent Values within the site (Stantec, August 2025)

2.5 Contaminated Sites

A review of the online DWER Contaminated Sites Database (DWER, 2025a) indicated the presence of contaminated sites at 886 (Lot 200 on Plan 36387) and 4254 (Lot 4254 on Plan 208478), Scott River Rd, Scott River, adjacent to the western side boundary (Figure 1, Appendix A). Note, the online Contaminated Sites Database only provides information on sites classified:

- contaminated - remediation required.
- contaminated - restricted use.
- remediated for restricted use.

Both contaminated sites are related to BHP's historic mining of heavy mineral sands at the Beenup Titanium mine, which is located to the west and hydraulically downgradient of the site. The DWER basic summary of records (BSR) (classified August 2018) indicates that the two lots are classified as "remediated for restricted use" due to the presence of elevated levels of acidity, sulphate and aluminium present in groundwater beneath the site.

Works involved the excavation of heavy mineral sands via dredging methods, and subsequent wet mineral separation and concentration, which disturbed PASS material. Remedial works associated with PASS were completed between 2000 and 2001, including treatment of the unsaturated zone with lime sand and addition of sand to materials returned to the dredge pond.

Groundwater and surface water assessments at the mine have identified metal and acidity-impacted groundwater generated by the disturbance of ASS at the site above freshwater and long-term irrigation guidelines at the time of classification. Fate and transport modelling of groundwater contaminants and a risk assessment indicate that groundwater concentrations do not pose an unacceptable risk to the environment, including downgradient receptors (Scott and Blackwood Rivers) or human health.

It is noted that other than for analytical testing or remediation, and except for groundwater abstraction from the existing licensed production bores on the northern boundary of Lot 4254 on Plan 208478, further groundwater abstraction is not permitted at 886 (Lot 200 on Plan 36387) Scott River Rd, Scott River.

2.6 Cultural Heritage

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (DPLH, 2025) identified that the Blackwood and Scott Rivers and associated tributaries are listed as a Registered Site and Lodged Heritage place respectively under the *Aboriginal Heritage Act 1972* (Appendix B).

3 PROPOSED DEVELOPMENT WORKS

The major development components are outlined in Table 3-1 and depicted in Figure 1-1, providing context for the subsequent sections detailing ASS and groundwater management. These works have been identified and detailed in consultation with SynergyRED. This preliminary ASSDMP contains Preliminary Operating Strategies specific to the proposed Scott River Wind Farm.

Table 3-1: Summary of Development Works

Component	Description
Turbine Construction	Up to 20 wind turbines, up to 250 m in height, will be constructed onsite. The works will involve the excavation and dewatering of in-situ soils. There are currently two primary foundation options being explored: Option 1 – Partially above ground foundation: would require foundations (~30 x 30 m in area) to be installed to depth of between 0.8-1.2 mbgl. The main gravity foundation would be supported by a series of concrete piles, which would be installed via concrete injected down augers to displace soils. Minimal soil from depth may be recovered when the auger is being removed as concrete is injected. Dewatering requirements would vary depending on the time of year and location of the turbine on-site. There may be up to ~1 m of dewatering required in summer, with up to ~2 m required in winter for a 3–4-week duration at each foundation. Option 2 – Fully above ground foundation: is similar to option 1 except the gravity foundation will be installed at the ground surface. As such there would be minimal excavation and no dewatering requirement. A third option, a traditional below ground foundation: is similar to option 1 except the gravity foundation will be installed completely below the ground surface. While considered unlikely at this stage, this option may be utilised, where it is confirmed prior to construction, through detailed site investigation and further modelling, that the proposed turbine location would not require dewatering that would present any risk to groundwater dependent values (i.e., drawdown greater than natural seasonal variation), and the potential risk associated with disturbance of ASS is considered low.
Underground services (e.g., cabling)	A network of underground electrical cabling will be required to be installed from each wind turbine to the substation(s). The electrical cabling will be installed at a depth of ~1.2 mbgl and require the excavation and potentially dewatering of in-situ soils.
Wind monitoring and communication towers	Foundations for wind monitoring and communication towers will involve the excavation and dewatering of in-situ soils similar to turbine construction but limited to depth of between 0.25-1.5 mbgl. Dewatering requirements would vary depending on the time of year, location and maximum depth of the foundation. There may be up to ~1 m of dewatering required in summer, with up to ~2 m required in winter for a 3–4-week duration at each foundation.
Transmission Poles and Towers	Western Power will be responsible for the installation of transmission poles and towers across the site. Foundations for the pole and towers will be concrete caisson (bored concrete) foundations, with displaced soil managed via the ASSDMP. No dewatering is required for these foundations however displaced water from the injection of concrete will be managed as per dewatering effluent in the ASSDMP.
Substation and Operations and maintenance area	Construction of support infrastructure may require the disturbance of insitu soils, and potentially dewatering for foundations and associated underground infrastructure, e.g. cabling, services.
Other supporting infrastructure (e.g., roads, temporary construction facilities)	A number of other supporting infrastructure will be required in support of the project, including, construction of site entrances and access roads, water storage infrastructure, public viewing area, and temporary construction facilities (e.g., site offices, laydown areas, and concrete batching plant). Minimal disturbance of insitu soils is anticipated in support of these components
Borrow pits	Local sourcing of gravel from borrow pits, should detailed geotechnical investigations confirm suitable source/s. Borrow pits will be excavated above the groundwater table and therefore no dewatering will be required.

Construction works will attempt to be scheduled for summer months where possible.

4 SITE INVESTIGATIONS

4.1 Soil

A preliminary ASS investigation was undertaken in February/March 2024 by Stantec as part of geotechnical investigations for the site (Stantec, July 2024). The scope of work completed whilst undertaking the soil investigation was:

- A soil sampling program comprising visual/olfactory inspection and laboratory analysis of soil samples taken from:
  - 20 test pit locations (TP01 to TP20) to a depth maximum depth of 2.1 mbgl
  - three deep boreholes (WM01 to WM03) to a maximum sampling depth of 10 mbgl.
- A total of 206 samples were collected from the 23 locations. All samples collected were subjected to "field measurements" of pH in water (pH_F) and field oxidised pH (pH_{FOX}), equivalent to one sample being field tested for every ~0.25 vertical metres investigated which is in line with DWER guidance (DWER, June 2015a)
- Comparison of field data results with applicable DWER indicator assessment criteria.
- Conducted selective laboratory analysis of 70 samples via the Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) suite method.

Soil sampling locations are provided in Figure 3, Appendix A, with sampling logs presented in Appendix C.

4.2 Groundwater

4.2.1 Scope and Sampling Locations

A total of 17 groundwater bores have been installed on-site by Stantec and form a monitoring network for the site (Figure 4, Appendix A) to assess groundwater quality and levels across the site, with the investigations primarily for understanding hydrogeological and hydrology on-site and not specifically for ASS. The on-site investigations entailed groundwater levels measurements from all 17 bores across the site and sampling of the following nine bores:

- Leederville Aquifer
  - WM01
  - WM02
  - WM03
- Superficial Aquifer
  - WM01-W-S01
  - WM01-W-S02
  - WM02-W-S01
  - WM02-W-S02
  - WM03-N-S03
  - WM03-W-S02B

4.2.2 Sampling Method and Analytical Suite

All bores have been measured for static water levels over four events (April, July and September 2024 and January 2025), with nine bores sampled (Section 5.2.1), via low-flow methods, i.e. peristaltic pump, and analysed in the field and at the laboratory for the following parameters[3] relative to ASS:

- Dissolved metals and metalloids: aluminium, arsenic, cadmium, chromium, iron, manganese, nickel, selenium, and zinc
- Physico-chemical parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction/oxidation (redox) potential
- Major cations: calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^{+}) and sodium (Na^{+})

[3] Not all parameters were analysed in all events

- Major anions: sulfate (SO_4^{2-}), chloride (Cl^-), alkalinity ((carbonate (CO_3^{2-}), bicarbonate (HCO_3^-) and hydroxide (OH^-))
- Nutrients: total phosphorus (TP), reactive phosphorus (RP), total nitrogen (TN), total kjeldahl nitrogen (TKN), total ammonia-N (NH_3+ NH_4-N), nitrates and nitrites (NO_X-N)
- Total dissolved solids (TDS).

Certain parameters (total iron and aluminium and acidity) from the nominated DWER groundwater suite (2015b) were not analysed, however this has not affected the overall assessment and sufficient to inform the ASSDMP. Ongoing baseline monitoring at a series of groundwater bores across the site is proposed for the nominated DWER groundwater suite (2015b) to provide a baseline data set prior to the commencement of works.

4.2.3 Groundwater Bore Installation Details

During the soil sampling program three deep groundwater monitoring bores (WM01-WM03) were installed by Stantec, with a further 14 shallow bores installed during a subsequent program (Figure 4, Appendix A).

Groundwater bores appear to have been installed in general accordance with the Minimum Construction Requirements for Water Bores in Australia (NUDLC, 2020) and the Water Quality Protection Note – Groundwater Monitoring Bores (DoW, 2006).

The screening intervals were placed at varying depths depending on the targeted geology, with the base of screens ranging from between 1.0 and 24.5 mbgl. The bores were screened using slotted 50 mm Class 18 PVC fitted with an end cap. The screen was packed with gravel and a bentonite seal placed above the screen. The soil profiles and bore construction details were logged during construction (Stantec, July 2024 and August 2025). Groundwater construction logs for the installed bores are presented in Appendix C and the locations provided in Figure 4, Appendix A, with a summary of the installation details presented below in Table 4-1, with the noted aquifer defined per the hydrogeological report (Stantec, August 2025).

Table 4-1: Bore Construction Details

Bore	Coordinates*		Top of Collar (mAHD)	Surface level (mAHD)	Depth (mbgl)	Screened interval (mbgl)	Aquifer
	Easting	Northing					
WM01	341,346	6,215,506	36.73	36.04	24.95	18.50 – 24.5	Leederville
WM01-W-S01	340,845	6,215,379	35.60	35.14	7.00	2.5 – 5.5	Superficial
WM01-W-S02	341,131	6,215,376	36.95	36.35	7.00	4.0 – 7.0	
WM02	343,044	6,208,189	29.22	28.57	24.95	12.50 – 24.5	Leederville
WM02-W-S01	343,227	6,208,201	29.52	28.92	4.50	1.5 – 4.0	Superficial
WM02-W-S02	342,828	6,208,156	28.09	27.45	6.0	3.0 – 6.0	
WM03	342,583	6,210,534	33.06	32.43	24.95	18.50 – 24.5	Leederville
WM03-N-S01	343,247	6,211,040	34.53	33.84	2.0	1.0 – 2.0	Superficial
WM03-N-S02B	343,266	6,211,102	34.38	33.71	1.00	0.5 - 1.0	
WM03-N-S03	343,304	6,211,217	34.65	34.00	3.0	1.5 – 3.0	
WM03-N-S04	343,224	6,211,480	35.39	34.79	1.90	0.9 – 1.9	
WM03-W-S01	343,119	6,210,924	34.37	33.67	1.00	0.4 – 1.0	
WM03-W-S02A	343,059	6,210,916	34.06	33.34	1.00	0.1 - 1.0	
WM03-W-S02B	343,059	6,210,918	34.02	33.35	3.00	1.0 – 3.0	
WM03-W-S03	342,987	6,210,892	34.51	33.87	1.00	0.4 – 1.0	
WM03-W-S04	342,902	6,210,923	33.70	33.14	2.00	1.5 – 2.0	
WM03-W-S05	342,693	6,210,889	33.07	32.50	4.5	1.5 – 4.5	

* GDA 94 MGA Zone 50

4.3 Surface Water

4.3.1 Scope and Sampling Locations

A total of eight surface water locations (Creekline Discharge: SW01-SW05 and wetlands: WM01-WL, WM02-WL and WM03-WL) have been sampled on-site by Stantec and form a monitoring network for the site (Figure 4, Appendix A) to assess surface water quality in several creeks and wetlands across the site, as detailed below, with the investigations primarily for understanding hydrogeological and hydrology on-site .

Sampling at all locations has been attempted during April, July and September 2024 and January 2025, however not locations contained surface water at the time of sampling (Stantec, April 2025). No sampling logs were available at the time of reporting.

A summary of the sampling program is presented in Table 4-2 below:

Table 4-2: Surface Water Sampling Summary

Id	Location Description	Coordinates*		Water Present/Sampled (✓/×)			
		Easting	Northing	April 24	July 24	Sept 24	Jan 25
Creekline Discharge							
SW01	Northeast boundary	345,146	6,216,210	×	×	✓	×
SW02	Western boundary	341,226	6,211,909	✓	✓	✓	✓
SW03	Easten boundary	345,580	6,209,394	×	✓	✓	×
SW04	Southeast boundary	345,505	6,211,598	×	✓	✓	×
SW05	Southwest boundary	341,534	6,208,684	×	✓	✓	×
Wetland							
WM01-WL	Wetland near WM01	341,467	6,215,363	×	✓	✓	×
WM02-WL	Wetland near WM02	343,671	6,208,174	×	✓	✓	✓
WM03-WL	Wetland near WM03	343,343	6,210,886	×	✓	✓	✓

* GDA 94 MGA Zone 50

4.3.2 Sampling Method and Analytical Suite

Surface water has been sampled via grab methods with parameters[4] analysed in field and laboratory for the following (relevant to ASS):

- Dissolved metals and metalloids: aluminium, arsenic, cadmium, chromium, iron, manganese, nickel, selenium, and zinc
- Physico-chemical parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction/oxidation (redox) potential
- Major cations: calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K+) and sodium (Na+)
- Major anions: sulfate (SO_4^{2-}), chloride (Cl^-), carbonate (CO_3^{2-}) and bicarbonate (HCO_3^-)
- Nutrients: total phosphorus (TP), reactive phosphorus (RP), total nitrogen (TN), total kjeldahl nitrogen (TKN) (calculated), total ammonia-N (NH_3+ NH_4-N), nitrates and nitrites (NO_X-N)
- Total dissolved solids (TDS)
- Turbidity.

Certain parameters (total iron and aluminium and acidity) from the nominated DWER surface water suite (2015b) were not analysed, however this has not affected the overall assessment and sufficient to inform the ASSDMP. Ongoing baseline monitoring is proposed to be undertaken for the project, for the nominated DWER surface water suite (2015b), to provide a baseline data set prior to the commencement of works.

[4] Not all parameters were analysed in all events

5 ASSESSMENT CRITERIA

5.1 Soil

Assessment criteria for ASS were adopted from the DWER guideline, *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (DWER, June 2015a) and *Treatment and Management of Soil and Water in Acid Sulfate Soils Landscapes* (DWER, June 2015b).

Table 5-1 below presents the indicative pH assessment criteria for ASS field test results.

Table 5-1: DWER Indicative pH Assessment Criteria for ASS

pH Measurement Type	AASS*	PASS^	Non-ASS (NASS)
pH_F	<4	>4	>4
pH_{FOX}	<4	<4	>4

* Actual ASS, ^ Potential ASS

Table 5-2 below presents the texture-based ASS action criteria for management. For excavation quantities of <1,000 tonnes ASS with ≥0.03 %S or ≥18 mol H+/tonne equivalent acidity a detailed management plan is required.

As further detail has not been provided on the total volume soil requiring excavation for the proposed project the most conservative action criteria have been applied.

Table 5-2: DWER ASS Management Action Criteria

Monitoring Activity		Action criteria (<1,000 tonnes)		Action criteria (>1,000 tonnes)	
		Existing + Potential Acidity		Existing + Potential acidity	
Texture	Approx. clay content	Equivalent sulfur	Equivalent acidity	Equivalent sulfur	Equivalent acidity
	(%<0.002 mm)	(%S)	(H^+/tonne)	(%S)	(H^+/tonne)
Coarse texture (sands to loamy sands)	≤5	0.03	18	0.03	18
Medium texture (sandy loams to light clays)	5–40	0.06	36	0.03	18
Fine texture (medium to heavy clays and silty clays)	≥40	0.10	62	0.03	18

5.2 Groundwater and Surface Water

Guideline levels for water quality were generally sourced from:

- Assessment and management of contaminated sites – Contaminated Sites Guidelines (DWER, 2021)
- Treatment and management of soil and water in acid sulfate soil landscapes (DWER, June 2015b).
- Guidelines for Fresh and Marine Water Quality (ANZG, 2023)

In cases where no guideline is reported, a guideline is sourced from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).

The guideline levels used for comparison with groundwater based upon ecological receptors and beneficial use are:

- Freshwater Guidelines (FWG) – South-west Australia wetland
- Long-term Irrigation Water Guidelines (LIWG)
- Livestock Drinking Water Guidelines (LDWG) - Cattle
- Acid Sulfate Soil (ASS) Indicator Parameters
- Non-potable Drinking Water Guidelines (NPUG).

Levels below the above stated criteria are generally inferred as safe. Levels that exceed the criteria should be used as a proxy for further investigation and assessment of the risk to humans or the environment, but do not necessarily signify environmental harm or risk of contamination.

6 RESULTS

6.1 Soils

6.1.1 Description

From the test pitting works, soil profiles encountered during the soil sampling exercise across the site may be generalised as; the shallow (<3 m) sub-surface profile generally comprised a thin layer of topsoil, overlying sand (of various silty fines fraction), often overlying iron cemented rock strength material (ferricrete). Where ferricrete was not encountered, further sand was present to termination depth though, some layers of rich organic materials were encountered (Stantec, July 2024).

From the boreholes the geology varied between the north (WM01) and the southern and central portions of the site (WM02 and WM03 respectively) (Figure 4, Appendix A).

A summary of the encountered soil profiles across the site is presented in Table 6-1.

Table 6-1: Soil Profile

Area	Soil Description
Northern	A thin layer of dune sands (< 1.6 m) was present immediately overlying saturated grey and dark grey, interbedded / alternating bands of clayey and sandy soils and frequent pockets of organic and peaty material.
Southern	A thin layer of dune sands (<1.0 m) was present overlying iron-cemented sands (ferricrete). The ferricrete was encountered as a 1.7 m thick, massive rock unit directly overlying weakly cemented organic rich sands. Residual sands and clays likely derived from the Leederville Formation were present underlying this unit.
Central	Similar to the southern area, though ferricrete was present only 0.35 m below surface, underlying topsoil and dune sands, and was encountered as a 2 m thick, massive rock unit. Weakly cemented organic rich sands were present directly beneath ferricrete, extending to 6.2 m before intersecting clayey and sandy soils likely residuals of the Leederville Formation.

Soil profiles for each location are presented in Appendix C.

6.1.2 ASS Findings

ASS results are presented on Table A, Appendix D, with laboratory documentation presented in Appendix E.

6.1.2.1 Field pH Parameters

Conclusions drawn from comparison of the field data with accepted DWER field assessment criteria (as outlined in Table 5-1) are as follows:

Table 6-2: pH_F and pH_{FOX} Summary

Indicative Classification	Number of Samples	Percentage of Total Samples
AASS (pH_F <4)	0	0%
PASS (pH_{FOX} <4)	139	67%
NASS	67	32%

The results show that the lowest reported pH (pH_F) prior to oxidation was 4.5 indicating that AASS were not present within the soils tested.

Following oxidation (pH_{FOX}) some pH values decreased to as low as pH 1.9. This suggests that oxidisable sulfur is likely to be present in the corresponding samples (where pH_{FOX} <3).

6.1.2.2 Confirmatory Assessment

Conclusions drawn from the ASS laboratory results (Table A, Appendix D) are summarised below in Table 6-3 to Table 6-5:

Table 6-3: ASS Summary

Analyte	Unit	Management Criteria	Number of Samples	Concentration (%S)			Number of Samples Exceeding Criteria (%)
				Minimum (Sample)	Mean	Maximum (Sample)	
SPOS	%S	>0.03	70	<0.005 (Numerous)	**0.17**	**1.9** (WM02-9.0)	43 (61%)
Net acidity*				<0.02 (Numerous)	**0.21**	**2.1** (WM02-9.0)	51 (73%)
TAA				<0.003 (Numerous)	**0.03**	**0.18** (WM02-9.0)	23 (33%)
TPA				<0.02 (Numerous)	**0.25**	**2.2** (WM02-9.0)	39 (56%)
S_{NAS}			2	<0.005 (WM03-3.50)	0.011	0.02 (WM02-9.0)	0 (0%)
pH_{KCl}	pH Units	Not Defined	70	4.3 (TP13–2.00)	5.3	7.3 (WM02-0.0)	N/A
pH_{OX}	pH Units	Not Defined		1.9 (WM02-9.0)	3.4	6.5 (TP03-0.0)	N/A
ANC	%S	Not Defined	0	Not tested			

* Excluding ANC. **Bold** denotes > criteria

Key findings from the above summary are presented below:

- SPOS was observed throughout the soil profile and the dominant form of acidity on-site.
- The majority of TPA present on-site is in the form of inorganic sulfur species, with elevated concentrations, with respect to SPOS, of acidity associated with organic acids or metal speciated acidity predominately present in the central portion of the site.
- There is no measurable ANC in the samples on-site.
- The calculated mean net acidity (excluding ANC) across all samples is 0.21%S, which exceeds the management criteria of 0.03%S.
- All investigation locations, except TP03, had at least one positive test results above the management criteria of 0.03%S.

Table 6-4 and Table 6-5 below provide a summary of the analytical data based upon geological units and depth, respectively.

Table 6-4: ASS Key Results Summary – Geological Units

Analyte	Unit	Sand – Pale Grey			Sand – Dark Brown/Grey			Sandy Clay			Ferricrete			Gravelly Sand		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
SPOS	%S	<0.005	0.007	0.014	<0.005	**0.21**	**1.9**	0.008	**0.28**	**1.3**	0.007	0.02	**0.05**	0.02	0.02	**0.03**
Net acidity*		<0.02	<0.02	0.023	<0.02	**0.25**	**2.1**	0.022	**1.4**	**0.31**	0.02	**0.04**	**0.09**	0.02	**0.04**	**0.06**
TAA		<0.003	0.007	0.014	<0.003	**0.04**	**0.18**	0.01	**0.03**	**0.12**	0.005	0.02	**0.08**	<0.003	0.02	0.028
TPA		<0.02	<0.02	<0.02	<0.02	**0.31**	**2.2**	**0.03**	**0.33**	**1.4**	0.02	**0.06**	**0.14**	<0.02		
S_{NAS}		-	-	-	<0.005	0.011	0.02	-	-	-	-	-	-	-	-	-
ANC		Not tested														
Number of samples		9			43			10			6			2		
Number of samples exceeding criteria		0			38			10			5			1		

* Excluding ANC. **Bold** denotes > criteria

Table 6-5: ASS Key Results Summary – Depth

Analyte	Unit	0-1 mbgl			1-2 mbgl			2-10 mbgl		
		Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
SPOS	%S	0.005	0.029	**0.15**	0.012	**0.08**	**0.21**	0.008	**0.41**	**1.9**
Net acidity*		<0.02	**0.05**	**0.20**	0.022	**0.13**	**0.29**	0.02	**0.45**	**2.1**
TAA		<0.003	0.02	**0.08**	0.009	**0.05**	**0.17**	0.01	**0.05**	**0.18**
TPA		<0.02	**0.07**	**1.2**	<0.02	**0.18**	**0.49**	**0.03**	**0.52**	**2.20**
S_{NAS}		0.006			0.006			<0.005	0.014	0.02
ANC	%S	Not tested								
Number of samples		38			6			26		
Number of samples exceeding criteria		22			5			26		

* Excluding ANC. **Bold** denotes > criteria

Key findings from the above summary are presented below:

- SPOS exceeds the management criteria in all the majority of soil units, with the dark grey/brown sands having the highest concentrations onsite.
- The mean net acidity of all soil types exceeded the management criteria, except pale grey sands.
- Soils contained no measurable acid neutralising capacity (ANC).
- Soils in the top 1 m pose a lower risk compared to deeper soils, especially those beyond 2 mbgl.
- The dark brown/grey sands and sandy clays (pale and dark grey) contain the highest concentrations of net acidity and SPOS observed on-site and are predominately located >2 mbgl.

6.1.3 Summary

Soils across the site are predominately characterised as sand (pale grey) overlying a layer of ferricrete, which is likely discontinuous across the site, with dark brown/grey sands and clayey sands extending to the depth of investigation.

The data supports a conclusion that ASS is present at the site in all the soil profiles, except shallow pale grey/white sands (<1 mbgl), with the dark grey/brown sands and sandy clay >2 mbgl exhibiting, the highest risk soils onsite. All soils exceeding the guidelines, with the exception of the shallow pale grey/white sands (<1 mbgl), will require management and lime-neutralisation during construction to manage the risk of acidification in line with DWER guidelines (2015b).

Whilst all soil types and across all depths, except shallow pale grey/white sands (<1 mbgl), exceeded the relevant DWER action management criteria and will require management and lime-neutralisation should these soils be disturbed, soils predominantly >2 mbgl pose the highest risk on-site, due to elevated concentrations of inorganic sulfur. Under the current proposed design, soils at this depth are unlikely to be disturbed either via excavation and or dewatering, except for minor volumes recovered when the auger is pulled up whilst injecting concrete to construct piles.

6.2 Groundwater

The following presents a summary of the monitoring completed to date relevant to ASS and preparation of this ASSDMP, which entails groundwater levels and flow from across the site and sampling results from nine bores (three deep and six shallow) undertaken by Stantec between April 2024 and January 2025.

6.2.1 Groundwater Elevation and Flow

Groundwater monitoring undertaken by Stantec (Stantec, August 2025) between April 2024 and September 2024, which typically represents the groundwater water level at its lowest and highest, respectively, with groundwater level in the Superficial Aquifer (shallow bores) ranging from 0.23 - 3.15 mbgl (elevation ranged between 26.25 mAHD and 35.32 mAHD). Groundwater level in the Leederville Aquifer (deep bores) ranged from 0.53 - 2.78 mbtoc (elevation ranged between 28.03 mAHD and 35.52 mAHD) (Table 6-6). The groundwater flow is in a general southerly direction in the Leederville Aquifer. The groundwater flow in the Superficial Aquifer is generally south-westerly and southerly in the north and central and southern portions of the site, respectively.

Table 6-6: Depth to Water and Static Water Levels

Bore	Top of Collar (mAHD)	Surface level (mAHD)	Apr-24		Sep-24	
			Depth to Water (mbgl)	Groundwater Elevation (mAHD)	Depth to Water (mbgl)	Groundwater Elevation (mAHD)
Leederville Aquifer						
WM01	36.73	36.04	2.25	33.79	0.53	35.51
WM02	29.22	28.57	2.78	25.79	0.72	27.85
WM03	33.06	32.43	1.21	31.22	0.70	31.73
Superficial Aquifer						
WM01-W-S01	35.60	35.14	0.63	34.51	0.74	34.4
WM01-W-S02	36.95	36.35	1.89	34.46	0.62	35.73
WM02-W-S01	29.52	28.92	3.15	25.77	1.04	27.88
WM02-W-S02	28.09	27.45	1.30	26.15	0.63	26.82
WM03-N-S01	34.53	33.84	1.46	32.38	0.61	33.23
WM03-N-S03	34.65	34.00	1.35	32.65	0.30	33.7
WM03-N-S04	35.39	34.79	1.38	33.41	0.58	34.21
WM03-W-S01	34.37	33.67	-	-	0.68	32.99
WM03-W-S03	34.51	33.87	-	-	0.66	33.21
WM03-W-S04	33.70	33.14	0.99	32.15	0.23	32.91
WM03-W-S05	33.07	32.50	1.20	31.3	0.47	32.03

6.2.2 Groundwater Quality Findings

Groundwater conditions were assessed from the nine groundwater monitoring bores sampled (Section 5.2.1), across the site (Figure 4). Groundwater results presented in Table B (Appendix D).

6.2.2.1 Physical Parameters

A summary of field observations from the ongoing baseline investigation are presented in Table 6-7 below.

Table 6-7: Groundwater Physical Parameters Summary

Parameter	Unit	Leederville Aquifer			Superficial Aquifer		
		Min	Mean	Max	Min	Mean	Max
pH	pH units	5.9	6.3	6.8	3.7	5.5	6.6
EC	µS/cm	266	447	633	296	636	2,740
Redox	mV	6	55	169	-161	29	317
DO	mg/L	0.06	0.7	2.9	0.07	0.7	6.6

6.2.2.2 Analytical results

A summary of key ASS parameters and guideline exceedances for the site is provided below in Table 6-8 and Table 6-9 for the Leederville and Superficial Aquifers respectively.

Table 6-8: Groundwater Analytical Results Summary – Leederville Aquifer

Analyte	Unit	Concentrations			Guideline Noncompliance	Noncompliant Bores
		Min (Bore)	Mean	Max (Bore)		
pH	pH units	**5.1** (WM01)	**5.8**	**6.2** (WM03)	ASS (<6), FWG (7.0-8.5)	ASS and FWG – All
EC	µS/cm	266 (WM01)	447	633 (WM02)	-	
TDS	mg/L	178 (WM01)	246	332 (WM02)	N/A	N/A
Alkalinity	mg/L	11 (WM01)	21	34 (WM03)	N/A	N/A
Chloride	mg/L	72 (WM01)	142	207 (WM02)	-	-
Sulfate	mg/L	5 (WM01)	9	15 (WM02)	-	-
Sulfate:Chloride	N/A	0.04 (WM02)	0.07	0.11 (WM03)	-	-
Aluminium	mg/L	<0.01 (All)	0.016	0.05 (WM03)	-	-
Arsenic	mg/L	<0.001 (All)	<0.001	0.002 (WM02)	-	-
Iron	mg/L	<0.05 (WM01, WM02)	**4.3**	**14.9** (WM02)	LIWG (0.2), NPUG (0.3)	LIWG and NPUG – All
Manganese	mg/L	0.06 (WM01)	0.25	**0.61** (WM02)	LIWG (0.2)	WM02, WM03
Nickel	mg/L	<0.001 (WM02)	0.004	**0.012** (WM03)	FWG (0.011)	WM03
Zinc	mg/L	<0.005 (WM01, WM02)	**0.008**	**0.021** (WM03)	FWG (0.008)	WM01, WM03
Total Phosphorus	mg/L	<0.01 (WM01, WM03)	0.04	**0.1** (WM02)	FWG (0.065)	WM02
Total Nitrogen	mg/L	0.2 (WM02)	0.3	0.6 (WM01)	-	-
Total Ammonia	mg/L	<0.01 (WM01)	0.1	0.17 (WM03)	-	-
Nitrate and Nitrite	mg/L	<0.01 (All)	0.06	**0.36** (WM03)	FWG (0.1)	WM03

Bold denotes guideline noncompliance. N/A – Not applicable. All metals are dissolved concentrations. Freshwater Guidelines (FWG) – South-west Australia wetland; Long-term Irrigation Water Guidelines (LIWG); Livestock Drinking Water Guidelines (LDWG) – Cattle; Acid Sulfate Soil (ASS) Indicator Parameters ; Non-potable Drinking Water Guidelines (NPUG).

Table 6-9: Groundwater Analytical Results Summary – Superficial Aquifer

Analyte	Unit	Concentrations			Guideline Noncompliance	Noncompliant Bores
		Min (Bore)	Mean	Max (Bore)		
pH	pH units	**4.6** (WM01-W-S01)	**5.6**	**6.4** (WM02-W-S02)	ASS (<6), FWG (7.0-8.5)	ASS and FWG – All
EC	µS/cm	296 (WM01-W-S02)	636	**2,740** (WM03-W-S02B)	LIWG (2,300)	WM03-W-S02B
TDS	mg/L	173 (WM01-W-S01)	388	822 (WM03-W-S02B)	N/A	N/A
Alkalinity	mg/L	<1 (Numerous)	14	59 (WM03-N-S03)	N/A	N/A
Chloride	mg/L	59 (WM01-W-S01)	153	320 (WM03-W-S02B)	NPUG (250)	WM03-W-S02B
Sulfate	mg/L	3 (WM02-W-S02)	44	109 (WM03-W-S02B)	-	-
Sulfate: Chloride	N/A	0.02 (WM02-W-S02)	0.32	0.68 (WM01-W-S01)	ASS (>0.5)	WM01-W-S01
Aluminium	mg/L	<0.01 (Numerous)	**0.29**	**2.2** (WM03-N-S03)	FWG (0.055) NPUG (0.2) ASS (1)	FWG – WM01-W-S02, WM02-W-S01, WM03-N-S03, WM03-W-S02B NPUG - WM03-N-S03, WM03-W-S02B ASS - WM03-N-S03, WM03-W-S02B
Arsenic	mg/L	<0.001 (All)	<0.001	0.006 (WM03-N-S03)	-	-
Iron	mg/L	<0.05 (Numerous)	**8.1**	**30.2** (WM02-W0S02)	LIWG (0.2) NPUG (0.3)	LIWG – All NPUG - All
Manganese	mg/L	0.015 (WM03-N-S03)	0.15	**0.44** (WM01-W-S01)	LIWG (0.2)	WM01-W-S01, WM02-W-S02, WM03-W-S02B
Nickel	mg/L	<0.001 (Numerous)	<0.001	**0.004** (WM01-W-S01)	-	-
Zinc	mg/L	<0.005 (Numerous)	0.008	**0.03** (WM01-W-S01)	FWG (0.008)	WM01-W-S01
Total Phosphorus	mg/L	<0.01 (Numerous)	**0.2**	**1.06** (WM01-S-S02)	FWG (0.065)	WM01-W-S01, WM01-W-S02, WM02-W-S02, WM03-N-S03, WM03-W-S02B
Total Nitrogen	mg/L	0.1 (WM01-W-S01)	**3.7**	**42** (WM03-N-S03)	FWG (1.5) LIWG (9)	FWG - WM01-W-S01, WM01-W-S02, WM02-W-S01, WM03-N-S03, WM03-W-S02B

Analyte	Unit	Concentrations			Guideline Noncompliance	Noncompliant Bores
		Min (Bore)	Mean	Max (Bore)		
						LIWG - WM03-N-S03, WM03-W-S02B
Total Ammonia	mg/L	<0.01 (WM01-W-S01)	**2.3**	**35.1** (WM03-N-S03)	NPUG (0.41) FWG (2.57)	NPUG - WM02-W-S01, WM03-N-S03, WM03-W-S02B FWG - WM03-N-S03
Nitrate and Nitrite	mg/L	<0.01 (All)	**0.28**	**5.97** (WM03-N-S03)	FWG (0.1)	WM02-W-S02, WM03-N-S03

Bold denotes guideline noncompliance. N/A – Not applicable. All metals are dissolved concentrations. Results not presented where all results were below the limit of reporting. Freshwater Guidelines (FWG) – South-west Australia wetland; Long-term Irrigation Water Guidelines (LIWG); Livestock Drinking Water Guidelines (LDWG) – Cattle; Acid Sulfate Soil (ASS) Indicator Parameters ; Non-potable Drinking Water Guidelines (NPUG).

6.2.3 Summary

Groundwater is slightly acidic and acidic to slightly acidic within the Leederville and Superficial Aquifers respectively, both containing low concentrations of acid buffering capacity. Concentrations for dissolved aluminium (Superficial only), iron, manganese and zinc commonly exceed adopted guideline values, with concentration of other metals typically below or marginally above the limit of reporting but below relevant guidelines. Dissolved metal concentrations are typically higher in the Superficial then Leederville Aquifer. Total nitrogen, total ammonia and total phosphorous concentrations reported in the Superficial Aquifer commonly exceeded adopted guidelines, with lower concentrations, which are predominately below adopted guidelines, observed in the Leederville Aquifer.

Based upon a review of the water quality results compared against the DWER ASS guidance, there is some evidence of acidification, i.e. low pH, especially in the Superficial Aquifer.

The groundwater is recognised as being susceptible to further acidification should soils and dewatering not be managed appropriately during construction.

6.3 Surface Water

6.3.1 Surface Water Quality Findings

Surface water conditions were assessed from the nine surface water locations sampled (Section 5.2.1), across the site (Figure 4, Appendix A). Surface water results presented in Table C (Appendix D).

6.3.1.1 Physical Parameters

A summary of field observations from the baseline investigation are presented in Table 6-10 below.

Table 6-10: Surface Water Physical Parameters Summary

Parameter	Unit	Creekline Discharge			Wetland		
		Min	Mean	Max	Min	Mean	Max
pH	pH units	6.4	7.1	7.4	6.1	6.4	7.3
EC	µS/cm	438	750	1,284	256	1,086	3,415
Redox	mV	-37	26	62	5	49	108
DO	mg/L	4.26	7.06	9.1	3.12	6.29	11.42

6.3.1.2 Analytical results

A summary of key ASS parameters and guideline exceedances for the site is provided below in Table 6-11 and Table 6-12 for the creekline discharge and wetlands respectively.

Table 6-11: Surface Water Analytical Results Summary – Creekline Discharge

Analyte	Unit	Concentrations			Guideline Noncompliance	Noncompliant Location(s)
		Min (Location)	Mean	Max (Location)		
pH	pH units	**6.4** (SW04)	**7.1**	**7.54** (SW04)	FWG (7.0-8.5)	SW02, SW03, SW04, SW05
EC	µS/cm	438 (SW03)	751	1,284 (SW02)	-	-
TDS	mg/L	269 (SW01)	504	619 (SW02)	N/A	N/A
TSS	NTU	21 (SW04)	72	180 (SW05)	N/A	N/A
Alkalinity	mg/L	55 (SW04)	113	175 (SW01)	N/A	N/A
Chloride	mg/L	56 (SW01)	207	326 (SW02)	NPUG (250)	SW02
Sulfate	mg/L	<5 (SW01)	34	47 (SW02)	-	-
Sulfate:Chloride	N/A	0.08 (SW04)	0.13	0.25 (SW03)	-	-
Aluminium	mg/L	<0.01 (SW02)	0.05	**0.14** (SW04)	FWG (0.055)	SW01, SW03, SW04
Arsenic	mg/L	<0.001 (SW01-SW04)	<0.001	0.001 (SW05)		
Iron	mg/L	0.28 (SW03)	**2.08**	**8.63** (SW03)	LIWG (0.2), NPUG (0.3)	LIWG, NPUG - All
Manganese	mg/L	<0.001 (SW01)	0.06	0.18 (SW05)	-	-
Total Phosphorus	mg/L	0.06 (SW02)	**0.83**	**6.23** (SW05)	FWG (0.065)	SW02, SW03, SW04, SW05
Reactive Phosphorus	mg/L	<0.01 (SW02)	0.08	**0.33** (SW04)	FWG (0.03)	SW02, SW04, SW5
Total Nitrogen	mg/L	1.3 (SW02)	**5.7**	**12.6** (SW05)	FWG (1.5) LIWG (5)	FWG - All LIWG – SW02, SW03, SW05
Total Ammonia	mg/L	<0.01 (SW01)	**1.48**	**4.61** (SW02)	NPUG (0.41) FWG (2.57)	NPUG, FWG: SW02
Nitrate and Nitrite	mg/L	<0.01 (SW02, SW04)	**0.21**	**1.23** (SW05)	FWG (0.1)	SW02, SW05

Bold denotes guideline noncompliance. N/A – Not applicable. All metals are dissolved concentrations. Results not presented where all results were below the limit of reporting. Freshwater Guidelines (FWG) – South-west Australia wetland; Long-term Irrigation Water Guidelines (LIWG); Livestock Drinking Water Guidelines (LDWG) – Cattle; Acid Sulfate Soil (ASS) Indicator Parameters ; Non-potable Drinking Water Guidelines (NPUG).

Table 6-12: Surface Water Analytical Results Summary – Wetland

Analyte	Unit	Concentrations			Guideline Noncompliance	Noncompliant Location(s)
		Min (Location)	Mean	Max (Location)		
pH	pH units	**6.1** (WM03-WL)	**6.4**	**7.3** (WM02-WL)	FWG (7.0-8.5)	FWG – All
EC	µS/cm	256 (WM01-WL)	1,089	**3,415** (WM03-WL)	LIWG (2,300)	WM03-WL
TDS	mg/L	214 (WM01-WL)	826	**2,240** (WM03-WL)	LIWG (1,500)	WM03-WL
Turbidity	NTU	2 (WM03-WL)	24	55 (WM02-WL)	N/A	N/A
Alkalinity	mg/L	17 (WM01-WL)	52	82 (WM02-WL)	N/A	N/A
Chloride	mg/L	86 (WM01-WL)	356	942 (WM03-WL)	NPUG (250) LWIG (710)	NPUG – WM02-WL, WM03-WL, LIWG – WM03-WL
Sulfate	mg/L	<5 (WM02-WL)	22	<50 (WM03-WL)	-	-
Sulfate: Chloride	N/A	0.01 (WM02-WL)	0.08	0.16 (WM03-WL)	-	-
Aluminium	mg/L	0.03 (WM01-WL)	**0.46**	**1.47** (WM03-N-S03)	FWG (0.055), NPUG (0.2), ASS (1)	FWG – All, NPUG – WM01-WL, WM03-WL, ASS – WM03-WL
Iron	mg/L	0.12 (WM01-WL)	**1.6**	**6.3** (WM03-WL)	LIWG (0.2), NPUG (0.3)	LIWG – All, NPUG - All
Manganese	mg/L	0.009 (WM03-WL)	0.03	0.078 (WM03-WL)	-	-
Zinc	mg/L	<0.005 (All)	<0.005	0.007 (WM03-WL)	-	-
Total Phosphorus	mg/L	**0.17** (WM02-WL)	**1.59**	**6.53** (WM03-WL)	FWG (0.065)	All
Reactive Phosphorus	mg/L	**0.09** (WM02-WL)	1.72	**6.1** (WM03-WL)	FWG (0.03)	All
Total Nitrogen	mg/L	**2.7** (WM02-WL)	**5.6**	**12.5** (WM03-WL)	FWG (1.5), LIWG (5)	FWG – All, LIWG – WM02-WL, WM03-WL,
Total Ammonia	mg/L	0.03 (WM02-WL)	0.17	**0.5** (WM01-WL)	NPUG (0.41)	NPUG – WM01-WL
Nitrate and Nitrite	mg/L	<0.01 (WM02-WL)	0.04	**0.11** (WM03-WL)	FWG (0.1)	WM03-WL

Bold denotes guideline noncompliance. N/A – Not applicable. All metals are dissolved concentrations. Freshwater Guidelines (FWG) – South-west Australia wetland; Long-term Irrigation Water Guidelines (LIWG); Livestock Drinking Water Guidelines (LDWG) – Cattle; Acid Sulfate Soil (ASS) Indicator Parameters ; Non-potable Drinking Water Guidelines (NPUG).

6.3.2 Summary

Surface water is slightly acidic to neutral (7.8 pH units) and contains measurable levels of acid buffering capacity. Concentrations for dissolved aluminium and iron commonly exceed adopted guideline values, with concentration of other metals typically below or marginally above the limit of reporting but below relevant guidelines. Total nitrogen, reactive phosphorous and total phosphorous concentrations reported in both wetland and creekline discharge samples commonly exceeded adopted guidelines, with isolated exceedances on total ammonia and oxidised nitrogen species.

Based upon a review of the surface water quality results compared against the DWER ASS guidance, there is minimal evidence of acidification.

It is recognised however that surface water is at risk from impacts from acidification, should soils and dewatering effluent not be managed appropriately during construction.

7 GROUNDWATER MODELLING

A preliminary estimation of potential dewatering volumes for the construction of foundations for the turbines and wind monitoring and communication towers has been undertaken by Stantec (August 2025). A summary of the modelling inputs, assumptions and results are presented below. Note the extent of drawdown and pumping rates will be dependent on the water levels at the time of construction.

7.1 Approach

Groundwater time-varying drawdown extent has been based upon Cooper-Jacob equation (Kruseman and de Ridder, 1994), with the Dupuit-Thiem model used to evaluate distance-drawdown and Marinelli and Niccoli (2000) model used to evaluate inflows in steady state conditions.

7.2 Drawdown Modelling Assumptions

7.2.1 General Model Inputs

The following general modelling inputs applied to both time-variant and steady-state models:

- Models rely on limited data and are based on conservative estimates.
- Excavation dimensions will be:
  - Turbines: 30 m by 30 m, depth 0.8-1.2 mbgl.
  - Meteorological tower (Met mast): maximum dimensions – 1.8 m by 1.8 m, depth 1.5 mbgl.
- The models assume that the entire sub-surface is fully saturated from ground surface level.
- To provide dry working conditions across the excavation, groundwater was assumed to be lowered to a maximum depth of approximately:
  - Turbines: 2 mbgl.
  - Meteorological tower: 3 mbgl.
- Horizontal hydraulic conductivity (based on Domenico and Schwartz 1990) was assigned as two zones to enable flexibility across the site, with regards to potential infrastructure placement (Figure 7-1):
  - Zone 1 (bore group WM01): dominant sandy clay (typical silt, clay range) aquifer was assigned 0.5 m/d.
  - Zone 2 (All other locations): dominant sand (typical fine sand range) aquifer was conservatively set to 20 m/day.
  - Transition zone: assigned to highlight an arbitrary boundary between the two zones and was estimated based on the limited soil bores and test pits in the northern area. The transition zone approximately circles the WM01 bore group and extends toward two proposed turbine locations in the north.

7.2.2 Time-Variant Inflow

The following model assumptions have been made in evaluating time-variant groundwater inflow and drawdown:

- For the Cooper-Jacob model the aquifer was unconfined, infinite, homogeneous, isotropic, uniform thickness and pumped at an initial time variant pumping rate attain the target drawdown.
- Five days of initial pumping to attain the target drawdown (which may vary per location). followed by steady-state pumping to maintain the target drawdown to satisfy the excavation development and typical 28-day curing of the concrete. Total dewatering is 33 days. The actual time needed to achieve the target groundwater drawdown may vary between excavation sites; it could be shorter or longer than five days, depending on conditions.
- The discharge is from a single, small diameter bore that is fully penetrating.
- Aquifer thickness was set to 20 m to satisfy the model equations.
- A specific yield of:
  - Zone 1: sandy clay or clayey sand 5% (based on silt) (Morris and Johnson, 1967).
  - Zone 2: sand 20% (based on typical sand) (Heath, 1983).

7.2.3 Steady-State Inflow & Distance-Drawdown

The following model assumptions have been made in evaluating steady-state groundwater inflow and drawdown:

- Aquifer was infinite, homogeneous and anisotropic in both zones (Marinelli and Niccoli 2000).
- For the Dupuit-Thiem model,
  - the aquifer was considered unconfined and was evaluated for steady-state constant daily discharge to maintain the target drawdown.
  - flat initial water table with pumping from a fully penetrating bore under steady-state conditions.
- For the Marinelli and Niccoli model
  - recharge was 30% of the average annual rainfall of 933 mm for the nearest BoM station (Scott River).
  - vertical conductivity was assumed to be half of the horizontal hydraulic conductivity, to account for a matrix comprised of sand.
- No sheet piling or cut off walls are used.

7.3 Results

7.3.1 Drawdown

The potential dewatering drawdown extents are presented in Table 7-1 and visually in Figure 7-1 with potential drawdown, on GDEs and social receptors presented in Figure 7-2 and Figure 7-3, respectively.

Table 7-1: Predicted Drawdown Distances

Structure Type	Maximum Depth of Drawdown (m)*	Location	Predicted Distance-Drawdown (m)			
			>3 m	2 m	1 m	0.5 m
Turbine	2	North (Zone 1)	9.5	17	31	43
		Central/South (Zone 2)	5	17	60	117
Meteorological tower	3	North (Zone 1)	N/A			
		Central/South (Zone 2)	1	6	34	86

* At edge of excavation. N/A not applicable. Meteorological tower not currently proposed in the north. Distances are reported as the radius from the centre of an excavation. Note: Communication Towers will have similar drawdown requirement to the meteorological tower.

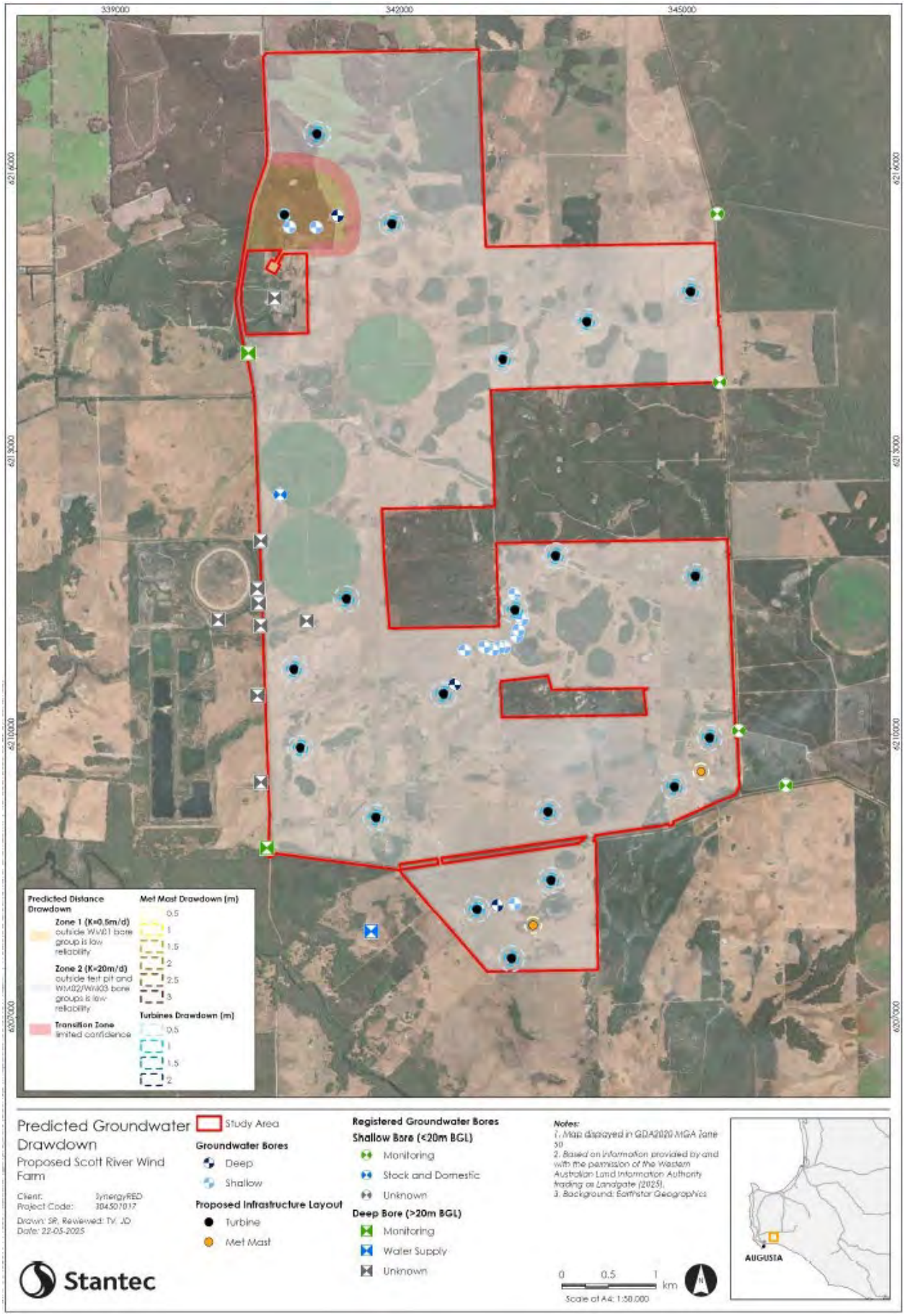

Figure 7-1: Predicted Groundwater Drawdown (Stantec, August 2025)

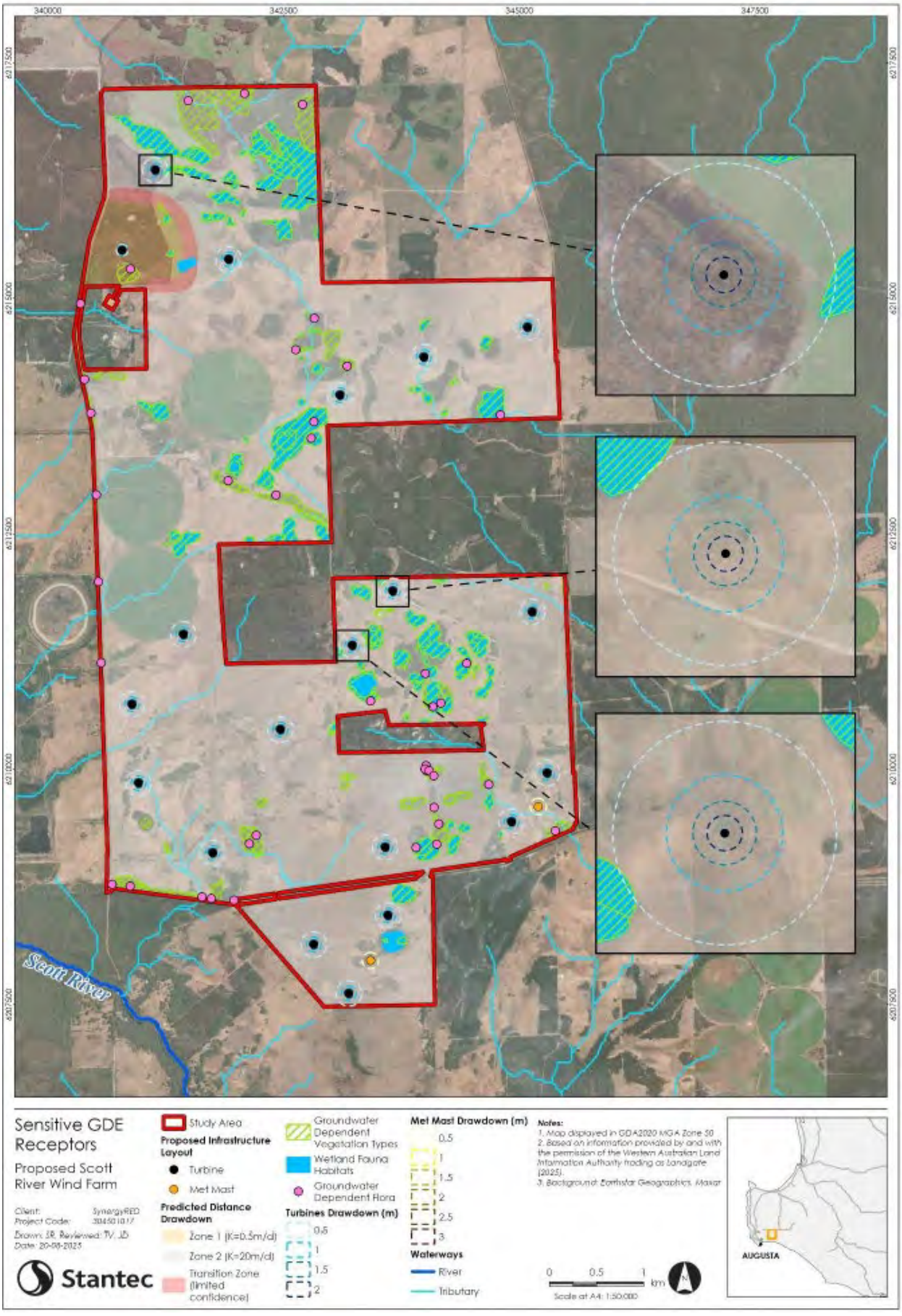

Figure 7-2: Predicted Groundwater Drawdown – GDEs (Stantec, August 2025)

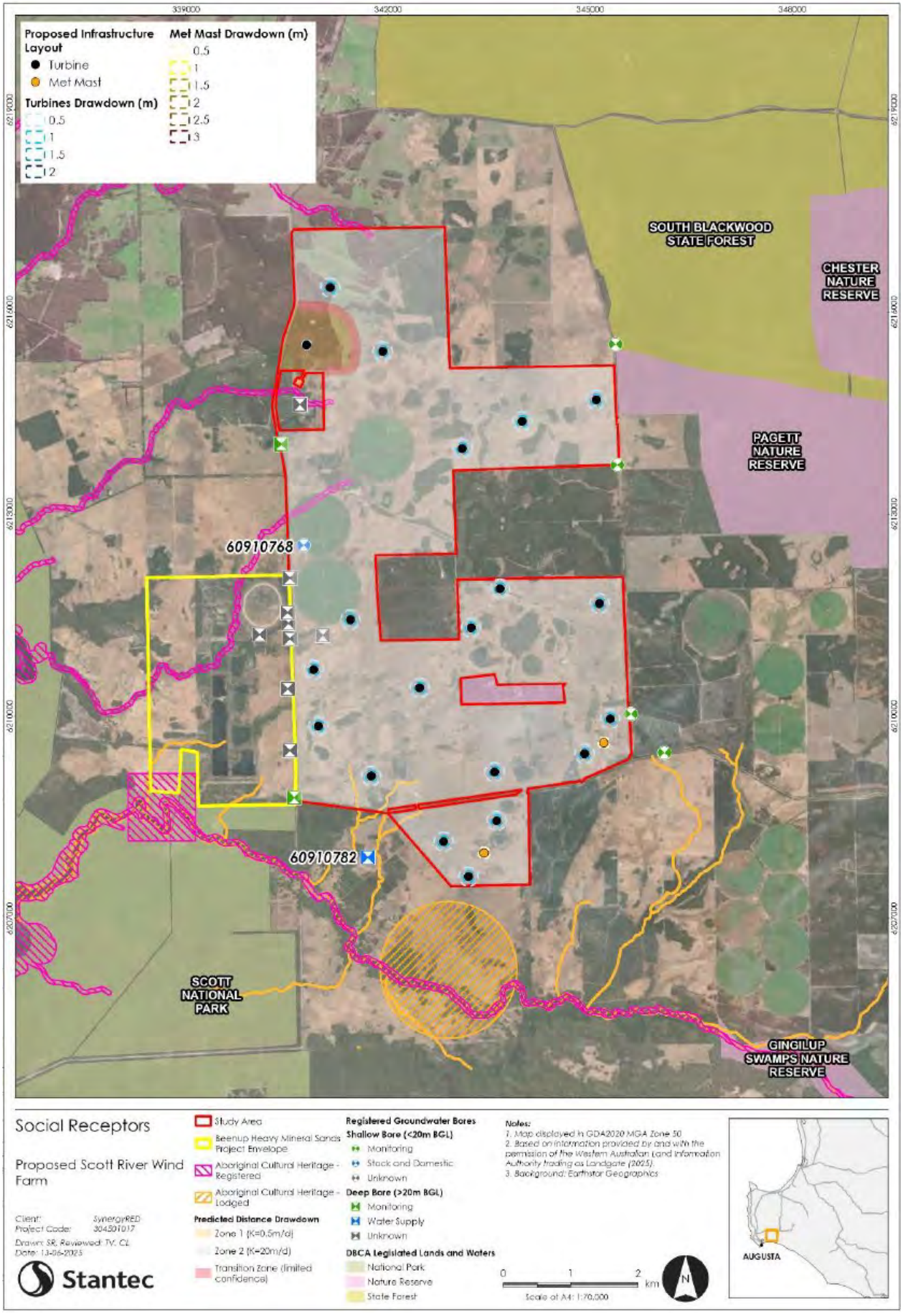

Figure 7-3: Predicted Groundwater Drawdown – Social Receptors (Stantec, August 2025)

7.3.2 Time-Variant Pumping (Cooper-Jacob model)

The elapsed time to attain the targeted drawdown depends upon the pumping rate. For the meteorological tower and turbines in zone 2 (K=20 m/d), to achieve the target drawdown at 5 days the following pumping rate is required, per location (Table 7-2).

Table 7-2: Summary of Time-Variant Discharge Rates, Per Location

Model Type	Zone	Hydraulic Conductivity (m/day)	Turbine: Discharge to Achieve Target 2.0 m Drawdown After 5 Days			Meteorological Tower: Discharge to Achieve Target 3.0 m Drawdown After 5 Days		
			Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 5 days (m^3)	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume in 5 days (m^3)
Cooper Jacobs (unconfined)	1	0.5[1]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
	2	20[2]	2,295	27	11,475	1,525	18	7,625

Notes:

N/A model was unable to calculate initial discharge for target drawdown. To satisfy the model equation, when Zone 1 was 0.5 m/day, the transient pumping estimated over 35 days to be valid and therefore was unable to be calculated. A steady-state model was likely to be representative of the initial discharge (see below).

[1] Clayey sand and sandy clay; [2] Sand.

7.3.3 Steady-State Pumping (Marinelli & Niccoli; Dupuit-Thiem models)

The below pumping rates (Table 7-3) are conservative based on the adopted horizontal hydraulic conductivity values and the absence of any cutoff structures in the excavation, such as sheet piles. Note that initial inflows are predicted to be greater to attain the target drawdown within a week, then the pumping rate would be reduced to maintain the target depth under steady-state conditions.

Table 7-3: Summary of Steady-State Discharge Rates

Model Type	Zone	Target 2.0 m Drawdown for a Single Turbine			Target 3.0 m Drawdown for a Single Meteorological Tower		
		Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume (m^3)[1]	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume (m^3)
Dupuit-Thiem (unconfined)	1	95	1	2,660	N/A	N/A	N/A
	2	1,833	21	51,324	-	-	-
Marinelli & Niccoli (Flow to a Pit)	1	56	0.7	1,568	N/A	N/A	N/A
	2	2,045	24	57,260	296	3.4	8,204[2]

Notes: N/A meteorological tower not proposed within the northern area Zone 1; -Dupuit-Thiem model not used for inflow rate in zone 2, only Marinelli and Niccoli. [1]: cumulative value is based on 5 days to reach target drawdown using the steady-state inflow and 28 days dewatering, total 33 days; [2]: cumulative value is based on 5 days to reach target drawdown using the time-variant pumping and steady-state 28 days dewatering total, 33 days.

7.4 Summary

Maximum extent of drawdown (i.e., the area experiencing more than ~0.5 m drawdown) is expected to extend ~117 m from turbines in Zone 2, and ~43 m in Zone 1, with the drawdown expected for the meteorological tower: to be ~86 m in Zone 2.

Table 7-4 below presents a summary of the preliminary modelling outputs with dewatering rates potentially up to 24 L/s, per turbine location, in the majority of site.

Table 7-4: Summary of Pumping Rates and Estimated Volume, Per Location

Zone	Turbine: Discharge for Target 2.0 m Drawdown After 33 Days			Meteorological Tower: Discharge for Target 3.0 m Drawdown After 33 Days		
	Discharge[1] (m^3/day)	Pumping Rate (L/s)	Cumulative Volume (m^3)	Discharge (m^3/day)	Pumping Rate (L/s)	Cumulative Volume days (m^3)
1	75.5	0.9	2,492[1]	-	-	-
2	2,058	24	65,767[2]	293	3.4	15,829[2]

Note: Initial pumping rate to achieve target drawdown will be higher before achieving steady state; Meteorological tower: not planned to be installed in Zone 1; [1]: Mean steady-state models [2]: Cumulative total based on discharge from time-variant 5 days to achieve target drawdown and 28 days steady-state model output

8 POTENTIAL ENVIRONMENTAL IMPACTS

The identified potential environmental impacts associated with earth working and or dewatering of ASS for the proposed construction activities is detailed in the Table 9-1 below. Potential impacts that have been determined as requiring management are addressed in detail within Dewatering Management (Section 10) and ASS Management (Section 11).

Table 8-1: Potential Environmental Impacts

Aspect	Potential Impact	Modelled Predictions	Management Measure
Oxidation of ASS			
Soils/sediments (excavated)	Problems, e.g., oxidation, (acid generation and metal leaching/ mobilisation) caused through the inappropriate handling, treatment or disposal of excavated soils.		Per ASSDMP ASS Management.
Soils/sediments (in situ)	ASS oxidation effects caused through exposure of the soils to air via open excavation and or dewatering.	The drawdown, if required, will be temporary (maximum of four weeks at any location) and localised per location. The cone of depression is modelled, based upon a worst-case scenario, i.e. groundwater at the site surface and with no active management, to exceed 50 cm at 100 m from the centre of turbine excavation across the majority of the site. This modelled cone of depression is greater than the recommended maximum in DWER guidelines (2015b), <10 cm at 100 m. Where construction works are scheduled in summer months, the cone of depression would be smaller due to lower water tables.	Per the ASSDMP Dewatering Management. Strategic use of dewatering infiltration basins/trenches to reduce the cone of depression.
Groundwater	Potential for acid and metal leaching through groundwater from oxidised ASS.		Groundwater level and quality monitoring per the ASSDMP to confirm modelling predictions. Strategic use of dewatering infiltration basins/trenches to reduce the cone of depression. Surface water level monitoring and quality monitoring (contingency).
Surface Water	Potential for acid and metal mobilisation into surface water from oxidised ASS.		
Groundwater Drawdown			
Impact on surface water bodies	Reduction in groundwater levels leading to a reduction in surface water levels in adjacent wetlands, with associated reduction in water quality.	The lateral extent of drawdown, based upon a worst-case scenario, i.e. groundwater at the site surface, may potentially impact permanent surface water bodies, i.e. wetlands; however, where construction works are scheduled in summer months, the potential impacts would be minimised due to lower water tables.	Groundwater level and quality monitoring per the ASSDMP to confirm modelling predictions. Strategic use of dewatering infiltration basins/trenches to reduce the cone of depression. Surface water level monitoring and quality monitoring (contingency).
GDE/Vegetation stress	Reduction in groundwater levels (i.e., below root zone) leading to stress of groundwater-dependent vegetation (phreatophytes).	Lateral extent of drawdown has the potential to impact GDEs and other sensitive ecology. Where construction works are scheduled in summer months, the potential impacts would be minimised due to lower water tables.	

Aspect	Potential Impact	Modelled Predictions	Management Measure
Residential users (bores)	Disruption to residential bores through lowering the water table below the intake level.	The radius of influence, based upon a worst-case scenario, i.e. groundwater at the site surface, is not anticipated to impact on- or off-site bores, likely to be installed in the deeper confined aquifer.	None required.
Irrigation bores	Disruption to residential bores through lowering the water table below the intake level.	The radius of influence, based upon a worst-case scenario, i.e. groundwater at the site surface, is not anticipated to extend to off-site residences and or impact on-off or off-site bores, installed in the deeper confined aquifer.	None required.
Contaminated Sites	Mobilisation and or migration of contaminants from contaminated sites in groundwater due to dewatering	The radius of influence, based upon a worst-case scenario, i.e. groundwater at the site surface, is not anticipated to extend off-site or influence groundwater impacted by the former Beenup Mineral Sands mine.	None required.
Dewatering Disposal			
Poor water quality	Ineffective treatment and or disposal resulting in environmental impacts to soils and or groundwater.		Treatment of dewatering in line with ASSDMP
Overflow of dewatering infrastructure	Ineffective management and or sizing of dewatering infrastructure resulting in environmental impacts, e.g. contamination, decline in health, sediment plumes to surface waters and or vegetation		Sizing and management of dewatering infrastructure per ASSDMP

9 MANAGEMENT OBJECTIVES

To minimise potential impacts on the environment and other groundwater users, active management of earthworks and dewatering operations is required during construction. This Preliminary ASSDMP presents preliminary management strategies, based upon available information at the time of reporting, for managing the proposed dewatering and earth working of ASS at the site.

The Preliminary ASSDMP specifically addresses the following proposed measures:

- Management of soil excavation, handling and stockpiling operations, including the neutralisation of acidity associated with ASS.
- Water table management to mitigate on- and off-site environmental impacts, this includes management of dewatering effluent produced during construction, if required and minimisation of the cone of depression.
- Potential contingency measures and corrective actions that may be implemented to rectify any breaches of the nominated triggers and management measures.
- Proposed soil, groundwater, dewatering effluent and surface water monitoring and validation to confirm works are undertaken in accordance with the performance objectives detailed herein.

10 DEWATERING AND GROUNDWATER MANAGEMENT

The following section outlines the most likely strategies for the management of dewatering effluent and groundwater, to be implemented on-site during construction works based upon information at the time of reporting.

10.1 Administrative Requirements

Dewatering works will potentially be required during construction of various elements of the wind farm including:

- Foundation construction for wind turbines (specifically the partially below ground foundation and the traditional below ground foundation options), wind monitoring and communication towers and potentially the O&M buildings and substation.
- Installation of underground services (e.g., cabling).

These estimates are dependent on the final infrastructure locations and design levels as well as the time of year and associated groundwater levels at the time of construction. Based upon proposed construction methodologies, it has been estimated that a maximum dewatering period of approximately 33 days per turbine or wind monitoring/communication tower location will be required. No dewatering is required for Turbine foundation option 2 (fully above ground foundation) nor transmission poles/towers to be installed by Western Power, however groundwater will be displaced by concrete during the pouring of piles. Dewatering requirements for other infrastructure is currently unknown. The results of dewatering estimates have required the adoption of 'dewatering management level 2' requirements, per DWER guidelines (DWER, 2015b).

Depending on the time of construction works the above may overestimate the actual dewatering required. The estimates are based on groundwater levels being at the surface, however, should construction works occur in summer, the groundwater levels will potentially be lower than those estimated.

This section describes how the groundwater dewatering will be managed within the site to ensure minimal impact to the environment and other groundwater users. It is acknowledged that the management strategies outlined will be part of the dewatering licence granted by the DWER and must be adhered to, as would any other condition of the water extraction licence.

Based upon information to date, the groundwater source to be used is considered to be the Superficial system (Superficial Aquifer and potentially shallow Leederville Aquifer in the north of the site). Groundwater levels and quality in the Superficial Aquifer (and potentially shallow Leederville Aquifer in the north of the site) will be monitored and reviewed during construction by a suitably qualified professional. This operating strategy is limited to the proposed project. It will only be reviewed if works are substantially altered.

10.2 Management Principles

The following management principles are to be promoted to limit the potential impact of dewatering on-site:

- Minimisation of dewatering requirements via modification to the construction methods, i.e. use of pile support foundations as opposed to traditional gravity foundations.
- Minimisation of the cone of depression via infiltration/recharge of most of the treated dewatering effluent and strategic siting and use of recharge basins/trenches.
- Treatment of dewatering effluent
- Monitoring of groundwater table and surface water (if required) levels and quality.

Requirements for the above management principles are outlined in the following sections.

10.3 Dewatering Treatment and Disposal

It is anticipated that dewatering will be required in support of excavation activities during construction. The requirement for dewatering is in part dependent on the earthwork component and depth of excavation and groundwater levels at the time of construction, which varies seasonally with rainfall.

10.3.1 Dewatering Treatment Method and Materials

Table 10-1 below details the dewatering effluent treatment method and neutralising agent proposed for the works.

Table 10-1: Dewatering Treatment Method and Materials

Dewatering Element	Requirement
Dewatering Treatment Method	Automated Dosing Unit
Dewatering Treatment Neutralising Agent	Calcium-based neutralising agent

10.3.2 Dewatering Disposal Assessment

Due to the likely constrained nature of individual construction footprints, e.g. wind turbine construction area, and the hydrogeological and geological conditions of the site an assessment of potential dewatering disposal options, after treatment, per options in DWER ASS guidelines (2015b) has been undertaken to determine the most suitable disposal method following treatment (Section 10.2.3) and detailed in below.

Table 10-2: Dewatering Disposal Options Assessment

Disposal Method	Comments	Suitability
Infiltration	Shallow water table and underlying ferricrete (depending on the time of year and location on-site) potentially limits the volume of water that can be infiltrated back into the superficial aquifer. Infiltration will require suitably sized areas (based upon volumes/rates) located in the project development envelope. Additional storage, e.g. holding tanks/bladders, and or strategic use of infrastructure for infiltration of treated effluent, due to the high-water table, is likely required to make infiltration more effective and minimise potential risks to sensitive receptors, i.e. GDEs.	Suitable with potential limitations to infiltration rates and areas.
Irrigation/ Dust Suppression/ Concrete Production	Groundwater will likely be suitable for irrigation (including surrounding paddocks) and or dust suppression onsite and or potentially used in the production of concrete at the onsite concrete batching plant, though some pre-treatment for pH, acidity and metals, may be required.	Suitable.
Discharge to Sewer	Not applicable (N/A) - No reticulated sewer infrastructure in the area.	N/A
Off-site Disposal	Dewatering effluent could potentially be treated and stored onsite prior to offsite disposal to a wastewater treatment plant, however the volume of dewatering and distance to plant likely make this option.	Not considered suitable - significant cost and emissions to transport to offsite disposal facility.
Discharge to Surface Water	Only considered an option when all other options have been exhausted (DWER 2015b). Dewatering effluent will be required to meet DWER surface water (2015b) criteria prior to any discharge and as such depending on the quality of the receiving water, may potentially not be viable. The drainage channels and ephemeral creeks onsite are hydrologically connected to the Blackwood and Scott Rivers.	Whilst the method may be suitable with likely additional treatment, e.g. metals, nutrients, and approval from DWER/DBCA; is it not considered a suitable option for the site at this time
Reinjection	Wells could potentially be constructed to facilitate reinjection of dewatering effluent. Potential limitations in rate of injection due to underlying geology/hydrogeology and would therefore require multiple wells, per dewatering location, to achieve sufficient rates.	Significant cost to construct wells and approach not guaranteed to achieve required rates.

Based upon a review of the potential dewatering disposal options and discussions with SynergyRED, a combination of dewatering disposal options will likely be required, namely infiltration and reuse for irrigation/dust suppression, with possible storage capacity. Construction methodologies (e.g., modifications to designs to minimise dewatering) to minimise the volume of dewatering have been considered to minimise dewatering requirements and manage dewatering onsite.

No dewatering effluent is to be disposed of, directly or indirectly, to the onsite wetlands, drainage lines and or the Scott or Blackwood Rivers.

10.3.3 Dewatering Treatment Setup

It has been proposed that the following management procedures will be applied for the handling of dewatering effluent, with the requirement for dewatering dependant on final invert levels, construction methodologies and groundwater elevation at the time of construction.

- Effluent will be pumped into an automated lime dosing (treatment) unit, utilising a calcium-based neutralising agent, i.e. hydrated lime, for the duration of the program, to increase the pH level. Lime dosing will be automatically controlled and based upon the results of monitored pH, acidity and alkalinity.
- Treated dewater effluent that is discharged from the automated lime treatment unit will be directed to a lined settlement basin (compacted limestone) and or holding tank/bladder. Sufficient retention time[5] will be provided to enable the precipitation of trace metals and settlement of solids from the dewatering effluent.
- Treated effluent will then be either:
  - Directed to a bunded recharge area, constructed into in-situ natural soils. The treated effluent will be recharged into the superficial aquifer as the primary disposal option, or
  - Reused for irrigation and/or dust suppression and/or in production of concrete onsite, may be considered should the treated effluent be of adequate quality to support this method of disposal.
- The capacity of the settlement basin/storage and recharge area will be maintained such that overflow does not occur to surrounding land. A small percentage of water is expected to recharge into the superficial aquifer via the settlement pond, where compacted limestone is used as a liner.

10.3.4 Dewatering Recharge/Infiltration Basins

Dewatering recharge/infiltration basins or trenches will be positioned to reduce the cone of depression by being positioned as close as possible to the area under abstraction. Depending on the construction footprint and available areas for recharge/infiltration either basins and or trenches will be used.

Where the cone of depression potentially impacts a sensitive receptor(s), e.g. GDE, wetland etc, basins/trenches will be positioned between the sensitive receptor(s) and the area under abstraction, to limit potential impacts to receptors.

All areas proposed for infiltration must be constructed and maintained within the allowable construction footprint for the project, i.e. no overland flow into surrounding vegetation and or surface water bodies.

10.4 Contact Details

Table 10-3: Contact Details

Project Role	Contact Details
Groundwater Consultant	PTG Consulting Pty Ltd Level 4, 167 St Georges Terrace, Perth, WA 6000 ATT: Alan Foley – 0493 090 390
Proponent	SynergyRED Level 23, 152-158 St Georges Terrace, Perth WA 6000

[5] DWER ASS guidelines (2015b) note; *The retention or settlement basins should be designed such that the dewatering effluent has a minimum of a six to 10-hour retention time, in order to settle sediment with a 0.015-mm target size.*

10.5 Roles and Responsibilities

The following responsibilities for the monitoring requirements are outlined in Table 10-4 below. All formal reporting to the SynergyRED/DWER will be undertaken by a suitably qualified environmental consultant.

All data must be provided to SynergyRED weekly and SynergyRED notified of any exceedances/non-compliance of triggers/criteria within 3 hours of receipt of data.

Table 10-4: Monitoring Program and Responsibilities

Monitoring Activity	Parameters	Responsibility
Dewatering Monitoring		
Daily	Field analysis: pH, EC, total titratable acidity (TTA), total alkalinity (TA) Flow meter reading	Civil Contractor/ Site Environment representative/ Specialist consultant
Weekly	Laboratory: total acidity, total alkalinity, pH	
Fortnightly	Laboratory: ▪ DWER Full Analytical Suite[1]	
Groundwater Monitoring		
Pre Construction Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	Civil Contractor/ Site Environment representative/ Specialist consultant
Every second day	Field analysis: pH, EC, TTA, TA, standing water level	
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	
Immediately After Dewatering		
Post-Construction		Site Environment representative/ Specialist consultant
Surface Water Monitoring		
Pre Construction Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: ▪ DWER Full Analytical Suite[1] ▪ Turbidity	Civil Contractor/ Site Environment representative/ Specialist consultant
Level 1[2]		
Every second day	Standing water level	Civil Contractor/ Site Environment representative/ Specialist consultant
Level 2[3]		
Every second day	Standing water level Field analysis: pH, EC, TTA, TA	Civil Contractor/ Site Environment representative/ Specialist consultant
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory:	
Immediately After Dewatering		

Monitoring Activity	Parameters	Responsibility
Post-Construction[4]	▪ DWER Full Analytical Suite[1] ▪ Turbidity	Site Environment representative/ Specialist consultant
Validation of Treated PASS Soils		
Collection of soil samples upon notification from site contractor	Laboratory: pH_F and pH_{FOX}, and SPOCAS[5]	Civil Contractor/Site Environment representative/ Specialist consultant
Accumulated Sediments		
Upon completion of dewatering, use of each settlement/recharge basin	Heavy metals	Civil Contractor/Site Environment representative/ Specialist consultant

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, total suspended solids (TSS), total dissolved solids (TDS), and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling. 2. Groundwater levels (at 100 m): >0.1 m at 100 m (outside natural decreases). 3. Groundwater decrease (outside natural decreases) adjacent to wetland and or deterioration in groundwater quality adjacent to wetland. 4. Only if Level 2 monitoring is undertaken. 5. Suspension Peroxide Oxidation Combined Acidity and Sulfur. ^ Within four weeks prior of dewatering commencing.

10.6 Management Guidance

10.6.1 Dewatering Effluent

A summary of the dewatering management requirements are presented below in Table 10-5.

Table 10-5: Dewatering Management Guidance

Dewatering Element	Guidance
Criteria for Source Use	Potential short-term dewatering of groundwater per location from the Superficial Aquifer and potentially shallow Leederville Aquifer (in the north of the site) (based upon current information) to allow the excavation of soil and construction of footings for various infrastructure and underground services.
Dewatering Program	Dewatering will be undertaken in stages, at low to relatively high pumping rates, depending on the location on site, foundation type and the water level at the time of construction. Dewatering at each location is not anticipated to exceed 33 days and is not expected to exceed 2 m of drawdown immediately adjacent to any location.
Timing of Pumping	Pumping when required will likely occur 24 hours a day. At all other times it would be suspended.
Dewatering Licence	A dewatering license from the DWER will be required to be obtained for the project, due the sites location within groundwater management zone and estimated dewatering rates, timeframes and volumes.
Method of Dewatering	The excavations will be dewatered using either groundwater spears or sump pumps.
Abstraction Rate	The abstraction rate for dewatering is predicted to be between 1-24 L/s, with potentially higher initial rates depending on the infrastructure being installed/constructed.
Dewater Treatment	Dewater will be treated on site before disposable. The quality of abstracted dewater may differ from the baseline results presented in this ASSDMP. However using the baseline groundwater data available, it would appear likely that dewater would have a pH of ~4.2-6.5, the TTA will likely be between 40 to 100 mg/L, and the alkalinity will potentially be below 30 mg/L, depending on the time of year. As such, dewater treatment for pH, acidity and alkalinity

Dewatering Element	Guidance
	will be required (as necessary) and is to be undertaken in accordance with current DWER standards which specify that dewater having pH <6.0 and/or TTA >40 mg/L and/or alkalinity <30 mg/L shall be subject to lime neutralisation.
Dewatering Treatment Material	Dewatering effluent is required to be treated with a calcium-based product.
Dewater Disposal	The primary options for disposing of dewatering effluent are via recharge to the Superficial aquifer and/or reuse onsite during construction (e.g., dust suppression). All areas proposed for infiltration must be constructed and maintained within the Development Envelope of the project, located as close as possible to dewatering works and located so as not to discharge directly/indirectly into any surface water bodies (i.e., wetlands). Dewatering recharge/infiltration basin/trenches should be strategically placed between dewatering locations and any nearby sensitive environmental receptor to mitigate potential impacts.

10.7 Dewatering Effluent and Groundwater Monitoring

The following monitoring program has been prepared in line with DWER guidance (2015b) and will be undertaken prior to, during and following the completion of dewatering operations.

10.7.1 Dewatering Effluent

10.7.1.1 Monitoring Regime and Responsibilities

Based upon the groundwater quality at the site exhibiting low pH, the schedule for dewater having pH between 4 and 6 and potentially total titratable acidity (TTA) between 40-100 mg/L ($CaCO_3$ equivalents)has been adopted, from the and is detailed below (Table 10-6). Samples for analysis will be collected:

- Prior to treatment, and
- Post treatment and before discharge.

Table 10-6: Dewatering Effluent Monitoring Program and Responsibilities

Monitoring Activity	Parameters	Responsibility
Daily	Field analysis: pH, EC, TTA, TA Flow meter reading	Civil Contractor/ Site Environment representative/ Specialist consultant
Weekly	Laboratory: total acidity, total alkalinity, pH	
Fortnightly	Laboratory: ▪ DWER Full Analytical Suite[1]	

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, total suspended solids (TSS), total dissolved solids (TDS), and nutrients. Field parameters including pH, EC, TTA, total alkalinity, dissolved oxygen and redox are recorded during sampling.

The quality of the pre-treatment dewatering effluent will be assessed at the commencement of works and the monitoring regime amended, if required, in line with DWER (2015b) guidelines as detailed in Table 10-7 below.

Table 10-7: Dewatering Effluent Monitoring Matrix

Trigger	Monitoring Activity	Parameters
TTA: <40mg/L pH: >6	Daily	Field analysis: pH, EC, TTA, TA,
	Fortnightly	Laboratory: total acidity, total alkalinity, pH
TTA: <40mg/L, pH: 4 to 6	Daily	Field analysis: pH, EC, TTA, TA
	Weekly	Laboratory: total acidity, total alkalinity, pH
TTA: 40-100mg/L pH: >6	Daily	Field analysis: pH, EC, TTA, TA
	Weekly	Laboratory: total acidity, total alkalinity, pH
TTA: 40-100mg/L, pH: 4 to 6	Daily	Field analysis: pH, EC, TTA, TA
	Weekly	Laboratory: total acidity, total alkalinity, pH
	Fortnightly	Laboratory: DWER ASS Full Analytical Suite[1]
TTA: >100mg/L or pH: <4 or total alkalinity <30 mg/L	Twice Daily	Field analysis: pH, EC, TTA, TA
	Weekly	Laboratory: DWER Full Analytical Suite[1]

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, TSS, TDS, and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling

10.7.1.2 Sampling Requirements and Analytical Suite

A summary of the monitoring and analytical suite for during construction dewatering effluent sampling is presented in Table 10-8 below.

Table 10-8: Dewatering Effluent Sampling Requirements and Analytical Suite

Item	Description
Flow meter	A reading of the flow meter will be collected and recorded.
Locations	Pre-treatment – Prior to lime dosing unit Post-treatment – Infiltration basin opposite inflow point (where water is not present in the infiltration pond at a point furthest from the lime dosing unit outfall).
Dewatering Effluent Sampling Methodology	Dewatering samples submitted for will be recovered using grab methods or directly from a tap/sampling point in the treatment line in line with the following guidelines: ▪ Australian Standard AS/NZS 5667.4: 1998 - Water quality - Sampling - Guidance on sampling from lakes, natural and man-made (Standards Australia 1998b). Care should be taken not to disturb sediments during sampling collection. All dewatering samples for laboratory analysis will be chilled and submitted to the primary National Associated of Testing Authorities (NATA) accredited laboratory, for analysis within 24 hours of collection.
Analytical Suite	Daily: pH, EC, TTA, TA Weekly: total acidity, total alkalinity, pH Fortnightly: DWER Full Analytical Suite[1] Analytical suite may vary based upon pre-treatment dewatering effluent quality and is to be reviewed and revised in line with Table 10-5.
Quality Control	The following quality control samples will be collected during the DWER full analytical suite monitoring event only: ▪ Field duplicate ▪ Equipment rinsate (only where reusable sampling equipment is used) ▪ Field blank.

Item	Description
	The full analytical suite (above) will be conducted on the field duplicate, with the equipment rinsate and field blank submitted for analysis of total and dissolved metals only. Where sampling is completed with groundwater sampling, only one set of quality control samples is required.

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, TSS, TDS, and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling

10.7.2 Groundwater

10.7.2.1 Monitoring Regime and Responsibilities

All bores will be monitored during the baseline monitoring event, with selected bores (likely two to three per location) monitored during and after dewatering depending on the location of dewatering/construction works at the time. The monitoring regime and bore network will be finalised with further engineering design and additional bores installed, where required.

Per DWER guidance (DWER June 2015b), the monitoring schedule (Table 10-9) will comprise:

Table 10-9: Groundwater Monitoring Program and Responsibilities

Monitoring Activity	Parameters	Responsibility
Pre Dewatering Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	Civil Contractor/Site Environment representative/ Specialist consultant
Every second day	Field analysis: pH, EC, TTA, TA, standing water level	
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: DWER Full Analytical Suite[1]	
Immediately After Dewatering		
Post-Construction		Site Environment representative/ Specialist consultant

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, total suspended solids (TSS), total dissolved solids (TDS), and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling. ^ Within four weeks prior to dewatering commencing.

Upon the commencement of works, the quality of the pre-treatment dewatering effluent will be assessed and the monitoring regime amended, if required, in line with DWER (2015b) guidelines.

Where additional bores are required to be installed or existing bores are damaged/destroyed and are required to be reinstalled, all bores are to be installed accordance with the *Minimum Construction Requirements for Water Bores in Australia* (NUDLC, 2020) and the *Water Quality Protection Note – Groundwater Monitoring Bores* (DoW, 2006).

10.7.2.2 Sampling Requirements and Analytical Suite

A summary of the monitoring and analytical suite for baseline, during and post construction groundwater sampling is presented in Table 10-10 below.

Table 10-10: Groundwater Sampling Requirements and Analytical Suite

Item	Description
Standing Water Level	The depth to water will be measured via a water level meter, relative to ground level/top of the bore collar and converted to mAHD using the bore survey data.
Groundwater Sampling Methodology	Groundwater samples submitted for laboratory analysis will be recovered using a low-flow methods, i.e. peristaltic or bladder pump, in accordance with USEPA (1996) guidance (as referenced by Australian Standard, AS/NZS 5667.11:1998) or Victoria EPA guidance (VEPA, 2022).

Item	Description
	Prior to sampling, groundwater will be purged to stability (reference parameters being pH, EC, DO, redox and temperature), measured using electronic probes. Groundwater samples will be then collected into appropriately preserved laboratory supplied containers (being field-filtered for dissolved metals, as applicable). All groundwater samples will be chilled and submitted to the primary National Associated of Testing Authorities (NATA) accredited laboratory, for analysis within 24 hours of collection.
Post-Construction	Post completion of dewatering operations, groundwater samples would be collected every second month for a period of six months (three sampling events) from the selected bores within the final monitoring network (to be determined based upon final engineering design).
Analytical Suite	Groundwater parameters to be analysed in the field and at the laboratory will comprise of the following: ▪ Dissolved metals and metalloids: aluminium, arsenic, cadmium, chromium, iron, manganese, nickel, selenium, and zinc ▪ Total metals: aluminium and iron ▪ Physico-chemical parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction/oxidation (redox) potential ▪ Major cations: calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^{+}) and sodium (Na^{+}) ▪ Major anions: sulfate (SO_4^{2-}), chloride (Cl^{-}), carbonate (CO_3^{2-}) and bicarbonate (HCO_3^{-}) ▪ Nutrients: total phosphorus (TP), reactive phosphorus (RP), total nitrogen (TN), total kjeldahl nitrogen (TKN) (calculated), total ammonia-N (NH_3+ NH_4-N), nitrates and nitrites (NO_X-N) ▪ Total dissolved solids (TDS), Total suspended solids (TSS) ▪ Acidity ▪ Field TTA and TA.
Quality Control	The following quality control samples will be collected during each groundwater monitoring event: ▪ Field duplicate ▪ Equipment rinsate ▪ Field blank. The full analytical suite (above) will be conducted on the field duplicate, with the equipment rinsate and field blank submitted for analysis of total and dissolved metals only.

10.8 Dewatering Effluent and Groundwater Water Quality Reference and Trigger Criteria

10.8.1 Groundwater

10.8.1.1 Groundwater Level (Drawdown) Triggers

Groundwater level triggers are developed to manage the depth of groundwater extraction across this site, mitigating impacts to ASS and groundwater dependent ecosystems. Prior to the commencement of dewatering, baseline monitoring event(s) will be undertaken to determine groundwater levels across various seasons and to develop appropriate trigger levels.

The framework for setting the trigger levels is defined below:

- The depth to groundwater in the monitoring bores will be recorded prior to the commencement, as part of a baseline monitoring event(s),
- The estimated maximum dewatering drawdown due to the construction activities at the bore will be determined based upon groundwater modelling,
- The trigger will be established based upon the estimated maximum dewatering drawdown at the bore with an additional tolerance of 0.2 metres (to account for variations in the modelling).

The ASSDMP will be revised to account for final engineering design details, additional baseline monitoring data and establishment of drawdown triggers for individual bores in accordance with the above framework. In

general groundwater will not be allowed to be drawdown by >0.1 m (excluding natural seasonal decreases) 100 m from dewatering works. Where dewatering activities potentially effect GDEs, more stringent groundwater level triggers (if required) will be defined cognisant of natural variation in groundwater levels to, ensure no impacts to GDEs greater than seasonal variation in groundwater levels.

Immediately prior to construction works (within a month of commencement), groundwater levels will be measured, and the drawdown triggers will be reviewed and revised where required.

10.8.1.2 Groundwater Quality Reference Criteria

The criteria nominated below are consistent with targets established in DWER guidance literature and have been standardised across all bores. It is noted that ASS criteria were exceeded, or were marginally within the guidelines, during sampling completed to date. It can therefore be expected that these triggers will likely be exceeded during the construction program.

Quarterly baseline groundwater monitoring across the site, should be undertaken at least one year prior to construction to contribute to the baseline dataset for the site, and inform the establishment of appropriate water quality targets and thresholds.

The criteria will serve as a value against which contingency responses would be considered, when taken in the wider context of "monitored data trends" over time, i.e. trends identifying deteriorating conditions.

The bore reference criteria for all bores are as follows:

- pH: 6.0 pH units
- Total Acidity: 40 mg/L ($CaCO_3$ equivalents)
- Dissolved Aluminium: 1 mg/L.

10.8.2 Dewatering Effluent

Presented in Table 10-11 is a summary of the dewatering treatment and discharge criteria for groundwater dewatering effluent, as specified in *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes* (DWER June 2015b).

Table 10-11: Dewatering Treatment and Discharge Reference Criteria

Analyte	Treatment Criteria	Discharge Criteria
Acidity	>40 mg/L ($CaCO_3$ equivalents)	<40 mg/L ($CaCO_3$ equivalents)
pH	<6 pH units	7.0 to 8.5 pH units
Alkalinity	<30 mg/L ($CaCO_3$ equivalents)	>30 mg/L ($CaCO_3$ equivalents)

10.9 Surface Water Monitoring and Water Quality Triggers and Criteria

The lateral extent of drawdown, based upon a worst-case scenario, i.e. groundwater at the site surface, may potentially impact surface water bodies, i.e. wetlands. Drawdown is not anticipated to impact surface water levels within any wetlands where construction works are undertaken during a summer period. Wetland water levels, however, can be expected to fall naturally over the period of operations, due to evaporation over periods of low rainfall recharge. These effects would be accounted for in the monitoring program. Similarly, catchment runoff might temporarily increase levels after periods of rainfall.

Therefore, surface water monitoring will only be undertaken where groundwater drawdown of >0.1 m is observed 100 m from dewatering activities (outside natural decreases) and the dewatering activities are in the vicinity of a wetland. Based upon the current design and modelled cone of depression only the wetland atWM03-WL (Figure 4, Appendix A) may potentially be impacted by drawdown (based upon a worst-case scenario).

10.9.1 Monitoring Regime and Responsibilities

The proposed monitoring will be undertaken on a staged approach, with no surface water monitoring being undertaken unless the following occurs:

1. Groundwater levels (at 100 m): <0.1 m or nominate groundwater trigger level – no monitoring
2. Groundwater levels[6] (at 100 m): >0.1 m (outside natural decreases) implement Level 1 monitoring;
3. Groundwater decrease[8] (outside natural decreases) adjacent to wetland and or deterioration in groundwater quality adjacent to wetland implement Level 2 monitoring.

The staged monitoring requirements are detailed in (Table 10-12).

Table 10-12: Surface Water Monitoring Program and Responsibilities

Monitoring Activity	Parameters	Responsibility
Pre Dewatering Baseline^	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: ▪ DWER Full Analytical Suite[1] ▪ Turbidity	Civil Contractor /Site Environment representative/ Specialist consultant
Level 1		
Every second day	Standing water level	Civil Contractor/ Site Environment representative/ Specialist consultant
Level 2		
Every second day	Standing water level Field analysis: pH, EC, TTA, TA	Civil Contractor / Site Environment representative/ Specialist consultant
Fortnightly	Field analysis: pH, EC, TTA, TA, standing water level Laboratory: ▪ DWER Full Analytical Suite[1] ▪ Turbidity	
Immediately After Dewatering		
Post-Construction*		Site Environment representative/ Specialist consultant

1. Total and dissolved metals, total acidity, total alkalinity, sulfate, chloride, total suspended solids (TSS), total dissolved solids (TDS), and nutrients. Field parameters including pH, EC, TTA, TA, dissolved oxygen and redox are recorded during sampling.

^ Within four weeks prior to dewatering commencing.

* Only if Level 2 monitoring is undertaken.

10.9.1.1 Sampling Requirements and Analytical Suite

A summary of the monitoring and analytical suite for baseline, during and post construction surface water sampling is presented in Table 10-13 below.

Table 10-13: Surface Water Sampling Requirements and Analytical Suite

Item	Description
Standing Water Level	The depth of water will be measured via a surveyed staff gauge within the wetland.
Surface water Sampling Methodology	Surface water samples submitted for laboratory analysis were recovered via grab samples in line with the following guidelines: ▪ Australian Standard AS/NZS 5667.4: 1998 - Water quality - Sampling - Guidance on sampling from lakes, natural and man-made (Standards Australia 1998b). ▪ Australian Standard AS/NZS 5667.6: 1998 - Water quality - Sampling - Guidance on sampling of rivers and streams (Standards Australia 1998b).

[6] and the dewatering activities are in the vicinity of a wetland.

Item	Description
	Prior to or upon to sampling, surface water physical parameters being pH, EC, DO, redox and temperature, were measured using electronic probes. Surface water samples will then be collected into appropriately preserved laboratory supplied containers (being field-filtered for dissolved metals, as applicable). All surface water samples will be chilled and submitted to the primary National Associated of Testing Authorities (NATA) accredited laboratory, for analysis within 24 hours of collection
Post Construction	For post-dewatering operations surface water samples will be collected every second month for six months (three sampling events),where Level 2 monitoring (Table 10-12) is implement onsite during construction.
Analytical Suite	Surface water parameters analysed in the field and at the laboratory comprised the following: ▪ Dissolved metals and metalloids: aluminium, arsenic, cadmium, chromium, iron, manganese, nickel, selenium, and zinc ▪ Total metals: aluminium and iron ▪ Physico-chemical parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction/oxidation (redox) potential ▪ Major cations: calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^{+}) and sodium (Na^{+}) ▪ Major anions: sulfate (SO_4^{2-}), chloride (Cl^{-}), carbonate (CO_3^{2-}) and bicarbonate (HCO_3^{-}) ▪ Nutrients: TP, RP, TN, TKN (calculated), total ammonia-N, NO_X-N ▪ Total dissolved solids (TDS), Total suspended solids (TSS), Turbidity ▪ Acidity ▪ Field TTA and TA.
Quality Control	The following quality control samples will be collected during each groundwater monitoring event: ▪ Field duplicate ▪ Equipment rinsate ▪ Field blank. The full analytical suite (above) will be conducted on the field duplicate, with the equipment rinsate and field blank submitted for analysis of total and dissolved metals and turbidity only.

10.9.2 Water Quality Reference and Trigger Criteria

10.9.2.1 Water Level (Drawdown) Triggers

DWER guidelines (DWER 2015b) nominate no decline in water levels in surface water bodies, however given the potential for other environmental factors, i.e. evaporation over the course of works, a working trigger will be developed for water levels within the surface water bodies to account for natural factors. Groundwater will not be allowed to be lowered by >10 cm at a distance of 100 m from dewatering activities, with no drawdown immediately adjacent to surface water bodies or within the surface water body itself (outside natural decreases).

As all wetlands are outside the 100 m radius from proposed dewatering works; surface water level monitoring via staff gauges (to be installed) will only be undertaken should a decrease in groundwater of >0.1 m at 100 m (outside natural decreases) occur in the vicinity of a wetland.

Surface water levels will be determined prior to the commencement of construction and a trigger level established. Potential staff gauge and surface sampling locations will be determined once further engineering design is completed.

10.9.2.2 Water Quality Reference Criteria

Quarterly baseline surface water monitoring across the site, should be undertaken at least one year prior to construction to contribute to the baseline dataset for the site, and inform the establishment of appropriate water quality targets and thresholds.

Criteria established in DWER guidance literature and standardised across all surface water locations, will serve as a criterion against which contingency responses would be considered when taken in the wider

context of "monitored data trends" over time, i.e. is there a trend identifying deteriorating conditions. It is noted that pH criteria were exceeded, or were marginally within the guidelines, during sampling completed to date. It can therefore be expected that these triggers will likely be exceeded naturally during the construction program and potentially not as a result of dewatering/construction activities.

The surface water reference criteria are as follows:

- pH – 7.0 to 8.5 pH units
- total acidity – 40 mg/L.

All other parameters will be monitored for data trends of the monitoring period[7].

10.10 Contingency Responses

The following section provides details regarding potential contingency responses that may be applied, where water quality impacts are deemed attributable to the proposal, and is based upon information at the time of reporting.

The approach to determining the appropriate contingency response is based upon identifying, managing and addressing the specific cause of the water quality impact. If additional measures to those detailed here are required, these will be agreed in consultation with DWER.

10.10.1 Groundwater

10.10.1.1 Bores

Where groundwater monitoring bores are damaged/destroyed prior to or during construction, replacement bores if required to support ongoing implementation of this plan, will be reinstalled to the same depth and construction as the damaged/destroyed bore. Replacement bores are to be installed by a licensed driller and in accordance with *Minimum Construction Requirements for Water Bores in Australia* (NUDLC 2020) and relevant 26D licence.

10.10.1.2 pH, Acidity and Groundwater Levels

Where the triggers are exceeded, the following contingency measures may be implemented:

- Increase frequency of field analysis sampling from every second day to daily
- The addition of a comprehensive suite of groundwater monitoring at an appropriate frequency may be required where dewater discharge and groundwater quality vary significantly from pre-dewatering conditions
- Pumping rates may be reduced
- The area under abstraction at any one time may be reduced
- Where a reduction in pumping rate or area under abstraction does not abate drawdown, pumps shall be suspended to allow groundwater levels to recover above the nominated trigger thresholds, unless otherwise agreed with the DWER/SynergyRED.
- Construction of additional infiltration/recharge basins.
- Implement surface water monitoring program[8].

10.10.2 Dewatering Effluent

10.10.2.1 Discharge Quality

Where the triggers are exceeded, the following contingency measures may be implemented:

- Increased liming of dewater, and or adjustment/enhancement of existing infrastructure

[7] It is noted that DWER guidelines (DWER 2015b), specifically Section 3.3.10, does not specify trigger criteria for surface water bodies when dewatering is not discharged directly and or indirectly to a surface water body.

[8] Where groundwater levels decrease by >0.1 m at 100 m (outside natural decreases) from dewatering activities in the vicinity of surface water bodies.

- Modifications to the settlement infrastructure and or additional onsite treatment infrastructure (as applicable) and or use of flocculants to promote improved settling and precipitation of metals.

10.10.2.2 Management

The dewatering settlement and discharge infrastructure should be designed and maintained to ensure suitable capacity and ongoing integrity for containment of all dewater (i.e., no unplanned loss of dewater to surrounding environment).

Where the integrity of the infrastructure is compromised and or effluent is not contained within the infrastructure, the following measure may be implemented :

- Reduce pump rates or cease all dewatering
- Reduce the area under abstraction
- Modifications to the settlement infrastructure to ensure all future dewater is contained. This may include the addition of extra storage capacity
- Increase volumes used for dust suppression.

Where any breaches occur, the SynergyRED project manager is required to be notified immediately and the aforementioned contingencies measures implemented under direction from SynergyRED.

10.10.3 Surface Water

Where the triggers are exceeded, the following contingency measures may be implemented:

- Dewatering operations in the vicinity of a surface water body to cease immediately should monitoring results show any decline in water levels (excluding natural variation i.e. evaporation) within the surface water body.
- Dewatering operations in the vicinity of a surface water body to cease immediately should monitoring results show any decline in surface water quality.
- Additional infiltration/recharge basins installed between dewatering activities and surface water body.

11 ASS MANAGEMENT

The following section outlines the most likely strategies for the management of soils identified as requiring treatment and management on-site during construction works, based upon information at the time of reporting.

11.1 Soil Excavation and Handling

11.1.1 Overview

Soils across the site are predominately characterised as sand (pale grey) overlying a layer of ferricrete, which is likely discontinuous across the site, with dark brown/grey sands and clayey sands exceeding the to the depth of investigation. Exceedances of the net acidity management criteria were observed in all soil types, and across all depths, except pale grey sands. Based upon the current proposed excavation depths natural soils, except shallow pale grey/white sands (<1 mbgl), exceed relevant DWER management criteria and will therefore require management and lime neutralisation upon disturbance.

A summary of the management requirements, based upon the current proposed construction methodology and available information at the time of reporting, with respect to ASS is presented below in Table 11-1. The soil management requirements will be reviewed and revised upon detailed design and further investigations. Infrastructure location specific criteria may potentially be developed.

Table 11-1: ASS Management Summary

Soils Requiring Management	Depth* (mbgl)	Management Requirements
Sand – Dark grey/brown/black	All	Lime treatment and reuse onsite where possible Geotechnically unsuitable material can be used as non-structural fill onsite or will be disposed of off-site at licensed soil treatment facility.
Sandy clay – Pale and dark grey	>1.75	
Ferricrete	0.5-3.5	

* Approximate. Soils requiring management, may be encountered at other depths.

11.1.2 Management Principles

The following management principles are to be promoted to limit the potential impact of oxidation and acid leaching for on-site soils.

1. The majority of the infrastructure for the wind farm will be installed into in-situ soils via open excavation and trenches. Soils requiring treatment will be:
    a. stockpiled prior to treatment on limestone pads. There are likely to be multiple treatment and stockpile locations given the area of development envelope, and distance between excavations.
        i. Where required, limestone pads will be constructed with crushed compacted[9] limestone, in accordance with DWER guidelines (2015b); i.e. ~300 mm thickness, with perimeter bunds (minimum 150 mm high)
        ii. The pad should be graded to a corner such that any leachate generated is contained/captured within the pad.
        iii. Where treatment on a limestone pad occurs, all soils are to be treated within 18 hours. Stockpiles must be <2 m in height;
    b. treated upon excavation (i.e. lime incorporated during excavation) and placed adjacent to the excavation, where possible;
2. Aglime will be incorporated into the material at the prescribed liming rate (Section 11.2.2). Treated soils will either be reinterred, reused on-site and or taken off site for disposal (refer Item 4).

[9] The level of compaction used should produce an appropriately low permeability to prevent infiltration of leachate (DWER, 2015b)

3. In areas requiring soil management and treatment, soils at the base and walls of excavations will be covered with a thin layer of aglime (~20 mm) as a precautionary measure to provide buffering capacity against minor releases of acidity.
4. Geotechnically unsuitable ASS material, where it cannot be used as non-structural fill onsite, will be disposed of offsite at a DWER licensed soil landfill facility and or treatment facility. All trucking and disposal documents must be kept and made available to SynergyRED at the end of works
5. During the works all material excavated and stockpiled, and or material imported to site, is to be stored an adequate distance away from waterways (creek/drainage lines) and wetlands, to minimise the potential for stockpile leachate/runoff entering such water bodies.

11.2 Liming Rate and Material

11.2.1 Lime Material

It is recommended that the lime material used on-site have a particle size distribution of predominately <1 mm. The liming rate will be updated based upon the liming material to be used, and validation test results.

Where material with a particle size of greater than 1 mm is utilised the required level of acid neutralisation may not occur due to the decreased surface area of the particles (neutralising sites), and additional aglime may be required in order to meet validation requirements. In addition, validation sampling may fail to meet accepted criteria due to the laboratory methodology screening soils to remove the >2 mm fraction prior to analysis.

11.2.2 Liming Rates

The liming rate for soils requiring treatment onsite, has been determined using the highest net acidity, and excluding ANC (refer Table 11-2 below). Additional assumptions include; bulk density of 1.6 tonne/m^3, a safety factor of 2, and effective neutralising value (ENV) of 50%, per the following calculation.

$$LR = \%S * \rho soil * CF * SF * \frac{100}{ENV}$$

Where: LR = liming rate

%S = percentage Sulfur

ρsoil = bulk density of soil (tonne/m^3) assumed at 1.6 tonne/m^3

CF = conversion factor (%S to kg pure $CaCO_3$/tonne) = 31.202

SF = safety factor of 2[10] as per DWER (2015b) guidelines

ENV = effective neutralising value

Table 11-2: Liming Rates

Soils Requiring Management	Depth[1] (mbgl)	Net acidity[2] (%S)	Liming rate (kg aglime/m^3)
Sand – Dark grey/brown/black	0-2.0	0.29	58 (50% ENV)
	2.0->10	2.1	420 (50% ENV)
All sandy clay – Pale and dark grey	>1.75	1.4	280 (50% ENV)
Ferricrete	0.5-3.5	0.09	18 (50% ENV)

1. Soils requiring management encountered outside of the nominated areas and or at different depths and must be treated and management as per the Earthworks Strategy. 2. Excluding ANC.

Upon confirmation of the neutralising agent to be used, and calculation of the neutralising agents ENV, per DWER guidance (2015b), the above liming rates will be adjusted accordingly.

[10] Given the highly reactive nature of the soils, a higher safety factor has been used to increase the neutralising capacity in the soils.

11.3 Validation Sampling

11.3.1 Sampling Protocol

Validation of treated soil will be undertaken via sampling and field pH tests (pH_F and pH_{FOX}) and confirmatory analysis assessment to validate the adequacy of the lime treatment. The number of samples to be collected to validate a stockpile (Table 11-3) will be in accordance with the sampling densities as specified in DWER ASS management guidance (DWER, 2015b) and in *Landfill Waste Classification and Waste Definitions 1996 (as amended 2019)* (DWER, 2019).

Table 11-3: Soil Validation Sampling Numbers

Volume (m^3)	Number of samples
100-200	4
200-500	6
500-1,000	8
1,000-2,000	11
2,000-3,000	15
3,000-4,000	18
4,000-5,000	20
5,000-10,000	24
>10,000	24 plus 4 for each additional 10,000 m^3

11.3.2 Validation Criteria

Treated soils/sediments should be well mixed and comply with the validation criteria, per DWER guidance (DWER, 2015b), presented below (Table 11-4). All validated soils are to be analysed for pH_F and pH_{FOX} with confirmatory analysis, SPOCAS, completed on 25% of field validated samples.

Table 11-4: Treated Soil Validation Criteria

Analyte	Criteria
pH_F	>6.5
pH_{FOX}	>5
pH_{KCl}	6.5-8.5
Net acidity	<0.03%S
Excess ANC (ANC_E)	>0.03%S

Experience is that typically the field tests underestimate the buffering capacity of the treated soils (by not reacting fully with the aglime material in the time taken to run the tests). Where the correlation between laboratory and field validation is poor, then the laboratory (confirmatory) results will take precedence, and future field results may be weighted to account for the discrepancy between the methods.

Minor non-compliances above the pH_{KCl} criteria, i.e. pH >8.5, are acceptable and unlikely to pose a risk to the environment however pH values should preferably be below pH 9.5.

11.3.3 Quality Control and Assurance

A minimum of one field duplicate sample will be collected per 20 primary samples.

11.3.4 Contingency measures

Where soils do not meet the above validation criteria, soils are to be retreated and tested, in line with the above protocols, until the results comply with the validation criteria.

11.4 Accumulated Sediments within Dewater Effluent Storage Infrastructure

11.4.1 Sampling Protocol

Sediments accumulated in the base of the dewater effluent storage infrastructure (i.e., settlement basins, holding tanks or inflatable bladders) can potentially contain elevated trace metal concentrations, precipitated from solution as a result of lime treatment. Sampling and analysis of accumulated sediments will be required to determine their suitability for backfill/reuse onsite and or for appropriate landfill disposal, during and on completion of dewatering activities. Sediment samples will be analysed for heavy metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

11.4.2 Validation Criteria

As a conservative approach, noting the presence of residences and sensitive environmental receptors onsite, accumulated sediment results will be compared with the following criteria presented in the *Guideline on the Investigation Levels for Soil and Groundwater* (NEPC, 2013) :

- Ecological Investigation Levels (EILs) – Urban residential/public open space.
- Health Investigation Levels for residential (HIL-A).
- Background concentrations.

EILs and HILs define conservative values to protect the environment and human health respectively. EILs reflect levels that have no observable effect on the most sensitive receptor for each contaminant. HILs reflect levels in soils that would have no observable effect on humans over a lifetime of exposure.

Should the accumulated sediments not be suitable for reuse on site, results would also be compared to Contaminant Threshold and Concentration Limit Guidelines as specified in the *Landfill and Waste Classification and Waste Definitions (as amended 2019)* (DWER, 2019), Australian Standard Leaching Procedure (ASLP) Classes, to determine the appropriate disposal requirements.

11.4.3 Quality Control and Assurance

- A minimum of one field duplicate sample will be collected per 20 primary samples.

12 ASS ENVIRONMENTAL REPORTING

12.1 Overview

The following reports will be prepared for the site following construction activities, with detailed description provided below:

- Closure (Construction Activities Close-out) report.
- Post Dewatering Monitoring Closure Report.

All reporting is required to be completed in general accordance with the DWER ASS guidelines (2015b).

12.2 Closure (Construction Activities Close-out) Report

The initial closure report will be prepared by an environmental consultant and issued to the DWER (Contaminated Sites Branch)/SynergyRED at the cessation of construction works.

The report will contain:

- Management measures undertaken at the site and their effectiveness.
- Soil validation results, both field and laboratory testing as specified in the ASSDMP.
- Amount of neutralising agent used during construction.
- Discussion of potential human health and environmental risk, and any remediation required.
- Photographic record of the earthworks program.
- Summary of the dewatering activities.
- Results of the dewatering, groundwater and surface water monitoring.

12.3 Post Construction Monitoring Closure Report

The closure report will be prepared by an environmental consultant and issued to the DWER (Contaminated Sites Branch)/ SynergyRED at the cessation of construction works.

The report will contain:

- Summary of construction works.
- Findings of the groundwater and surface water post-construction monitoring.

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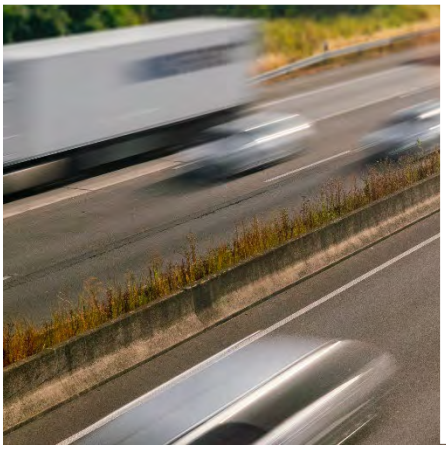
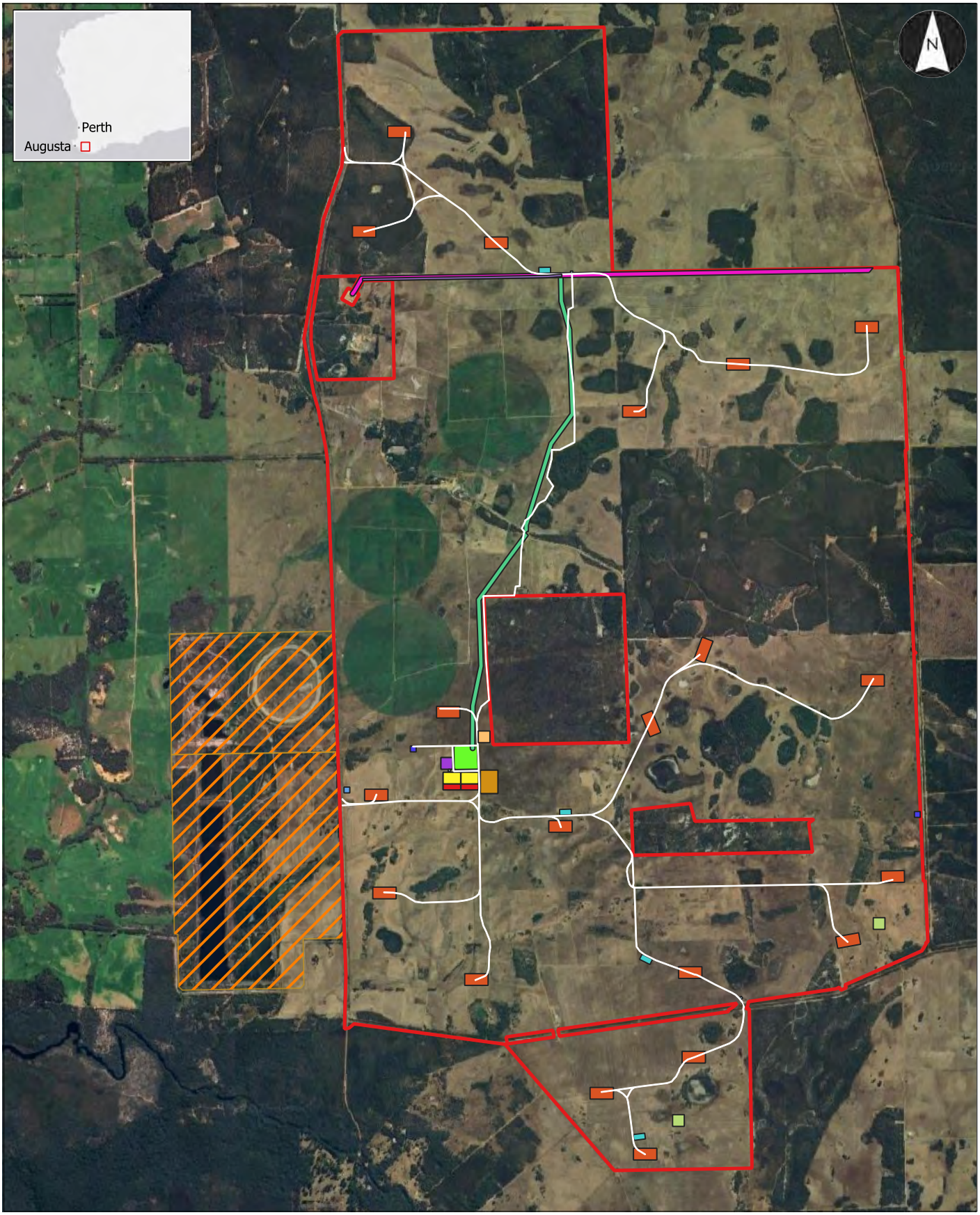
Appendix A - Figures







Site Location and Layout

Project: Proposed Scott River Wind Farm

Legend

- Site Boundary
- Contaminated Site

Indicative Infrastructure Location

- Borrow Pit
- Bushfire Water Tank
- Communication Tower
- Meteorological Mast
- Project Transmission Line
- Proposed Roads
- Wind Turbine
- Construction Laydown Area
- WP Transmission Line
- Conrete Batching Plant
- Construction Laydown Area
- Construction Site Offices
- Operation and Maintenance Area
- Project Substation

ptg consulting

Not For Construction

0 0.5 1 1.5 km

Scale at A4: 1:45000

Client: Synergy RED
Project Code: PTG - 02095
Drawn By: AW, Checked By: AF
Date: (2025-08-25)
Figure No: 1

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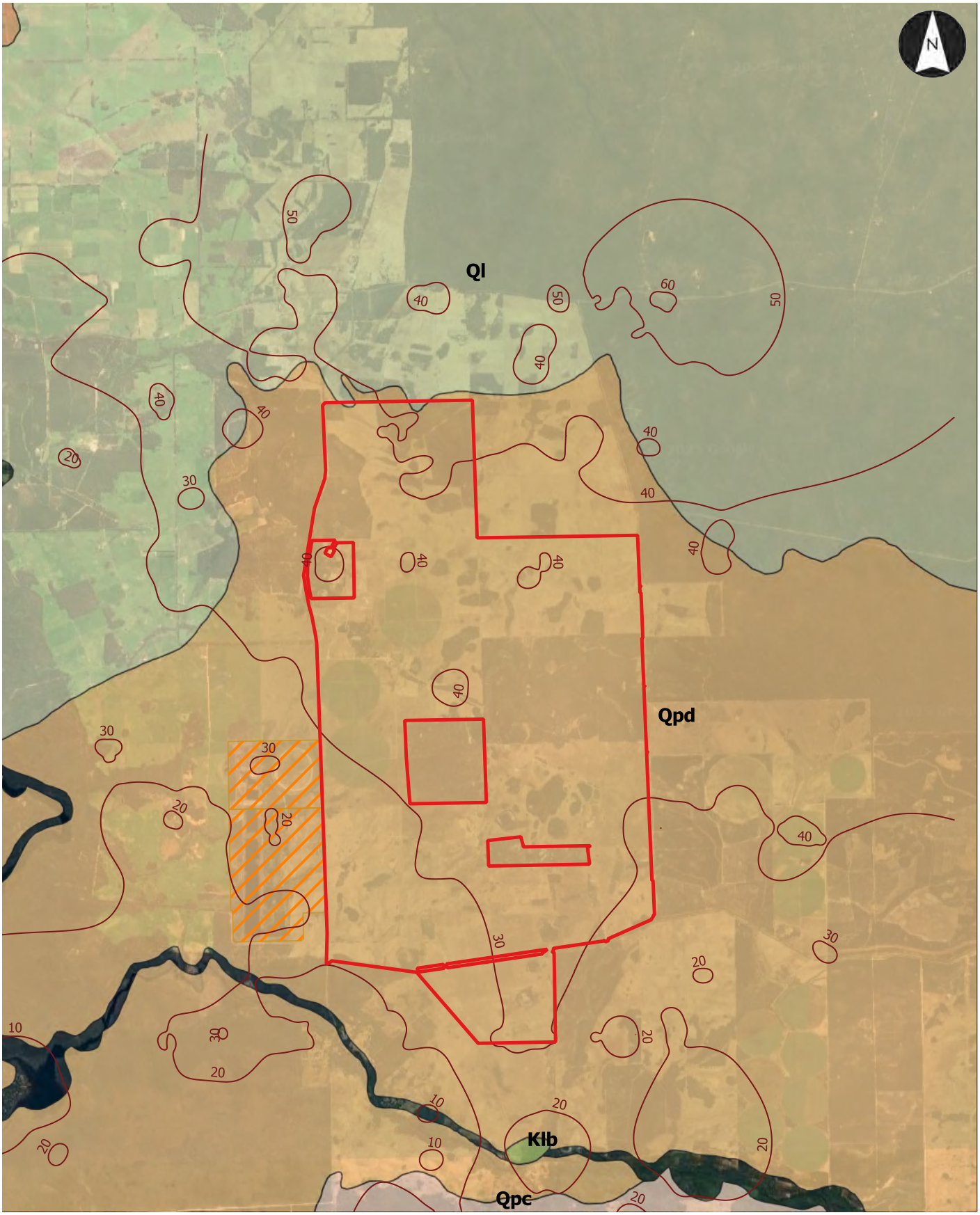

Topography and Geology

Project: Proposed Scott River Wind Farm

Client: Synergy RED
Project Code: PTG - 02095
Drawn By: AW, Checked By: AF
Date: (2025-07-11)
Figure No: 2

Legend

- Site Boundary
- Contaminated Site

Geology 1:250,000

- Qpd - Sand Dunes
- Ql - Laterite and Associated Quartz Sand (undifferentiated)
- Qpc - Coastal Limestone: Eolian alcarnite with minor occurences of fossil soil and beach conglomerate
- Klb - Bunbury Basalt
- 10m Elevation Contours (mAHD)

ptg consulting

Not For Construction

0 1 2 km

Scale at A4: 1:80000

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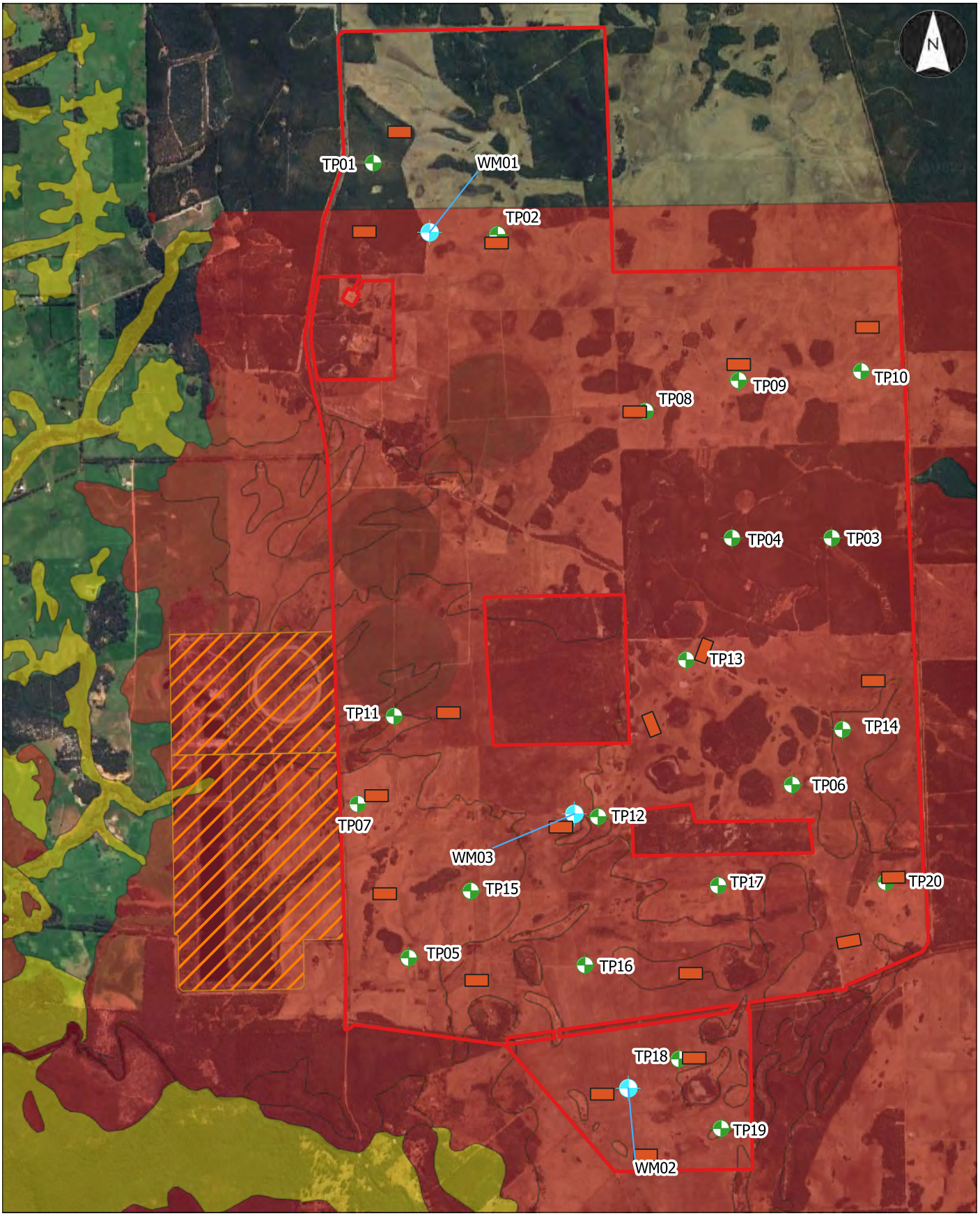

Acid Sulfate Risk and Soil Sampling Locations

Project: Proposed Scott River Wind Farm

Client: Synergy RED
Project Code: PTG - 02095
Drawn By: AW, Checked By: AF
Date: (2025-07-11)
Figure No: 3

Legend

- Site Boundary
- Contaminated Site
- Acid Sulfate Soil Risk
  - High to moderate risk
  - Moderate to low risk
- Indicative Wind Turbine
- Soil Sampling Locations
  - Test Pits
  - Deep Bore Hole

ptg consulting

Not For Construction

0 0.5 1 1.5 km

Scale at A4: 1:45000

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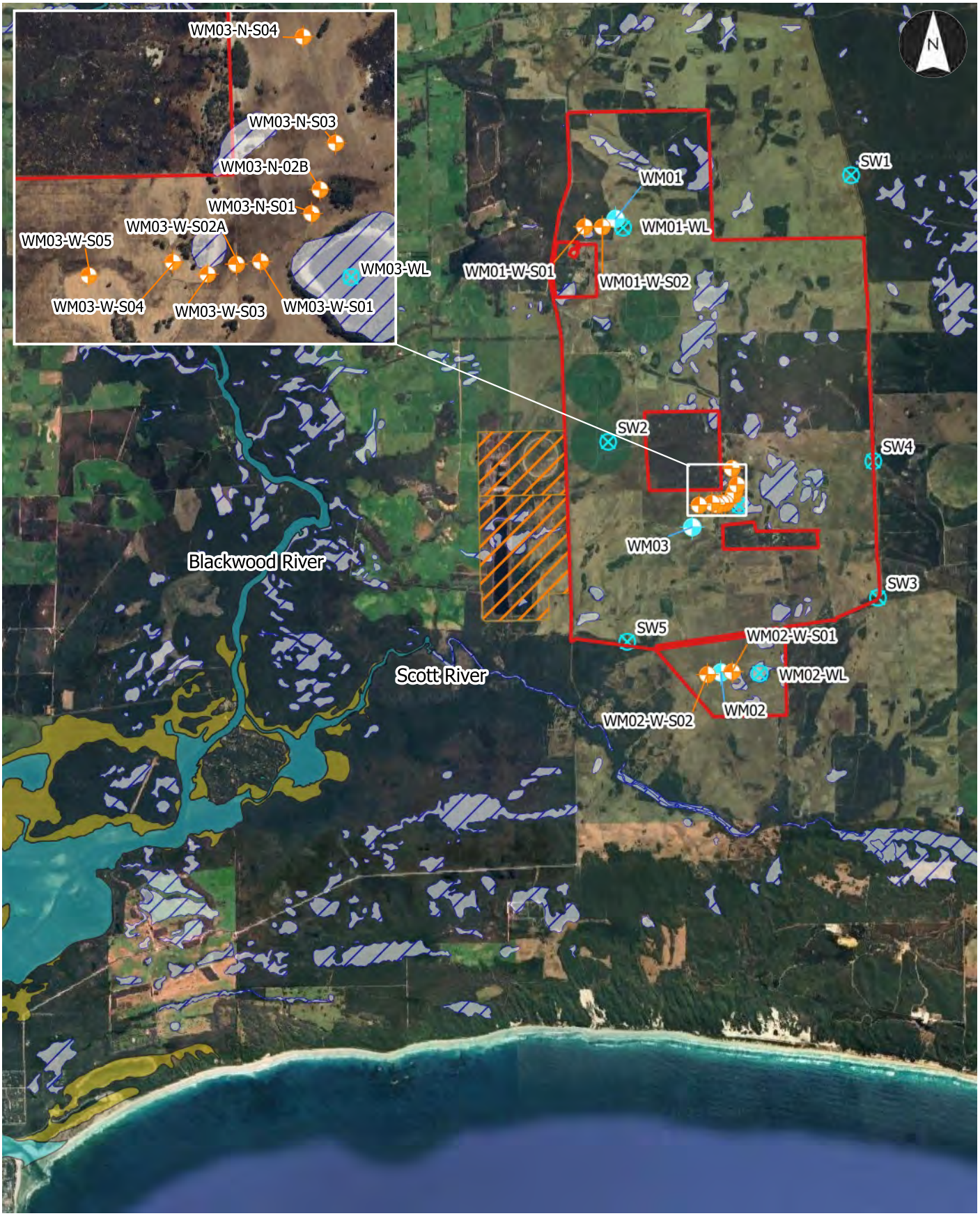

Groundwater, Waterways and Wetlands

Project: Proposed Scott River Wind Farm

Client: Synergy RED
Project Code: PTG - 02095
Drawn By: AW, Checked By: AF
Date: (2025-07-11)
Figure No: 4

Legend

- Site Boundary
- Contaminated Site
- Surface Water Sampling
- Shallow Bore Locations
- Deep Bore Hole

Hydrography (DWER 031)

- Major River
- Stream
- Tributary

Wetlands (DBCA 017)

- Sensitive Wetlands
- Estuary (shoreline and peripheral)
- Estuary (waterbody)

ptg consulting

Not For Construction

0 0.5 1 1.5 km

Scale at A4: 1:85000

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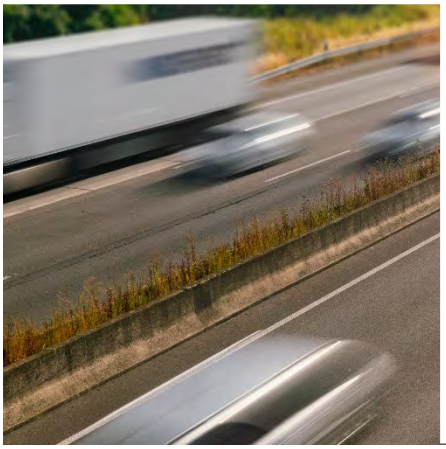
Appendix B – Database Search Results





Dandjoo Species List Export

Created by Guest User on 31 Mar 2025

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Date time	2025-03-31T15:19:47.135136+08:00

Conservation status summary	Count
CD	1
CR	4
EN	12
EX	1
None	109
OS	1
P1	9
P2	7
P3	27
P4	16
Parent of conservation listed taxa	3
VU	5
Total	**195**

Kingdoms	Count
Animalia	20
Fungi	1
Plantae	174
Total unique species	**195**

#	Class	Family	Name	Establishment	Conservation
Animalia					
1	Actinopterygii Klein, 1885	Galaxiidae	Galaxiella munda McDowall, 1978 *(mud minnow)*	native	VU
2	Actinopterygii Klein, 1885	Galaxiidae	Galaxiella nigrostriata (Shipway, 1953) *(Black-stripe Minnow)*	native	EN
3	Actinopterygii Klein, 1885	Lepidogalaxiidae Rosen, 1974	Lepidogalaxias salamandroides Mees, 1961 *(Salamanderfish)*	native	EN
4	Arachnida	Idiopidae Simon, 1889	Idiosoma Ausserer, 1871		Parent of conservation listed taxa
5	Aves	Ardeidae	Botaurus poiciloptilus (Wagler, 1827) *(Australasian Bittern)*	native	EN
6	Aves	Cacatuidae	Calyptorhynchus banksii naso Gould, 1837 *(Forest Red-tailed Black*	native	VU

			Cockatoo)		
7	Aves	Cacatuidae	Zanda Mathews, 1913		Parent of conservation listed taxa
8	Aves	Cacatuidae	Zanda baudinii Lear, 1832 *(Baudin's Cockatoo)*	native	EN
9	Aves	Cacatuidae	Zanda latirostris Carnaby, 1948 *(Carnaby's Cockatoo)*	native	EN
10	Aves	Falconidae	Falco peregrinus Tunstall, 1771 *(Peregrine Falcon)*	native	OS
11	Aves	Megapodiidae	Leipoa ocellata Gould, 1840 *(Malleefowl)*	native	VU
12	Bivalvia	Hyriidae	Westralunio carteri Iredale, 1934 *(Carter's Freshwater Mussel)*	native	VU
13	Insecta	Scarabaeidae	Onthophagus ferox Harold, 1867		
14	Malacostraca	Parastacidae	Cherax tenuimanus Smith, 2002	native	CR
15	Malacostraca	Parastacidae	Engaewa reducta Riek, 1967 *(Dunsborough Burrowing Crayfish)*	native	EN
16	Mammalia	Dasyuridae	Phascogale tapoatafa wambenger Aplin, Rhind, Ten Have & Chesser, 2015 *(South-western Brush-tailed Phascogale)*	native	CD
17	Mammalia	Macropodidae	Setonix brachyurus (Quoy & Gaimard, 1830) *(Quokka)*	native	VU
18	Mammalia	Muridae	Hydromys chrysogaster Geoffroy, 1804 *(Water-rat)*	native	P4
19	Mammalia	Peramelidae	Isoodon fusciventer (Gray, 1841)	native	P4
20	Mammalia	Pseudocheiridae	Pseudocheirus occidentalis (Thomas, 1888) *(Western Ringtail Possum)*	native	CR

Fungi

21	Basidiomycetes	Amanitaceae Pouzar	Amanita fibrillopes O.K.Mill.	native	P3

Plantae

22	Liliopsida	Anarthriaceae D.F.Cutler & Airy Shaw	Anarthria scabra R.Br.	native	
23	Liliopsida	Anarthriaceae D.F.Cutler & Airy Shaw	Lyginia imberbis R.Br.	native	
24	Liliopsida	Asparagaceae Juss.	Lomandra caespitosa (Benth.) Ewart *(Tufted Mat Rush)*	native	
25	Liliopsida	Asparagaceae Juss.	Lomandra suaveolens (Endl.) Ewart	native	
26	Liliopsida	Cyperaceae Juss.	Cyathochaeta stipoides K.L.Wilson	native	P3
27	Liliopsida	Cyperaceae Juss.	Cyathochaeta teretifolia W.Fitzg.	native	P3
28	Liliopsida	Cyperaceae Juss.	Evandra aristata R.Br.	native	
29	Liliopsida	Cyperaceae Juss.	Ficinia marginata (Thunb.) Fourc.		
30	Liliopsida	Cyperaceae Juss.	Isolepis cyperoides R.Br.	native	
31	Liliopsida	Cyperaceae Juss.	Lepidosperma Labill.		
32	Liliopsida	Cyperaceae Juss.	Machaerina ascendens R.L.Barrett & K.L.Wilson	native	P2
33	Liliopsida	Cyperaceae Juss.	Reedia spathacea F.Muell.	mixed	EN
34	Liliopsida	Cyperaceae Juss.	Schoenus elegans S.T.Blake	native	
35	Liliopsida	Cyperaceae Juss.	Schoenus indutus (F.Muell.) Benth.	native	P1
36	Liliopsida	Cyperaceae Juss.	Schoenus loliaceus KÃ¼k.	native	P2
37	Liliopsida	Cyperaceae Juss.	Tricostularia davisii R.L.Barrett & K.L.Wilson *(Davisâ€™ Tricostularia)*	native	P3
38	Liliopsida	Dasypogonaceae Dumort.	Dasypogon bromeliifolius R.Br. *(Pineapple Bush)*	native	
39	Liliopsida	Haemodoraceae R.Br.	Anigozanthos flavidus DC. *(Tall Kangaroo Paw)*	native	
40	Liliopsida	Haemodoraceae R.Br.	Anigozanthos viridis Endl. subsp. viridis	native	
41	Liliopsida	Haemodoraceae R.Br.	Haemodorum simplex Lindl.	native	
42	Liliopsida	Haemodoraceae R.Br.	Phlebocarya ciliata R.Br.	native	
43	Liliopsida	Hemerocallidaceae R.Br.	Caesia occidentalis R.Br.	native	
44	Liliopsida	Orchidaceae Juss.	Caladenia abbreviata Hopper & A.P.Br. *(Coastal Spider Orchid)*	native	P3
45	Liliopsida	Orchidaceae Juss.	Caladenia thinicola Hopper & A.P.Br. *(Scott River Spider Orchid)*	native	
46	Liliopsida	Orchidaceae Juss.	Microtis alba R.Br. *(White Mignonette Orchid)*	native	
47	Liliopsida	Orchidaceae Juss.	Microtis media R.Br. subsp. media	native	
48	Liliopsida	Philydraceae Link	Philydrella pygmaea subsp. minima L.G.Adams	native	P1
49	Liliopsida	Restionaceae R.Br.	Chordifex amblycoleus (F.Muell.) B.G.Briggs & L.A.S.Johnson	native	

50	Liliopsida	Restionaceae R.Br.	Chordifex gracilior (Benth.) B.G.Briggs & L.A.S.Johnson	native	P3
51	Liliopsida	Restionaceae R.Br.	Chordifex isomorphus (K.W.Dixon & Meney) B.G.Briggs & L.A.S.Johnson	native	
52	Liliopsida	Restionaceae R.Br.	Chordifex jacksonii B.G.Briggs & L.A.S.Johnson	native	P3
53	Liliopsida	Restionaceae R.Br.	Cytogonidium leptocarpoides (Benth.) B.G.Briggs & L.A.S.Johnson	native	
54	Liliopsida	Restionaceae R.Br.	Desmocladus Nees		
55	Liliopsida	Restionaceae R.Br.	Desmocladus castaneus B.G.Briggs & L.A.S.Johnson	native	
56	Liliopsida	Restionaceae R.Br.	Desmocladus fasciculatus (R.Br.) B.G.Briggs & L.A.S.Johnson	native	
57	Liliopsida	Restionaceae R.Br.	Empodisma gracillimum (F.Muell.) L.A.S.Johnson & D.F.Cutler	native	
58	Liliopsida	Restionaceae R.Br.	Hypolaena caespitosa B.G.Briggs & L.A.S.Johnson	native	
59	Liliopsida	Restionaceae R.Br.	Hypolaena pubescens (R.Br.) Nees	native	
60	Liliopsida	Restionaceae R.Br.	Hypolaena robusta Meney & Pate	native	P4
61	Liliopsida	Restionaceae R.Br.	Leptocarpus R.Br.		
62	Liliopsida	Restionaceae R.Br.	Leptocarpus laxus (R.Br.) B.G.Briggs	native	
63	Liliopsida	Restionaceae R.Br.	Leptocarpus scariosus R.Br.	native	
64	Liliopsida	Restionaceae R.Br.	Leptocarpus scoparius B.G.Briggs	native	
65	Liliopsida	Restionaceae R.Br.	Leptocarpus trisepalus (Nees) B.G.Briggs	native	
66	Liliopsida	Restionaceae R.Br.	Lepyrodia R.Br.		
67	Liliopsida	Restionaceae R.Br.	Lepyrodia heleocharoides Gilg	native	P3
68	Liliopsida	Restionaceae R.Br.	Lepyrodia macra Nees *(Large Scale Rush)*	native	
69	Liliopsida	Restionaceae R.Br.	Lepyrodia porterae B.G.Briggs & L.A.S.Johnson	native	
70	Liliopsida	Restionaceae R.Br.	Loxocarya cinerea R.Br.	native	
71	Liliopsida	Restionaceae R.Br.	Loxocarya magna Meney & K.W.Dixon	native	P3
72	Liliopsida	Restionaceae R.Br.	Melanostachya ustulata (Ewart & Sharman) B.G.Briggs & L.A.S.Johnson	native	
73	Liliopsida	Restionaceae R.Br.	Sporadanthus strictus (R.Br.) B.G.Briggs & L.A.S.Johnson	native	
74	Liliopsida	Restionaceae R.Br.	Tremulina B.G.Briggs & L.A.S.Johnson		
75	Liliopsida	Restionaceae R.Br.	Tremulina tremula (R.Br.) B.G.Briggs & L.A.S.Johnson	native	
76	Liliopsida	Xyridaceae C.Agardh	Xyris lanata R.Br.	native	
77	Liliopsida	Xyridaceae C.Agardh	Xyris roycei N.A.Wakef.	native	
78	Magnoliopsida	Apiaceae Lindl.	Xanthosia tasmanica Domin	native	
79	Magnoliopsida	Asteraceae Bercht. & J.Presl	Blennospora doliiformis Keighery	native	P3
80	Magnoliopsida	Asteraceae Bercht. & J.Presl	Cotula turbinata L.	alien	
81	Magnoliopsida	Asteraceae Bercht. & J.Presl	Leptinella drummondii (Benth.) D.G.Lloyd & C.J.Webb	native	P3
82	Magnoliopsida	Asteraceae Bercht. & J.Presl	Pithocarpa corymbulosa Lindl.	native	P3
83	Magnoliopsida	Asteraceae Bercht. & J.Presl	Vellereophyton dealbatum (Thunb.) Hilliard & B.L.Burtt	alien	
84	Magnoliopsida	Caryophyllaceae Juss.	Silene gallica L. var. gallica	alien	
85	Magnoliopsida	Celastraceae R.Br.	Tripterococcus sp. Brachylobus (A.S. George 14234)	native	P4
86	Magnoliopsida	Dilleniaceae Salisb.	Hibbertia stellaris Endl. *(Orange Stars)*	native	
87	Magnoliopsida	Droseraceae Salisb.	Drosera enodes N.G.Marchant & Lowrie	native	
88	Magnoliopsida	Droseraceae Salisb.	Drosera fimbriata DeBuhr	native	P4
89	Magnoliopsida	Droseraceae Salisb.	Drosera glanduligera Lehm.	native	
90	Magnoliopsida	Droseraceae Salisb.	Drosera leucoblasta Benth. *(Wheel Sundew)*	native	
91	Magnoliopsida	Ericaceae Juss.	Andersonia caerulea R.Br. subsp. caerulea	native	
92	Magnoliopsida	Ericaceae Juss.	Andersonia ferricola Lemson	native	P1
93	Magnoliopsida	Ericaceae Juss.	Andersonia sp. Amabile (N. Gibson & M. Lyons 355)	native	P3
94	Magnoliopsida	Ericaceae Juss.	Leucopogon alternifolius R.Br.	native	P3
95	Magnoliopsida	Ericaceae Juss.	Leucopogon australis R.Br.	native	
96	Magnoliopsida	Ericaceae Juss.	Leucopogon cordatus Sond.	native	
97	Magnoliopsida	Ericaceae Juss.	Leucopogon gilbertii Stschegl.	native	
98	Magnoliopsida	Ericaceae Juss.	Leucopogon wheelerae Hislop	native	P3
99	Magnoliopsida	Ericaceae Juss.	Needhamiella pumilio (R.Br.) L.Watson	native	

100	Magnoliopsida	Ericaceae Juss.	Sphenotoma gracilis (R.Br.) Sweet *(Swamp Paper-heath)*	native	
101	Magnoliopsida	Ericaceae Juss.	Styphelia intricata Hislop	native	P2
102	Magnoliopsida	Ericaceae Juss.	Styphelia pendula (R.Br.) Spreng.	native	
103	Magnoliopsida	Fabaceae Lindl.	Acacia inops Maiden & Blakely	native	P3
104	Magnoliopsida	Fabaceae Lindl.	Acacia lateriticola var. Glabrous variant (B.R.Maslin 6765)	native	P3
105	Magnoliopsida	Fabaceae Lindl.	Acacia myrtifolia (Sm.) Willd.	native	
106	Magnoliopsida	Fabaceae Lindl.	Acacia pulchella R.Br. var. pulchella	mixed	
107	Magnoliopsida	Fabaceae Lindl.	Acacia tayloriana F.Muell.	native	P4
108	Magnoliopsida	Fabaceae Lindl.	Aotus carinata Meisn.	native	P4
109	Magnoliopsida	Fabaceae Lindl.	Aotus gracillima Meisn.	native	
110	Magnoliopsida	Fabaceae Lindl.	Aotus intermedia Meisn.	native	
111	Magnoliopsida	Fabaceae Lindl.	Bossiaea praetermissa J.H.Ross	native	
112	Magnoliopsida	Fabaceae Lindl.	Daviesia inflata Crisp	native	
113	Magnoliopsida	Fabaceae Lindl.	Gastrolobium formosum (Lindl.) G.Chandler & Crisp	native	P3
114	Magnoliopsida	Fabaceae Lindl.	Gompholobium polymorphum R.Br.	native	
115	Magnoliopsida	Fabaceae Lindl.	Gompholobium tomentosum Labill. *(Hairy Yellow Pea)*	native	
116	Magnoliopsida	Fabaceae Lindl.	Jacksonia horrida DC.	native	
117	Magnoliopsida	Fabaceae Lindl.	Latrobea diosmifolia Benth.	native	
118	Magnoliopsida	Fabaceae Lindl.	Loricobbia pinifolia (Meisn.) R.L.Barrett & T.Macfarlane	native	P3
119	Magnoliopsida	Fabaceae Lindl.	Sphaerolobium drummondii Turcz.	native	
120	Magnoliopsida	Fabaceae Lindl.	Sphaerolobium macranthum Meisn.	native	
121	Magnoliopsida	Goodeniaceae R.Br.	Dampiera heteroptera Rajput & Carolin	native	P3
122	Magnoliopsida	Goodeniaceae R.Br.	Lechenaultia expansa R.Br.	native	
123	Magnoliopsida	Haloragaceae R.Br.	Gonocarpus pusillus (Benth.) Orchard	native	P4
124	Magnoliopsida	Lamiaceae Martinov	Hemigenia obovata F.Muell.	native	P1
125	Magnoliopsida	Lamiaceae Martinov	Hemigenia sp. Nillup (R.D. Royce 98)	native	P2
126	Magnoliopsida	Myrtaceae Juss.	Actinodium Schauer		
127	Magnoliopsida	Myrtaceae Juss.	Actinodium cunninghamii Schauer *(Albany Daisy)*	native	
128	Magnoliopsida	Myrtaceae Juss.	Agonis flexuosa (Willd.) Sweet var. flexuosa *(Peppermint)*	mixed	
129	Magnoliopsida	Myrtaceae Juss.	Astartea onycis Rye & Trudgen *(Clawed Astartea)*	native	P4
130	Magnoliopsida	Myrtaceae Juss.	Beaufortia sparsa R.Br. *(Swamp Bottlebrush)*	native	
131	Magnoliopsida	Myrtaceae Juss.	Calothamnus lateralis var. crassus (Benth.) A.S.George	native	P3
132	Magnoliopsida	Myrtaceae Juss.	Darwinia ferricola Keighery	native	EN
133	Magnoliopsida	Myrtaceae Juss.	Homalospermum firmum Schauer	native	
134	Magnoliopsida	Myrtaceae Juss.	Hypocalymma ericifolium Benth.	native	
135	Magnoliopsida	Myrtaceae Juss.	Hypocalymma strictum Schauer	native	
136	Magnoliopsida	Myrtaceae Juss.	Kunzea recurva Schauer	native	
137	Magnoliopsida	Myrtaceae Juss.	Kunzea sulphurea Tovey & P.Morris	native	
138	Magnoliopsida	Myrtaceae Juss.	Melaleuca basicephala Benth.	native	P4
139	Magnoliopsida	Myrtaceae Juss.	Melaleuca incana R.Br. subsp. incana	native	
140	Magnoliopsida	Myrtaceae Juss.	Melaleuca thymoides Labill.	native	
141	Magnoliopsida	Myrtaceae Juss.	Pericalymma crassipes Schauer	native	
142	Magnoliopsida	Myrtaceae Juss.	Pericalymma megaphyllum Cranfield	native	P1
143	Magnoliopsida	Myrtaceae Juss.	Pericalymma spongiocaule Cranfield	native	
144	Magnoliopsida	Myrtaceae Juss.	Taxandria inundata J.R.Wheeler & N.G.Marchant	native	
145	Magnoliopsida	Myrtaceae Juss.	Taxandria parviceps (Schauer) J.R.Wheeler & N.G.Marchant	native	
146	Magnoliopsida	Myrtaceae Juss.	Verticordia lehmannii Schauer	native	P4
147	Magnoliopsida	Myrtaceae Juss.	Verticordia plumosa var. vassensis A.S.George	native	EN
148	Magnoliopsida	Proteaceae Juss.	Adenanthos detmoldii F.Muell. *(Scott River Jugflower)*	native	P4
149	Magnoliopsida	Proteaceae Juss.	Adenanthos meisneri Lehm.	native	
150	Magnoliopsida	Proteaceae Juss.	Adenanthos x pamela E.C.Nelson	native	P4
151	Magnoliopsida	Proteaceae Juss.	Banksia attenuata R.Br. *(Slender Banksia)*	native	
152	Magnoliopsida	Proteaceae Juss.	Banksia dallanneyi A.R.Mast & K.R.Thiele subsp. dallanneyi	native	
153	Magnoliopsida	Proteaceae Juss.	Banksia ilicifolia R.Br. *(Holly-leaved Banksia)*	native	

154	Magnoliopsida	Proteaceae Juss.	Banksia littoralis R.Br. *(Swamp Banksia)*	native	
155	Magnoliopsida	Proteaceae Juss.	Banksia meisneri subsp. ascendens (A.S.George) A.S.George *(Scott River Banksia)*	native	P4
156	Magnoliopsida	Proteaceae Juss.	Banksia nivea subsp. uliginosa (A.S.George) A.R.Mast & K.R.Thiele	native	EN
157	Magnoliopsida	Proteaceae Juss.	Conospermum caeruleum subsp. debile (Meisn.) E.M.Benn.	native	
158	Magnoliopsida	Proteaceae Juss.	Conospermum flexuosum R.Br.	native	
159	Magnoliopsida	Proteaceae Juss.	Conospermum quadripetalum E.M.Benn.	native	CR
160	Magnoliopsida	Proteaceae Juss.	Grevillea brachystylis Meisn.	native	Parent of conservation listed taxa
161	Magnoliopsida	Proteaceae Juss.	Grevillea brachystylis subsp. australis Keighery	native	CR
162	Magnoliopsida	Proteaceae Juss.	Grevillea manglesii PÃ©pin	native	
163	Magnoliopsida	Proteaceae Juss.	Grevillea manglesioides subsp. ferricola Keighery	native	P3
164	Magnoliopsida	Proteaceae Juss.	Grevillea manglesioides subsp. metaxa Makinson	native	
165	Magnoliopsida	Proteaceae Juss.	Grevillea papillosa (McGill.) Olde & Marriott	native	P3
166	Magnoliopsida	Proteaceae Juss.	Hakea tuberculata R.Br.	native	
167	Magnoliopsida	Proteaceae Juss.	Hakea varia R.Br.	native	
168	Magnoliopsida	Proteaceae Juss.	Isopogon formosus subsp. dasylepis (Meisn.) Foreman	native	P3
169	Magnoliopsida	Proteaceae Juss.	Lambertia orbifolia subsp. vespera A.D.Webb, L.T.Monks & Wege *(Scott River Honeysuckle)*	native	EN
170	Magnoliopsida	Proteaceae Juss.	Synaphea macrophylla A.S.George	native	P1
171	Magnoliopsida	Proteaceae Juss.	Synaphea nexosa A.S.George	native	P1
172	Magnoliopsida	Proteaceae Juss.	Synaphea otiostigma A.S.George	native	P3
173	Magnoliopsida	Proteaceae Juss.	Synaphea petiolaris R.Br. *(Synaphea)*	native	
174	Magnoliopsida	Proteaceae Juss.	Synaphea petiolaris subsp. triloba A.S.George	native	
175	Magnoliopsida	Rhamnaceae Juss.	Spyridium spadiceum (Fenzl) Benth.	native	P4
176	Magnoliopsida	Rhamnaceae Juss.	Stenanthemum sublineare Rye	native	P2
177	Magnoliopsida	Rubiaceae Juss.	Opercularia hispidula Endl.	native	
178	Magnoliopsida	Rutaceae Juss.	Boronia anceps Paul G.Wilson	native	P3
179	Magnoliopsida	Rutaceae Juss.	Boronia exilis Paul G.Wilson	native	EN
180	Magnoliopsida	Rutaceae Juss.	Boronia spathulata Lindl. *(Boronia)*	native	
181	Magnoliopsida	Santalaceae R.Br.	Leptomeria dielsiana Pilg. *(Diel's Currant Bush)*	native	EX
182	Magnoliopsida	Santalaceae R.Br.	Leptomeria furtiva Lepschi	native	P2
183	Magnoliopsida	Santalaceae R.Br.	Leptomeria squarrulosa R.Br.	native	
184	Magnoliopsida	Stylidiaceae R.Br.	Levenhookia preissii (Sond.) F.Muell.	native	P1
185	Magnoliopsida	Stylidiaceae R.Br.	Stylidium amoenum R.Br. var. amoenum	native	
186	Magnoliopsida	Stylidiaceae R.Br.	Stylidium calcaratum R.Br.	native	
187	Magnoliopsida	Stylidiaceae R.Br.	Stylidium despectum R.Br. *(Dwarf Triggerplant)*	native	
188	Magnoliopsida	Stylidiaceae R.Br.	Stylidium inundatum R.Br.	native	
189	Magnoliopsida	Stylidiaceae R.Br.	Stylidium leeuwinense Lowrie & Kenneally	native	P4
190	Magnoliopsida	Stylidiaceae R.Br.	Stylidium repens R.Br. *(Matted Triggerplant)*	native	
191	Magnoliopsida	Stylidiaceae R.Br.	Stylidium sp. Scott River Plain (N.G. Marchant 74/23)	native	P1
192	Magnoliopsida	Stylidiaceae R.Br.	Stylidium trudgenii Lowrie & Kenneally	native	P3
193	Magnoliopsida	Thymelaeaceae Juss.	Pimelea hispida R.Br. *(Bristly Pimelea)*	native	
194	Magnoliopsida	Thymelaeaceae Juss.	Pimelea longiflora R.Br.	native	
195	Magnoliopsida	Violaceae Batsch	Pigea volubilis (E.M.Benn.) P.I.Forst.		P2

Conservation status definitions

Threatened species

- CR – Critically Endangered
- EN – Endangered
- VU – Vulnerable
- EX – Extinct
- EW – Extinct in the Wild
- CD – Species of special conservation interest (conservation dependent)
- OS – Species otherwise in need of special protection (other specially protected)
- MI – Migratory
- SP – Specially protected species

Priority species

- P1 – Priority 1: Poorly-known species – known from few locations, none on conservation lands
- P2 – Priority 2: Poorly-known species – known from few locations, some on conservation lands
- P3 – Priority 3: Poorly-known species – known from several locations
- P4 – Priority 4: Rare, Near Threatened and other species in need of monitoring

Dandjoo specific codes

- Parent of conservation listed taxa
- Cons code inherited from parent, X

Read full definitions at https://bio.wa.gov.au/guide/conservation-status-definitions

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Further note, precise locations of conservation listed species are considered sensitive. To protect this information, obfuscation has been applied to conservation-listed species records. For these species, the true location is Â±10km from the search area used to generate this species list.

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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Search Criteria

1 Aboriginal Cultural Heritage (ACH) Register in Custom search area - Polygon - 115.265855430364°E, 34.2631202316705°S (GDA94) : 115.265855430364°E, 34.1928645767378°S (GDA94) : 115.327138541936°E, 34.1928645767378°S (GDA94) : 115.327138541936°E, 34.2631202316705°S (GDA94) : 115.265855430364°E, 34.2631202316705°S (GDA94)

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All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within or adjacent to the following Indigenous Land Use Agreement(s): South West Boojarah #2 Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will ‘impact’ (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DEMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.

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Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- Boundary Reliable (Yes/No): Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- Boundary Restricted = No: Represents the actual location of the ACH as understood by the Department..
- Boundary Restricted = Yes: To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- Culturally Sensitive = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- Culturally Sensitive = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.
- Culturally Sensitive Nature:
  - No Gender / Initiation Restrictions: *Anyone* can view the information.
  - Men only: Only *males* can view restricted information.
  - Women only: Only *females* can view restricted information.

Status:

- Register: Aboriginal cultural heritage places that are assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*.
- Lodged: Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the *Aboriginal Heritage Act 1972.*
- Historic: Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the *Aboriginal Heritage Act 1972*. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Coordinates

Map coordinates are based on the GDA 2020 Datum.

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Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
20434	Blackwood River	No	Yes	No	No Gender / Initiation Restrictions	Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	

Department of Planning, Lands and Heritage

GOVERNMENT OF WESTERN AUSTRALIA

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register

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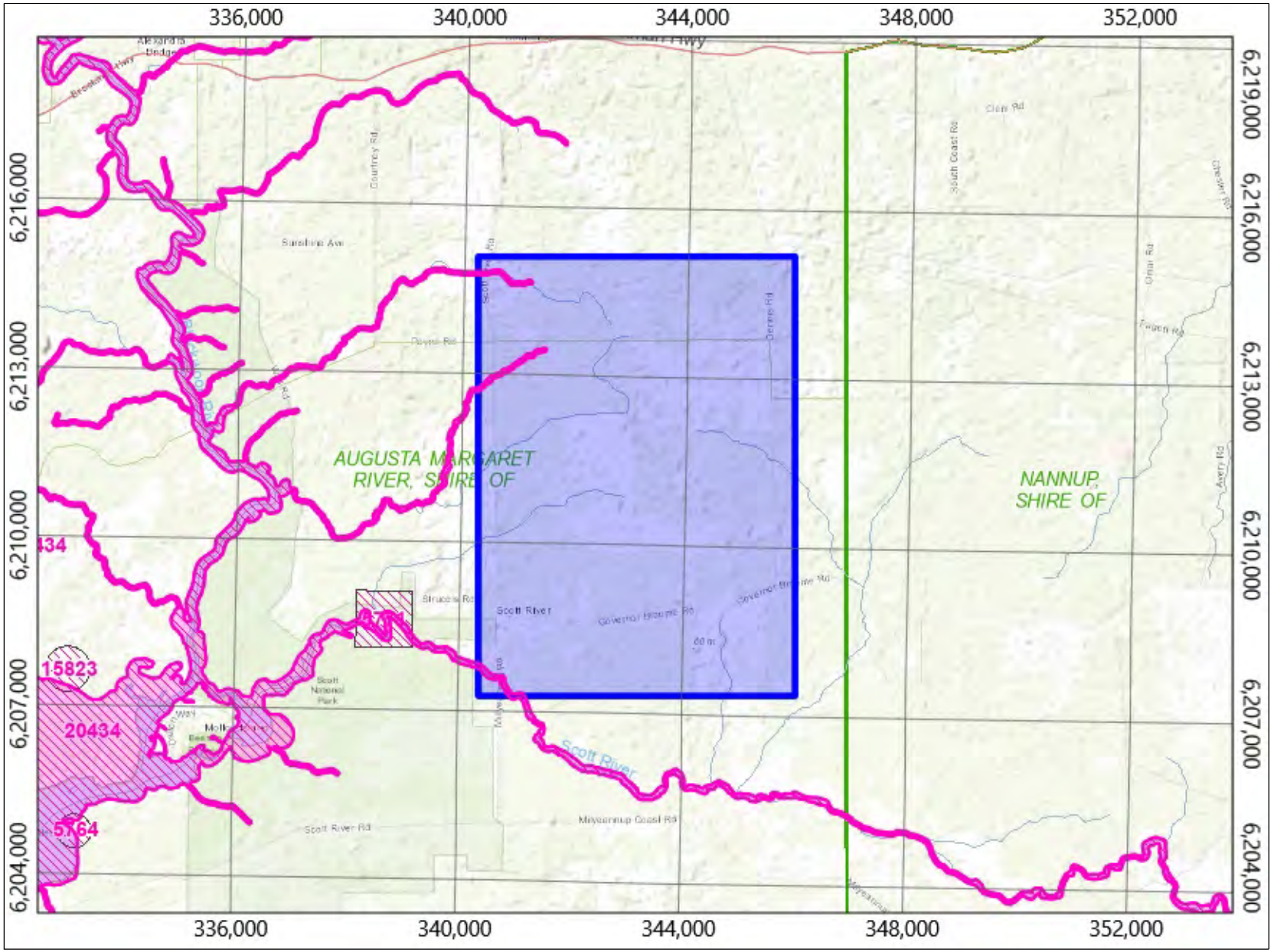

Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

4.12 kilometres

Map Scale 1 : 125,000

MGA Zone 50 (GDA2020)

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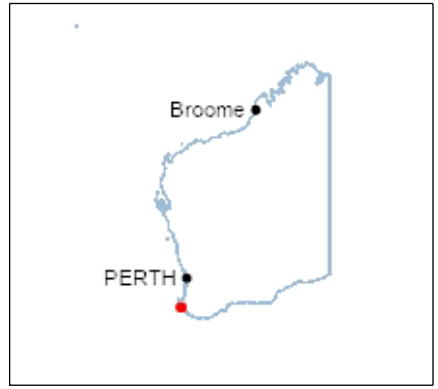

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Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Lodged

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South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within or adjacent to the following Indigenous Land Use Agreement(s): South West Boojarah #2 Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will ‘impact’ (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DEMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.

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Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- Boundary Reliable (Yes/No): Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- Boundary Restricted = No: Represents the actual location of the ACH as understood by the Department..
- Boundary Restricted = Yes: To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- Culturally Sensitive = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- Culturally Sensitive = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.
- Culturally Sensitive Nature:
  - No Gender / Initiation Restrictions: Anyone can view the information.
  - Men only: Only males can view restricted information.
  - Women only: Only females can view restricted information.

Status:

- Register: Aboriginal cultural heritage places that are assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Lodged: Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the Aboriginal Heritage Act 1972.
- Historic: Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the Aboriginal Heritage Act 1972. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Coordinates

Map coordinates are based on the GDA 2020 Datum.

Basemap Copyright

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Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Lodged

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
22928	Scott River	No	Yes	No	No Gender / Initiation Restrictions	Lodged	Creation / Dreaming Narrative; Water Source	*Registered Knowledge Holder names available from DPLH	

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Lodged

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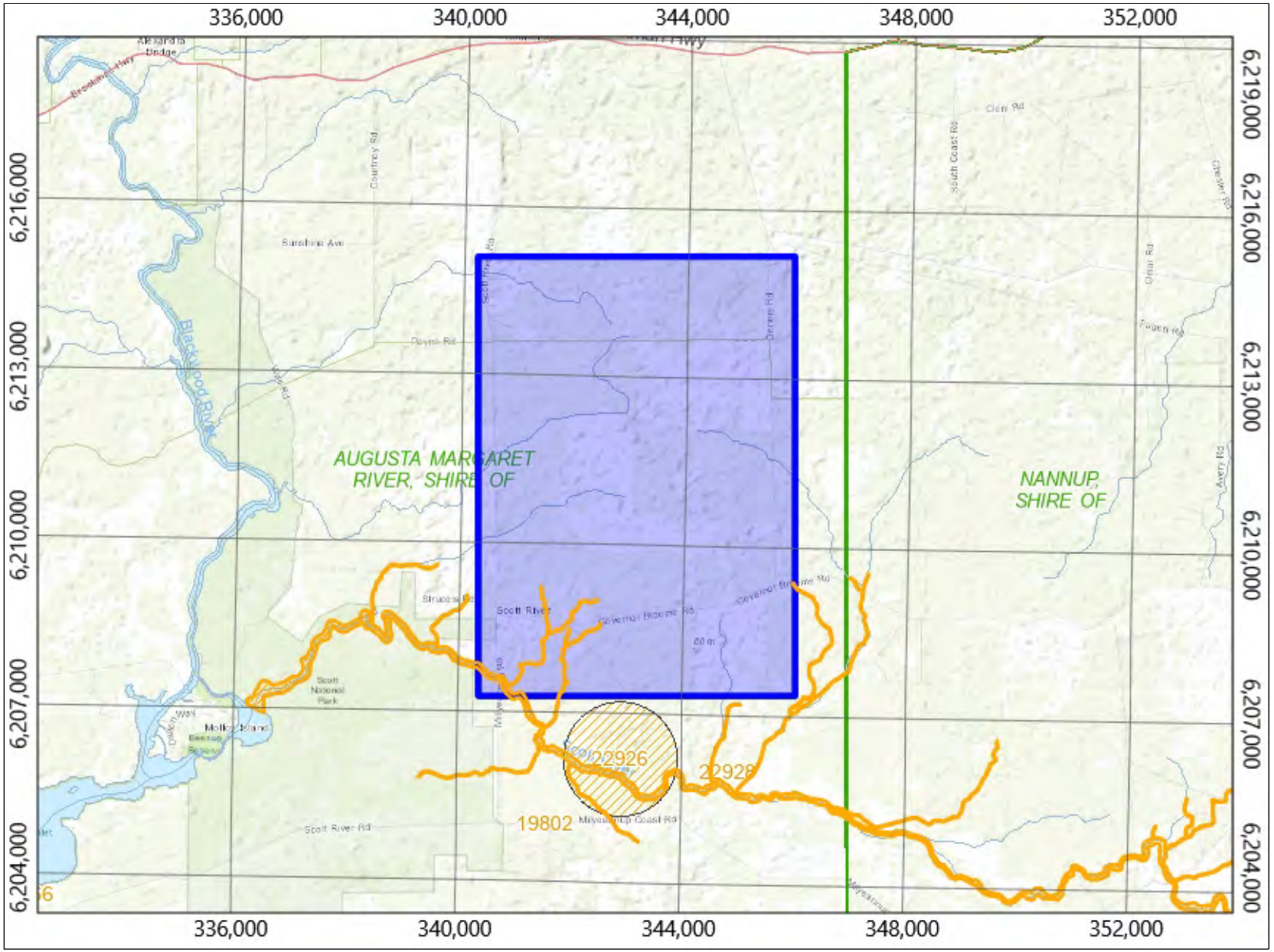

Legend

- Aboriginal Cultural Heritage (ACH) Lodged
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

4.12 kilometres

Map Scale 1 : 125,000

MGA Zone 50 (GDA2020)

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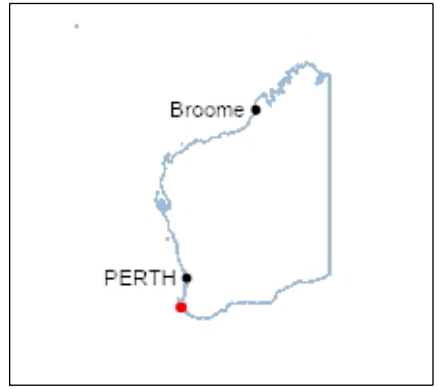
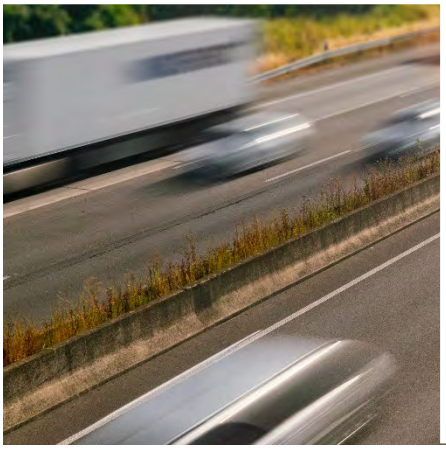




Appendix C – Sampling and Groundwater Bore Construction Logs





Stantec

SOIL AND ROCK EXPLANATORY NOTES, ABBREVATIONS & TERMS (DESCRIPTIONS, CLASSIFICATION CHARTS AND LOG KEYS)

CLASSIFICATION AND INFERRED STRATISGRAPHY

Soil and rock are classified and described in accordance with the recommendations of Australian Standard AS 1726-2017 Geotechnical Site Investigations which unless mentioned otherwise has been used to prepare these notes. The material properties are assessed in the field by visual/tactile methods. The order in which descriptions are provided on logs is as follows:

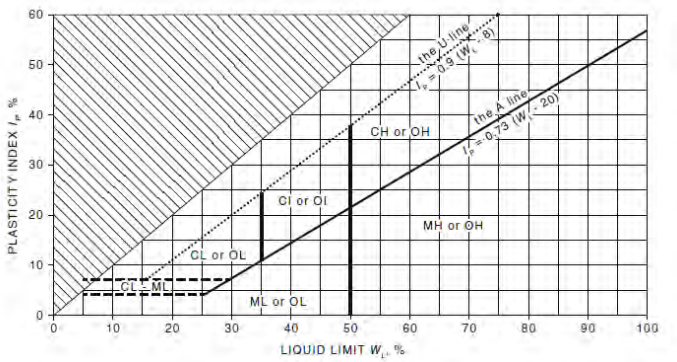
SOIL TYPE (AS 1726-2017 Classification) using BLOCK LETTERS, colour, structure, particle characteristics, geological origin, other minor components. The consistency/density and moisture conditions are listed as abbreviations in separate columns.

The presence of FILL and TOPSOIL shall be indicated at the beginning of the description using BLOCK LETTERS.

Particle Size Definitions

Fraction	Components	Sub Division	Particle Size
Oversize	BOULDERS		> 200mm
	COBBLES		63 – 200mm
Coarse Grained	GRAVEL	Coarse	19 – 63mm
		Medium	6.70 – 19mm
		Fine	2.36 – 6.70mm
	SAND	Coarse	0.60 – 2.36mm
		Medium	0.21 – 0.60mm
		Fine	0.075 – 0.21mm
Fine Grained	SILT		0.002 – 0.075mm
	CLAY		< 0.002mm

Plasticity Properties



NOTE: The U line is an approximate upper bound for most natural soils. Data which plots above the U line may represent unusual/problem soil behaviour, or unreliable data and should be considered carefully.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Major Soil Group	Descriptor	
G - Gravel **S** - Sand	**W** - Well-Graded **P** - Poorly-Graded **S** - Silty **C** - Clayey	**Coefficient of Uniformity (C_u) :** $C_u = D_{60} / D_{10}$
		Coefficient of Curvature (C_c) : $C_c = (D_{30})^2 / (D_{10}D_{60})$
		D_{10} – Grain Diameter (mm) Corresponding to 10% Soil Passing
		D_{30} – Grain Diameter (mm) Corresponding to 30% Soil Passing
		D_{60} – Grain Diameter (mm) Corresponding to 60% Soil Passing
M - Silt **C** - Clay **O** - Organic	**L** - Low Plasticity (LL < 35%) **H** - High Plasticity (LL > 50%)	**NOTE:** Well-Graded Sand (SW) : $C_u > 6$ and $C_c = 1\text{-}3$ Well-Graded Gravel (GW) : $C_u > 4$ and $C_c = 1\text{-}3$

Organic – The soil has between 20% – 75% Organic Matter / Medium Plasticity (Fine Grained Clay Soils ONLY): 35% < LL < 50%

MINOR COMPONENTS

Zoning	Description
Layer	The zone is continuous across the exposure or sample
Lens	Discontinuous layer of different material, with lenticular shape
Pocket	Irregular inclusions of different material
Interbedded / Interlaminated	Layers of alternating soil types are too thin to be described individually

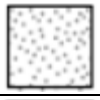
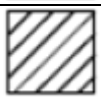
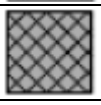
The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse-grained soils may be described as strongly or weakly cemented.

Cementation State	Description
Uncemented (Uc)	No cementation present
Weakly Cemented (Wk)	The soil may be easily disaggregated by hand in air or water
Moderately Cemented (Mo)	Effort is required to disaggregate the soil by hand in air or water

Terminology	Field Guide	Coarse Grained Soils		Fine Grained Soils
		Percentage Fines	Percentage Coarse	Percentage Coarse
Trace	Presence just detectable	≤ 5%	≤ 15%	≤ 15%
With	Presence easily detectable	> 5% / ≤ 12%	> 15% / ≤ 30%	> 15% / ≤ 30%

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading

SYMBOLS

	GRAVEL (GW / GP / GM /GC)		COBBLES & BOULDERS
	SAND (SW / SP / SM / SC)		PEAT (Pt)
	SILT (ML / OL / MH / OH)		TOPSOIL
	CLAY (CL / OL / CH / OH)		FILL

Combinations of these basic graphic symbols may be used to indicate and describe mixed materials such as Gravelly CLAY. EXAMPLE: GP-GC = Poorly-Graded GRAVEL with Silt

SOIL ORIGIN DESCRIPTIONS

Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity and/or water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by streams and rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual Soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely Weathered Material	Formed by in-situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

MOISTURE CONDITIONS (COARSE GRAINED AND FINED GRAINED SOILS)

Symbol	Term	Description
Coarse Grained Soils -		
D	Dry	Non-cohesive and free running/flowing
M	Moist	Soil feels cool, darkened in colour, soil tends to stick together
W	Wet	Soil feels cool, darkened in colour, soil tends to stick together, free water forms when handling
Fine Grained Soils -		
w < PL	Moist	Moist, Dry of Plastic Limit (PL), hard and friable or powdery
w ≈ PL		Moist, near Plastic Limit (PL), soils can be moulded at a moisture content approximately equal to the Plastic Limit (PL)
w > PL		Moist, Wet of Plastic Limit (PL), soils usually weakened and free water forms on hands when handling
w ≈ LL	Wet	Wet, near Liquid Limit (LL)
w > LL		Wet, Wet of Liquid Limit (LL)

MOISTURE CONDITIONS (ROCK)		
Symbol	**Term**	**Description**
D	Dry	Looks and feels dry
M	Moist	Feels cool, darkened in colour, nut no water is visible on the surface
W	Wet	Feels cool, darkened in colour, water film or droplets visible on the surface

GROUNDWATER	
	Water Level at Date Shown
	Water Inflow - Water Flowing/Flooding into Hole
	Water Outflow - Partial Water Loss
	Water Outflow - Complete Water Loss
GROUNDWATER NOT OBSERVED	The observation of groundwater, whether present or not, was not possible due to drilling water surface seepage or cave in of the borehole and/or test pit
GROUNDWATER NOT ENCOUNTERED	The borehole and/or test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole and/or test pit been left open for a longer period.

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

DENSITY / CONSISTENCY (COARSE GRAINED AND FINE GRAINED SOILS)

Relative Density (Coarse Grained Soils) -

Symbol	Term	Density Index (%)	SPT (150mm) *	DCP (100mm) *	DCP (150mm) *
VLs	Very Loose	Less than 15%	0 - 4	0 - 1	0 - 1
Ls	Loose	15% - 35%	4 - 10	1 - 2	1 - 3
MD	Medium Dense	35% - 65%	10 - 30	2 - 5	3 - 8
D	Dense	65% - 85%	30 - 50	5 - 10	8 - 15
VD	Very Dense	More than 85%	> 50	> 10	> 15

Consistency (Fine Grained Soils) -

Symbol	Term	Undrained Shear Strength (kPa)	Field Guide	DCP (100mm) *	DCP (150mm) *
VS	Very Soft	Less than 12kPa	Exudes between fingers when squeezed in hand	0	0
S	Soft	12kPa - 25kPa	Can be moulded by light finger pressure	0 -1	0 - 1.5
F	Firm	25kPa - 50kPa	Can be moulded by strong finger pressure	1 - 2	1.5 - 3
St	Stiff	50kPa - 100kPa	Cannot be moulded by fingers, can be indented by thumb	2 - 4	3 - 6
VSt	Very Stiff	100kPa - 200kPa	Can be easily indented by thumb nail	4 - 8	6 - 12
Hd	Hard	More than 200kPa	Can be indented with difficult by thumb nail	> 8	> 12

(*) - Number of blows are depth related and can vary significantly. In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material. SPT and DCP are not stated in AS 1726-2017, and may be subject to corrections for overburden pressure and equipment type. Corrections have not been performed in preparing the following logs.

C	Curved	The defect has a gradual change in orientation.
U	Undulating	The defect has a wavy surface.
St	Stepped	The defect has one or more well defined steps.
I	Irregular	The defect has many sharp changes of orientation.
Alternatively, the surface roughness may be characterised by the Joint Roughness Coefficient (JRC) [AS 1726:2017 – Figure 9]		
Defect Coatings and Composition of Seams -		
KL	Clean	No visible coatings.
S	Stained	No visible coating but surfaces are discoloured.
V	Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy.
C	Coating	A visible coating up to 1mm thick. Thicker soil material shall be described using defect terms (e.g. infilled seam). Thicker rock strength material shall be described as a vein.

DRILLING / EXCAVATION METHODS

Subsurface investigations may be conducted by either one or a combination of the following methods.

Test Pitting: Excavation/Trench [TP] -		**Spiral Flight Auger Drilling [SFAD] -**	
BH	Backhoe Bucket	AS	Auger Screwing
EX	Excavator Bucket	AD/V	Continuous Flight Auger with V-Bit
R	Ripper	AD/T	Continuous Spiral Flight Auger with TC-Bit
H	Hydraulic Hammer	ADH	Continuous Hollow Flight Auger
EE	Existing Excavation	**Rotary Non-Core Drilling [RNCD] -**	
N	Natural Exposure	WB	Washbore Drilling
Manual Drilling: Hand Operated Tools [MD] -		RR	Rock Roller
HA	Hand Auger	AIRCORE	Air Core
HAND	Excavated by Hand Methods	JET	Jetting
Continuous Sample Drilling [CSD] -		**Rotary Core Drilling [RCD] -**	
PT	Push Tube Sampling	PQ3	83mm - Diamond Wire Line Core Barrel
EPT	Extruded Push Tube	HMLC	63mm - Diamond Wire Line Core Barrel
PS	Percussion Sampling	HQ3	61mm - Diamond Wire Line Core Barrel
SONIC	Sonic Drilling	NMLC	52mm - Diamond Conventional Core Barrel
Hammer Drilling [HD] -		NQ3	45mm - Diamond Wire Line Core Barrel
AH	Air Hammer	DTC	Diatube Concrete Coring
AT	Air Track		
RAB	Percussion Rotary Air Blast		
RC	Reverse Circulation		

Boreholes -	
Vertical Boreholes	The dip (inclination from horizontal) of the defect is given
Inclined Boreholes	The inclination is measured as the acute angle between the core axis and the vertical direction

PENETRATION / EXCAVATION RESISTANCE

VE	Very Easy	Rapid penetration possible with very little effort from the equipment used
E	Easy	Rapid penetration possible with little effort from the equipment used
F	Firm	Excavation possible at an acceptable rate with moderate effort from the equipment used
H	Hard	Further penetration is possible at a slow rate and requires significant effort from the equipment used
VH	Very Hard	Further penetration is possible at a very slow rate and requires maximum effort from the equipment used
These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.		

EXCAVATION STABILITY CONDITIONS	
Stable	No obvious/gross short-term instability noted
Unstable	Collapse of the majority, or one or more faces of the excavation
Flooding	Excavation filled with water
Major Spalling	Major material falling into excavation
Minor Spalling	Minor material falling into excavation

CORE DRILLING PARAMETERS

There are a number of parameters that may be measured during core drilling (of both soil and rock profiles), and which may provide useful investigation data. The measurements that define these parameters should be taken during the drilling process, when drill core is relatively undamaged.

Symbol	Term	Calculation Formula
TCR	Total Core Recovery	$\text{TCR} = \frac{\text{Length of Core Recovered}}{\text{Length of Core Run}} \times 100\%$
RQD	Rock Quality Designation	$\text{RQD} = \frac{\sum \text{Length of Sound Core Pieces} > 100\text{mm in Length}}{\text{Length of Core Run}} \times 100\%$
FF	Fracture Frequency	$\text{FF} = \frac{\text{Number of Defects}}{\text{Length of Core Recovered (m)}}$

SAMPLING METHODS

BDS	Bulk Disturbed Sample	SPT	Standard Penetration Test Sample
DS	Disturbed Sample	ES	Environmental Soil Sample
U	Thin Wall Tube Undisturbed Sample	WS	Environmental Water Sample
C	Core Sample	ASS	Acid Sulfate Soil Sample

TESTING METHODS

SPT	Standard Penetration Test (AS 1289.6.3.1) – Blows per 150mm and N Value
N	Blows per 300mm Penetration following 150mm seating (First 150mm)
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and the rod weight only
HB	Hammer double bouncing on anvil
HP / PP	Hand/Pocket Penetrometer Test expressed as instrument reading in kPa
PSP	Perth Sand Penetrometer (AS 1289.6.3.3) – Blows per 150mm
DCP	Dynamic Cone Penetrometer (AS 1289.6.3.2) – Blows per 150mm
CPT	Cone Penetration Test
CPTu	Cone Penetration Test with Pore Pressure (u) measurement
WPT	Water Pressure Test
FP	Field Permeability Test over section noted
FV	Field Vane Shear Test expressed as Uncorrected Shear Strength (sv = Peak Value / sr = Residual Value)
PID	Photoionisation Detector Reading in ppm (Parts Per Million)
PM	Pressuremeter Test over section noted

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 1 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects
PT	PVC	1	39	1	TS		0.10m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics, dark black brown mottled; with silt. (Topsoil)	Uc	VLs to Ls	SPT 0.00 - 0.45 m 2, 2, 2 N*=4	100	0		0.00: PID: 6.6ppm 0.00: PID: 6.6ppm; SPT Recovery: 0.45 m 0.00: QC1
					QDD		SAND (SP): fine to coarse grained, sub-rounded to sub-angular, pale grey brown to; with silty fines. (Aeolian)							0.50: PID: 4.0ppm
														1.00: PID: 4.6ppm
		2	38	2			1.60m Sandy CLAY (CI): medium plasticity, pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; zones of clay high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded; (Residual Soil)		VS	SPT 1.50 - 1.95 m 1, 0, 1 N*=1	100	0		1.50: PID: 5.3ppm 1.50: PID: 5.3ppm; SPT Recovery: 0.45 m
									S to F					
		3	37	3						SPT 3.00 - 3.45 m 0, 1, 2 N*=3	100	0		3.00: SPT Recovery: 0.45 m
			36	4										
		4	35	5						SPT 4.50 - 4.95 m 2, 1, 3 N*=4	100	0		4.50: SPT Recovery: 0.45 m
									St					
		5	34	6						SPT 6.00 - 6.45 m 1, 4, 5 N*=9	100	0		6.00: SPT Recovery: 0.45 m
			33	7						SPT 7.50 - 7.95 m 1, 3, 4 N*=7				7.50: SPT Recovery: 0.45 m

Leederville Formation

Water Level

Monitoring Well Details: WM01 - 0.7m stickup

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 304501017_BH_REVA.GPJ <<DrawingFile>> 17/05/2024 15:23 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 2 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
PT		6	31	9			Sandy CLAY (Cl): medium plasticity, pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; zones of clay high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded; (Residual Soil) *(continued)*	Uc	St		100	0				
											100	0		9.00: SPT Recovery: 0.75 m		
										SPT 9.00 - 9.45 m 6, 8, 5 N*=13						
		7	30	10							100	0				
										SPT 10.50 - 10.95 m 6, 6, 3 N*=9				10.50: SPT Recovery: 0.45 m		
		8	29	11			11.00m				100	0		11.00: SPT Recovery: 0.45 m		
					Leederville Formation		SAND (SP): medium to coarse grained, sub-rounded to sub-angular, quartz and lithics, pale grey mottled dark grey; with clay high plasticity; frequent lenses of clay and sandy clay, medium to high plasticity; (Residual Soil)		MD	SPT 11.00 - 11.45 m 3, 9, 11 N*=20						
		9	28	12							100	0				
										SPT 12.50 - 12.95 m 6, 10, 11 N*=21				12.50: SPT Recovery: 0.45 m		
HQ-3		10	27	13				CL			24	0		12.95-13.8: Core Loss		
								Uc	MD							
			26	14						SPT 14.00 - 14.45 m 5, 14, 14 N*=28				14.00: SPT Recovery: 0.45 m		
		11	25	15			15.10m				100	0				
							Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics and peat, dark grey; high plasticity; trace black peat fragments; (Residual Soil) 15.40m									
									VSt					15.50: SPT Recovery: 0.45 m		
							CLAY (CH): high plasticity, dark grey and black; with peat; (Residual Soil) 15.70m		MD	SPT 15.50 - 15.95 m 5, 9, 9 N*=18						

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
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KT Chlorite
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Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017

Hole No: WM01

Position: E341346.000 N6215506.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt | **Mounting:** Track | **Contractor:** National Geotech
Data Started: 26/2/24 | **Date Completed:** 27/2/24 | **Logged By:** ES | **Checked By:** BP

Drilling | Material Description | Defect Description

Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3					Leederville Formation		16.10m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics and peat, dark grey; high plasticity; trace black peat fragments; (Residual Soil) *(continued)*	Uc	VSt to Hd		100	0				
		12					CLAY (CH): high plasticity, dark grey and black; with peat; frequent lenses of clayey sand & sandy clay; (Residual Soil)				100	0				
			23	17						SPT 17.00 - 17.45 m 5, 9, 13 N*=22				17.00: SPT Recovery: 0.45 m		
		13	22	18							100	0				
							18.55m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics, pale grey; high plasticity; (Residual Soil)		MD	SPT 18.50 - 18.95 m 6, 10, 13 N*=23				18.50: SPT Recovery: 0.45 m		
		14	21	19							100	0				
			20	20			19.90m CLAY (CH): high plasticity, dark grey and black; with peat; frequent lenses of clayey sand & sandy clay; (Residual Soil)		VSt	SPT 20.00 - 20.45 m 6, 7, 10 N*=17				20.00: SPT Recovery: 0.45 m		
		15	19	21			21.00m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics, pale grey; low plasticity. (Residual Soil)	CL			52	0		21-21.5: Core Loss		
									MD to D	SPT 21.50 - 21.95 m 8, 11, 17 N*=28				21.50: SPT Recovery: 0.45 m		
		16	18	22							100	0				
			17	23						SPT 23.00 - 23.45 m 9, 13, 18 N*=31				23.00: SPT Recovery: 0.45 m		
		17					23.90m				100	0				

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
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COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
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INFILL MATERIALS
X Carbonaceus
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STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 4 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		17	15	25	Leederville Formation		CLAY (CH): high plasticity, dark grey and black; with Peat; frequent lenses of clayey sand & sandy clay; (Residual Soil) *(continued)*	Uc	Hd		100	0				
							24.80m			SPT 24.50 - 24.95 m 6, 15, 15 N*=30				24.50: SPT Recovery: 0.45 m		
							24.95m Clayey SAND (SC): fine to medium grained, sub-rounded to sub-angular, quartz, lithics, grey; high plasticity; (Residual Soil)		MD to D						
							TERMINATED AT 24.95 m Target depth									
			14	26												
			13	27												
			12	28												
			11	29												
			10	30												
			9	31												

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
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PQ Rotary core (85mm)
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PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
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VL Very Low

ROCK WEATHERING
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SW Slightly Weathered
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XW Extremly Weathered

DEFECT TYPE
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P Parting
SM Seam
SZ Sheared zone
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CSM Crushed Seam
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HB Handing Break
DB Drilling Break

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COATING
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INFILL MATERIALS
X Carbonaceus
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Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



WM01: 0 - 5m,
0.0 - 3.0m



WM01: 5 - 10m,
5.0 - 10.0 m

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CORE BOX - PHOTO SHEET

Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM01: 10 - 15m,
10.0 - 15.0m



WM01: 15 - 20m,
15 m to 20m

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CORE BOX - PHOTO SHEET

Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM01: 20 - 25m,
20.0 - 25.0 m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 1 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
PT	PVC	1	30	1	TS		0.10m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics, dark black brown mottled; with silt. (Topsoil)	Uc	Ls	SPT 0.00 - 0.45 m 2, 4, 6 N*=10				0.00: PID: 3.2ppm 0.00: PID: 3.2ppm; SPT Recovery: 0.45 m 0.00: QC1		WM02 - 0.7m stickup
					QDD		SAND (SP): fine to medium grained, sub-rounded to sub-angular, pale grey brown to; trace; (Aeolian)							0.50: PID: 4.6ppm		
							1.00m							1.00: PID: 6.4ppm		
					Duricrust		FERRICRETE: granular, fine to coarse grained, dark orange brown to red-brown; <10% vuggs (DI Duricrust).	Mo	M to H		100			1.50: PID: 3.2ppm		
			29	2						SPT 2.00 - 2.05 m 30/50mm N*=R				2.00: 50mm 2.00: SPT Recovery: 0.45 m; 50mm		
		2					2.70m									
			28	3	Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown to grey; with silty fines. (Aeolian)	Uc	MD to D		100			3.50: SPT Recovery: 0.45 m		
										SPT 3.50 - 3.95 m 11, 15, 16 N*=31						
		3	27	4							100					
			26	5						SPT 5.00 - 5.45 m 6, 10, 17 N*=27				5.00: SPT Recovery: 0.45 m 5.45: Core was recovered but driller dropped core upon transfer to split		
		4	25	6							100					
										SPT 6.50 - 6.95 m 5, 10, 13 N*=23				6.50: SPT Recovery: 0.45 m		
		5	24	7							100					
														8.00: SPT Recovery:		

HQ-3

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 2 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		6	22	9	Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown to grey; with silty fines. (Aeolian) *(continued)*	Uc	MD to D	SPT 8.00 - 8.45 m 4, 7, 14 N*=21	100			0.45 m		
							9.25m									
		7	21	10	Leederville Formation		Sandy CLAY (CI): medium plasticity; pale grey and dark grey; sand, fine to medium grained, sub angular to sub rounded; zones of clay, high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded. (Residual Soil)		F to St	SPT 9.50 - 9.95 m 0, 0, 3 N*=3	100			9.50: SPT Recovery: 0.45 m		
		8	20	11			11.00m							11.00: SPT Recovery: 0.45 m		
							CLAY (CH): high plasticity, dark grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)			SPT 11.00 - 11.45 m 1, 5, 4 N*=9	100					
		9	19	12			12.70m							12.50: SPT Recovery: 1.05 m		
							SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil)		VD	SPT 12.50 - 12.95 m 12, 27, 30 N*=57	100					
									MD							
		10	17	14						SPT 14.00 - 14.45 m 11, 13, 7 N*=20				14.00: SPT Recovery: 1.05 m		
			16	15			15.10m				100					
							CLAY (CH): high plasticity, dark grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)		Hd							
							15.55m							15.50: SPT Recovery: 1.05 m		
							SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil)		D	SPT 15.50 - 15.95 m 5, 17, 28 N*=45						

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
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WATER
Water Level on date shown
water inflow
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ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 3 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		11	14	17	Leederville Formation		SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil) *(continued)*	Uc	D		100					
											100					
										SPT 17.00 - 17.45 m 9, 17, 19 N*=36				17.00: SPT Recovery: 1.05 m		
		12	13	18			17.90m SAND (SP): fine to coarse grained, sub-rounded to sub-angular; dark grey; with clay, medium plasticity. (Residual Soil)		MD		100					
										SPT 18.50 - 18.95 m 5, 9, 7 N*=16				18.50: SPT Recovery: 1.05 m		
		13	12	19							100					
			11	20			20.10m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey; with clay, low to medium plasticity. (Residual Soil)			SPT 20.00 - 20.45 m 7, 10, 13 N*=23				20.00: SPT Recovery: 1.05 m		
		14	10	21			20.90m CLAY (CH): medium plasticity, pale grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)		VSt to Hd		100					
										SPT 21.50 - 21.95 m 4, 4, 10 N*=14				21.50: SPT Recovery: 1.05 m		
		15	9	22							100					
			8	23						SPT 23.00 - 23.45 m 7, 11, 13 N*=24				23.00: SPT Recovery: 1.05 m		
		16									100					

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremely High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremely Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 4 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		16	6	25	Leederville Formation		CLAY (CH): medium plasticity, pale grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil) *(continued)*	Uc	VSt to Hd	SPT 24.50 - 24.95 m 10, 14, 16 N*=30	100			24.50: SPT Recovery: 1.05 m		
							24.95m									
			5	26			TERMINATED AT 24.95 m Target depth									
			4	27												
			3	28												
			2	29												
			1	30												
			0	31												

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No: 304501017**



**WM02: 0 - 0.5m,
0.0 - 5.0**



**WM02: 5 - 10m,
5.0 - 10.0**

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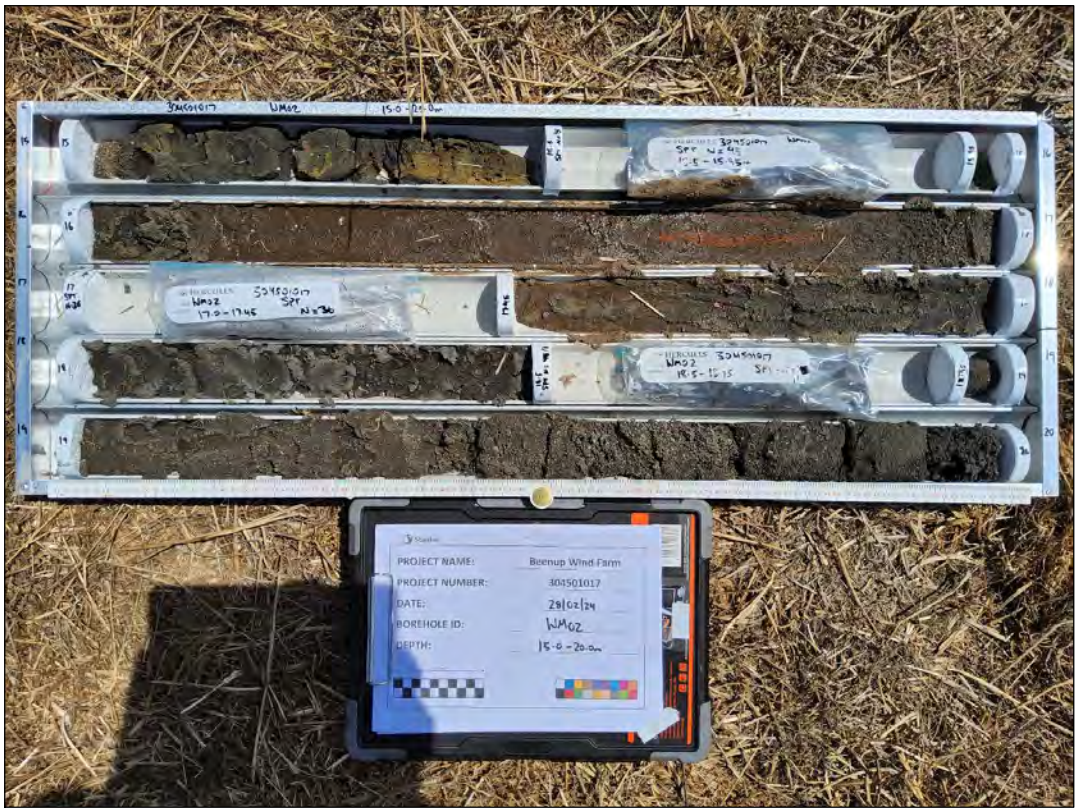
Stantec

CORE BOX - PHOTO SHEET Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



**WM02: 10 - 15m,
10.0 - 15.0**



**WM02: 15 - 20m,
15.0 - 20.0**

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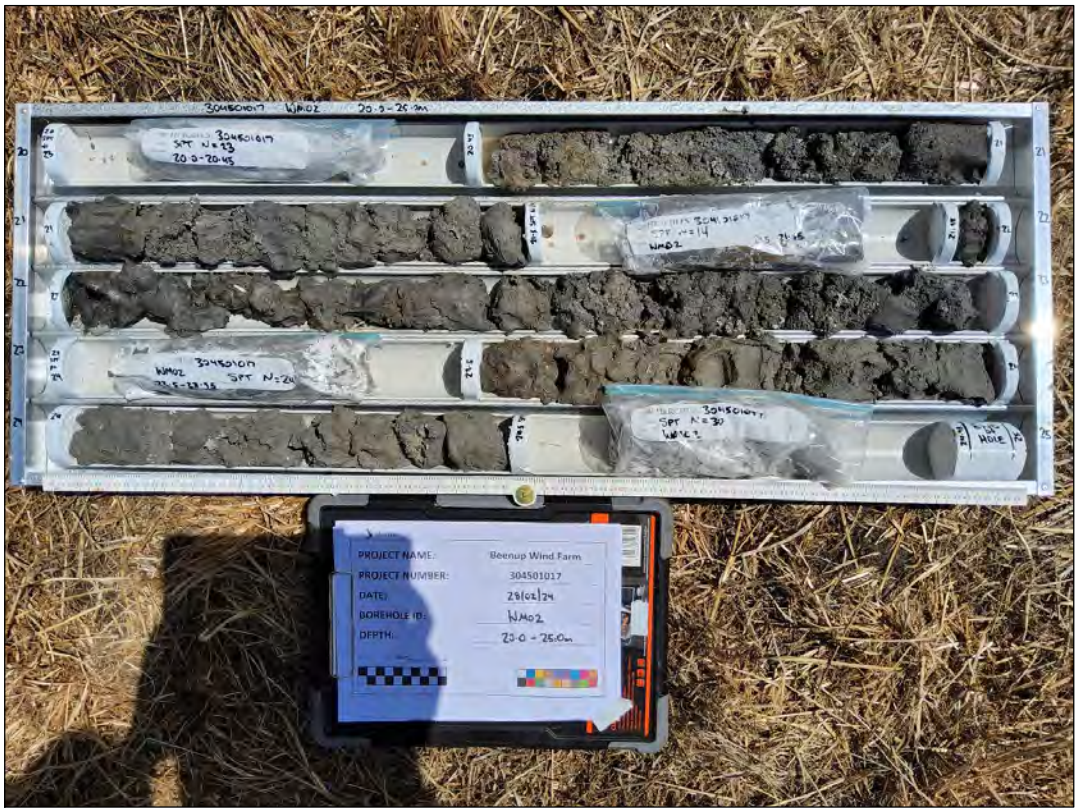
CORE BOX - PHOTO SHEET

Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM02: 20 - 25m,
20.0 - 25.0

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 1 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
PT	PVC	1	31	1	TS		0.20m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics; dark black & mottled brown; with silty fines. (Topsoil)	Uc	Ls	SPT 0.00 - 0.40 m 3, 6, 30/100mm N*=R	100		20 60 200 600 2000	0.00: PID: 6.1ppm; 400mm 0.00: PID: 6.1ppm; SPT Recovery: 0.45 m; 400mm 0.00: QC1		WM03 - 0.7m stickup
					QD		0.35m SAND (SP): fine to medium grained, sub-rounded to sub-angular, pale grey-brown. (Aeolian)	Mo	M to H					0.50: PID: 3.8ppm		
					Duricrust		FERRICRETE: granular, fine to coarse grained, dark orange brown to red-brown; <10% vuggs (DI Duricrust).							1.00: PID: 4.3ppm		
														1.50: PID: 5.4ppm		
		2	30	2						SPT 2.00 - 2.07 m 30/70mm N*=R	100			2.00: 70mm 2.00: SPT Recovery: 0.07 m; 70mm		
			29	3			3.40m									
					Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown mottled orange; trace silty fines. (Aeolian)	Wk	D					3.50: SPT Recovery: 0.45 m		
			28	4				Uc		SPT 3.50 - 3.95 m 13, 18, 18 N*=36	100					
		3														
			27	5						SPT 5.00 - 5.45 m 9, 15, 16 N*=31				5.00: SPT Recovery: 0.45 m		
		4	26	6							100					
							6.18m									
					Leederville Formation		SAND (SP): fine to medium grained, sub-rounded to sub-angular, dark grey, mottled black. (Residual Soil)		MD					6.50: SPT Recovery: 0.45 m		
										SPT 6.50 - 6.95 m 8, 9, 8 N*=17						
		5	25	7							100			8.00: SPT Recovery:		

HQ-3

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 2 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		6	23	9	Leederville Formation		SAND (SP): fine to medium grained, sub-rounded to sub-angular, dark grey, mottled black. (Residual Soil) *(continued)*	Uc	MD	SPT 8.00 - 8.45 m 7, 10, 14 N*=24	100			0.45 m		
									D					9.50: SPT Recovery: 0.45 m		
		7	22	10						SPT 9.50 - 9.95 m 7, 16, 20 N*=36	100					
			21	11						SPT 11.00 - 11.45 m 11, 21, 28 N*=49				11.00: SPT Recovery: 0.45 m		
		8	20	12							100					
										SPT 12.50 - 12.95 m 7, 15, 18 N*=33				12.50: SPT Recovery: 0.45 m		
							12.90m									
		9	19	13			SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; pale grey to dark grey; trace clayey fines. (Residual Soil)		MD		100					
			18	14						SPT 14.00 - 14.45 m 5, 12, 14 N*=26				14.00: SPT Recovery: 0.45 m		
		10	17	15							100					
							from 15.4m... with medium plasticity clay.		D	SPT 15.50 - 15.95 m 4, 12, 29 N*=41				15.50: SPT Recovery: 0.45 m		

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017

Hole No: WM03

Sheet: 3 of 4

Position: E342583.000 N6210534.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt | **Mounting:** Track | **Contractor:** National Geotech
Data Started: 28/2/24 | **Date Completed:** 29/2/24 | **Logged By:** ES | **Checked By:** BP

Drilling: Method	Drilling: Casing	Drilling: Core Run	RL (m AHD)	Depth (m)	Material Description: Geology	Material Description: Graphic Log	Material Description: LITHOLOGY	Material Description: Weathering / Cementation	Material Description: Strength / Density / Consistency	Material Description: Sample or Field Test	Defect Description: TCR (%)	Defect Description: RQD (%)	Defect Description: Average Natural Defect Spacing (mm)	Defect Description: Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		11	15	17	Leederville Formation		SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; pale grey to dark grey; trace clayey fines. (Residual Soil) *(continued)*	Uc	D		100					
											100					
									VD	SPT 17.00 - 17.24 m 19, 30/90mm N*=R				17.00: 180mm 17.00: SPT Recovery: 0.45 m; 180mm		
							17.40m									
		12	14	18			SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey to dark grey; layers of clay, low to medium plasticity. (Residual Soil)		MD		100					
														18.50: SPT Recovery: 0.45 m		
										SPT 18.50 - 18.95 m 10, 12, 21 N*=33						
		13	13	19							100					
							19.65m									
							19.80m SANDSTONE: fine grained, siliceous; dark grey-brown. (Weathered Rock)									
							SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey; with clay, low plasticity. (Residual Soil)									
		14	12	20										20.00: SPT Recovery: 0.45 m		
										SPT 20.00 - 20.45 m 8, 9, 11 N*=20						
											100					
			11	21										21.50: SPT Recovery: 0.45 m		
										SPT 21.50 - 21.95 m 9, 12, 12 N*=24						
		15	10	22							100					
														23.00: SPT Recovery: 0.45 m		
			9	23						SPT 23.00 - 23.45 m 8, 13, 17 N*=30						
		16					23.90m				100					

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
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DT Diatube concrete coring
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SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
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ROCK WEATHERING
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DEFECT TYPE
J Joint
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SM Seam
SZ Sheared zone
FL Foliation
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CSM Crushed Seam
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HB Handing Break
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 4 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		16	7	25	Leederville Formation		Sandy CLAY (Cl): medium plasticity, fine to coarse grained, sub-rounded to sub-angular; pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; interbedded high plasticity clays and fine to coarse-grained, sub-rounded to angular sands; trace fine gravel. (Residual Soil) *(continued)*	Uc	VSt	SPT 24.50 - 24.95 m 4, 7, 11 N*=18	100			24.50: SPT Recovery: 0.45 m		
							24.95m TERMINATED AT 24.95 m Target depth									
			6	26												
			5	27												
			4	28												
			3	29												
			2	30												
			1	31												

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
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DT Diatube concrete coring
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PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
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M Medium
L Low
VL Very Low

ROCK WEATHERING
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SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
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PLANARITY
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IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
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COATING
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STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



**WM03: 0 - 0.5m,
0.0 - 5.0**



**WM03: 5 - 10m,
5.0 - 10.0**

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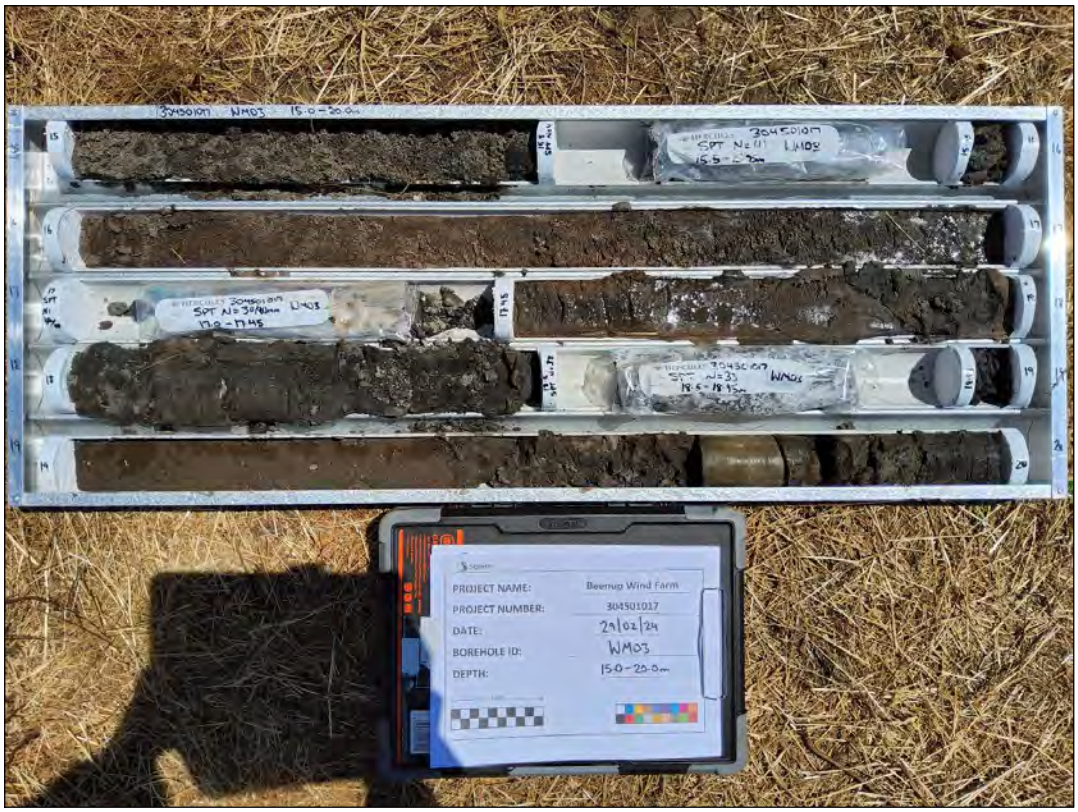
Stantec

CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No: 304501017**



**WM03: 10 - 15m,
10.0 - 15.0**



**WM03: 15 - 20m,
15.0 - 20.0**

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CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



WM03: 20 - 25m,
20.0 - 25.0

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Stantec

TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP01

Job No: 304501017 **Sheet:** 1 of 1

Position: E340863.000 N6216098.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable		ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; with gravel, sub-angular, iron cemented sand nodules; trace silty fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 3.5ppm
									0.10m	SAND (SP): fine to coarse grained, sub-rounded, quartz; pale grey with dark grey; trace fines. (aeolian)			MD	
				ES 0.25 m	3 4 5								D	
				ES 0.50 m	4 4	39.5	0.5							0.50 m: PID - 2.8ppm
				ES 0.75 m	5 6									
				ES 1.00 m	5 6	39.0	1.0	Quaternary Dune Deposits (QDD)						1.00 m: PID - 4.1ppm
				ES 1.25 m	5 6 7									
				ES 1.50 m	7 7	38.5	1.5						VD	
				ES 1.75 m	11 23									
					Refusal 28									
	H		▽	D 2.00 m		38.0	2.0		2.00m	SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; brown to dark brown; pockets of organics. (aeolian).	W	Wk		
									2.10m	TERMINATED AT 2.10 m Refusal (machine limit - penetration)				
						37.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP01: Downhole



TP01: Coretray - 0.0 - 2.1

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP02

Job No: 304501017 **Sheet:** 1 of 1

Position: E341925.000 N6215486.000 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.50m (Length) by 4.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
EX	VE	Stable	Not Encountered	ES 0.00 m	2	43.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace silty fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 2.3ppm
										0.10m				
				ES 0.25 m	3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to coarse grained, sub-rounded, quartz; pale grey, with dark grey; trace silty fines. (aeolian)			MD to D	
					3									
				ES 0.50 m	4	42.5	0.5							0.50 m: PID - 3.2ppm
					4									
				ES 0.75 m	3									
					4								VD	
	VH				4					0.90m				
					Refusal 2			DI		FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
						42.0	1.0			1.00m				
				ES 1.00 m						TERMINATED AT 1.00 m Refusal on rock				1.00 m: PID - 4.1ppm
						41.5	1.5							
						41.0	2.0							
						40.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP02: Downhole



TP02: Coretray - 0.0 - 1.0m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP03

Job No: 304501017 **Sheet:** 1 of 1

Position: E344783.000 N6212893.000 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing				Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m	Cap refusal - dug through 30	43.0	0.0	Fill		FILL: Gravelly SAND: Fine to Coarse, sub angular to sub rounded, white sand; Fine to coarse, sub angular, white gravel. (Unsealed Road).	D	Uc	VD	
										0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)			MD	
				ES 0.25 m	3 2 3									
				ES 0.50 m	3 3 2	42.5	0.5	Quaternary Dune Deposits (QDD)		0.50m SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz; white. (aeolian)				
				ES 0.75 m	2 2 3									
				ES 1.00 m	3 3 2	42.0	1.0							
				ES 1.25 m	2 3 2									
				ES 1.50 m	2 2 2	41.5	1.5							
				ES 1.75 m	2 2 3									
				ES 2.00 m	3 3 4	41.0	2.0			2.00m TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
					4 5 5	40.5	2.5							
					4 6 6									

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP03: Downhole



TP03: Coretray - 0.0. - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP04

Job No: 304501017 **Sheet:** 1 of 1

Position: E343930.000 N6212893.000 **Angle from Horizontal:** 90° **Surface Elevation:** 41.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	Refusal on surface 35			TS		TOPSOIL: Gravelly SAND: fine to coarse grained, sub angular to sub rounded, grey sand; Fine to coarse,Sub angular, white gravel; trace fines; Organics; (Topsoil)	D	Uc	VD	0.00 m: PID - 1.8ppm
										0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey mottled pale brown. (aeolian)			D MD Ls to MD	
				ASS 0.25 m	5 3 2					0.50m				
					2 3 3 3 3	40.5	0.5	Quaternary Dune Deposits (QDD)		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz; white. (aeolian)			MD	0.50 m: PID - 2.2ppm
				ES 0.75 m										
				ES 1.00 m	3 2 2 3 3 3 3	40.0	1.0							1.00 m: PID - 4.3ppm
				ES 1.25 m										
				ES 1.50 m	3 3 3 3 3	39.5	1.5							
										1.75m			D	
				ES 1.75 m	4 4 3 4 4 4 5 5 6 5 4 5 6	39.0 38.5	2.0 2.5			TERMINATED AT 1.75 m Practical Refusal (side wall collapse)				

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP04

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP04: Downhole



TP04: Core tray - 0.0 - 1.75m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP05

Job No: 304501017 **Sheet:** 1 of 1

Position: E341167.000 N6209303.000 **Angle from Horizontal:** 90° **Surface Elevation:** 27.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace silty fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 2.0ppm
				ES 0.25 m	2 4					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey, mottled dark brown. (aeolian)			D	
				ES 0.50 m	4 5	26.5	0.5	Quaternary Dune Deposits (QDD)			M			0.50 m: PID - 4.5ppm
				ES 0.75 m	6 5								VD	
	VH				4			D		0.85m				
					Refusal 1					0.90m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
						26.0	1.0			TERMINATED AT 0.90 m Refusal on rock				
						25.5	1.5							
						25.0	2.0							
						24.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP05

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP05: Downhole



TP05: Coretray - 0.0 - 0.9m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP06

Job No: 304501017 **Sheet:** 1 of 1

Position: E344443.000 N6210783.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.00m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID- 1.5ppm
										0.10m SAND (SP): fine to medium grained, rounded to angular quartz; pale grey, mottled pale brown. (aeolian)			MD	
				ES 0.25 m	3 3 3			Quaternary Dune Deposits (QDD)						
				ES 0.50 m	6	39.5	0.5							0.50 m: PID- 3.3ppm
	VH				Refusal 2			D	FI	0.65m 0.70m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
										TERMINATED AT 0.70 m Refusal on rock				
						39.0	1.0							
						38.5	1.5							
						38.0	2.0							
						37.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP06

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP06: Downhole



TP06: Coretray - 0.0 - 0.7m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP07

Job No: 304501017 **Sheet:** 1 of 1

Position: E340730.000 N6210619.000 **Angle from Horizontal:** 90° **Surface Elevation:** 25.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	1	25.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 1.6ppm
										0.10m	M			
				ES 0.25 m	2 5					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey; trace silty fines. (aeolian)			D	
				ES 0.50 m	6 7 7	24.5	0.5							0.50 m: PID - 3.1ppm
				ES 0.75 m	8 9 8									
				ES 1.00 m	8 7 8	24.0	1.0	Quaternary Dune Deposits (QDD)		1.00m				1.00 m: PID - 4.8ppm
				ES 1.25 m	9 9 10					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz; dark grey, mottled dark brown; pockets of organics. (aeolian)			VD	
				ES 1.50 m	9	23.5	1.5				W			
					26/100 26					1.70m				
				Bs 1.70 m	24/100 24 25 23 22 23	23.0	2.0			TERMINATED AT 1.70 m Practical Refusal (side wall collapse)				
					Practical refusal 25	22.5	2.5							

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- Bs - Bulk disturbed sample
- D - Disturbed sample
- E - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- Hd - Hard

RELATIVE DENSITY
- VLs - Very Loose
- Ls - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP07

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP07: Downhole



TP07: Coretray - 0.0 - 1.7m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP08

Job No: 304501017 **Sheet:** 1 of 1

Position: E343189.728 N6213977.040 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.50m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	4	43.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 2.0ppm
										0.10m				
				ES 0.25 m	3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to coarse grained, rounded to sub-angular, quartz; pale grey; trace silty fines. (aeolian)			MD	
					2								Ls to MD	
				ES 0.50 m	2	42.5	0.5				M			0.50 m: PID - 2.5ppm
					1									
				ES 0.75 m	2									
					2									
				ES 1.00 m	1	42.0	1.0				W		D	1.00 m: PID - 5.6ppm
					2									
					2									
				ES 1.25 m	3									
					4									
					4									
					4									
				ES 1.50 m	6	41.5	1.5						VD	
					10									
				ES 1.75 m	25							Wk		
					22									
					30					1.95m				
						41.0	2.0			2.00m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey, mottled dark brown. (aeolian)		We		
				ES 2.00 m Bs 2.00 m	35					TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
					Refusal 40	40.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP08

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP08: Downhole view



TP08: Core tray 0.0 - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP09

Job No: 304501017 **Sheet:** 1 of 1

Position: E343986.000 N6214241.000 **Angle from Horizontal:** 90° **Surface Elevation:** 46.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.00m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing				Material Description							
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	2	46.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey. (Topsoil).	D	Uc	Ls to MD	0.00 m: PID - 2.0 ppm
				ES 0.25 m	2					SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)				
				ES 0.50 m	2	45.5	0.5	Quaternary Dune Deposits (QDD)						0.50 m: PID - 5.6 ppm
				ES 0.75 m	1									
				ES 1.00 m	2	45.0	1.0							1.00 m: PID - 6.7ppm
				ES 1.25 m	2								MD	
					2								D	
					3					1.40m				
					4					SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz and iron oxide; pale yellow and stained dark brown. (aeolian)	M to W		VD	
				ES 1.50 m Bs 1.50 m	refusal 25	44.5	1.5			1.50m TERMINATED AT 1.50 m Practical Refusal (side wall collapse)				
						44.0	2.0							
						43.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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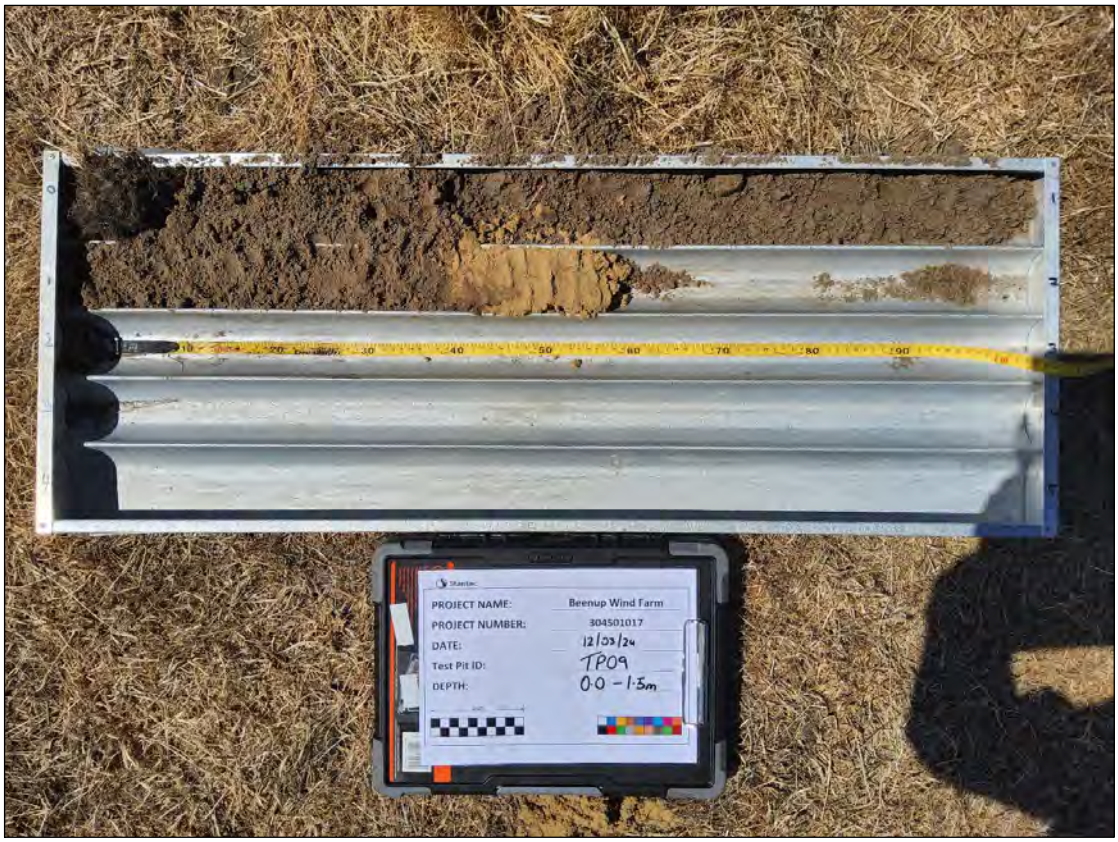
TEST PIT - PHOTO SHEET

Test Pit No. TP09

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP09: Downhole



TP09: Core tray 0.0- 1.5

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP10

Job No: 304501017 **Sheet:** 1 of 1

Position: E345034.000 N6214318.000 **Angle from Horizontal:** 90° **Surface Elevation:** 39.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	6			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 6.9ppm
					4					0.10m SAND (SP): fine to coarse grained, rounded to sub-angular, quartz; pale grey; trace silty fines; dark grey. (aeolian)				
				ES 0.25 m	4									
					4									
					4									
				ES 0.50 m	4	38.5	0.5	Quaternary Dune Deposits (QDD)						0.50 m: PID - 4.3ppm
					4									
				ES 0.75 m	5								MD	
					4									
					2 3									
				Bs 1.00 m ES 1.00 m Bs 1.00 m	2 3	38.0	1.0							1.00 m: PID - 2.5ppm
	VH				3 3					1.10m				
					4 refusal 4			D		FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust). 1.20m	M	We	M	
										TERMINATED AT 1.20 m Refusal on rock				
						37.5	1.5							
						37.0	2.0							
						36.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP10

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP10: 0.0 - 1.2



TP10: Downhole view

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP11

Job No: 304501017 **Sheet:** 1 of 1

Position: E341041.000 N6211370.000 **Angle from Horizontal:** 90° **Surface Elevation:** 28.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.50m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing				Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2	28.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.3ppm 0.01 m: had to move to new location due to spraying
							0.10m			SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz with lithics; pale brown to brown. (aeolian)			D	
				ES 0.25 m	4 4 5									
				ES 0.50 m	5 6 6	27.5	0.5				M			0.50 m: PID - 3.6ppm
				ES 0.75 m	8 8 7									
				ES 1.00 m	5 4 5	27.0	1.0	Quaternary Dune Deposits (QDD)						1.00 m: PID - 4.3ppm
				ES 1.25 m	5 5 6									
				ES 1.50 m	4 6 6	26.5	1.5							
				ES 1.75 m	8 6 7									
							1.70m			SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; brown to dark brown; pockets of organics. (aeolian).				
				ES 2.00 m D 2.00 m	7 8 8	26.0	2.0			TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
					7 6 6	25.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP11

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP11: Downhole



TP11: Coretray - 0.0 - 2.0m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Job No: 304501017

Hole No: TP12

Sheet: 1 of 1

Position: E342786.000 N6210510.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 36.000 m AHD

Machine Type: Backhoe | **Excavation Method:** 600mm Toothed Trenching Bucket

Excavation Dimensions: 3.00m (Length) by 1.00m (Width) | **Contractor:** RemX Australia

Date Excavated: 13/3/24 | **Logged By:** ES | **Checked By:** BP

Excavation: Method	Excavation: Resistance	Excavation: Stability	Water	Sampling & Testing: Sample or Field Test	Sampling & Testing: DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Material Description: Geology	Material Description: Graphic Log	Material Description: SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Material Description: Moisture Condition	Material Description: Cementation / Weathering	Material Description: Consistency / Relative Density	Material Description: STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m	2			TS		0.10m TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 3.4ppm
	VH				Refusal 1			Q		0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale yellow-brown. (aeolian)		We	M	
								D	F	0.20m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).				
										TERMINATED AT 0.20 m Refusal on rock				
						35.5	0.5							
						35.0	1.0							
						34.5	1.5							
						34.0	2.0							
						33.5	2.5							

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- Bs - Bulk disturbed sample
- D - Disturbed sample
- E - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- Hd - Hard

RELATIVE DENSITY
- VLs - Very Loose
- Ls - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP12

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP12: Downhole



TP12: Coretray - 0.0 - 0.2m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP13

Job No: 304501017 **Sheet:** 1 of 1

Position: E343538.000 N6211851.000 **Angle from Horizontal:** 90° **Surface Elevation:** 39.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.7ppm
										0.10m				
				ES 0.25 m	1 3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled dark grey. (aeolian)				
				ES 0.50 m	2 2	38.5	0.5						MD	0.50 m: PID - 2.9ppm
				ES 0.75 m	3 3 3									
				ES 1.00 m	3 3 3	38.0	1.0						D	1.00 m: PID- 4.2ppm
				ES 1.25 m	5 5 6								VD	
				ES 1.50 m Bs 1.50 m	8 10	37.5	1.5				M			
				ES 1.75 m	15 20 Refusing 15					1.70m				
								Duricrust		SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; dark grey; pockets of organics. (aeolian)		Wk		
										2.00m				
				ES 2.00 m D 2.00 m		37.0	2.0			TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
						36.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP13

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP13: Downhole



TP13: Corebox - 0.0 - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP14

Job No: 304501017 **Sheet:** 1 of 1

Position: E344875.000 N6211256.000 **Angle from Horizontal:** 90° **Surface Elevation:** 38.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ASS 0.00 m	3			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	MD to D	0.00 m: PID - 2.5ppm
										0.10m				
				ES 0.25 m	5			QDD		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)				
					Refusal 4					0.35m				
	VH							D		0.40m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
						37.5	0.5			TERMINATED AT 0.40 m Refusal on rock				
						37.0	1.0							
						36.5	1.5							
						36.0	2.0							
						35.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP14

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP14: Downhole



TP14: Corebox - 0.0 - 0.4

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP15

Job No: 304501017

Sheet: 1 of 1

Position: E341697.000 N6209876.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 28.000 m AHD

Machine Type: Backhoe | **Excavation Method:** 600mm Toothed Trenching Bucket

Excavation Dimensions: 3.00m (Length) by 1.00m (Width) | **Contractor:** RemX Australia

Date Excavated: 13/3/24 | **Logged By:** ES | **Checked By:** BP

Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil) 0.10m	D	Uc	Ls to MD	0.00 m: PID - 0.5ppm
				ES 0.25 m	3, 3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and iron oxide; dark yellow, stained dark orange. (aeolian)			MD to D	
				ES 0.50 m	5, 4, 4	27.5	0.5				M			0.50 m: PID - 1.5ppm
				ES 0.75 m	5, 6					0.95m				
	VH				Refusal on coffee rock			D	F	1.00m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				Bs 1.00 m ES 1.00 m		27.0	1.0			TERMINATED AT 1.00 m Refusal on rock				1.00 m: PID - 2.9ppm
						26.5	1.5							
						26.0	2.0							
						25.5	2.5							

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- Bs - Bulk disturbed sample
- D - Disturbed sample
- E - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- Hd - Hard

RELATIVE DENSITY
- VLs - Very Loose
- Ls - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP15

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP15: Downhole



TP15: Coretray - 0.0 - 1.0m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP16

Job No: 304501017 **Sheet:** 1 of 1

Position: E342673.000 N6209242.000 **Angle from Horizontal:** 90° **Surface Elevation:** 30.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.50m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation: Method	Excavation: Resistance	Excavation: Stability	Water	Sampling & Testing: Sample or Field Test	Sampling & Testing: DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Material Description: Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m DUP 0.00 m TRIP 0.00 m				TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	VD	0.00 m: PID - 0.6ppm
	VH				Refusal on coffee rock			D		0.10m 0.15m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust). TERMINATED AT 0.15 m Refusal on rock		We	M	
						29.5	0.5							
						29.0	1.0							
						28.5	1.5							
						28.0	2.0							
						27.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP16

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP16: Downhole



TP16: Coretray - 0.0 - 0.15m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP17

Job No: 304501017 **Sheet:** 1 of 1

Position: E343812.000 N6209922.000 **Angle from Horizontal:** 90° **Surface Elevation:** 37.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m				TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.6ppm
										0.10m				
				ES 0.25 m	Refusal 2 2			QDD		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled dark grey. (aeolian)			VD	
										0.45m				
	VH							D		0.50m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				ES 0.50 m		36.5	0.5			TERMINATED AT 0.50 m Refusal on rock				0.50 m: PID - 1.6ppm
						36.0	1.0							
						35.5	1.5							
						35.0	2.0							
						34.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP17

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP17: Downhole



TP17: Coretray - 0.0. - 0.5m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP18

Job No: 304501017 **Sheet:** 1 of 1

Position: E343477.000 N6208439.000 **Angle from Horizontal:** 90° **Surface Elevation:** 33.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m				TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	VD	0.00 m: PID - 1.0ppm
	VH				Refusal			D	F	0.10m / 0.15m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust). TERMINATED AT 0.15 m Refusal on rock		We	M	
						32.5	0.5							
						32.0	1.0							
						31.5	1.5							
						31.0	2.0							
						30.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP18

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP18: Downhole



TP18: Coretray - 0.0 - 0.15m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP19

Job No: 304501017 **Sheet:** 1 of 1

Position: E343836.000 N6207845.000 **Angle from Horizontal:** 90° **Surface Elevation:** 35.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	4			QDTS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 0.7ppm
				ES 0.25 m	5 6 6					0.10m SAND (SP): fine to medium grained, rounded to angular; pale grey, mottled dark grey. (aeolian)	M			
	VH			ES 0.50 m	8	34.5	0.5	Quaternary Dune Deposits (QDTS)		0.55m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	0.50 m: PID - 2.3ppm
					8 8 Refusal 4					0.60m TERMINATED AT 0.60 m Refusal on rock				
						34.0	1.0							
						33.5	1.5							
						33.0	2.0							
						32.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
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TEST PIT - PHOTO SHEET

Test Pit No. TP19

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP19: Downhole



TP19: Coretray - 0.0 - 0.6m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP20

Job No: 304501017 **Sheet:** 1 of 1

Position: E345245.000 N6209951.000 **Angle from Horizontal:** 90° **Surface Elevation:** 33.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.1ppm
										0.10m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz; pale yellow stained orange-brown. (aeolian)				
				ES 0.25 m	3 5									
				ES 0.50 m	6 6	32.5	0.5	QDD					MD	0.50 m: PID - 1.7ppm
				ES 0.75 m	6 6 6					0.85m				
	VH				Refusal on concrete			D		0.90m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				ES 1.00 m		32.0	1.0			TERMINATED AT 0.90 m Refusal on rock				
						31.5	1.5							
						31.0	2.0							
						30.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
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E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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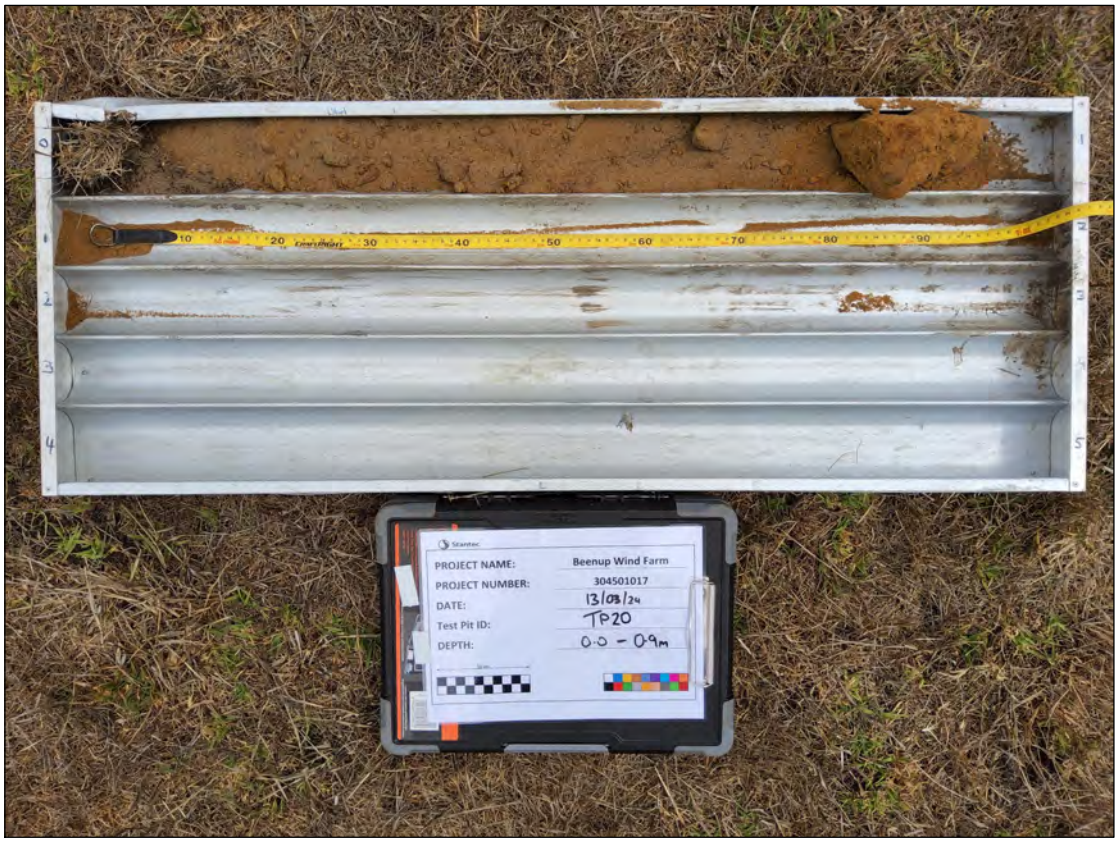
TEST PIT - PHOTO SHEET

Test Pit No. TP20

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP20: Downhole



TP20: Corebox - 0.0 - 0.9m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S01

Job No: 304501017 **Sheet:** 1 of 2

Position: E340844.970 N6215378.790 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 35.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		35.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; pale brown, mottled orange-brown; trace silt, non-plastic; trace rootlets to 0.2m depth. (Aeolian)	Uc						0.00: Stickup: 0.5m		WM1-W-S01
			34.5	1.0			1.00m									
			34.0	1.5			Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz & iron oxide; grey, mottled yellow-brown; clay, low plasticity. (Aeolian)									
			33.5	2.0												
			33.0	2.5			2.50m									
			32.5	3.0	Leederville Formation		Sandy CLAY (Cl): medium plasticity; grey; sand, fine to medium grained, sub-rounded to angular, quartz & lithics. (Residual)	Wk								
			32.0	3.5			3.50m									
			31.5				Organic CLAY (OH): medium to high plasticity; dark grey to black; trace sand, fine-grained, quartz & lithics. (Residual).									
							4.00m									

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S01

Job No: 304501017 **Sheet:** 2 of 2

Position: E340844.970 N6215378.790 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 35.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			31.0	4.5	Leederville Formation		Organic CLAY (OH): high plasticity; black. (Residual)	Wk								
			30.5													
			30.0	5.0												
			29.5	5.5												
			29.0	6.0												
			28.5	6.5												
				7.0			7.00m									
			28.0				TERMINATED AT 7.00 m Target depth Soil Logging									
			27.5	7.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM1-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM1-W-S01: 0 - 7m, Boxes 1

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S02

Job No: 304501017 **Sheet:** 1 of 2

Position: E341131.110 N6215376.110 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 36.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		36.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets to 0.8m depth (Aeolian).	Uc						0.00: Stickup: 0.65m		WM1-W-S02
			35.5	1.0												
			35.0	1.5												
			34.5	2.0			2.00m									
			34.0	2.5	Leederville Formation		Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz; grey; clay, low to medium-plasticity. (Residual)								Whilst Drilling	
			33.5	3.0												
			33.0	3.5												
			32.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM1-W-S02

Job No: 304501017 **Sheet:** 2 of 2

Position: E341131.110 N6215376.110 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 36.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			32.0	4.5	Leederville Formation		Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz; grey; clay, low to medium-plasticity. (Residual) *(continued)*	Uc								
							4.20m Sandy CLAY (Cl): medium plasticity; dark grey; sand, fine to course-grained, sub-rounded to angular, quartz & lithics. (Residual)									
			31.5	5.0			4.50m Clayey SAND (SC): fine to coarse-grained; sub-rounded to sub-angular; quartz & lithics; grey; clay, high-plasticity. (Residual)									
			31.0	5.5												
			30.5	6.0												
			30.0	6.5												
			29.5	7.0			7.00m TERMINATED AT 7.00 m Target depth Soil Logging									
			29.0	7.5												
			28.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 XBEENUP HYDRO LOGS.GPJ <<DrawingFile>> 30/05/2024 17:00 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S01

Job No: 304501017 **Sheet:** 1 of 2

Position: E343226.910 N6208201.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 28.920 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		28.5	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz; grey; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM2-W-S01
							0.80m									
			28.0	1.0			Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; pale brown; trace clayey fines, low plasticity. (Aeolian)									
			27.5	1.5			1.80m									
			27.0	2.0	Dll Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
							2.20m									
			26.5	2.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz & organics; black; with clay, low-plasticity. (Aeolian)	Wk							Whilst Drilling	
			26.0	3.0												
			25.5	3.5												
			25.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S01

Job No: 304501017 **Sheet:** 2 of 2

Position: E343226.910 N6208201.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 28.920 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			24.5	4.5			SAND (SP): fine to medium-grained; sub-rounded to rounded; quartz & organics; black; with clay, low-plasticity. (Aeolian) *(continued)*	Wk								
							4.30m									
							Sandy CLAY (Cl): medium plasticity; dark brown to dark grey; sand, fine to medium-grained, sub-rounded to rounded, quartz & organics. (Alluvial).	Uc								
							4.50m									
							TERMINATED AT 4.50 m Target Water Contact Soil Logging									
			24.0	5.0												
			23.5	5.5												
			23.0	6.0												
			22.5	6.5												
			22.0	7.0												
			21.5	7.5												
			21.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Hole ID: WM2-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM2-W-S01: 0 - 4.5m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S02

Job No: 304501017 **Sheet:** 1 of 2

Position: E342827.500 N6208156.170 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 27.450 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		27.0	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; brown; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM2-W-S02
							0.80m									
			26.5	1.0	DII Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
			26.0	1.5												
			25.5	2.0												
							2.30m									
			25.0	2.5	Quaternary Dune Deposits		Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz; mottled white-brown to grey; clay, low plasticity. (Aeolian)	Wk								
							2.90m									
			24.5	3.0			Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz & organics; dark grey to black; clay, low plasticity. (Aeolian)								Whilst Drilling	
			24.0	3.5												
			23.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM2-W-S02

Job No: 304501017 **Sheet:** 2 of 2

Position: E342827.500 N6208156.170 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 27.450 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 12/3/24 **Date Completed:** 12/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			23.0	4.5	Quaternary Dune Deposits		Clayey SAND (SC): fine to medium-grained; sub-rounded to rounded; quartz & organics; dark grey to black; clay, low plasticity. (Aeolian) *(continued)*	Wk								
			22.5	5.0				Uc								
			22.0	5.5												
			21.5	6.0			6.00m									
							TERMINATED AT 6.00 m Target depth Soil Logging									
			21.0	6.5												
			20.5	7.0												
			20.0	7.5												
			19.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Hole ID: WM2-W-S02

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM2-W-S02: 0 - 6m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S01

Job No: 304501017 **Sheet:** 1 of 1

Position: E343246.590 N6211039.500 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.840 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5	Quaternary Dune Deposits		SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; grey; trace silt, non-plastic; trace rootlets to 0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S01
			33.0	1.0			1.00m									
			32.5	1.5			SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; dark brown; with silt/clay, low plasticity. (Aeolian) From 1.4m... mottled orange-brown									
			32.0	2.0			1.80m Clayey SAND (SC): fine to medium-grained, sub-rounded to sub-angular; quartz & organics; black; clay, low plasticity. (Laucustrine) 2.00m	Wk								
			31.5	2.5			TERMINATED AT 2.00 m Refusal Soil Logging								Whilst Drilling	
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-N-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S01: 0 - 2m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S02 (A)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343265.730 N6211102.080 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.710 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level
DPP	N/A		33.5	0.5	QDD		SAND (SP): fine to medium grained; sub-angular to sub-rounded; quartz; yellow, mottled orange; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian) 0.20m	Uc							
					DII		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust). 0.40m							0.40: Well Install	
			33.0	1.0			TERMINATED AT 0.40 m Refusal Soil Logging							NO WELL INSTALLATION DEPTH TOO SHALLOW	
			32.5	1.5											
			32.0	2.0											
			31.5	2.5											
			31.0	3.0											
			30.5	3.5											
			30.0												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-N-S02 (A)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S02 (A): 0 - 0.4m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S02 (B)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343265.730 N6211102.080 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.710 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0	QDD		Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz; orange-brown; trace clay, low to medium plasticity. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S02
AD/V				0.30m												
			33.0	0.5	DI - DII Duricrust		FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
				1.00m												
				1.0			TERMINATED AT 1.00 m Refusal Soil Logging									
			32.5	1.5												
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET

Hole ID: WM3-N-S02 (B)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S02 (B): 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S03

Job No: 304501017 **Sheet:** 1 of 1

Position: E343304.400 N6211216.990 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 34.000 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): medium to fine-grained; sub-angular to sub-rounded; quartz; pale grey to grey; trace silt, non-plastic; trace rootlets to 0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S03
							0.50m SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; pale brown; with clayey fines; low plasticity. (Aeolian)									
			33.0	1.0			1.40m									
			32.5	1.5			1.50m Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; brown to red brown; clay, low to medium plasticity. (Aeolian)	Wk								
							Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz & organics; dark brown; clay, medium plasticity. (Aeolian)								Whilst Drilling	
			32.0	2.0												
			31.5	2.5												
			31.0	3.0			3.00m TERMINATED AT 3.00 m Target depth Soil Logging									
			30.5	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S03

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S03: 0 - 3m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-N-S04

Job No: 304501017 **Sheet:** 1 of 1

Position: E343223.940 N6211480.060 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 34.790 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		34.5	0.5			SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; pale grey; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-N-S04
			34.0	1.0												
			33.5	1.5			1.50m									
			33.0				Clayey SAND (SC): fine to medium-grained; sub-rounded to sub-angular; quartz & organics; dark brown; silty/clayey fines, low to medium plasticity. (Aeolian)	Wk							Whilst Drilling	
				1.90m												
			32.5	2.0			TERMINATED AT 1.90 m Refusal Soil Logging									
			32.0	2.5												
			31.5	3.0												
			31.0	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-N-S04

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-N-S04: 0 - 1.9m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S01

Job No: 304501017 **Sheet:** 1 of 1

Position: E343118.740 N6210924.010 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.670 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 14/3/24 **Date Completed:** 14/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): fine to medium-grained; sub-rounded to sub-angular; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets to 0.6m depth (Aeolian).	Uc						0.00: Stickup: 0.6m		WM3-W-S01
			33.0				0.80m									
				1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).	Wk								
							1.00m									
			32.5	1.5			TERMINATED AT 1.00 m Refusal Soil Logging									
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Hole ID: WM3-W-S01

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S01: 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S02 (A)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343059.020 N6210916.440 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.340 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.5			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz and ferricrete fragments; orange-brown. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S02a
			32.5	1.0			0.30m FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust). 1.00m									
			32.0	1.5			TERMINATED AT 1.00 m Target depth Soil Logging									
			31.5	2.0												
			31.0	2.5												
			30.5	3.0												
			30.0	3.5												
			29.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET

Hole ID: WM3-W-S02 (A)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S02 (A): 0 - 1m

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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S02 (B)

Job No: 304501017 **Sheet:** 1 of 1

Position: E343058.710 N6210917.830 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.350 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.0			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; greay; trace silt, non-plastic; trace rootlets to 0.1m depth. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S02b
			32.5	1.0			1.00m									
			32.0	1.5			SAND (SP): fine to medium-grained; sub-angular to rounded; quartz; pale to dark orange-brown; with silty fines, low plasticity. (Aeolian)									
			31.5	2.0												
			31.0	2.5			2.50m								Whilst Drilling	
			30.5	3.0			Clayey SAND (SC): fine to medium-grained; sub-angular to sub-rounded; quartz; grey; clay, low to medium plasticity. (Aeolian).	Wk								
							3.00m									
			30.0	3.5			TERMINATED AT 3.00 m Target depth Soil Logging									
			29.5													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-W-S02 (B)

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S02 (B): 0 - 3m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S03

Job No: 304501017 **Sheet:** 1 of 1

Position: E342987.260 N6210892.360 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.870 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description								Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.5	0.5			SAND (SP): fine to medium-grained; sub-angular to sub-rounded; quartz; greay; trace silt, non-plastic. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S03
							0.60m									
			33.0	1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
							1.00m									
							TERMINATED AT 1.00 m Target depth Soil Logging									
			32.5	1.5												
			32.0	2.0												
			31.5	2.5												
			31.0	3.0												
			30.5	3.5												
			30.0													

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-W-S03

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S03: 0 - 1m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S04

Job No: 304501017 **Sheet:** 1 of 1

Position: E342901.620 N6210922.540 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 33.140 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		33.0	0.5			SAND (SP): fine to medium-grained, sub-rounded to sub-angular, quartz; grey; trace silt, non-plastic; rootlets to 0.1m depth (Aeolian).	Uc						0.00: Stickup: 0.6m		WM3-W-S04
			32.5				0.80m								Whilst Drilling	
AD/V			32.0	1.0			FERRICRETE: fine to coarse grained; sub-rounded to angular clasts, quartz & iron oxide; red-brown. (Duricrust).									
			31.5	1.5			1.80m									
							SAND (SP): fine to medium-grained; sub-rounded to sub-angular, quartz & organics; black; with silt, non-plastic. (Aeolian)	Wk								
				2.0			2.00m									
			31.0				TERMINATED AT 2.00 m Target depth Soil Logging									
			30.5	2.5												
			30.0	3.0												
			29.5	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller
- PQ Rotary core (85mm)
- HQ Rotary core (63.5mm)
- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
- M Medium
- L Low
- VL Very Low

ROCK WEATHERING
- FR Fresh
- SW Slightly Weathered
- MW Moderately Weathered
- HW Highly Weathered
- XW Extremly Weathered

DEFECT TYPE
- J Joint
- P Parting
- SM Seam
- SZ Sheared zone
- FL Foliation
- V Vein
- CSM Crushed Seam
- FZ Fracture Zone
- HB Handing Break
- DB Drilling Break

PLANARITY
- PL Planar
- IR Irregular
- CU Curved
- DIS Discontinuous
- ST Stepped
- UN Undulose

ROUGHNESS
- VR Very Rough
- RO Rough
- SO Smooth
- SL Slockensided
- POL Polished

COATING
- CN Clean
- STN Stained
- VN Veneer (thin or patchy)
- CT Coating (up to 1mm)

INFILL MATERIALS
- X Carbonaceus
- MU Unidentified minteral
- MS Secondary mineral
- KT Chlorite
- CA Calcite
- Fe Iron Oxide
- Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-W-S04

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S04: 0 - 2m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S05

Job No: 304501017 **Sheet:** 1 of 2

Position: E342692.990 N6210889.200 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 32.500 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP	N/A		32.0	0.5			SAND (SP): fine to medium-grained, subangular to rounded; quartz; dark brown to grey; trace silt, non-plastic; trace rootlets <0.1m. (Aeolian)	Uc						0.00: Stickup: 0.6m		WM3-W-S05
			31.5	1.0												
			31.0	1.5			1.60m SAND (SP): fine to medium-grained; sub-angular to rounded; quartz &organics; dark brown-black; with silt and clay, low plasticity. (Aeolian)									
			30.5	2.0			2.30m									
			30.0	2.5			Clayey SAND (SC): fine to medium-grained, sub-angular to sub-rounded, quartz; brown; trace silt, low to medium plasticity. (Aeolian)	Wk							Whilst Drilling	
			29.5	3.0												
			29.0	3.5												

DRILLING
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
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- NMLC Rotary core (51.94mm)
- DT Diatube concrete coring
- PT Push tube
- PS Percussion sampling
- SON Sonic drilling
- AH Air hammer

WATER
- Water Level on date shown
- water inflow
- water outflow

ROCK QUALITY DESCRIPTIONS
- RQD Rock Quality Designation (%)
- TCR Total Core Recovery (%)

ROCK STRENGTH
- EH Extremly High
- VH Very High
- H High
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- VL Very Low

ROCK WEATHERING
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DEFECT TYPE
- J Joint
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PLANARITY
- PL Planar
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ROUGHNESS
- VR Very Rough
- RO Rough
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COATING
- CN Clean
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INFILL MATERIALS
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Wind Farm Project
Location: Shire of Augusta Margaret River

Hole No: WM3-W-S05

Job No: 304501017 **Sheet:** 2 of 2

Position: E342692.990 N6210889.200 50 MGA94 **Angle from Horizontal:** 90° **Surface Elevation:** 32.500 m AHD

Rig Type: Geoprobe 7822dt **Mounting:** Light Vehicle **Contractor:** National Geotech

Data Started: 13/3/24 **Date Completed:** 13/3/24 **Logged By:** NM **Checked By:**

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
DPP			32.5	0.0			Clayey SAND (SC): fine to medium-grained, sub-angular to sub-rounded, quartz; brown; trace silt, low to medium plasticity. (Aeolian) *(continued)*	Wk								
							4.30m									
			28.0	4.5			SAND (SP): fine to medium-grained, sub-angular to sub-rounded, quartz & organics; dark brown-black; trace silt, non-plastic. (Aeolian)	Uc								
							4.50m									
							TERMINATED AT 4.50 m Target Water Contact Soil Logging									
			27.5	5.0												
			27.0	5.5												
			26.5	6.0												
			26.0	6.5												
			25.5	7.0												
			25.0	7.5												

DRILLING
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Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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Stantec

CORE BOX - PHOTO SHEET Hole ID: WM3-W-S05

Client: Synergy Australia
Project: Beenup Wind Farm
Location: Beenup, WM-01

Job No: 304501017



WM3-W-S05: 0 - 4.5m

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Appendix D – Tables

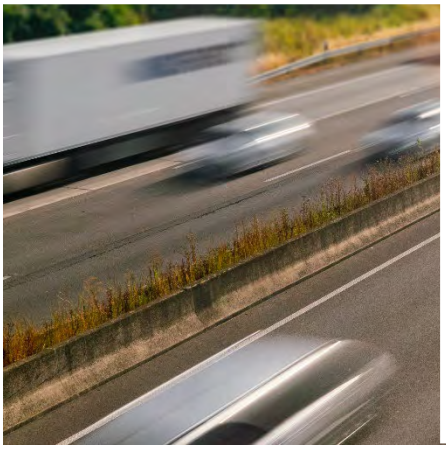




Table A Acid Sulfate Soils

Definitions:
- (No Guideline), --- not tested, LOR (Limit of Reporting), Reaction Vigour (1 =Slight, 2 = Moderate, 3 = Strong, 4 = Extreme), mht (mol H+/tonne)

Notes

denotes less than the limit of reporting
Field test value indicative of AASS
Field test value indicative of PASS
Denotes sample exceeds DWER Action Criteria of 0.03 (%S) or 18 mol H+ / tonne, for excavations of >1,000 tonnes

Location	Date	Depth (mbgl)	Soil Description	Trigger	Field Tests				Acidity Trail						SPOS		SNAS		Net Acidity		ANC	
					pH-F	pH-FOX	pH Δ	Reaction	pH KCl	pH Ox	TAA		TPA		SPOS		SNAS		TAA+SPOS+ SNAS		ANCE	
				Units	pH		-	-	pH		%S	mht	%S	mht	%S	mht	%S	mht	%S	mht	%S	mht
				ASS	<4	<4			-		0.03	18	0.03	18	0.03	18	0.03	18	0.03	18	-	-
				LOR	0.1	0.1	0.1	-	0.1	0.1	0.005	2	0.02	2	0.005	2	0.005	2	0.005	2	0.02	2
WM01	26/02/2024	0.00	SAND: fine to coarse grained, dark black brown mottled; with silt		5.2	3.9	1.3	2	5.4	3.0	0.018	11	<0.02	<2	0.019	12	---	---	0.038	24	---	---
WM01	26/02/2024	0.25			5.2	3.9	1.3	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	0.50			5.5	3.7	1.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	0.75			5.5	3.5	2.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	1.00			5.4	3.5	1.9	2	5.2	3.4	0.017	11	<0.02	<2	0.009	6	---	---	0.026	16	---	---
WM01	26/02/2024	1.25			5.3	3.6	1.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	1.50			5.2	3.9	1.3	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	1.75			5.3	3.0	2.3	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	2.00			5.2	2.9	2.3	2	5.3	3.7	0.014	9	0.050	31	0.037	23	---	---	0.051	32	---	---
WM01	26/02/2024	2.25			5.4	2.9	2.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	2.50			5.9	3.4	2.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	2.75			5.7	3.3	2.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	3.00			5.9	3.0	2.9	2	5.0	4.3	0.014	9	0.030	19	0.008	5	---	---	0.022	14	---	---
WM01	26/02/2024	3.25			5.8	3.1	2.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	3.50			6.2	2.7	3.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	3.75			6.2	2.5	3.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	4.00			6.1	2.6	3.5	2	5.2	4.6	0.011	7	0.110	69	0.087	54	---	---	0.098	61	---	---
WM01	26/02/2024	4.25			6.0	2.6	3.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	4.50			6.2	2.5	3.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	4.75			6.3	2.2	4.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	5.00			6.3	2.4	3.9	2	4.9	2.9	0.027	17	0.270	168	0.200	125	---	---	0.220	137	---	---
WM01	26/02/2024	5.25			6.1	2.4	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	5.50			6.3	2.3	4.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	5.75	Sandy CLAY: pale grey and dark grey;		6.3	1.9	4.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	6.00			6.0	2.3	3.7	4	5.2	2.7	0.010	6	0.250	156	0.210	131	---	---	0.220	137	---	---
WM01	26/02/2024	6.25			6.1	2.3	3.8	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	6.50			6.1	2.4	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	6.75			6.1	2.4	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	7.00			6.1	2.3	3.8	4	5.2	2.9	0.011	7	0.200	125	0.150	94	---	---	0.170	106	---	---
WM01	26/02/2024	7.25			6.7	2.3	4.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	7.50			6.3	2.2	4.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	7.75			6.3	2.4	3.9	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	8.00			6.4	2.4	4.0	4	5.1	3.2	0.016	10	0.180	112	0.130	81	---	---	0.150	94	---	---
WM01	26/02/2024	8.25			6.4	2.3	4.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	8.50			6.3	2.1	4.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	8.75			6.1	2.3	3.8	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	9.00			6.2	2.5	3.7	4	5.0	3.2	0.033	21	0.290	181	0.140	87	---	---	0.180	112	---	---
WM01	26/02/2024	9.25			6.4	2.3	4.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	9.50			5.8	2.3	3.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	9.75			6.0	2.3	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM01	26/02/2024	10.00			5.4	2.3	3.1	4	5.2	2.4	0.016	10	0.530	331	0.530	331	---	---	0.550	343	---	---
WM02	27/02/2024	0.00	SAND: dark black brown mottled; with silt.		5.5	3.6	1.9	2	7.3	3.4	<0.003	<2	<0.02	<2	0.025	16	---	---	<0.02	<2	---	---
WM02	27/02/2024	0.25			6.0	3.2	2.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	0.50	SAND: fine to medium grained, pale grey brown		6.4	4.0	2.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	0.75			6.3	4.1	2.2	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	1.00			6.4	4.5	1.9	2	5.3	4.2	0.011	7	0.030	19	0.010	6	---	---	0.021	13	---	---
WM02	27/02/2024	1.25			5.7	4.7	1.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	1.50			6.9	4.4	2.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	1.75	FERRICRETE: fine to coarse grained, dark orange brown to red-brown;		5.7	4.3	1.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	2.00			6.2	5.0	1.2	2	6.1	6.3	0.009	6	< 0.02	<2	0.012	7	---	---	0.022	14	---	---
WM02	27/02/2024	2.25			7.2	3.2	4.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	2.50			6.9	4.4	2.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	2.75			5.7	4.3	1.4	2	5.1	2.8	0.010	6	0.150	94	0.099	62	---	---	0.110	69	---	---
WM02	27/02/2024	3.00			6.2	5.0	1.2	2	5.0	2.9	0.019	12	0.200	125	0.120	75	---	---	0.140	87	---	---
WM02	27/02/2024	3.25			7.2	3.2	4.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	3.50			6.6	3.2	3.4	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	3.75			6.1	2.7	3.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	4.00			7.2	2.8	4.4	4	5.2	2.6	0.021	13	0.390	243	0.270	168	---	---	0.290	181	---	---
WM02	27/02/2024	4.25			5.8	3.1	2.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	4.50			5.7	3.2	2.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	4.75			5.8	2.9	2.9	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	5.00			5.2	2.9	2.3	4	4.7	2.3	0.054	34	0.810	505	0.650	405	---	---	0.700	437	---	---
WM02	27/02/2024	5.25			5.5	3.1	2.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	5.50			5.4	3.2	2.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	5.75	SAND: fine to medium grained, rich in organics; dark brown to grey;		6.5	2.8	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	6.00			6.5	2.7	3.8	4	4.9	2.2	0.030	19	0.640	399	0.570	356	---	---	0.600	374	---	---
WM02	27/02/2024	6.25			5.7	2.4	3.3	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	6.50			6.0	2.9	3.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	6.75			4.6	2.5	2.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	7.00			7.7	2.5	5.2	4	5.0	2.4	0.017	11	0.320	200	0.270	168	---	---	0.290	181	---	---
WM02	27/02/2024	7.25			4.5	2.3	2.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	7.50			4.8	2.3	2.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	7.75			5.0	2.7	2.3	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	8.00			4.8	2.6	2.2	4	4.6	2.1	0.041	26	0.540	337	0.440	274	---	---	0.480	299	---	---
WM02	27/02/2024	8.25			6.1	2.3	3.8	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	8.50			5.3	2.7	2.6	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	8.75			4.9	2.7	2.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	9.00			5.0	2.8	2.2	4	4.4	1.9	0.180	112	2.200	1372	1.900	1185	0.023	11	2.100	1310	---	---
WM02	27/02/2024	9.25	Sandy CLAY: pale grey and dark grey; sand, fine to medium grained,		5.2	2.6	2.6	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	9.50			4.9	3.0	1.9	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	9.75			5.2	2.9	2.3	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM02	27/02/2024	10.00			4.8	2.9	1.9	4	4.6	2.2	0.120	75	1.400	873	1.300	811	---	---	1.400	873	---	---
WM03	28/02/2024	0.00	SAND: fine to coarse grained, organics; dark black & mottled brown;		5.6	3.1	2.5	3	5.2	2.5	0.048	30	1.200	748	0.086	54	---	---	0.130	81	---	---
WM03	28/02/2024	0.25	SAND: fine to medium grained, pale grey-brown		6.8	4.0	2.8	2	5.1	3.7	0.050	31	0.320	200	0.150	94	---	---	0.200	125	---	---
WM03	28/02/2024	0.50			6.2	4.3	1.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	0.75			5.5	4.6	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	1.00			5.2	4.4	0.8	2	5.7	4.8	0.026	16	0.060	37	0.012	7	---	---	0.039	24	---	---
WM03	28/02/2024	1.25			5.3	4.7	0.6	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	2.00	FERRICRETE: fine to coarse grained, dark orange brown to red-brown		5.2	4.6	0.6	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	2.25			5.5	4.4	1.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	2.50			5.7	4.6	1.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	2.75			5.5	4.7	0.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	3.00			5.8	4.1	1.7	2	5.8	4.1	0.018	11	0.090	56	0.046	29	---	---	0.064	40	---	---
WM03	28/02/2024	3.25			6.1	3.3	2.8	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	3.50			6.7	3.0	3.7	4	4.7	2.7	0.033	21	0.330	206	0.230	143	<0.005	<2	0.260	162	---	---
WM03	28/02/2024	3.75			6.2	3.1	3.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	4.00			7.3	2.7	4.6	4	4.7	2.6	0.041	26	0.450	281	0.350	218	---	---	0.390	243	---	---
WM03	28/02/2024	4.25			6.7	3.0	3.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	4.50	SAND: fine to medium grained,rich in organics; dark brown mottled orange; trace silty fines.		6.6	3.1	3.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	4.75			7.1	3.2	3.9	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	5.00			7.2	3.2	4.0	4	5.6	3.8	0.014	9	0.160	100	0.110	69	---	---	0.130	81	---	---
WM03	28/02/2024	5.25			7.8	2.5	5.3	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	5.50			7.7	2.5	5.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	5.75			7.7	2.5	5.2	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	6.00			7.9	2.5	5.4	4	5.0	2.6	0.016	10	0.240	150	0.180	112	---	---	0.200	125	---	---
WM03	28/02/2024	6.25			7.0	2.9	4.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	6.50			5.4	3.1	2.3	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	6.75			4.9	2.8	2.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	7.00			6.4	3.7	2.7	4	4.7	3.0	0.160	100	1.400	873	0.860	536	---	---	1.000	624	---	---
WM03	28/02/2024	7.25			5.2	3.1	2.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	7.50			5.6	2.9	2.7	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	7.75			5.0	2.9	2.1	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	8.00	SAND: fine to medium grained, subrounded to sub-angular, dark grey, mottled black.		4.7	3.4	1.3	4	4.5	2.6	0.140	87	1.100	686	0.760	474	---	---	0.900	561	---	---
WM03	28/02/2024	8.25			6.6	3.2	3.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	8.50			6.6	3.2	3.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	8.75			6.7	3.2	3.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	9.00			6.2	3.2	3.0	4	4.7	2.7	0.055	34	0.610	380	0.440	274	---	---	0.500	312	---	---
WM03	28/02/2024	9.25			5.5	2.9	2.6	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	9.50			5.5	3.0	2.5	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	9.75			6.4	3.0	3.4	4	---	---	---	---	---	---	---	---	---	---	---	---	---	---
WM03	28/02/2024	10.00			5.6	3.2	2.4	4	4.7	2.7	0.060	37	0.690	430	0.500	312	---	---	0.560	349	---	---

Location	Date	Depth (mbgl)	Soil Description	Trigger	Field Tests				Acidity Trail						SPOS		SNAS		Net Acidity		ANC	
					pH-F	pH-FOX	pH Δ	Reaction	pH KCl	pH Ox	TAA		TPA		SPOS		SNAS		TAA+SPOS+ SNAS		ANCE	
				Units	pH		-	-	pH		%S	mht	%S	mht	%S	mht	%S	mht	%S	mht	%S	mht
				ASS	<4	<4			-		0.03	18	0.03	18	0.03	18	0.03	18	0.03	18	-	-
				LOR	0.1	0.1	0.1	-	0.1	0.1	0.005	2	0.02	2	0.005	2	0.005	2	0.005	2	0.02	2
TP01	14/03/2024	0.00	SAND: fine to medium grained, dark grey		4.6	3.1	1.5	2	4.6	2.9	0.075	47	0.130	81	0.024	15	---	---	0.098	61	---	---
TP01	14/03/2024	0.25	SAND: fine to coarse grained, pale grey with dark grey; trace fines		4.6	3.2	1.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP01	14/03/2024	0.75			4.8	3.7	1.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP01	14/03/2024	1.00			4.8	3.8	1.0	2	5.1	3.5	0.014	9	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP01	14/03/2024	1.25			4.6	3.8	0.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP01	14/03/2024	1.50			4.5	3.8	0.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP01	14/03/2024	1.75			4.7	3.6	1.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP01	14/03/2024	2.00	SAND: fine to coarse grained, dark grey/brown; trace fines		4.7	3.5	1.2	2	4.7	2.6	0.060	37	0.100	62	0.037	23	---	---	0.097	60	---	---
TP02	14/03/2024	0.00	SAND: fine to medium grained, dark grey		4.8	3.4	1.4	2	5.0	2.7	0.034	21	0.030	19	0.024	15	---	---	0.058	36	---	---
TP02	14/03/2024	0.25	SAND: fine to coarse grained, dark grey; trace fines		4.8	3.9	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP02	14/03/2024	0.50			4.8	3.9	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP02	14/03/2024	0.75			4.8	3.9	0.9	2	5.1	3.7	0.034	21	0.030	19	0.009	6	---	---	0.043	27	---	---
TP02	14/03/2024	1.00	FERRICRETE: dark orange brown		4.8	3.9	0.9	2	4.8	4.2	0.076	47	0.140	87	0.013	8	---	---	0.089	56	---	---
TP03	12/03/2024	0.00	Gravelly SAND: Fine to Coarse, white sand;		6.4	5.1	1.3	2	6.9	6.5	<0.003	<2	<0.02	<2	0.018	11	---	---	<0.02	<2	---	---
TP03	12/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled pale brown		6.5	5.1	1.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP03	12/03/2024	1.00			5.8	3.5	2.3	2	5.6	4.6	0.005	3	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP04	12/03/2024	0.00	Gravelly SAND: fine to coarse grained, grey sand		5.4	3.2	2.2	2	5.2	5.7	0.028	17	<0.02	<2	0.030	19	---	---	0.059	37	---	---
TP04	12/03/2024	0.50	SAND: fine to medium grained, pale grey mottled pale brown		6.1	3.9	2.2	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP04	12/03/2024	1.00	SAND: fine to medium grained, white		6.1	4.2	1.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP04	12/03/2024	1.25			6.1	4.6	1.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP04	12/03/2024	1.75			5.7	3.9	1.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP05	13/03/2024	0.00	SAND: fine to medium grained, dark grey; trace silty fines.		5.6	2.7	2.9	2	5.3	6.2	0.022	14	<0.02	<2	0.054	34	---	---	0.076	47	---	---
TP05	13/03/2024	0.25			6.0	3.1	2.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP05	13/03/2024	0.50			6.0	3.9	2.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP05	13/03/2024	0.75			6.2	4.2	2.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP06	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.0	3.9	1.1	2	4.8	2.5	0.058	36	<0.02	<2	0.050	31	---	---	0.110	69	---	---
TP06	13/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled pale brown		4.9	4.1	0.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP06	13/03/2024	0.50			4.9	4.4	0.5	2	5.6	3.9	0.006	4	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP07	14/03/2024	0.00	SAND: fine to medium grained, dark grey		6.0	5.0	1.0	2	6.3	3.0	0.004	2	<0.02	<2	0.065	41	---	---	0.069	43	---	---
TP07	14/03/2024	0.25	SAND: fine to coarse grained, pale grey; trace silty fines.		6.0	5.1	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP07	14/03/2024	0.50			6.2	5.2	1.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP07	14/03/2024	0.75			6.3	5.4	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP07	14/03/2024	1.00	SAND: fine to coarse grained, dark grey, mottled dark brown; pockets of organics		6.7	5.7	1.0	2	6.0	4.4	<0.003	<2	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP07	14/03/2024	1.25			6.7	5.6	1.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP07	14/03/2024	1.50			6.0	2.2	3.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	0.00	SAND: fine to medium grained, dark grey		5.0	3.8	1.2	2	5.4	2.9	0.013	8	<0.02	<2	0.023	14	---	---	0.035	22	---	---
TP08	12/03/2024	0.25	SAND: fine to coarse grained, pale grey; trace silty fines.		5.3	4.6	0.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	0.50			5.2	4.3	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	0.75			5.3	4.4	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	1.00			6.1	4.6	1.5	2	5.5	3.6	0.009	6	<0.02	<2	0.014	9	---	---	0.023	14	---	---
TP08	12/03/2024	1.25			6.3	4.8	1.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	1.50			5.2	4.4	0.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	1.75			5.9	4.4	1.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP08	12/03/2024	2.00	SAND: fine to coarse grained, dark grey, mottled dark brown;		5.0	2.8	2.2	2	5.5	3.8	0.015	9	0.050	31	0.059	37	---	---	0.074	46	---	---
TP09	12/03/2024	0.00	SAND: fine to medium grained, dark grey		5.1	4.2	0.9	2	5.4	2.9	0.032	20	<0.02	<2	0.059	37	---	---	0.091	57	---	---
TP09	12/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled pale brown		5.1	4.4	0.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP09	12/03/2024	1.00			5.6	4.9	0.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP09	12/03/2024	1.50	SAND: fine to medium grained, pale yellow and stained dark brown.		6.0	5.2	0.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP10	12/03/2024	0.00	SAND: fine to medium grained, dark grey		6.0	4.0	2.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP10	12/03/2024	1.00			6.1	4.1	2.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	0.00	SAND: fine to medium grained, dark grey		5.9	3.8	2.1	2	5.9	3.0	0.007	4	<0.02	<2	0.042	26	---	---	0.049	31	---	---
TP11	14/03/2024	0.25	SAND: fine to coarse grained, pale brown to brown		6.1	4.0	2.1	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	0.50			6.0	3.7	2.3	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	0.75			6.5	5.1	1.4	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	1.00			6.6	5.2	1.4	2	6.3	4.8	<0.003	<2	<0.02	<2	0.006	4	---	---	<0.02	<2	---	---
TP11	14/03/2024	1.25			6.2	4.3	1.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	1.50			6.3	4.3	2.0	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	1.75	SAND: fine to coarse grained, brown to dark brown; pockets of organics.		5.9	3.1	2.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP11	14/03/2024	2.00			5.3	3.4	1.9	4	5.0	3.3	0.049	31	0.410	256	0.210	131	---	---	0.260	162	---	---
TP12	13/03/2024	0.00	SAND: fine to medium grained, dark grey		6.0	4.1	1.9	2	6.0	6.2	0.007	4	<0.02	<2	0.032	20	---	---	0.039	24	---	---
TP13	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.9	5.0	0.9	2	6.7	3.2	<0.003	<2	<0.02	<2	0.080	50	---	---	0.027	17	---	---
TP13	13/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled dark grey		4.7	4.0	0.7	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	0.50			4.6	4.3	0.3	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	0.75			4.7	4.2	0.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	1.00			4.7	4.2	0.5	2	5.4	3.3	0.006	4	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP13	13/03/2024	1.25			4.7	4.1	0.6	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	1.50			4.7	4.2	0.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	1.75	SAND: fine to coarse grained, dark brown; pockets of organics.		4.8	3.9	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP13	13/03/2024	2.00			4.8	3.6	1.2	2	4.3	2.2	0.170	106	0.490	306	0.110	69	0.006	3	0.290	181	---	---
TP14	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.5	3.5	2.0	2	5.2	2.7	0.023	14	<0.02	<2	0.049	31	---	---	0.072	45	---	---
TP14	13/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled dark grey		5.8	3.7	2.1	2	5.4	3.1	0.009	6	<0.02	<2	0.012	7	---	---	0.021	13	---	---
TP15	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.3	3.5	1.8	2	5.3	2.9	0.022	14	<0.02	<2	0.043	27	---	---	0.065	41	---	---
TP15	13/03/2024	0.25	SAND (SP): fine to coarse grained, dark yellow, stained dark orange.		5.6	4.1	1.5	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP15	13/03/2024	0.50			5.7	4.8	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP15	13/03/2024	0.75			5.9	5.0	0.9	2	5.8	4.1	0.006	4	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP15	13/03/2024	1.00	FERRICRETE: fine grained; dark orange/brown;		6.2	5.1	1.1	2	6.1	4.3	0.005	3	<0.02	<2	0.007	4	---	---	<0.02	<2	---	---
TP16	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.8	3.0	2.8	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP17	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.3	2.8	2.5	2	5.4	3.0	0.018	11	<0.02	<2	0.034	21	---	---	0.053	33	---	---
TP17	13/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled dark grey		5.3	3.1	2.2	2	5.3	3.5	0.009	6	<0.02	<2	<0.005	<2	---	---	<0.02	<2	---	---
TP17	13/03/2024	0.50	FERRICRETE: fine grained; dark orange brown;		5.3	3.1	2.2	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP18	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.9	3.8	2.1	2	5.4	3.9	0.018	11	<0.02	<2	0.021	13	---	---	0.039	24	---	---
TP19	14/03/2024	0.00	SAND: fine to medium grained, dark grey		6.5	5.0	1.5	2	7.1	3.2	<0.003	<2	<0.02	<2	0.042	26	---	---	0.042	26	---	---
TP19	14/03/2024	0.25	SAND: fine to medium grained, pale grey, mottled dark grey		5.2	4.3	0.9	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TP19	14/03/2024	0.50			5.2	4.7	0.5	2	5.9	3.1	0.004	2	<0.02	<2	0.007	4	---	---	<0.02	<2	---	---
TP20	13/03/2024	0.00	SAND: fine to medium grained, dark grey		5.2	4.6	0.6	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Table B Groundwater Quality Laboratory Results

Definitions:
PWG (Freshwater Guidelines) for slightly - moderately disturbed systems, LIWG (Long Term Irrigation Water Guidelines), Dewatering trigger values DWER ASS Guideline Series (2015), NPUG (Non-potable groundwater use), LDWG - Livestock Drinking Water Guidelines
- (No Guideline), — not tested, LOR (Limit of Reporting),

Notes:
Guideline values have been adopted from the following guidance documentation:
- *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes* (DWER 2015b)
- *Assessment and Management of Contaminated Sites* (DWER 2021)
- *Freshwater and Marine Water Quality Guidelines* (ANZG, 2023)
-ANZECC/ARMCANZ 2000 Freshwater and Marine WQ Guidelines Chapter 3 SW wetland environments - Table 3.3.6
All results expressed as mg/L except for pH (pH units), ratios (unitless), Redox mV (mili Volts) and EC (µS/cm)
Denotes less than LOR

Sample ID	Date	Event	Trigger	Dissolved Metals & Metalloids										Total Metals		Field Parameters					Acid Sulfate Soil Parameters						ASS Ratios		Cations				Nutrients					
				Aluminium	Arsenic	Cadmium	Chromium	Iron	Manganese	Nickel	Selenium	Zinc		Total Aluminium	Total Iron	pH	E.C	Redox	DO	Groundwater Elevation	Total Acidity (CaCO3)	Total Alkalinity (CaCO3)	TDS	TSS	Sulfate	Chloride	Acidity: Alkalinity	Sulfate: Chloride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN	Total Ammonia (NH_3-N + NH_4-N)	NO_x-N
	Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L	pH units	µS/cm	mV	mg/L	mAHD	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	FWG			0.055[a]	0.013	0.0002	0.001	-	1.9	0.011	0.005	0.008		-	0.3	7.0-8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.065	0.03	1.5	-	2.57	0.1
	NPUG			0.2	0.1	0.02	0.5	0.3	5	0.2	0.1	3		-	0.3	-	-	-	-	-	-	-	-	-	1000	250	-	-	-	-	-	-	-	-	-	-	0.41	-
	LIWG			5	0.1	0.01	0.1	0.2	0.2	0.2	0.02	2		-	0.2	-	2300	-	-	-	-	-	1500	-	-	710	-	-	-	-	-	-	-	-	5	-	-	-
	LDWG			5	0.5	0.01	1.0	-	-	0.15	0.02	20		5	-	-	-	-	-	-	-	-	2500	-	1000	-	-	-	1000	2000	-	-	-	-	-	-	-	400
	ASS			1	-	-	-	-	-	-	-	-		-	-	<6	-	-	-	-	>40	-	-	-	-	-	>1	>0.5	-	-	-	-	-	-	-	-	-	-
	LOR			0.01	0.001	0.0001	0.001	0.05	0.005	0.001	0.001	0.005		0.1	0.02	0.01	10	1	0.01	0.01	1	1	10	5	1	1	-	-	1	1	1	1	0.01	0.005	0.1	0.1	0.01	0.01
Leederville Aquifer																																						
WM01	04/17/2024	Baseline		0.020	<0.001	<0.0001	0.004	2.62	---	---	---	---		---	---	5.38	266	15	0.06	33.79	---	---	---	---	---	---	---	---	---	5	7	---	0.04	---	0.3	0.3	---	<0.01
WM01	23/07/2024	Baseline		0.030	<0.001	<0.0001	<0.001	2.58	0.09	0.002	<0.01	<0.005		---	---	5.34	295	107	0.21	34.66	---	11	185	---	6	84	---	0.07	2	6	8.0	43	0.03	<0.01	0.6	0.6	0.150	<0.01
WM01	26/09/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	0.06	0.06	0.005	<0.01	0.0090		---	---	5.67	317	156	1.63	35.52	---	24	189	---	5	100	---	0.05	8	6	7.0	43	<0.01	<0.01	0.3	0.1	<0.01	0.180
WM01	20/01/2025	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.08	0.002	<0.01	<0.005		---	---	5.11	308	11	0.18	34.48	---	11	178	---	7	72	---	0.10	2	6	7.0	42	0.04	<0.01	0.3	0.3	0.140	<0.01
WM02	17/04/2024	Baseline		0.010	0.0020	<0.0001	---	11.40	---	---	---	---		---	---	6.06	528	6	0.10	27.48	---	---	---	---	---	---	---	---	---	9	5.0	---	0.10	---	0.3	0.3	---	<0.01
WM02	23/07/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	14.90	0.20	<0.001	<0.01	<0.005		---	---	5.92	623	19	0.41	28.50	---	16	332	---	15	202	---	0.07	2	12	6.0	97	0.04	<0.01	0.2	0.2	0.110	<0.01
WM02	26/09/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	3.11	0.22	<0.001	<0.01	<0.005		---	---	5.86	617	17	1.04	28.03	---	17	322	---	11	197	---	0.06	3	12	6.0	94	0.03	<0.01	0.2	0.2	0.080	<0.01
WM02	21/01/2025	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.21	<0.001	<0.01	<0.005		---	---	5.94	633	31	0.08	27.68	---	21	310	---	9	207	---	0.04	2	12	6.0	95	0.04	<0.01	0.2	0.2	0.090	<0.01
WM03	17/04/2024	Baseline		0.050	<0.001	<0.0001	---	6.48	---	---	---	---		---	---	6.08	450	6	0.22	30.57	---	---	---	---	---	---	---	---	---	8	3.0	---	0.06	---	0.3	0.3	---	<0.01
WM03	24/07/2024	Baseline		0.010	<0.001	<0.0001	<0.001	2.94	0.61	0.008	<0.01	0.0130		---	---	6.15	434	71	2.89	32.09	---	30	234	---	9	128	---	0.07	5	8	4.0	68	0.01	<0.01	0.5	0.4	0.170	0.090
WM03	27/09/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	6.76	0.33	0.004	<0.01	0.0080		---	---	5.79	419	53	0.93	31.84	---	26	225	---	7	148	---	0.05	3	8	3.0	62	<0.01	<0.01	0.3	0.3	0.150	<0.01
WM03	21/01/2025	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.43	0.012	<0.01	0.0210		---	---	6.19	473	169	0.59	30.98	---	34	240	---	15	142	---	0.11	9	8	4.0	69	0.02	<0.01	0.6	0.2	0.030	0.360
Superficial Aquifer																																						
WM01-W-S01	17/04/2024	Baseline		<0.01	0.0030	<0.0001	---	7.16	---	---	---	---		---	---	5.93	354	-14	1.05	32.17	---	---	---	---	---	---	---	---	---	8	4.0	---	0.93	---	2.3	2.3	---	<0.01
WM01-W-S01	23/07/2024	Baseline		0.010	<0.001	<0.0001	<0.001	0.07	0.32	0.003	<0.01	0.0300		---	---	4.57	370	284	0.79	32.84	---	<1	245	---	41	93	---	0.44	4	8	4.0	53	<0.01	<0.01	0.2	0.2	<0.01	0.040
WM01-W-S01	26/09/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.21	0.002	<0.01	0.0210		---	---	4.61	323	317	0.81	34.23	---	<1	186	---	43	91	---	0.47	4	7	3.0	47	<0.01	<0.01	0.1	0.1	<0.01	<0.01
WM01-W-S01	20/01/2025	Baseline		0.040	<0.001	<0.0001	<0.001	<0.05	0.44	0.004	<0.01	0.0120		---	---	5.17	343	168	6.60	32.99	---	<1	173	---	40	59	---	0.68	3	6	2.0	42	<0.01	<0.01	0.2	0.2	0.030	0.010
WM01-W-S02	17/04/2024	Baseline		0.030	<0.001	<0.0001	---	17.80	---	---	---	---		---	---	6.42	341	-161	0.17	33.20	---	---	---	---	---	---	---	---	---	12	6.0	---	0.28	---	1.1	1.1	---	0.010
WM01-W-S02	25/07/2024	Baseline		0.070	0.0020	<0.0001	<0.001	4.19	0.05	<0.001	<0.01	<0.005		---	---	5.51	296	27	1.03	33.52	---	5	688	---	4	92	---	0.04	1	6	5.0	46	1.06	<0.01	2.8	2.8	0.080	<0.01
WM01-W-S02	26/09/2024	Baseline		0.040	<0.001	<0.0001	<0.001	0.58	0.05	<0.001	<0.01	<0.005		---	---	5.22	413	47	0.87	35.32	---	<1	234	---	36	123	---	0.29	4	11	4.0	51	<0.01	<0.01	0.4	0.4	0.150	<0.01
WM01-W-S02	20/01/2025	Baseline		0.040	<0.001	<0.0001	<0.001	<0.05	0.03	<0.001	<0.01	<0.005		---	---	4.97	413	-64	0.19	34.10	---	<1	222	---	34	83	---	0.41	3	10	4.0	53	<0.01	<0.01	0.3	0.3	0.140	<0.05
WM02-W-S01	17/04/2024	Baseline		0.100	<0.001	<0.0001	---	22.40	---	---	---	---		---	---	6.41	394	-135	0.11	27.58	---	---	---	---	---	---	---	---	---	7	14.0	---	0.04	---	2.1	2.1	---	<0.01
WM02-W-S01	23/07/2024	Baseline		0.090	<0.001	<0.0001	<0.001	6.05	0.13	<0.001	<0.01	<0.005		---	---	5.95	390	23	0.22	28.84	---	24	230	---	34	91	---	0.37	11	8	14.0	46	0.03	<0.01	1.6	1.6	0.850	0.020
WM02-W-S01	26/09/2024	Baseline		0.040	<0.001	<0.0001	<0.001	0.23	0.04	<0.001	<0.01	<0.005		---	---	5.62	395	71	0.58	28.25	---	17	212	---	35	104	---	0.34	14	8	12.0	39	<0.01	<0.01	1.7	1.7	1.150	<0.01
WM02-W-S01	21/01/2025	Baseline		0.130	<0.001	<0.0001	0.001	3.39	0.08	<0.001	<0.01	<0.005		---	---	6.00	430	-126	0.14	27.73	---	23	247	---	37	79	---	0.47	20	6	15.0	40	0.01	<0.01	1.7	1.7	0.760	0.020
WM02-W-S02	17/04/2024	Baseline		0.020	<0.001	<0.0001	---	30.20	---	---	---	---		---	---	6.42	545	-112	0.11	26.25	---	---	---	---	---	---	---	---	---	10	9.0	---	0.08	---	0.6	0.6	---	<0.01
WM02-W-S02	25/07/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	0.20	0.14	<0.001	<0.01	<0.005		---	---	5.68	506	141	0.37	27.45	---	24	283	---	30	135	---	0.22	11	11	12.0	65	0.02	<0.01	0.7	0.6	0.250	0.130
WM02-W-S02	26/09/2024	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.25	<0.001	<0.01	<0.005		---	---	5.85	543	49	0.43	26.76	---	34	280	---	15	166	---	0.09	9	12	8.0	75	0.02	<0.01	0.3	0.3	0.110	0.010
WM02-W-S02	21/01/2025	Baseline		<0.01	<0.001	<0.0001	<0.001	<0.05	0.27	<0.001	<0.01	<0.005		---	---	6.24	571	-99	0.19	26.22	---	35	285	---	3	175	---	0.02	4	10	6.0	86	0.34	<0.01	0.8	0.8	0.060	<0.01
WM03-N-S03	17/04/2024	Baseline		0.340	0.0020	<0.0001	---	11.00	---	---	---	---		---	---	5.51	376	51	0.86	32.65	---	---	---	---	---	---	---	---	---	8	3.0	---	0.02	---	1.3	1.2	---	0.140
WM03-N-S03	24/07/2024	Baseline		0.360	<0.001	<0.0001	<0.001	2.70	0.05	<0.001	<0.01	<0.005		---	---	4.58	747	265	0.55	33.82	---	<1	442	---	86	180	---	0.48	34	18	18.0	70	0.04	<0.01	9.0	3.0	0.700	5.97
WM03-N-S03	27/09/2024	Baseline		2.240	0.0060	<0.0001	0.004	15.30	0.12	0.002	<0.01	<0.005		---	---	5.87	892	5	0.57	33.71	---	59	618	---	74	209	---	0.35	18	10	36.0	67	0.28	0.12	42.0	41.9	35.100	0.070
WM03-N-S03	21/01/2025	Baseline		0.340	<0.001	<0.0001	<0.001	2.88	0.02	<0.001	<0.01	<0.005		---	---	5.63	639	-92	0.10	33.01	---	<1	307	---	38	163	---	0.23	17	9	6.0	59	0.19	<0.01	2.8	2.8	1.020	<0.01
WM03-W-S02B	17/04/2024	Baseline		<0.01	<0.001	<0.0001	---	17.40	---	---	---	---		---	---	6.08	2740	-39	0.31	32.04	---	---	---	---	---	---	---	---	---	54	27.0	---	0.03	---	0.6	0.6	---	0.010
WM03-W-S02B	24/07/2024	Baseline		1.020	<0.001	<0.0001	0.001	17.50	0.29	0.002	<0.01	<0.005		---	---	5.63	943	61	0.25	33.46	---	4	714	---	63	287	---	0.22	10	18	57.0	119	0.16	0.05	4.6	4.6	0.510	<0.01
WM03-W-S02B	27/09/2024	Baseline		0.780	<0.001	<0.0001	<0.001	13.00	0.19	0.001	<0.01	<0.005		---	---	5.52	1200	55	0.49	33.42	---	10	822	---	109	320	---	0.34	12	24	79.0	137	0.68	0.32	5.3	5.3	0.440	0.020
WM03-W-S02B	21/01/2025	Baseline		1.240	0.0010	<0.0001	0.002	22.80	0.14	0.001	<0.01	<0.005		---	---	5.80	1100	-21	0.07	32.30	---	15	792	---	74	307	---	0.24	12	21	69.0	122	0.54	0.31	6.4	6.4	0.500	<0.05

Table C Surface Water Quality Laboratory Results

Definitions:
FWG (Freshwater Guidelines) for slightly - moderately disturbed systems, LIWG (Long Term Irrigation Water Guidelines), Dewatering trigger values DWER ASS Guideline Series (2015), NPUG (Non-potable groundwater use), LDWG - Livestock Drinking Water Guidelines
- (No Guideline), --- not tested, LOR (Limit of Reporting),

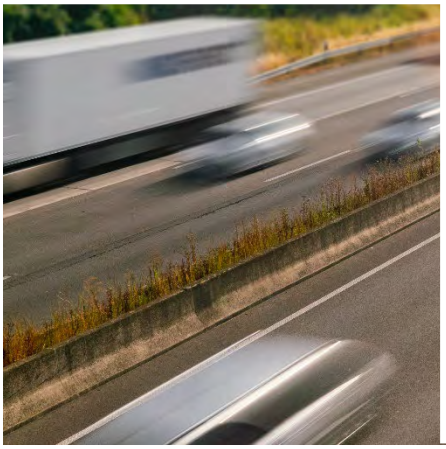
Notes:
Guideline values have been adopted from the following guidance documentation:
- *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes* (DWER 2015b)
- *Assessment and Management of Contaminated Sites* (DWER 2021)
- *Freshwater and Marine Water Quality Guidelines* (ANZG, 2023)
-ANZECC/ARMCANZ 2000 Freshwater and Marine WQ Guidelines Chapter 3 SW wetland environments - Table 3.3.6
All results expressed as mg/L except for pH (pH units), ratios (unitless), Redox mV (mili Volts) and EC (µS/cm)

Denotes less than LOR

Sample ID	Date	Event	Trigger	Dissolved Metals & Metalloids										Total Metals		Field Parameters				Acid Sulfate Soil Parameters							ASS Ratios		Cations				Nutrients					
				Aluminium	Arsenic	Cadmium	Chromium	Iron	Manganese	Nickel	Selenium	Zinc	Total Aluminium	Total Iron	pH	E.C	Redox	DO	Total Acidity (CaCO3)	Total Alkalinity (CaCO3)	TDS	TSS	Turbidity	Sulfate	Chloride	Acidity: Alkalinity	Sulfate: Chloride	Calcium	Magnesium	Potassium	Sodium	Total P	Reactive P	Total N	TKN	Total Ammonia (NH_3-N + NH_4-N)	NO_x-N
	Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH units	µS/cm	mV	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	-	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				FWG	**0.055**	**0.013**	**0.0002**	**0.001**	**-**	**1.9**	**0.011**	**0.005**	**0.008**	**-**	**0.3**	**7.0-8.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.065**	**0.03**	**1.5**	**-**	**2.57**	**0.1**
				NPUG	**0.2**	**0.1**	**0.02**	**0.5**	**0.3**	**5**	**0.2**	**0.1**	**3**	**-**	**0.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1000**	**250**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.41**	**-**
				LIWG	**5**	**0.1**	**0.01**	**0.1**	**0.2**	**0.2**	**0.2**	**0.02**	**2**	**-**	**0.2**	**-**	**2300**	**-**	**-**	**-**	**-**	**1500**	**-**	**-**	**-**	**-**	**710**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**	**-**
				LDWG	**5**	**0.5**	**0.01**	**1.0**	**-**	**-**	**0.15**	**0.02**	**20**	**5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2500**	**-**	**-**	**-**	**1000**	**-**	**-**	**-**	**1000**	**2000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**400**
				ASS	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**<6**	**-**	**-**	**-**	**>40**	**-**	**-**	**-**	**-**	**-**	**-**	**>1**	**>0.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
				LOR	**0.01**	**0.001**	**0.0001**	**0.001**	**0.05**	**0.005**	**0.001**	**0.001**	**0.005**	**0.1**	**0.02**	**0.01**	**10**	**1**	**0.01**	**1**	**1**	**10**	**5**	**0.1**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**1**	**0.01**	**0.005**	**0.1**	**0.1**	**0.01**	**0.01**
Creekline Discharge																																					
SW01	25/09/2024	Baseline		0.060	<0.001	<0.001	<0.001	2.03	<0.001	<0.001	<0.01	<0.005	---	---	7.25	445	53	8.96	---	175	269	---	34	<5	56	---	0.09	58	11	3	22	0.06	0.01	1.6	1.6	0.010	0.010
SW02	17/04/2024	Baseline		<0.01	<0.001	---	---	1.46	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20	18.0	---	0.16	---	7.2	7.2	---	0.020
SW02	22/07/2024	Baseline		0.020	<0.001	---	---	2.82	---	---	---	---	---	---	6.86	828	-37	4.76	---	---	---	---	---	---	---	---	---	---	21	26.0	---	0.23	---	6.7	6.0	---	0.710
SW02	25/09/2024	Baseline		<0.01	<0.001	<0.001	<0.001	0.98	0.141	<0.001	<0.01	<0.005	---	---	7.31	1207	12	9.10	---	100	686	---	65	47	320	---	0.15	46	24	18.0	138	0.50	0.04	8.6	8.4	3.830	0.200
SW02	20/01/2025	Baseline		<0.01	<0.001	<0.001	<0.001	1.25	0.007	<0.001	<0.01	<0.005	---	---	7.37	1284	61	8.49	---	111	691	---	25	42	326	---	0.13	42	20	28.0	142	0.36	<0.01	8.0	8.0	4.610	<0.01
SW03	22/07/2024	Baseline		0.040	<0.001	---	---	0.28	---	---	---	---	---	---	7.17	438	39	6.75	---	---	---	---	---	---	---	---	---	---	9	9.0	---	0.06	---	1.3	1.3	---	0.020
SW03	25/09/2024	Baseline		0.070	<0.001	<0.001	<0.001	1.39	0.002	<0.001	<0.01	<0.005	---	---	6.85	727	52	7.51	---	72	440	---	110	47	190	---	0.25	38	10	16.0	82	0.68	0.02	6.0	6.0	0.040	0.020
SW04	22/07/2024	Baseline		0.120	<0.001	---	---	0.45	---	---	---	---	---	---	6.39	441	22	4.26	---	---	---	---	---	---	---	---	---	---	8	9.0	---	0.10	---	2.2	2.2	---	<0.01
SW04	25/09/2024	Baseline		0.140	<0.001	<0.001	<0.001	8.63	0.011	<0.001	<0.01	<0.005	---	---	7.45	557	62	8.29	---	55	367	---	21	12	145	---	0.08	27	10	4.0	58	0.54	0.33	3.2	3.2	0.030	<0.01
SW05	22/07/2024	Baseline		0.050	0.0010	---	---	1.34	---	---	---	---	---	---	6.84	645	6	4.85	---	---	---	---	---	---	---	---	---	---	13	25.0	---	0.22	---	5.0	3.8	---	1.230
SW05	25/09/2024	Baseline		0.010	0.0010	<0.001	<0.001	2.20	0.177	<0.001	<0.01	<0.005	---	---	7.32	943	-9	7.64	---	165	570	---	180	24	207	---	0.12	44	15	42.0	97	6.23	0.09	12.6	12.6	0.370	0.010
Wetland																																					
WM01-WL	23/07/2024	Baseline		0.600	<0.001	---	---	0.12	---	---	---	---	---	---	6.12	256	108	4.75	---	---	---	---	---	---	---	---	---	---	<1	4.0	---	0.43	---	3.5	3.5	---	0.030
WM01-WL	26/09/2024	Baseline		0.760	<0.001	0.001	<0.001	0.34	0.022	<0.001	<0.01	<0.005	---	---	6.15	290	89	4.88	---	17	214	---	18	<10	86	---	0.12	4	5	8.0	38	0.31	0.15	3.6	3.6	0.500	0.010
WM02-WL	23/07/2024	Baseline		0.030	<0.001	---	---	0.16	---	---	---	---	---	---	6.75	997	49	8.48	---	---	---	---	---	---	---	---	---	---	---	18	12.0	---	0.17	---	2.7	2.7	---	0.040
WM02-WL	26/09/2024	Baseline		0.060	<0.001	<0.001	<0.001	2.07	0.023	<0.001	<0.01	<0.005	---	---	7.33	427	15	11.42	---	60	266	---	55	7	103	---	0.07	24	10	7.0	45	0.59	0.09	8.0	8.0	0.030	<0.01
WM02-WL	21/01/2025	Baseline		0.050	0.0020	<0.001	<0.001	2.35	0.018	<0.001	<0.01	<0.005	---	---	6.40	1669	5	7.85	---	88	848	---	22	<5	407	---	0.01	34	23	29.0	192	0.79	0.11	7.3	7.3	0.200	<0.01
WM03-WL	24/07/2024	Baseline		0.360	0.0010	---	---	0.93	---	---	---	---	---	---	6.12	775	49	3.12	---	---	---	---	---	---	---	---	---	---	---	23	22.0	---	1.75	---	3.9	3.8	---	0.110
WM03-WL	27/09/2024	Baseline		0.310	<0.001	<0.001	<0.001	0.86	0.009	<0.001	<0.01	<0.005	---	---	6.13	863	52	3.43	---	29	560	---	2	39	242	---	0.16	8	18	11.0	124	2.14	2.15	3.1	3.1	0.040	0.020
WM03-WL	21/01/2025	Baseline		1.470	0.0020	0.002	<0.001	6.30	0.078	<0.001	<0.01	0.0070	---	---	6.13	3415	25	6.37	---	66	2240	---	22	<50	942	---	0.05	24	54	46.0	542	6.53	6.10	12.5	12.4	0.060	0.070



Appendix E – Laboratory Documentation





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Attention: **Brenton Petracca**

Report **1075587-S**
Project name BEENUP WIND FARM
Received Date Mar 05, 2024

Client Sample ID			**WM01-0.0**	**WM01-0.5**	**WM01-1.0**	**WM01-1.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ma0013729**	**L24-Ma0013730**	**L24-Ma0013731**	**L24-Ma0013732**
Date Sampled			**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	82	104	57	83
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			WM01-0.0	WM01-0.5	WM01-1.0	WM01-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013729	L24-Ma0013730	L24-Ma0013731	L24-Ma0013732
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	36	37	38	36
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	7.9	< 1	< 1	< 1
Nitrate-N	1	mg/kg	1.6	1.3	1.2	< 1
Nitrite-N	1	mg/kg	1.6	1.3	1.2	< 1
NOx-N	1	mg/kg	1.6	1.4	1.2	< 1
Total Kjeldahl Nitrogen	10	mg/kg	370	680	280	40
Total Nitrogen	10	mg/kg	370	680	280	40
Phosphorus	1	mg/kg	19	27	4.5	3.4
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	< 1	< 1	< 1	< 1
Lead	1	mg/kg	5.2	4.6	7.8	6.1
Manganese	5	mg/kg	< 5	< 5	5.9	< 5
Mercury	0.02	mg/kg	< 0.02	< 0.02	0.02	< 0.02
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	< 5	< 5	< 5	< 5
Sample Properties						
% Moisture	1	%	11	4.4	20	16

Client Sample ID			WM02-0.0	WM02-0.5	WM02-1.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013733	L24-Ma0013734	L24-Ma0013735	L24-Ma0013737
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	61	< 50	180
TRH C29-C36	50	mg/kg	< 50	68	< 50	190
TRH C10-C36 (Total)	50	mg/kg	< 50	129	< 50	370
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	99	90	97	116
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	110	< 100	310
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	100
TRH >C10-C40 (total)*	100	mg/kg	< 100	110	< 100	410
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			WM02-0.0	WM02-0.5	WM02-1.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013733	L24-Ma0013734	L24-Ma0013735	L24-Ma0013737
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	37	36	39	52
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1	< 1	< 1	1.1
Nitrate-N	1	mg/kg	15	13	2.2	< 1
Nitrite-N	1	mg/kg	15	13	2.2	< 1
NOx-N	1	mg/kg	< 1	< 1	2.4	< 1
Total Kjeldahl Nitrogen	10	mg/kg	1200	700	86	5200
Total Nitrogen	10	mg/kg	1200	700	88	5200
Phosphorus	1	mg/kg	190	45	5.3	610
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	2.9	< 1	< 1	6.5
Lead	1	mg/kg	< 1	< 1	< 1	4.1
Manganese	5	mg/kg	< 5	< 5	< 5	14
Mercury	0.02	mg/kg	0.03	0.03	0.03	0.05
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	5.4	< 5	< 5	8.4
Sample Properties						
% Moisture	1	%	< 1	2.6	20	6.6

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	< 50	-	-	-
TRH C29-C36	50	mg/kg	< 50	-	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	-
Toluene	0.1	mg/kg	< 0.1	-	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	-

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
BTEX						
o-Xylene	0.1	mg/kg	< 0.1	-	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	79	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	-
TRH C6-C10	20	mg/kg	< 20	-	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	< 100	-	-	-
TRH >C34-C40	100	mg/kg	< 100	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
Bifenthrin	0.2	mg/kg	< 0.2	-	-	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	-
Chlordane	0.01	mg/kg	< 0.01	-	-	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
p.p-DDD	0.01	mg/kg	< 0.01	-	-	-
p.p-DDE	0.01	mg/kg	< 0.01	-	-	-
p.p-DDT	0.01	mg/kg	< 0.01	-	-	-
o.p-DDT	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	-
Lindane	0.01	mg/kg	< 0.01	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Oxychlordane	0.01	mg/kg	< 0.01	-	-	-
Diazinon	0.2	mg/kg	< 0.2	-	-	-
Ethion	0.05	mg/kg	< 0.05	-	-	-
Fenitrothion	0.1	mg/kg	< 0.1	-	-	-
Malathion	0.1	mg/kg	< 0.1	-	-	-
Trifluralin	0.2	mg/kg	< 0.2	-	-	-
Ammonia-N	10	mg/kg	43	-	-	-
Chromium (VI)	1	mg/kg	< 1	-	-	-
Filterable Reactive Phosphorus	1	mg/kg	< 1	-	-	-
Nitrate-N	1	mg/kg	3.1	-	-	-

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Nitrite-N	1	mg/kg	3.1	-	-	-
NOx-N	1	mg/kg	3.2	-	-	-
Total Kjeldahl Nitrogen	10	mg/kg	1100	-	-	-
Total Nitrogen	10	mg/kg	1100	-	-	-
Phosphorus	1	mg/kg	30	-	-	-
Heavy Metals						
Arsenic	2	mg/kg	11	-	-	-
Beryllium	2	mg/kg	< 2	-	-	-
Boron	10	mg/kg	< 10	-	-	-
Cadmium	0.1	mg/kg	< 0.1	-	-	-
Cobalt	5	mg/kg	< 5	-	-	-
Copper	1	mg/kg	< 1	-	-	-
Lead	1	mg/kg	20	-	-	-
Manganese	5	mg/kg	< 5	-	-	-
Mercury	0.02	mg/kg	0.05	-	-	-
Nickel	1	mg/kg	< 1	-	-	-
Selenium	2	mg/kg	< 2	-	-	-
Zinc	5	mg/kg	< 5	-	-	-
Sample Properties						
% Moisture	1	%	25	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.2	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.9	3.9	3.7
Reaction Ratings*[S05]	0	comment	-	2.0	2.0	2.0

Client Sample ID			WM01-0.75	WM01-1.0	WM01-1.25	WM01-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013756	L24-Ma0013757	L24-Ma0013758	L24-Ma0013759
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.4	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.5	3.6	3.9
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-1.75	WM01-2.0	WM01-2.25	WM01-2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013760	L24-Ma0013761	L24-Ma0013762	L24-Ma0013763
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.4	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	2.9	3.4
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-2.75	WM01-3.0	WM01-3.25	WM01-3.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013764	L24-Ma0013765	L24-Ma0013766	L24-Ma0013767
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	5.8	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.0	3.1	2.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-3.75	WM01-4.0	WM01-4.25	WM01-4.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013768	L24-Ma0013769	L24-Ma0013770	L24-Ma0013771
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.1	6.0	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.6	2.6	2.5
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-4.75	WM01-5.0	WM01-5.25	WM01-5.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013772	L24-Ma0013773	L24-Ma0013774	L24-Ma0013775
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.3	6.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.4	2.4	2.3
Reaction Ratings*[S05]	0	comment	2.0	2.0	4.0	2.0

Client Sample ID			WM01-5.75	WM01-6.0	WM01-6.25	WM01-6.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013776	L24-Ma0013777	L24-Ma0013778	L24-Ma0013779
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.0	6.1	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	2.3	2.3	2.4
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-6.75	WM01-7.0	WM01-7.25	WM01-7.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013780	L24-Ma0013781	L24-Ma0013782	L24-Ma0013783
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.1	6.7	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.3	2.3	2.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-7.75	WM01-8.0	WM01-8.25	WM01-8.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013784	L24-Ma0013785	L24-Ma0013786	L24-Ma0013787
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.4	6.4	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.4	2.3	2.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-8.75	WM01-9.0	WM01-9.25	WM01-9.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013788	L24-Ma0013789	L24-Ma0013790	L24-Ma0013791
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.2	6.4	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.5	2.3	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-9.75	WM01-10.0	WM02-0.0	WM02-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013792	L24-Ma0013793	L24-Ma0013794	L24-Ma0013795
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	5.4	5.5	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.3	3.6	3.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	2.0	2.0

Client Sample ID			WM02-0.5	WM02-0.75	WM02-1.0	WM02-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013796	L24-Ma0013797	L24-Ma0013798	L24-Ma0013799
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.3	6.4	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.1	4.5	4.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM02-1.5	WM02-1.75	WM02-2.0	WM02-2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013800	L24-Ma0013801	L24-Ma0013802	L24-Ma0013803
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	5.7	6.2	7.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.3	5.0	3.2
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM02-2.5	WM02-2.75	WM02-3.0	WM02-3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013804	L24-Ma0013805	L24-Ma0013806	L24-Ma0013807
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	7.6	7.2	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	2.6	2.8	2.8
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	3.0

Client Sample ID			WM02-3.50	WM02-3.75	WM02-4.0	WM02-4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013808	L24-Ma0013809	L24-Ma0013810	L24-Ma0013811
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.1	7.2	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.7	2.8	3.1
Reaction Ratings*[S05]	0	comment	3.0	4.0	4.0	4.0

Client Sample ID			WM02-4.50	WM02-4.75	WM02-5.0	WM02-5.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013812	L24-Ma0013813	L24-Ma0013814	L24-Ma0013815
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.8	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.9	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-5.50	WM02-5.75	WM02-6.0	WM02-6.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013816	L24-Ma0013817	L24-Ma0013818	L24-Ma0013819
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	6.5	6.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.8	2.7	2.4
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-6.50	WM02-6.75	WM02-7.0	WM02-7.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013820	L24-Ma0013821	L24-Ma0013822	L24-Ma0013823
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	4.6	7.7	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.5	2.5	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-7.50	WM02-7.75	WM02-8.0	WM02-8.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013824	L24-Ma0013825	L24-Ma0013826	L24-Ma0013827
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	5.0	4.8	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.7	2.6	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-8.50	WM02-8.75	WM02-9.0	WM02-9.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013828	L24-Ma0013829	L24-Ma0013830	L24-Ma0013831
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	4.9	5.0	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.7	2.8	2.6
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-9.50	WM02-9.75	WM02-10.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013832	L24-Ma0013833	L24-Ma0013834	L24-Ma0013835
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.2	4.8	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	3.0

Client Sample ID			WM03-0.25	WM03-0.5	WM03-0.75	WM03-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013836	L24-Ma0013837	L24-Ma0013838	L24-Ma0013839
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	6.2	5.5	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.3	4.6	4.4
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM03-1.25	WM03-2.0	WM03-2.25	WM03-2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013840	L24-Ma0013843	L24-Ma0013844	L24-Ma0013845
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.6	4.4	4.6
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM03-2.75	WM03-3.0	WM03-3.25	WM03-3.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013846	L24-Ma0013847	L24-Ma0013848	L24-Ma0013849
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.8	6.1	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.1	3.3	3.0
Reaction Ratings*[S05]	0	comment	2.0	2.0	4.0	4.0

Client Sample ID			WM03-3.75	WM03-4.0	WM03-4.25	WM03-4.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013850	L24-Ma0013851	L24-Ma0013852	L24-Ma0013853
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	7.3	6.7	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	2.7	3.0	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-4.75	WM03-5.0	WM03-5.25	WM03-5.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013854	L24-Ma0013855	L24-Ma0013856	L24-Ma0013857
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.2	7.8	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.2	2.5	2.5
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-5.75	WM03-6.0	WM03-6.25	WM03-6.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013858	L24-Ma0013859	L24-Ma0013860	L24-Ma0013861
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.9	7.0	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.5	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-6.75	WM03-7.0	WM03-7.25	WM03-7.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013862	L24-Ma0013863	L24-Ma0013864	L24-Ma0013865
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	6.4	5.2	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.7	3.1	2.9
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-7.75	WM03-8.0	WM03-8.25	WM03-8.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013866	L24-Ma0013867	L24-Ma0013868	L24-Ma0013869
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.7	6.6	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.4	3.2	3.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-8.75	WM03-9.0	WM03-9.25	WM03-9.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013870	L24-Ma0013871	L24-Ma0013872	L24-Ma0013873
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.7	6.2	5.5	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.2	2.9	3.0
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-9.75	WM03-10.0	Trip Blank
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013874	L24-Ma0013875	L24-Ma0013882
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	-	-	< 20
BTEX					
Benzene	0.1	mg/kg	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3
BTEX					
4-Bromofluorobenzene (surr.)	1	%	-	-	79
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5

Client Sample ID			WM03-9.75	WM03-10.0	Trip Blank
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013874	L24-Ma0013875	L24-Ma0013882
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	6.4	5.6	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	-
Reaction Ratings*[S05]	0	comment	4.0	4.0	-
Total Recoverable Hydrocarbons					
TRH C6-C10	20	mg/kg	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
NEPM 2013 Metals : Metals M12	Welshpool	Mar 08, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
OCOP in Soil	Welshpool	Mar 09, 2024	14 Days
- Method: ARL003 - OCOP and PCB in Soil			
Ammonia-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL304 - Ammonia in Soil and Sediment by Discrete Analyser			
Chromium (VI)	Welshpool	Mar 08, 2024	28 Days
- Method: ARL051 - Hexavalent Chromium in Soil			
Filterable Reactive Phosphorus	Welshpool	Mar 08, 2024	7 Day
- Method: ARL120 - Filterable Reactive Phosphorus in Soil			
Nitrate-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Nitrite-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL312 - Nitrite in Soil and Sediment by Discrete Analyser			
Phosphorus	Welshpool	Mar 08, 2024	7 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Acid Sulfate Soils Field pH Test	Welshpool	Mar 06, 2024	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
NOx-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Total Kjeldahl Nitrogen	Welshpool	Mar 08, 2024	7 Days
- Method: ARL118 - Total Phosphorus and TKN in Soil and Biosolids			
Total Nitrogen	Welshpool	Mar 06, 2024	7 Days
- Method: ARL No. 330 - Persulfate Method for Simultaneous Determination of TN & TP			
Naphthalene	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Welshpool	Mar 07, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
% Moisture	Welshpool	Mar 06, 2024	14 Days
- Method: ARL135 Moisture in Solids			

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Company Name: Stantec Australia Pty Ltd (WA)
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Project Name: BEENUP WIND FARM

Order No.:
Report #: 1075587
Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																		
1	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013729	X			X	X		X	X	X		X		X		X		X	
2	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013730	X			X	X		X	X	X		X		X		X		X	
3	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013731	X			X	X		X	X	X		X		X		X		X	
4	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013732	X			X	X		X	X	X		X		X		X		X	
5	WM02-0.0	Feb 28, 2024		Soil	L24-Ma0013733	X			X	X		X	X	X		X		X		X		X	
6	WM02-0.5	Feb 28, 2024		Soil	L24-Ma0013734	X			X	X		X	X	X		X		X		X		X	
7	WM02-1.0	Feb 28, 2024		Soil	L24-Ma0013735	X			X	X		X	X	X		X		X		X		X	
8	WM03-0.0	Feb 29, 2024		Soil	L24-Ma0013737	X			X	X		X	X	X		X		X		X		X	
9	WM03-0.5	Feb 29, 2024		Soil	L24-Ma0013738	X			X	X		X	X	X		X		X		X		X	
10	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013741														X				
11	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013742														X				
12	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013743														X				
13	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013744														X				
14	WM02-0.0	Feb 28, 2024		Soil	L24-Ma0013745														X				

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Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
15	WM02-0.5	Feb 28, 2024		Soil	L24-Ma0013746														X				
16	WM02-1.0	Feb 28, 2024		Soil	L24-Ma0013747														X				
17	WM02-1.5	Feb 28, 2024		Soil	L24-Ma0013748														X				
18	WM03-0.0	Feb 29, 2024		Soil	L24-Ma0013749														X				
19	WM03-0.5	Feb 29, 2024		Soil	L24-Ma0013750														X				
20	WM03-1.0	Feb 29, 2024		Soil	L24-Ma0013751														X				
21	WM03-1.5	Feb 29, 2024		Soil	L24-Ma0013752														X				
22	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013753										X								
23	WM01-0.25	Feb 26, 2024		Soil	L24-Ma0013754										X								
24	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013755										X								
25	WM01-0.75	Feb 26, 2024		Soil	L24-Ma0013756										X								
26	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013757										X								
27	WM01-1.25	Feb 26, 2024		Soil	L24-Ma0013758										X								
28	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013759										X								
29	WM01-1.75	Feb 26, 2024		Soil	L24-Ma0013760										X								

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Company Name: Stantec Australia Pty Ltd (WA)
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Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1075587
Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
30	WM01-2.0	Feb 26, 2024		Soil	L24-Ma0013761										X								
31	WM01-2.25	Feb 26, 2024		Soil	L24-Ma0013762										X								
32	WM01-2.5	Feb 26, 2024		Soil	L24-Ma0013763										X								
33	WM01-2.75	Feb 26, 2024		Soil	L24-Ma0013764										X								
34	WM01-3.0	Feb 26, 2024		Soil	L24-Ma0013765										X								
35	WM01-3.25	Feb 26, 2024		Soil	L24-Ma0013766										X								
36	WM01-3.50	Feb 26, 2024		Soil	L24-Ma0013767										X								
37	WM01-3.75	Feb 26, 2024		Soil	L24-Ma0013768										X								
38	WM01-4.0	Feb 26, 2024		Soil	L24-Ma0013769										X								
39	WM01-4.25	Feb 26, 2024		Soil	L24-Ma0013770										X								
40	WM01-4.50	Feb 26, 2024		Soil	L24-Ma0013771										X								
41	WM01-4.75	Feb 26, 2024		Soil	L24-Ma0013772										X								
42	WM01-5.0	Feb 26, 2024		Soil	L24-Ma0013773										X								
43	WM01-5.25	Feb 26, 2024		Soil	L24-Ma0013774										X								
44	WM01-5.50	Feb 26, 2024		Soil	L24-Ma0013775										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
45	WM01-5.75	Feb 26, 2024		Soil	L24-Ma0013776										X								
46	WM01-6.0	Feb 26, 2024		Soil	L24-Ma0013777										X								
47	WM01-6.25	Feb 26, 2024		Soil	L24-Ma0013778										X								
48	WM01-6.50	Feb 26, 2024		Soil	L24-Ma0013779										X								
49	WM01-6.75	Feb 26, 2024		Soil	L24-Ma0013780										X								
50	WM01-7.0	Feb 26, 2024		Soil	L24-Ma0013781										X								
51	WM01-7.25	Feb 26, 2024		Soil	L24-Ma0013782										X								
52	WM01-7.50	Feb 26, 2024		Soil	L24-Ma0013783										X								
53	WM01-7.75	Feb 26, 2024		Soil	L24-Ma0013784										X								
54	WM01-8.0	Feb 26, 2024		Soil	L24-Ma0013785										X								
55	WM01-8.25	Feb 26, 2024		Soil	L24-Ma0013786										X								
56	WM01-8.50	Feb 26, 2024		Soil	L24-Ma0013787										X								
57	WM01-8.75	Feb 26, 2024		Soil	L24-Ma0013788										X								
58	WM01-9.0	Feb 26, 2024		Soil	L24-Ma0013789										X								
59	WM01-9.25	Feb 26, 2024		Soil	L24-Ma0013790										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
60	WM01-9.50	Feb 26, 2024		Soil	L24-Ma0013791										X								
61	WM01-9.75	Feb 26, 2024		Soil	L24-Ma0013792										X								
62	WM01-10.0	Feb 26, 2024		Soil	L24-Ma0013793										X								
63	WM02-0.0	Feb 26, 2024		Soil	L24-Ma0013794										X								
64	WM02-0.25	Feb 26, 2024		Soil	L24-Ma0013795										X								
65	WM02-0.5	Feb 26, 2024		Soil	L24-Ma0013796										X								
66	WM02-0.75	Feb 26, 2024		Soil	L24-Ma0013797										X								
67	WM02-1.0	Feb 26, 2024		Soil	L24-Ma0013798										X								
68	WM02-1.25	Feb 26, 2024		Soil	L24-Ma0013799										X								
69	WM02-1.5	Feb 26, 2024		Soil	L24-Ma0013800										X								
70	WM02-1.75	Feb 26, 2024		Soil	L24-Ma0013801										X								
71	WM02-2.0	Feb 26, 2024		Soil	L24-Ma0013802										X								
72	WM02-2.25	Feb 26, 2024		Soil	L24-Ma0013803										X								
73	WM02-2.5	Feb 26, 2024		Soil	L24-Ma0013804										X								
74	WM02-2.75	Feb 26, 2024		Soil	L24-Ma0013805										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
75	WM02-3.0	Feb 26, 2024		Soil	L24-Ma0013806										X								
76	WM02-3.25	Feb 26, 2024		Soil	L24-Ma0013807										X								
77	WM02-3.50	Feb 26, 2024		Soil	L24-Ma0013808										X								
78	WM02-3.75	Feb 26, 2024		Soil	L24-Ma0013809										X								
79	WM02-4.0	Feb 26, 2024		Soil	L24-Ma0013810										X								
80	WM02-4.25	Feb 26, 2024		Soil	L24-Ma0013811										X								
81	WM02-4.50	Feb 26, 2024		Soil	L24-Ma0013812										X								
82	WM02-4.75	Feb 26, 2024		Soil	L24-Ma0013813										X								
83	WM02-5.0	Feb 26, 2024		Soil	L24-Ma0013814										X								
84	WM02-5.25	Feb 26, 2024		Soil	L24-Ma0013815										X								
85	WM02-5.50	Feb 26, 2024		Soil	L24-Ma0013816										X								
86	WM02-5.75	Feb 26, 2024		Soil	L24-Ma0013817										X								
87	WM02-6.0	Feb 26, 2024		Soil	L24-Ma0013818										X								
88	WM02-6.25	Feb 26, 2024		Soil	L24-Ma0013819										X								
89	WM02-6.50	Feb 26, 2024		Soil	L24-Ma0013820										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
90	WM02-6.75	Feb 26, 2024		Soil	L24-Ma0013821										X								
91	WM02-7.0	Feb 26, 2024		Soil	L24-Ma0013822										X								
92	WM02-7.25	Feb 26, 2024		Soil	L24-Ma0013823										X								
93	WM02-7.50	Feb 26, 2024		Soil	L24-Ma0013824										X								
94	WM02-7.75	Feb 26, 2024		Soil	L24-Ma0013825										X								
95	WM02-8.0	Feb 26, 2024		Soil	L24-Ma0013826										X								
96	WM02-8.25	Feb 26, 2024		Soil	L24-Ma0013827										X								
97	WM02-8.50	Feb 26, 2024		Soil	L24-Ma0013828										X								
98	WM02-8.75	Feb 26, 2024		Soil	L24-Ma0013829										X								
99	WM02-9.0	Feb 26, 2024		Soil	L24-Ma0013830										X								
100	WM02-9.25	Feb 26, 2024		Soil	L24-Ma0013831										X								
101	WM02-9.50	Feb 26, 2024		Soil	L24-Ma0013832										X								
102	WM02-9.75	Feb 26, 2024		Soil	L24-Ma0013833										X								
103	WM02-10.0	Feb 26, 2024		Soil	L24-Ma0013834										X								
104	WM03-0.0	Feb 26, 2024		Soil	L24-Ma0013835										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
105	WM03-0.25	Feb 26, 2024		Soil	L24-Ma0013836										X								
106	WM03-0.5	Feb 26, 2024		Soil	L24-Ma0013837										X								
107	WM03-0.75	Feb 26, 2024		Soil	L24-Ma0013838										X								
108	WM03-1.0	Feb 26, 2024		Soil	L24-Ma0013839										X								
109	WM03-1.25	Feb 26, 2024		Soil	L24-Ma0013840										X								
110	WM03-2.0	Feb 26, 2024		Soil	L24-Ma0013843										X								
111	WM03-2.25	Feb 26, 2024		Soil	L24-Ma0013844										X								
112	WM03-2.5	Feb 26, 2024		Soil	L24-Ma0013845										X								
113	WM03-2.75	Feb 26, 2024		Soil	L24-Ma0013846										X								
114	WM03-3.0	Feb 26, 2024		Soil	L24-Ma0013847										X								
115	WM03-3.25	Feb 26, 2024		Soil	L24-Ma0013848										X								
116	WM03-3.50	Feb 26, 2024		Soil	L24-Ma0013849										X								
117	WM03-3.75	Feb 26, 2024		Soil	L24-Ma0013850										X								
118	WM03-4.0	Feb 26, 2024		Soil	L24-Ma0013851										X								
119	WM03-4.25	Feb 26, 2024		Soil	L24-Ma0013852										X								

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1075587
Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
120	WM03-4.50	Feb 26, 2024		Soil	L24-Ma0013853										X								
121	WM03-4.75	Feb 26, 2024		Soil	L24-Ma0013854										X								
122	WM03-5.0	Feb 26, 2024		Soil	L24-Ma0013855										X								
123	WM03-5.25	Feb 26, 2024		Soil	L24-Ma0013856										X								
124	WM03-5.50	Feb 26, 2024		Soil	L24-Ma0013857										X								
125	WM03-5.75	Feb 26, 2024		Soil	L24-Ma0013858										X								
126	WM03-6.0	Feb 26, 2024		Soil	L24-Ma0013859										X								
127	WM03-6.25	Feb 26, 2024		Soil	L24-Ma0013860										X								
128	WM03-6.50	Feb 26, 2024		Soil	L24-Ma0013861										X								
129	WM03-6.75	Feb 26, 2024		Soil	L24-Ma0013862										X								
130	WM03-7.0	Feb 26, 2024		Soil	L24-Ma0013863										X								
131	WM03-7.25	Feb 26, 2024		Soil	L24-Ma0013864										X								
132	WM03-7.50	Feb 26, 2024		Soil	L24-Ma0013865										X								
133	WM03-7.75	Feb 26, 2024		Soil	L24-Ma0013866										X								
134	WM03-8.0	Feb 26, 2024		Soil	L24-Ma0013867										X								

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1075587
Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
135	WM03-8.25	Feb 26, 2024		Soil	L24-Ma0013868										X								
136	WM03-8.50	Feb 26, 2024		Soil	L24-Ma0013869										X								
137	WM03-8.75	Feb 26, 2024		Soil	L24-Ma0013870										X								
138	WM03-9.0	Feb 26, 2024		Soil	L24-Ma0013871										X								
139	WM03-9.25	Feb 26, 2024		Soil	L24-Ma0013872										X								
140	WM03-9.50	Feb 26, 2024		Soil	L24-Ma0013873										X								
141	WM03-9.75	Feb 26, 2024		Soil	L24-Ma0013874										X								
142	WM03-10.0	Feb 26, 2024		Soil	L24-Ma0013875										X								
143	WM01-QC1	Feb 26, 2024		Water	L24-Ma0013876			X										X			X		X
144	WM02-QC1	Feb 28, 2024		Water	L24-Ma0013877			X										X			X		X
145	WM03-QC1	Feb 29, 2024		Water	L24-Ma0013878			X										X			X		X
146	WM02-QC2	Feb 29, 2024		Soil	L24-Ma0013879		X																
147	WM03-QC3	Feb 29, 2024		Soil	L24-Ma0013880		X																
148	Sample 1	Feb 29, 2024		Water	L24-Ma0013881						X												
149	Trip Blank	Feb 29, 2024		Soil	L24-Ma0013882												X						
						9	2	3	9	9	1	9	9	9	121	9	1	12	12	9	3	9	3

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Received: Mar 5, 2024 10:56 AM
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Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail	Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																		
Test Counts	9	2	3	9	9	1	9	9	9	121	9	1	12	12	9	3	9	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
OCOP in Soil							
Aldrin	mg/kg	< 0.01			0.01	Pass	
alpha-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
beta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
delta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
Bifenthrin	mg/kg	< 0.2			0.2	Pass	
Bromophos Ethyl	mg/kg	< 0.05			0.05	Pass	
Chlordane	mg/kg	< 0.01			0.01	Pass	
Chlorpyrifos	mg/kg	< 0.02			0.02	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
p.p-DDD	mg/kg	< 0.01			0.01	Pass	
p.p-DDE	mg/kg	< 0.01			0.01	Pass	
p.p-DDT	mg/kg	< 0.01			0.01	Pass	
o.p-DDT	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan Sulfate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor Epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene (HCB)	mg/kg	< 0.01			0.01	Pass	
Lindane	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Oxychlordane	mg/kg	< 0.01			0.01	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.05			0.05	Pass	
Fenitrothion	mg/kg	< 0.1			0.1	Pass	
Malathion	mg/kg	< 0.1			0.1	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Trifluralin	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Chromium (VI)	mg/kg	< 1			1	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Total Kjeldahl Nitrogen	mg/kg	< 10			10	Pass	
Phosphorus	mg/kg	< 1			1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 1			1	Pass	
Lead	mg/kg	< 1			1	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.02			0.02	Pass	
Nickel	mg/kg	< 1			1	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	105			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	100			70-130	Pass	
Toluene	%	108			70-130	Pass	
Ethylbenzene	%	104			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	
o-Xylene	%	101			70-130	Pass	
Xylenes - Total*	%	104			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	105			70-130	Pass	
TRH C6-C10	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	110			70-130	Pass	
LCS - % Recovery							
OCOP in Soil							
Aldrin	%	85			60-120	Pass	
Dieldrin	%	107			60-120	Pass	
p.p-DDT	%	117			60-120	Pass	
Endrin	%	86			60-120	Pass	
Heptachlor	%	83			60-120	Pass	
Lindane	%	99			60-120	Pass	
LCS - % Recovery							
Phosphorus	%	105			80-120	Pass	
LCS - % Recovery							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals									
Arsenic			%	114			80-120	Pass	
Beryllium			%	88			80-120	Pass	
Boron			%	87			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Cobalt			%	90			80-120	Pass	
Copper			%	94			80-120	Pass	
Lead			%	89			80-120	Pass	
Manganese			%	88			80-120	Pass	
Mercury			%	94			80-120	Pass	
Nickel			%	89			80-120	Pass	
Selenium			%	96			80-120	Pass	
Zinc			%	88			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L24-Ma0017035	NCP	%	107			70-130	Pass	
TRH C10-C14	L24-Ma0012765	NCP	%	114			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L24-Ma0017035	NCP	%	102			70-130	Pass	
Toluene	L24-Ma0017035	NCP	%	99			70-130	Pass	
Ethylbenzene	L24-Ma0017035	NCP	%	107			70-130	Pass	
m&p-Xylenes	L24-Ma0017035	NCP	%	103			70-130	Pass	
o-Xylene	L24-Ma0017035	NCP	%	109			70-130	Pass	
Xylenes - Total*	L24-Ma0017035	NCP	%	105			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L24-Ma0017035	NCP	%	104			70-130	Pass	
TRH C6-C10	L24-Ma0017035	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L24-Ma0012765	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Beryllium	L24-Ma0013735	CP	%	85			75-125	Pass	
Boron	L24-Ma0013735	CP	%	79			75-125	Pass	
Cadmium	L24-Ma0013735	CP	%	89			75-125	Pass	
Cobalt	L24-Ma0013735	CP	%	90			75-125	Pass	
Copper	L24-Ma0013735	CP	%	89			75-125	Pass	
Lead	L24-Ma0013735	CP	%	90			75-125	Pass	
Manganese	L24-Ma0013735	CP	%	89			75-125	Pass	
Mercury	L24-Ma0013735	CP	%	91			75-125	Pass	
Nickel	L24-Ma0013735	CP	%	88			75-125	Pass	
Zinc	L24-Ma0013735	CP	%	89			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0017034	NCP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0017034	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0017034	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0017034	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0017034	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0013729	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0013729	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Diazinon	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0013729	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0013729	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0013729	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen	L24-Ma0013729	CP	mg/kg	370	430	14	20%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Selenium	L24-Ma0015257	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0013733	CP	%	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphorus	L24-Ma0013734	CP	mg/kg	45	43	4.6	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0013734	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0013734	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0013734	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0013734	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Lead	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	L24-Ma0013737	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0013737	CP	mg/kg	180	220	19	30%	Pass	
TRH C29-C36	L24-Ma0013737	CP	mg/kg	190	200	7.9	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0013737	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0013737	CP	mg/kg	310	350	12	30%	Pass	
TRH >C34-C40	L24-Ma0013737	CP	mg/kg	100	120	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0013738	CP	mg/kg	43	44	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0013738	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0013738	CP	mg/kg	3.1	3.4	8.2	20%	Pass	
Nitrite-N	L24-Ma0013738	CP	mg/kg	3.1	3.4	8.2	20%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013753	CP	pH Units	5.2	5.1	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013753	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013763	CP	pH Units	5.9	5.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013763	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013773	CP	pH Units	6.3	6.3	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013773	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013783	CP	pH Units	6.3	6.2	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013783	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013793	CP	pH Units	5.4	5.4	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013793	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013803	CP	pH Units	7.2	7.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013803	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013813	CP	pH Units	5.8	5.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013813	CP	comment	4.0	4.0	pass	30%	Pass	

Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013823	CP	pH Units	4.5	4.4	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013823	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013833	CP	pH Units	5.2	5.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013833	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013843	CP	pH Units	5.2	5.2	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013843	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013855	CP	pH Units	7.2	7.1	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013855	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013865	CP	pH Units	5.6	5.6	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013865	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013875	CP	pH Units	5.6	5.9	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013875	CP	comment	4.0	4.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q05	The matrix spike concentration is less than five times the background concentration in the sample - therefore the spike recovery cannot be determined
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Elden Garrett	Analytical Services Manager
Douglas Todd	Senior Analyst-Metal
Douglas Todd	Senior Analyst-Sample Properties
John Horwood	Senior Analyst-Volatile
Kim Rodgers	Senior Analyst-Sample Properties
Lauren Killin	Senior Analyst-Inorganic
Patrick Patfield	Senior Analyst-Organic
Patrick Patfield	Senior Analyst-Volatile
Paul Nottle	Senior Analyst-Organic
Rhys Thomas	Senior Analyst-Asbestos
Sam Becker	Senior Analyst-Inorganic
Sean Sangster	Senior Analyst-Metal



Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
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WA 6000

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Edvinder Singh**

Report **1084676-S**
Project name BEENYUP WIND FARM
Received Date Apr 03, 2024

Client Sample ID			**WM01 - 0.0**	**WM01 - 1.0**	**WM01 - 10.0**	**WM01 - 2.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ap0011899**	**L24-Ap0011900**	**L24-Ap0011901**	**L24-Ap0011902**
Date Sampled			**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.4	5.2	5.2	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	10	10	8.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.018	0.017	0.016	0.014
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.8	1.2	26	2.4
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	23	16	340	32
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.038	0.026	0.55	0.051
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.0	3.4	2.4	3.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	0.53	0.05
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	330	32
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	320	23
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	0.52	0.04
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	0.014	0.006
Peroxide Extractable Sulfur	0.005	% S	0.019	0.009	0.54	0.043
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.019	0.009	0.53	0.037
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	12	5.6	330	23
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.030	0.010	< 0.005	< 0.005
Calcium - Peroxide	0.005	% Ca	0.033	0.012	0.007	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.007	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.006	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	3.4	< 0.005

Client Sample ID			WM01 - 0.0	WM01 - 1.0	WM01 - 10.0	WM01 - 2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011899	L24-Ap0011900	L24-Ap0011901	L24-Ap0011902
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.006	0.010
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.009	0.011
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	23	16	340	32
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	0.03	0.55	0.05
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.8	1.2	26	2.4
Extraneous Material						
<2mm Fraction	0.005	g	68	54	15	83
>2mm Fraction	0.005	g	0.72	0.48	0.63	1.5
Analysed Material	0.1	%	99	99	96	98
Extraneous Material	0.1	%	1.1	0.9	3.9	1.7

Client Sample ID			WM01 - 3.0	WM01 - 4.0	WM01 - 5.0	WM01 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011903	L24-Ap0011904	L24-Ap0011905	L24-Ap0011906
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	5.2	4.9	5.2
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	8.5	6.8	17	6.2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.014	0.011	0.027	0.010
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.0	4.6	10	10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	14	61	140	130
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.022	0.098	0.22	0.22
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.3	3.2	2.9	2.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	0.11	0.27	0.25
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	19	66	170	160
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	10	60	150	150
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	0.10	0.24	0.24
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.006	< 0.005	0.021	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.014	0.087	0.22	0.21
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.008	0.087	0.20	0.21
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	5.0	54	120	130

Client Sample ID			WM01 - 3.0	WM01 - 4.0	WM01 - 5.0	WM01 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011903	L24-Ap0011904	L24-Ap0011905	L24-Ap0011906
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Peroxide	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.018	0.010	0.010	0.008
Magnesium - Peroxide	0.005	% Mg	0.018	0.011	0.012	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	14	61	140	130
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.02	0.10	0.22	0.22
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.0	4.6	10	10
Extraneous Material						
<2mm Fraction	0.005	g	69	73	22	61
>2mm Fraction	0.005	g	6.5	4.3	< 0.005	3.9
Analysed Material	0.1	%	91	94	100	94
Extraneous Material	0.1	%	8.6	5.6	< 0.1	6.0

Client Sample ID			WM01 - 7.0	WM01 - 8.0	WM01 - 9.0	WM02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011907	L24-Ap0011908	L24-Ap0011909	L24-Ap0011910
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.2	5.1	5.0	7.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	6.6	9.8	20	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.011	0.016	0.033	< 0.003
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	7.7	7.0	8.3	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	100	94	110	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.17	0.15	0.18	< 0.02

Client Sample ID			WM01 - 7.0	WM01 - 8.0	WM01 - 9.0	WM02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011907	L24-Ap0011908	L24-Ap0011909	L24-Ap0011910
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	3.2	3.2	3.4
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.20	0.18	0.29	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	130	110	180	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	120	100	160	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.19	0.16	0.26	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	0.007
Peroxide Extractable Sulfur	0.005	% S	0.15	0.13	0.14	0.032
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.15	0.13	0.14	0.025
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	97	84	90	16
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	< 0.005	< 0.005	0.010	0.12
Calcium - Peroxide	0.005	% Ca	< 0.005	< 0.005	0.011	0.14
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	0.018
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	0.014
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	8.9
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.009	0.012	0.029	0.008
Magnesium - Peroxide	0.005	% Mg	0.011	0.014	0.031	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	100	94	110	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.17	0.15	0.18	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	7.7	7.0	8.3	< 1
Extraneous Material						
<2mm Fraction	0.005	g	48	25	26	76
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	5.9
Analysed Material	0.1	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	7.2

Client Sample ID			WM02 - 1.0	WM02 - 10.0	WM02 - 2.0	WM02 - 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011911	L24-Ap0011912	L24-Ap0011913	L24-Ap0011914
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.3	4.6	6.1	5.1
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	7.0	76	5.8	6.5
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.011	0.12	0.009	0.010
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.0	67	1.0	5.1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	13	900	13	0.11
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.021	1.4	0.022	68
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.2	2.2	6.3	2.8
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	1.4	< 0.02	0.15
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	18	900	7.0	94
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	11	820	< 2	87
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	1.3	< 0.02	0.14
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.008	0.093	0.024	0.017
Peroxide Extractable Sulfur	0.005	% S	0.018	1.4	0.037	0.12
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.010	1.3	0.012	0.099
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	6.3	820	7.7	62
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.007	0.027	0.007	0.016
Calcium - Peroxide	0.005	% Ca	0.008	0.11	0.008	0.019
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.083	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.066	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	41	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.026	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.033	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	0.007	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.009	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	5.5	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	13	900	13	68
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.02	1.4	0.02	0.11
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	< 1	67	1.0	5.1

Client Sample ID			WM02 - 1.0	WM02 - 10.0	WM02 - 2.0	WM02 - 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011911	L24-Ap0011912	L24-Ap0011913	L24-Ap0011914
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	15	10	22	67
>2mm Fraction	0.005	g	< 0.005	< 0.005	1.8	< 0.005
Analysed Material	0.1	%	100	100	92	100
Extraneous Material	0.1	%	< 0.1	< 0.1	7.5	< 0.1

Client Sample ID			WM02 - 3.0	WM02 - 4.0	WM02 - 5.0	WM02 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011915	L24-Ap0011916	L24-Ap0011917	L24-Ap0011918
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	5.2	4.7	4.9
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	12	13	33	19
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.019	0.021	0.054	0.030
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	6.5	14	33	28
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	87	180	440	370
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.14	0.29	0.70	0.60
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	2.6	2.3	2.2
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.20	0.39	0.81	0.64
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	120	240	510	400
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	110	230	470	380
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.18	0.37	0.76	0.61
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	0.006	0.030	0.019
Peroxide Extractable Sulfur	0.005	% S	0.13	0.28	0.68	0.59
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.12	0.27	0.65	0.57
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	75	170	410	360
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.006	0.018	0.006	0.012
Calcium - Peroxide	0.005	% Ca	0.008	0.020	0.007	0.013
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			WM02 - 3.0	WM02 - 4.0	WM02 - 5.0	WM02 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011915	L24-Ap0011916	L24-Ap0011917	L24-Ap0011918
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.006	0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.4	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	87	180	440	370
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.14	0.29	0.70	0.60
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	6.5	14	33	28
Extraneous Material						
<2mm Fraction	0.005	g	16	28	22	11
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			WM02 - 7.0	WM02 - 8.0	WM02 - 9.0	WM03 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011919	L24-Ap0011920	L24-Ap0011921	L24-Ap0011922
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	4.6	4.4	5.2
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	26	110	30
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.017	0.041	0.18	0.048
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	13	23	98	6.3
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	180	300	1300	84
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.29	0.48	2.1	0.13
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.4	2.1	1.9	2.5
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.32	0.54	2.2	1.2
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	200	340	1400	720
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	190	310	1300	690
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.30	0.50	2.0	1.1
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.011	0.031	0.13	0.006
Peroxide Extractable Sulfur	0.005	% S	0.28	0.47	2.0	0.092
HCl Extractable Sulfur	0.005	% S	N/A	N/A	0.14	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.27	0.44	1.9	0.086
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	170	270	1200	54

Client Sample ID			WM02 - 7.0	WM02 - 8.0	WM02 - 9.0	WM03 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011919	L24-Ap0011920	L24-Ap0011921	L24-Ap0011922
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	0.023	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	0.017	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	11	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.011	0.007	0.021	0.19
Calcium - Peroxide	0.005	% Ca	0.012	0.008	0.030	0.21
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.009	0.027
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	0.021
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.5	13
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.007	0.030	0.021
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.008	0.033	0.023
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	180	300	1300	84
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.29	0.48	2.1	0.13
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	13	23	98	6.3
Extraneous Material						
<2mm Fraction	0.005	g	12	13	15	110
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	2.0
Analysed Material	0.1	%	100	100	100	98
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	1.7

Client Sample ID			WM03 - 0.25	WM03 - 1.0	WM03 - 10.0	WM03 - 3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011923	L24-Ap0011924	L24-Ap0011925	L24-Ap0011926
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.1	5.7	4.7	5.8
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	31	16	37	11
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.050	0.026	0.060	0.018
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	9.6	1.8	26	3.0
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	130	24	350	40
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.20	0.039	0.56	0.064

Client Sample ID			WM03 - 0.25	WM03 - 1.0	WM03 - 10.0	WM03 - 3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011923	L24-Ap0011924	L24-Ap0011925	L24-Ap0011926
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.7	4.8	2.7	4.1
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.32	0.06	0.69	0.09
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	200	35	430	55
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	170	18	390	44
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.27	0.03	0.63	0.07
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.016	0.071	0.021	0.024
Peroxide Extractable Sulfur	0.005	% S	0.17	0.083	0.52	0.070
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.15	0.012	0.50	0.046
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	96	7.7	310	29
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.072	0.012	0.007	< 0.005
Calcium - Peroxide	0.005	% Ca	0.076	0.014	0.009	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.011	< 0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.012	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.2	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	130	24	350	40
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.20	0.04	0.56	0.06
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	9.6	1.8	26	3.0
Extraneous Material						
<2mm Fraction	0.005	g	10	36	33	31
>2mm Fraction	0.005	g	< 0.005	12	< 0.005	2.0
Analysed Material	0.1	%	100	75	100	94
Extraneous Material	0.1	%	< 0.1	25	< 0.1	6.1

Client Sample ID			WM03 - 3.50	WM03 - 5.0	WM03 - 6.0	WM03 - 7.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011927	L24-Ap0011928	L24-Ap0011929	L24-Ap0011930
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	5.6	5.0	4.7
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	20	8.9	9.8	100
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.033	0.014	0.016	0.16
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	12	6.0	9.2	48
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	160	80	120	640
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.26	0.13	0.20	1.0
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.7	3.8	2.6	3.0
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.33	0.16	0.24	1.4
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	210	100	150	860
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	190	92	140	760
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.30	0.15	0.22	1.2
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	0.011	0.008	0.037
Peroxide Extractable Sulfur	0.005	% S	0.24	0.13	0.19	0.90
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.23	0.11	0.18	0.86
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	140	71	110	540
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.007	0.016	0.010	0.013
Calcium - Peroxide	0.005	% Ca	0.008	0.018	0.011	0.014
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	< 0.005	0.009
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	< 0.005	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	160	80	120	640
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.26	0.13	0.20	1.0
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	12	6.0	9.2	48

Client Sample ID			WM03 - 3.50	WM03 - 5.0	WM03 - 6.0	WM03 - 7.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011927	L24-Ap0011928	L24-Ap0011929	L24-Ap0011930
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	71	12	15	38
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			WM03 - 8.0	WM03 - 9.0	WM03 - 4.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011931	L24-Ap0011932	L24-Ap0011933
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Actual Acidity (NLM-3.2)					
pH-KCL (NLM-3.1)	0.1	pH Units	4.5	4.7	4.7
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	89	35	26
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.14	0.055	0.041
SPOCAS Suite - WA (Excluding ANC)					
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	42	23	18
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	560	310	240
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.90	0.50	0.39
Potential Acidity - Titratable Peroxide					
pH-OX	0.1	pH Units	2.6	2.7	2.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	1.1	0.61	0.45
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	680	380	280
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	590	350	260
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.95	0.55	0.41
Extractable Sulfur					
Sulfur - KCl Extractable	0.005	% S	0.073	0.028	0.017
Peroxide Extractable Sulfur	0.005	% S	0.83	0.47	0.37
HCl Extractable Sulfur	0.005	% S	0.071	N/A	N/A
Potential Acidity (SPOS)					
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.76	0.44	0.35
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	470	280	220
Retained Acidity (S-NAS)					
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	< 0.005	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	< 0.005	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	< 2	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
Extractable Calcium					
Calcium - KCl Extractable	0.005	% Ca	< 0.005	0.007	0.006
Calcium - Peroxide	0.005	% Ca	0.006	0.008	0.008
Calcium - Acid Reacted	0.005	% Ca	0.006	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	2.9	< 0.005	< 0.005

Client Sample ID			WM03 - 8.0	WM03 - 9.0	WM03 - 4.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011931	L24-Ap0011932	L24-Ap0011933
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Extractable Magnesium					
Magnesium - KCl Extractable	0.005	% Mg	0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.005	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)					
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)					
ANC Fineness Factor		factor	1.5	1.5	1.5
Net Acidity (Including ANC)					
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	560	310	240
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.90	0.50	0.39
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	42	23	18
Extraneous Material					
<2mm Fraction	0.005	g	55	40	16
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite - WA (Excluding ANC)			
SPOCAS Suite - WA (Excluding ANC)	Brisbane	Apr 10, 2024	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Apr 10, 2024	6 Week
- Method: LTM-GEN-7050/7070			

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Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084676
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	WM01 - 0.0	Feb 26, 2024		Soil	L24-Ap0011899	X	X
2	WM01 - 1.0	Feb 26, 2024		Soil	L24-Ap0011900	X	X
3	WM01 - 10.0	Feb 26, 2024		Soil	L24-Ap0011901	X	X
4	WM01 - 2.0	Feb 26, 2024		Soil	L24-Ap0011902	X	X
5	WM01 - 3.0	Feb 26, 2024		Soil	L24-Ap0011903	X	X
6	WM01 - 4.0	Feb 26, 2024		Soil	L24-Ap0011904	X	X
7	WM01 - 5.0	Feb 26, 2024		Soil	L24-Ap0011905	X	X
8	WM01 - 6.0	Feb 26, 2024		Soil	L24-Ap0011906	X	X
9	WM01 - 7.0	Feb 26, 2024		Soil	L24-Ap0011907	X	X
10	WM01 - 8.0	Feb 26, 2024		Soil	L24-Ap0011908	X	X
11	WM01 - 9.0	Feb 26, 2024		Soil	L24-Ap0011909	X	X
12	WM02 - 0.0	Feb 28, 2024		Soil	L24-Ap0011910	X	X
13	WM02 - 1.0	Feb 28, 2024		Soil	L24-Ap0011911	X	X
14	WM02 - 10.0	Feb 28, 2024		Soil	L24-Ap0011912	X	X

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Company Name: Stantec Australia Pty Ltd (WA)
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Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084676
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
15	WM02 - 2.0	Feb 28, 2024		Soil	L24-Ap0011913	X	X
16	WM02 - 2.75	Feb 28, 2024		Soil	L24-Ap0011914	X	X
17	WM02 - 3.0	Feb 28, 2024		Soil	L24-Ap0011915	X	X
18	WM02 - 4.0	Feb 28, 2024		Soil	L24-Ap0011916	X	X
19	WM02 - 5.0	Feb 28, 2024		Soil	L24-Ap0011917	X	X
20	WM02 - 6.0	Feb 28, 2024		Soil	L24-Ap0011918	X	X
21	WM02 - 7.0	Feb 28, 2024		Soil	L24-Ap0011919	X	X
22	WM02 - 8.0	Feb 28, 2024		Soil	L24-Ap0011920	X	X
23	WM02 - 9.0	Feb 28, 2024		Soil	L24-Ap0011921	X	X
24	WM03 - 0.0	Feb 29, 2024		Soil	L24-Ap0011922	X	X
25	WM03 - 0.25	Feb 29, 2024		Soil	L24-Ap0011923	X	X
26	WM03 - 1.0	Feb 29, 2024		Soil	L24-Ap0011924	X	X
27	WM03 - 10.0	Feb 29, 2024		Soil	L24-Ap0011925	X	X
28	WM03 - 3.0	Feb 29, 2024		Soil	L24-Ap0011926	X	X
29	WM03 - 3.50	Feb 29, 2024		Soil	L24-Ap0011927	X	X
30	WM03 - 5.0	Feb 29, 2024		Soil	L24-Ap0011928	X	X

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Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084676
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
31	WM03 - 6.0	Feb 29, 2024		Soil	L24-Ap0011929	X	X
32	WM03 - 7.0	Feb 29, 2024		Soil	L24-Ap0011930	X	X
33	WM03 - 8.0	Feb 29, 2024		Soil	L24-Ap0011931	X	X
34	WM03 - 9.0	Feb 29, 2024		Soil	L24-Ap0011932	X	X
35	WM03 - 4.0	Feb 29, 2024		Soil	L24-Ap0011933	X	X
Test Counts						35	35

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	95			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	108			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	95			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	108			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011903	CP	pH Units	5.0	5.1	2.1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011903	CP	mol H+/t	8.5	7.0	19	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011903	CP	% pyrite S	0.014	0.011	19	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011903	CP	pH Units	4.3	4.3	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011903	CP	% pyrite S	0.03	0.03	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011903	CP	mol H+/t	19	19	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011903	CP	% S	0.006	0.005	14	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011903	CP	% S	0.014	0.013	7.7	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011903	CP	% S	0.008	0.008	3.6	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011903	CP	mol H+/t	5.0	4.9	3.6	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011903	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011903	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011903	CP	% Mg	0.018	0.018	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011903	CP	% Mg	0.018	0.018	2.8	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011903	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011903	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011903	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011903	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011913	CP	pH Units	6.1	6.1	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011913	CP	mol H+/t	5.8	5.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011913	CP	% pyrite S	0.009	0.009	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011913	CP	pH Units	6.3	6.3	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011913	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011913	CP	mol H+/t	7.0	6.8	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011913	CP	% S	0.024	0.025	2.0	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011913	CP	% S	0.037	0.036	2.8	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011913	CP	% S	0.012	0.011	13	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011913	CP	mol H+/t	7.7	6.8	13	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011913	CP	% Ca	0.007	0.007	3.7	30%	Pass	
Calcium - Peroxide	L24-Ap0011913	CP	% Ca	0.008	0.008	2.0	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011913	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011913	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011913	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011913	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011913	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011913	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011924	CP	pH Units	5.7	5.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011924	CP	mol H+/t	16	15	10	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011924	CP	% pyrite S	0.026	0.024	10	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011924	CP	pH Units	4.8	4.8	1.2	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011924	CP	% pyrite S	0.06	0.05	4.2	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011924	CP	mol H+/t	35	33	4.2	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011924	CP	% S	0.071	0.070	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011924	CP	% S	0.083	0.082	1.8	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011924	CP	% S	0.012	0.012	6.8	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011924	CP	mol H+/t	7.7	7.2	6.8	30%	Pass	

Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011924	CP	% Ca	0.012	0.012	1.8	30%	Pass	
Calcium - Peroxide	L24-Ap0011924	CP	% Ca	0.014	0.013	5.9	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011924	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011924	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011924	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011924	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011924	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011924	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011933	CP	pH Units	4.7	4.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011933	CP	mol H+/t	26	25	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011933	CP	% pyrite S	0.041	0.041	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011933	CP	pH Units	2.6	2.6	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011933	CP	% pyrite S	0.45	0.45	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011933	CP	mol H+/t	280	280	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011933	CP	% S	0.017	0.017	1.4	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011933	CP	% S	0.37	0.38	2.5	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011933	CP	% S	0.35	0.36	2.7	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011933	CP	mol H+/t	220	230	2.7	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011933	CP	% Ca	0.006	0.006	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011933	CP	% Ca	0.008	0.009	17	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011933	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011933	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011933	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011933	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011933	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011933	CP	factor	1.5	1.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Elden Garrett	Analytical Services Manager
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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WA 6000

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Edvinder Singh**

Report **1084649-S**
Project name BEENYUP WIND FARM
Received Date Apr 03, 2024

Client Sample ID			**TP01 - 0.0**	**TP01 - 1.0**	**TP01 - 2.0**	**TP02 - 0.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ap0011751**	**L24-Ap0011752**	**L24-Ap0011753**	**L24-Ap0011754**
Date Sampled			**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.6	5.1	4.7	5.0
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	47	8.9	38	21
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.075	0.014	0.060	0.034
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	4.6	< 1	4.5	2.7
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	61	< 10	61	36
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.098	< 0.02	0.097	0.058
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	3.5	2.6	2.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.13	< 0.02	0.10	0.03
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	84	4.8	63	16
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	37	< 2	25	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.06	< 0.02	0.04	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.008	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.031	< 0.005	0.037	0.024
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.024	< 0.005	0.037	0.024
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	15	< 2	23	15
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.021	< 0.005	0.008	0.041
Calcium - Peroxide	0.005	% Ca	0.027	< 0.005	0.011	0.050
Calcium - Acid Reacted	0.005	% Ca	0.006	< 0.005	< 0.005	0.009
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	0.007
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	2.8	< 0.005	< 0.005	4.4

Client Sample ID			TP01 - 0.0	TP01 - 1.0	TP01 - 2.0	TP02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011751	L24-Ap0011752	L24-Ap0011753	L24-Ap0011754
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.010	< 0.005	0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.011	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	61	< 10	61	36
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.10	< 0.02	0.10	0.06
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	4.6	< 1	4.5	2.7
Extraneous Material						
<2mm Fraction	0.005	g	91	200	160	170
>2mm Fraction	0.005	g	9.6	0.66	2.2	0.44
Analysed Material	0.1	%	91	100	99	100
Extraneous Material	0.1	%	9.5	0.3	1.3	0.3

Client Sample ID			TP02 - 0.75	TP02 - 1.0	TP03 - 0.0	TP03 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011755	L24-Ap0011756	L24-Ap0011757	L24-Ap0011758
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.1	4.8	6.9	5.6
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	22	48	< 2	3.2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.034	0.076	< 0.003	0.005
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	2.0	4.2	< 1	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	27	56	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.043	0.089	< 0.02	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.7	4.2	6.5	4.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	0.14	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	20	85	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	38	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	0.06	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.009	0.013	0.024	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.009	0.013	0.018	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	5.5	8.0	12	< 2

Client Sample ID			TP02 - 0.75	TP02 - 1.0	TP03 - 0.0	TP03 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011755	L24-Ap0011756	L24-Ap0011757	L24-Ap0011758
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.005	< 0.005	0.13	0.017
Calcium - Peroxide	0.005	% Ca	0.007	0.006	0.13	0.020
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.006	0.006	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	3.1	2.9	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.009	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	27	56	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	0.09	< 0.02	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	2.0	4.2	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	150	240	150	150
>2mm Fraction	0.005	g	< 0.005	0.47	86	< 0.005
Analysed Material	0.1	%	100	100	64	100
Extraneous Material	0.1	%	< 0.1	0.2	36	< 0.1

Client Sample ID			TP04 - 0.0	TP05 - 0.0	TP06 - 0.0	TP06 - 0.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011759	L24-Ap0011760	L24-Ap0011761	L24-Ap0011762
Date Sampled			Mar 12, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.2	5.3	4.8	5.6
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	18	14	36	3.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.028	0.022	0.058	0.006
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	2.7	3.6	5.0	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	37	48	67	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.059	0.076	0.11	< 0.02

Client Sample ID			TP04 - 0.0	TP05 - 0.0	TP06 - 0.0	TP06 - 0.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011759	L24-Ap0011760	L24-Ap0011761	L24-Ap0011762
Date Sampled			Mar 12, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	5.7	6.2	2.5	3.9
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.030	0.054	0.050	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.030	0.054	0.050	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	19	34	31	< 2
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.082	0.10	0.099	0.012
Calcium - Peroxide	0.005	% Ca	0.063	0.046	0.11	0.014
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.007	0.007	0.012	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.007	0.013	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	37	48	67	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.06	0.08	0.11	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	2.7	3.6	5.0	< 1
Extraneous Material						
<2mm Fraction	0.005	g	88	140	98	130
>2mm Fraction	0.005	g	37	3.5	1.1	0.53
Analysed Material	0.1	%	70	98	99	100
Extraneous Material	0.1	%	30	2.4	1.1	0.4

Client Sample ID			TP07 - 0.0	TP07 - 1.0	TP08 - 0.0	TP08 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011763	L24-Ap0011764	L24-Ap0011765	L24-Ap0011766
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	6.3	6.0	5.4	5.5
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	2.4	< 2	7.9	5.7
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.004	< 0.003	0.013	0.009
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	3.2	< 1	1.7	1.1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	43	< 10	22	14
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.069	< 0.02	0.035	0.023
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.0	4.4	2.9	3.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.065	< 0.005	0.023	0.014
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.065	< 0.005	0.023	0.014
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	41	< 2	14	8.6
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.22	0.009	0.030	0.011
Calcium - Peroxide	0.005	% Ca	0.25	0.011	0.034	0.013
Calcium - Acid Reacted	0.005	% Ca	0.034	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	0.027	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	17	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.010	< 0.005	0.006	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.010	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	43	< 10	22	14
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.07	< 0.02	0.04	0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	3.2	< 1	1.7	1.1

Client Sample ID			TP07 - 0.0	TP07 - 1.0	TP08 - 0.0	TP08 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011763	L24-Ap0011764	L24-Ap0011765	L24-Ap0011766
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	130	170	140	180
>2mm Fraction	0.005	g	0.62	0.35	0.10	0.42
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	0.5	0.2	< 0.1	0.2

Client Sample ID			TP08 - 2.0	TP09 - 0.0	TP11 - 0.0	TP11 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011767	L24-Ap0011768	L24-Ap0011769	L24-Ap0011770
Date Sampled			Mar 12, 2024	Mar 12, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.5	5.4	5.9	6.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	9.5	20	4.3	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.015	0.032	0.007	< 0.003
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	3.5	4.3	2.3	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	46	57	31	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.074	0.091	0.049	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.8	2.9	3.0	4.8
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.05	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	30	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	20	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.03	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.066	0.059	0.042	0.006
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.059	0.059	0.042	0.006
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	37	37	26	3.7
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.030	0.16	0.087	0.023
Calcium - Peroxide	0.005	% Ca	0.033	0.16	0.096	0.025
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.008	0.009	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.006	0.007	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	4.0	4.6	< 0.005

Client Sample ID			TP08 - 2.0	TP09 - 0.0	TP11 - 0.0	TP11 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011767	L24-Ap0011768	L24-Ap0011769	L24-Ap0011770
Date Sampled			Mar 12, 2024	Mar 12, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.007	0.008	0.007	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.008	0.007	0.008	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	46	57	31	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.07	0.09	0.05	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	3.5	4.3	2.3	< 1
Extraneous Material						
<2mm Fraction	0.005	g	190	82	130	140
>2mm Fraction	0.005	g	0.62	< 0.005	0.40	2.3
Analysed Material	0.1	%	100	100	100	98
Extraneous Material	0.1	%	0.3	< 0.1	0.3	1.6

Client Sample ID			TP11 - 2.0	TP12 - 0.0	TP13 - 0.0	TP13 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011771	L24-Ap0011772	L24-Ap0011773	L24-Ap0011774
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	6.0	6.7	5.4
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	31	4.6	< 2	4.0
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.049	0.007	< 0.003	0.006
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	12	1.8	1.2	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	160	24	17	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.26	0.039	0.027	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.3	6.2	3.2	3.3
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.41	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	260	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	230	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.36	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.006	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.22	0.032	0.080	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.21	0.032	0.080	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	130	20	50	< 2

Client Sample ID			TP11 - 2.0	TP12 - 0.0	TP13 - 0.0	TP13 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011771	L24-Ap0011772	L24-Ap0011773	L24-Ap0011774
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.014	0.11	0.35	0.007
Calcium - Peroxide	0.005	% Ca	0.016	0.060	0.43	0.008
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.072	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.058	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	36	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.031	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.037	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.008	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.7	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	160	24	17	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.26	0.04	0.03	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	12	1.8	1.2	< 1
Extraneous Material						
<2mm Fraction	0.005	g	240	100	100	150
>2mm Fraction	0.005	g	4.4	< 0.005	1.5	0.70
Analysed Material	0.1	%	98	100	99	100
Extraneous Material	0.1	%	1.8	< 0.1	1.4	0.5

Client Sample ID			TP13 - 2.0	TP14 - 0.0	TP14 - 0.25	TP15 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011775	L24-Ap0011776	L24-Ap0011777	L24-Ap0011778
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.3	5.2	5.4	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	110	14	5.5	14
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.17	0.023	0.009	0.022
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	13	3.4	< 1	3.0
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	180	45	13	40
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.29	0.072	0.021	0.065

Client Sample ID			TP13 - 2.0	TP14 - 0.0	TP14 - 0.25	TP15 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011775	L24-Ap0011776	L24-Ap0011777	L24-Ap0011778
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.2	2.7	3.1	2.9
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.49	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	310	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	200	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.32	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	0.012
Peroxide Extractable Sulfur	0.005	% S	0.11	0.049	0.012	0.055
HCl Extractable Sulfur	0.005	% S	< 0.005	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.11	0.049	0.012	0.043
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	69	30	7.5	27
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.006	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	< 0.005	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	2.8	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.021	0.053	0.016	0.065
Calcium - Peroxide	0.005	% Ca	0.031	0.066	0.019	0.072
Calcium - Acid Reacted	0.005	% Ca	0.010	0.013	< 0.005	0.006
Calcium - Acid Reacted (s-aCa)	0.005	% S	0.008	0.011	< 0.005	0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	4.9	6.6	< 0.005	3.1
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.009	0.006	< 0.005	0.005
Magnesium - Peroxide	0.005	% Mg	0.010	0.007	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	180	45	13	40
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.29	0.07	0.02	0.07
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	13	3.4	< 1	3.0
Extraneous Material						
<2mm Fraction	0.005	g	160	160	160	150
>2mm Fraction	0.005	g	0.58	2.1	4.3	1.9
Analysed Material	0.1	%	100	99	97	99
Extraneous Material	0.1	%	0.4	1.3	2.6	1.3

Client Sample ID			TP15 - 0.75	TP15 - 1.0	TP17 - 0.0	TP17 - 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011779	L24-Ap0011780	L24-Ap0011781	L24-Ap0011782
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.8	6.1	5.4	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	3.6	3.2	11	5.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.006	0.005	0.018	0.009
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	< 1	< 1	2.5	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	< 10	< 10	33	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	< 0.02	< 0.02	0.053	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.1	4.3	3.0	3.5
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	3.5	3.6	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.009	0.018	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.013	0.025	0.034	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	< 0.005	0.007	0.034	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	< 2	4.4	21	< 2
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.006	0.007	0.036	< 0.005
Calcium - Peroxide	0.005	% Ca	0.007	0.008	0.038	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	< 10	< 10	33	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	< 0.02	< 0.02	0.05	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	< 1	< 1	2.5	< 1

Client Sample ID			TP15 - 0.75	TP15 - 1.0	TP17 - 0.0	TP17 - 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011779	L24-Ap0011780	L24-Ap0011781	L24-Ap0011782
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	140	150	150	160
>2mm Fraction	0.005	g	9.6	210	1.2	2.0
Analysed Material	0.1	%	94	41	99	99
Extraneous Material	0.1	%	6.3	59	0.8	1.2

Client Sample ID			TP18 - 0.0	TP19 - 0.0	TP19 - 0.50
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011783	L24-Ap0011784	L24-Ap0011785
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit			
Actual Acidity (NLM-3.2)					
pH-KCL (NLM-3.1)	0.1	pH Units	5.4	7.1	5.9
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	< 2	2.4
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.018	< 0.003	0.004
SPOCAS Suite - WA (Excluding ANC)					
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.8	< 1	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	24	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.039	< 0.02	< 0.02
Potential Acidity - Titratable Peroxide					
pH-OX	0.1	pH Units	3.9	3.2	3.1
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02
Extractable Sulfur					
Sulfur - KCl Extractable	0.005	% S	0.018	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.039	0.042	0.007
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A
Potential Acidity (SPOS)					
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.021	0.042	0.007
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	13	26	4.2
Retained Acidity (S-NAS)					
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[SO2]	0.005	% S	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
Extractable Calcium					
Calcium - KCl Extractable	0.005	% Ca	0.026	0.26	0.031
Calcium - Peroxide	0.005	% Ca	0.030	0.30	0.034
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.046	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.037	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	23	< 0.005

Client Sample ID			TP18 - 0.0	TP19 - 0.0	TP19 - 0.50
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011783	L24-Ap0011784	L24-Ap0011785
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit			
Extractable Magnesium					
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.010	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.011	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)					
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)					
ANC Fineness Factor		factor	1.5	1.5	1.5
Net Acidity (Including ANC)					
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	24	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	< 0.02	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.8	< 1	< 1
Extraneous Material					
<2mm Fraction	0.005	g	140	110	140
>2mm Fraction	0.005	g	8.5	0.84	0.66
Analysed Material	0.1	%	94	99	100
Extraneous Material	0.1	%	5.8	0.7	0.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite - WA (Excluding ANC)			
SPOCAS Suite - WA (Excluding ANC)	Brisbane	Apr 11, 2024	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Apr 11, 2024	6 Week
- Method: LTM-GEN-7050/7070			

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
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WA 6000

Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084649
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP01 - 0.0	Mar 14, 2024		Soil	L24-Ap0011751	X	X
2	TP01 - 1.0	Mar 14, 2024		Soil	L24-Ap0011752	X	X
3	TP01 - 2.0	Mar 14, 2024		Soil	L24-Ap0011753	X	X
4	TP02 - 0.0	Mar 14, 2024		Soil	L24-Ap0011754	X	X
5	TP02 - 0.75	Mar 14, 2024		Soil	L24-Ap0011755	X	X
6	TP02 - 1.0	Mar 14, 2024		Soil	L24-Ap0011756	X	X
7	TP03 - 0.0	Mar 12, 2024		Soil	L24-Ap0011757	X	X
8	TP03 - 1.0	Mar 12, 2024		Soil	L24-Ap0011758	X	X
9	TP04 - 0.0	Mar 12, 2024		Soil	L24-Ap0011759	X	X
10	TP05 - 0.0	Mar 13, 2024		Soil	L24-Ap0011760	X	X
11	TP06 - 0.0	Mar 13, 2024		Soil	L24-Ap0011761	X	X
12	TP06 - 0.50	Mar 13, 2024		Soil	L24-Ap0011762	X	X
13	TP07 - 0.0	Mar 14, 2024		Soil	L24-Ap0011763	X	X
14	TP07 - 1.0	Mar 14, 2024		Soil	L24-Ap0011764	X	X

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Received: Apr 3, 2024 5:46 PM
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Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
15	TP08 - 0.0	Mar 12, 2024		Soil	L24-Ap0011765	X	X
16	TP08 - 1.0	Mar 12, 2024		Soil	L24-Ap0011766	X	X
17	TP08 - 2.0	Mar 12, 2024		Soil	L24-Ap0011767	X	X
18	TP09 - 0.0	Mar 12, 2024		Soil	L24-Ap0011768	X	X
19	TP11 - 0.0	Mar 14, 2024		Soil	L24-Ap0011769	X	X
20	TP11 - 1.0	Mar 14, 2024		Soil	L24-Ap0011770	X	X
21	TP11 - 2.0	Mar 14, 2024		Soil	L24-Ap0011771	X	X
22	TP12 - 0.0	Mar 13, 2024		Soil	L24-Ap0011772	X	X
23	TP13 - 0.0	Mar 13, 2024		Soil	L24-Ap0011773	X	X
24	TP13 - 1.0	Mar 13, 2024		Soil	L24-Ap0011774	X	X
25	TP13 - 2.0	Mar 13, 2024		Soil	L24-Ap0011775	X	X
26	TP14 - 0.0	Mar 13, 2024		Soil	L24-Ap0011776	X	X
27	TP14 - 0.25	Mar 13, 2024		Soil	L24-Ap0011777	X	X
28	TP15 - 0.0	Mar 13, 2024		Soil	L24-Ap0011778	X	X
29	TP15 - 0.75	Mar 13, 2024		Soil	L24-Ap0011779	X	X
30	TP15 - 1.0	Mar 13, 2024		Soil	L24-Ap0011780	X	X

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Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
31	TP17 - 0.0	Mar 13, 2024		Soil	L24-Ap0011781	X	X
32	TP17 - 0.25	Mar 13, 2024		Soil	L24-Ap0011782	X	X
33	TP18 - 0.0	Mar 14, 2024		Soil	L24-Ap0011783	X	X
34	TP19 - 0.0	Mar 14, 2024		Soil	L24-Ap0011784	X	X
35	TP19 - 0.50	Mar 14, 2024		Soil	L24-Ap0011785	X	X
Test Counts						35	35

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	101			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	93			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	94			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	105			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	102			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011751	CP	pH Units	4.6	4.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011751	CP	mol H+/t	47	48	4.1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011751	CP	% pyrite S	0.075	0.078	4.1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011751	CP	pH Units	2.9	2.9	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011751	CP	% pyrite S	0.13	0.14	2.4	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011751	CP	mol H+/t	84	86	2.4	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011751	CP	% S	0.008	0.007	7.2	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011751	CP	% S	0.031	0.031	2.6	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011751	CP	% S	0.024	0.024	1.3	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011751	CP	mol H+/t	15	15	1.3	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011751	CP	% Ca	0.021	0.021	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011751	CP	% Ca	0.027	0.026	1.3	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011751	CP	% Ca	0.006	0.005	4.0	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011751	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011751	CP	mol H+/t	2.8	2.6	4.0	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011751	CP	% Mg	0.010	0.010	2.3	30%	Pass	
Magnesium - Peroxide	L24-Ap0011751	CP	% Mg	0.011	0.011	1.8	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011751	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011751	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011751	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011751	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011761	CP	pH Units	4.8	4.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011761	CP	mol H+/t	36	36	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011761	CP	% pyrite S	0.058	0.058	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011761	CP	pH Units	2.5	2.5	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011761	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011761	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011761	CP	% S	0.050	0.050	1.4	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011761	CP	% S	0.050	0.050	1.4	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011761	CP	mol H+/t	31	31	1.4	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011761	CP	% Ca	0.099	0.10	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011761	CP	% Ca	0.11	0.12	4.4	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011761	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011761	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011761	CP	% Mg	0.012	0.012	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011761	CP	% Mg	0.013	0.014	3.2	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011761	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011761	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011761	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011765	CP	pH Units	5.4	5.3	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011765	CP	mol H+/t	7.9	8.4	6.8	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011765	CP	% pyrite S	0.013	0.013	6.8	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011765	CP	pH Units	2.9	2.9	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011765	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011765	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011765	CP	% S	0.023	0.023	2.4	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011765	CP	% S	0.023	0.023	2.4	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011765	CP	mol H+/t	14	14	2.4	30%	Pass	

Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011765	CP	% Ca	0.030	0.029	3.9	30%	Pass	
Calcium - Peroxide	L24-Ap0011765	CP	% Ca	0.034	0.033	1.3	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011765	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011765	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011765	CP	% Mg	0.006	0.006	5.8	30%	Pass	
Magnesium - Peroxide	L24-Ap0011765	CP	% Mg	0.007	0.006	4.1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011765	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011765	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011765	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011770	CP	pH Units	6.3	6.3	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011770	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011770	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011770	CP	pH Units	4.8	4.7	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011770	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011770	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011770	CP	% S	0.006	0.005	16	20%	Pass	
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Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011770	CP	% S	0.006	0.005	16	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011770	CP	mol H+/t	3.7	3.1	16	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011770	CP	% Ca	0.023	0.023	2.8	30%	Pass	
Calcium - Peroxide	L24-Ap0011770	CP	% Ca	0.025	0.025	2.5	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011770	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011770	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011770	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011770	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011779	CP	pH Units	5.8	5.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011779	CP	mol H+/t	3.6	3.7	2.3	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011779	CP	% pyrite S	0.006	0.006	2.3	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011779	CP	pH Units	4.1	4.2	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011779	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011779	CP	mol H+/t	3.5	3.2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011779	CP	% S	0.009	0.008	5.1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011779	CP	% S	0.013	0.014	6.2	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011779	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011779	CP	% Ca	0.006	0.006	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011779	CP	% Ca	0.007	0.007	2.1	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011779	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011779	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011779	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011779	CP	factor	1.5	1.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Elden Garrett	Analytical Services Manager
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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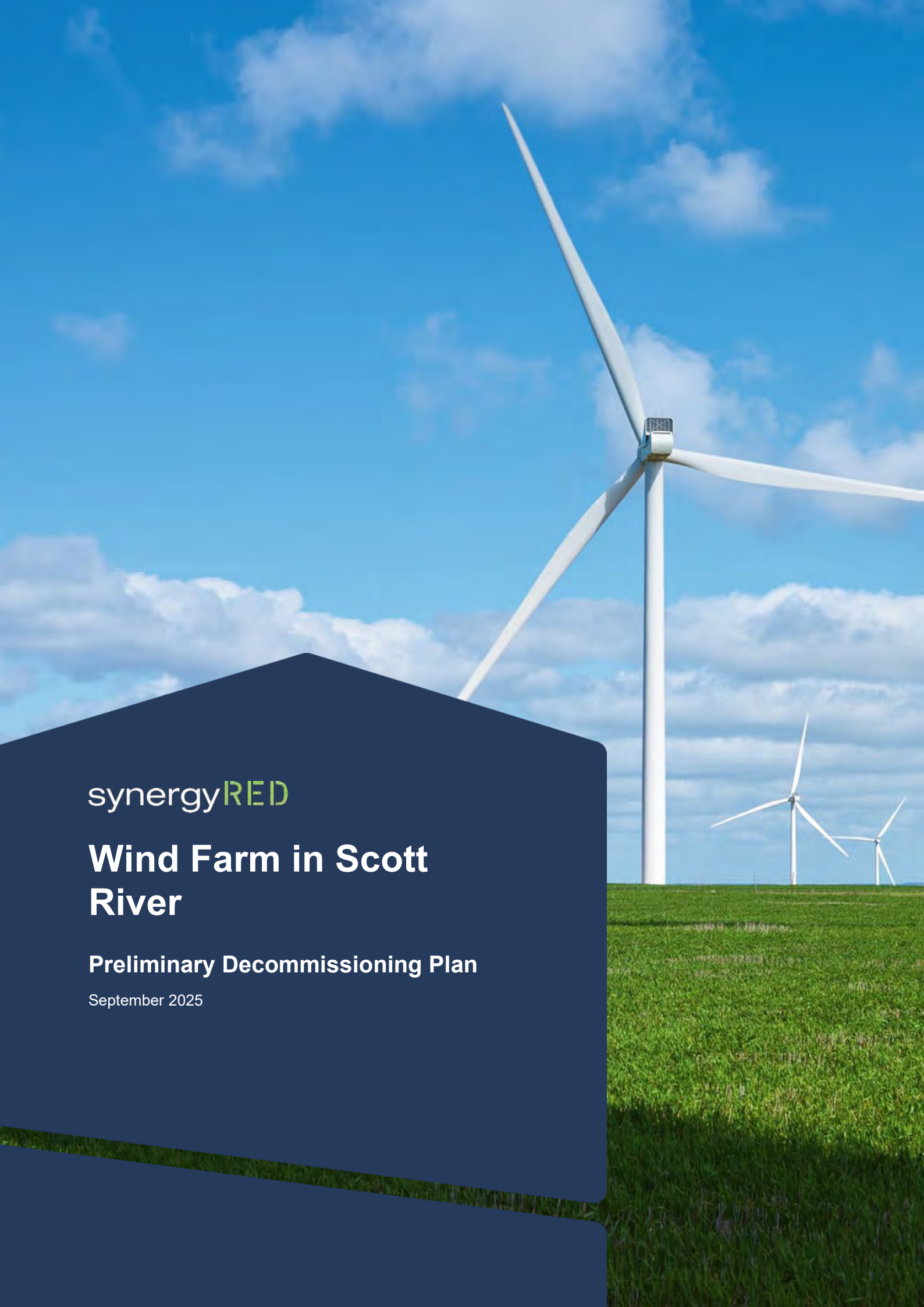
Attachment 4 (RSD) -Appendix C

Preliminary Decommissioning Plan



synergyRED

Wind Farm in Scott River

Preliminary Decommissioning Plan

September 2025

synergyRED

Document title
Proposed Wind Farm in Scott River Preliminary Decommissioning Plan

Version	Author		Reviewer		Approver		
	Name	Signature	Name	Signature	Name	Signature	Date
A	Wilson Mandisodza		Kathleen Hammond Will Moore Rowan Gallagher		Chris Binstead		24/09/25

Cover image - Warradarge Wind Farm is a Bright Energy Investment (BEI) asset which is a joint venture between Synergy, CBUS and DIF.

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synergy.net.au/Our-energy/SynergyRED

SynergyRED acknowledges the Traditional Owners of the Land on which we operate and their continuing connection to the land, water and community. We pay our respects to all Aboriginal and Torres Strait Islander communities, their cultures and to Elders past, present and emerging.

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Acronyms

DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
WA	Western Australia

1 Introduction

SynergyRED, the Proponent, is seeking to construct and operate an onshore wind farm of up to 100MW in Scott River approximately 15 km north-east of the Augusta townsite in the south-west region of Western Australia. The Proposal consists of up to 20 wind turbines and associated infrastructure and will connect into the South-West Interconnected System (SWIS) via the existing 132kV transmission line between Beenup and Manjimup. The Proposal is located on predominantly cleared freehold land used for farming and adjacent road reserves.

SynergyRED is seeking development approval for the Proposed wind farm in Scott River. The project is currently in pre-feasibility. The final location and type of turbines has not been confirmed to allow flexibility in confirming the final location and design of the turbines and infrastructure during the detailed design process. Figure 1 below shows the maximum turbine dimension proposed for the wind farm.

This Preliminary Decommissioning Plan (DP) has been developed to outline the management of the wind farm and associated infrastructure at the end of project life.

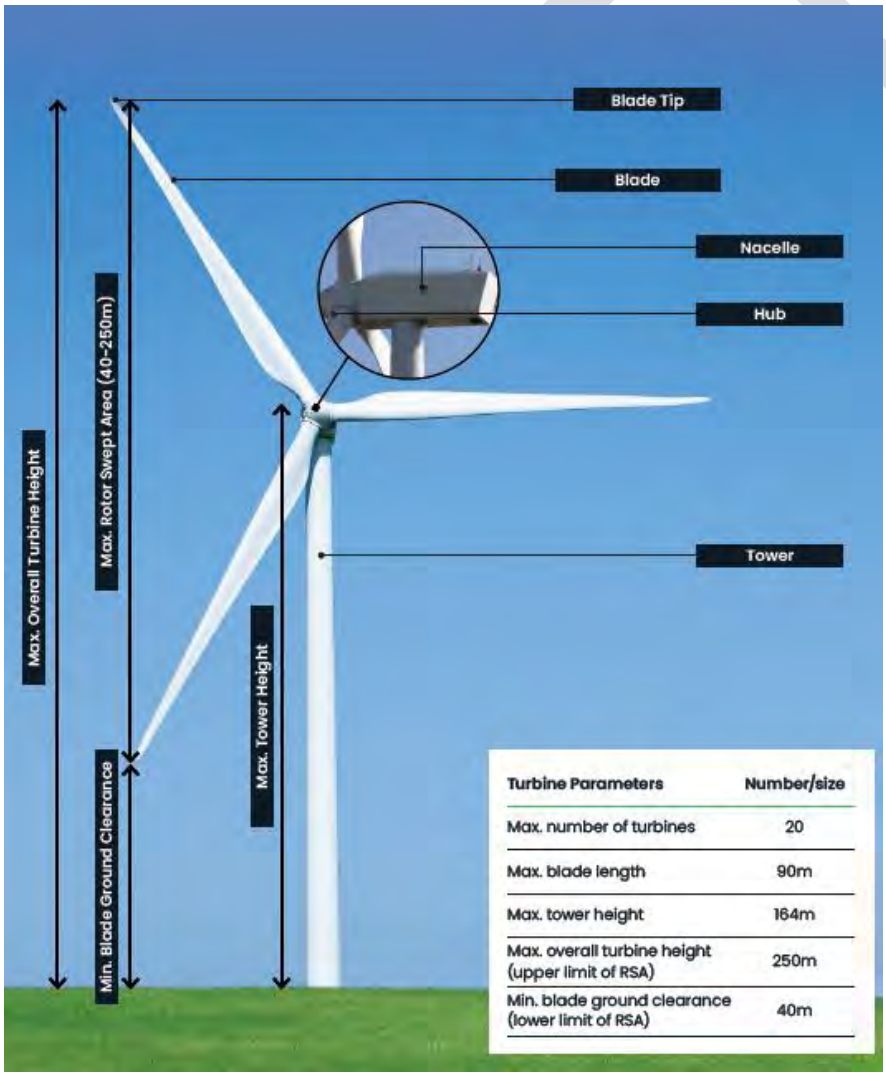

Figure 1 Maximum turbine dimensions/specifications.

1.1 Purpose of Decommissioning Plan

The purpose of this DP is to provide a preliminary strategy for managing the decommissioning phase of the Project. This includes:

- Assessing the existing environment and site conditions.
- Outlining decommissioning methodologies for turbines and associated infrastructure.
- Outlining responsibilities in the decommissioning.
- Managing environmental impacts.
- Identifying predicted waste streams and implementing appropriate management measures.
- Establishing rehabilitation objectives related to landform, soil quality, and biodiversity; and
- Providing a conceptual timeline for the decommissioning of site infrastructure and the completion of the rehabilitation program.

This DP assumes that the Project will be decommissioned at the end of its anticipated 30-year operational timeframe. If repowering the wind farm is not viable, the Project will be decommissioned in accordance with future revisions of this plan.

The DP demonstrates a commitment to ensuring appropriate environmental management during the decommissioning phase, in line with legislative requirements, conditions of consent and stakeholder interests.

1.2 Relevant standards and legislation

The relevant standards and legislation related to this DP are listed below:

- Environmental Protection Act 1994.
- Environmental Protection Regulation 2019.
- Waste Reduction and Recycling Act 2011.
- Waste Reduction and Recycling Regulation 2011.
- Contaminated Sites Act 2003 (WA).
- Contaminated Sites Regulations 2006 (WA).
- A Guide to Preparing Revegetation Plans for Clearing Permits (DWER, 2018)
- Guidance Statement No. 6 - Rehabilitation of Terrestrial Ecosystems (EPA, 2006)
- Phytophthora Dieback Management Manual (DBCA, 2020)

1.3 Scope of DP

The scope of the DP is limited to assets comprising or supporting the Proposed Wind Farm in Scott River. This excludes the Western Power 132kV existing powerline and Beenup Substation.

The Development footprint spans 3,597 hectares (ha), however the actual ground disturbance during operation is expected to be ~1-2% and while it is expected to be ~4% during construction and decommissioning. .

The DP scope considers the life cycle including:

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- Development, revision, and stakeholder engagements during planning and operational phases; followed by.
- Planning, waste, and rehabilitation management strategies implemented during deconstruction and rehabilitation phases; and,
- Verification of rehabilitation performance relative to completion criteria during monitoring and relinquishment.

1.4 Validity and review of DP

This management plan is planned to be reviewed 15 years after energisation and every five years thereafter until the end of the 30-year operational period, or sooner if there are significant changes.

The review will consider advancements in technology, market conditions for reused and scrap materials, changes in environmental legislation, changes to stakeholder sentiment/expectations or change in land zoning, updates in legislation and guidelines, lessons learned from similar projects, and any necessary project approvals for decommissioning and rehabilitation.

1.5 Site description

The proposed wind farm in the Scott River region, is within predominantly cleared farmland, blue gum plantation and adjacent road. The Proposal consists of up to 20 wind turbines, with associated infrastructure comprised of wind monitoring and communication towers, an operation and maintenance area, substation and transmission infrastructure, internal access roads, public viewing area and additional supporting infrastructure (e.g., water storage, concrete batching plant, construction site offices and laydown, borrow pits and dewatering and ASS management infrastructure).

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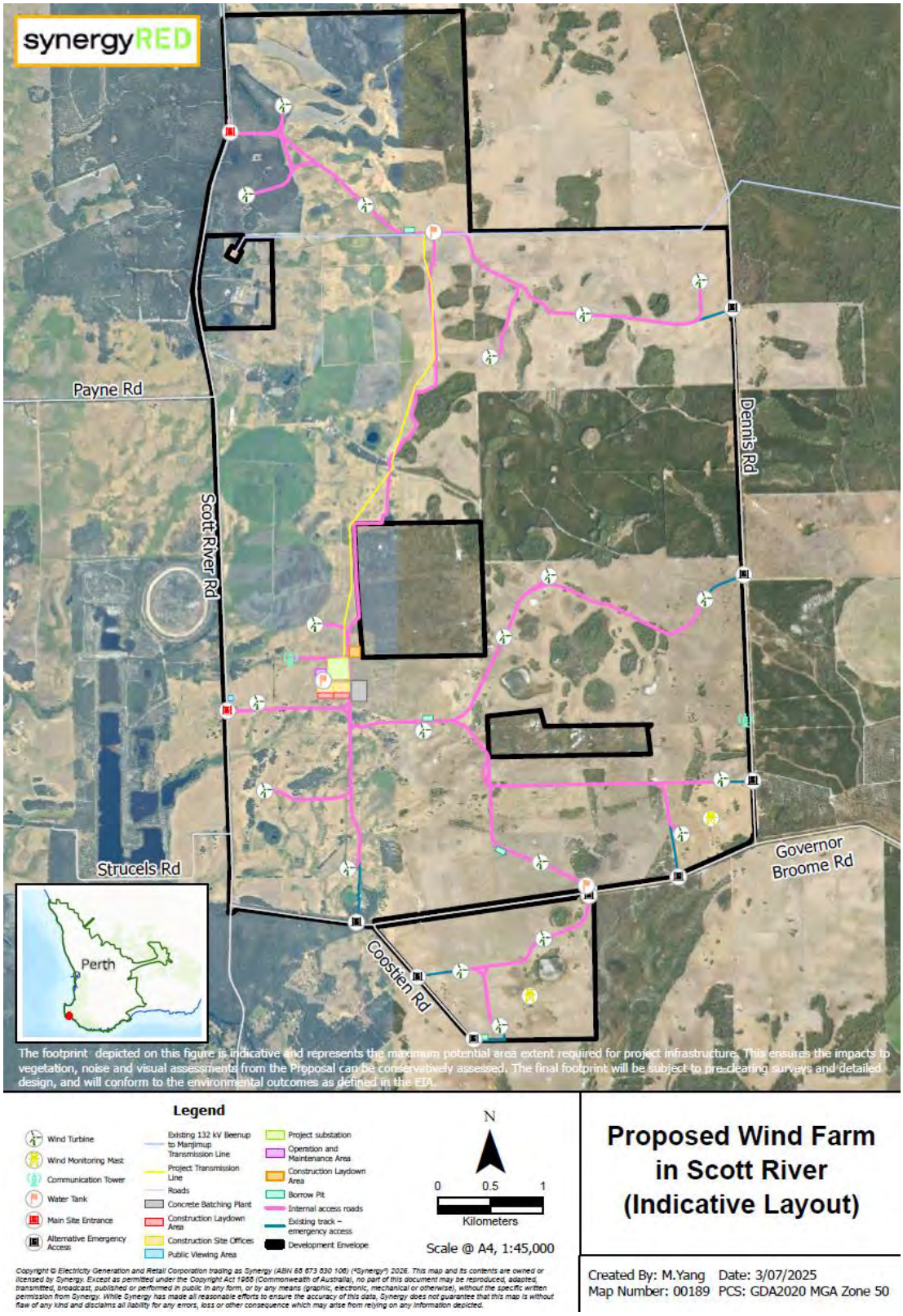

Figure 2 Indicative layout - Proposed wind farm in Scott River

2 Proponent commitments

2.1 Funding

The Proponent holds full financial liability for the decommissioning of the wind farm. The Proponent is responsible for ensuring that all decommissioning works are adequately funded. This obligation rests solely with the Proponent and does not extend to the landowner or any external stakeholders.

Where applicable, the lessor may choose to pursue an alternative arrangement that is commercially suitable to their interests.

This document will be reviewed periodically throughout the life of the project to ensure that the financial responsibility for decommissioning remains clearly defined and that the wind farm's decommissioning is fully funded.

2.2 Decommissioning of the site

At decommissioning, the Proponent commits to removing all above-ground infrastructure, including turbines, substations, and overhead powerlines, and rehabilitating the land to to a state agreed upon with the landowners, and in any event to a state suitable for the prevailing agricultural land use. This may include regrading, topsoil replacement, and revegetation.

Prior to ceasing operation of the wind farm, the Proponent will ensure that appropriate funding is in place to cover the costs of decommissioning and site rehabilitation. The Proponent commits to periodically reviewing and adjusting the decommissioning plan to account for changes in technology, market conditions, and regulatory requirements, and considering alternative arrangements that suit landowners, such as retaining certain infrastructure for future use.

3 Decommissioning Process

3.1 Dismantling and Removal of Wind Turbines for refurbishment

Wind turbines will be electrically disconnected, drained of all liquids, and dismantled, with blades, nacelles, rotors, and towers removed by crane. Other components like transformers and inverters will also be removed for recycling, sale, or disposal.

A crane is expected to remove the blades. Any external components, including transformers and inverters, will be removed from their foundations, and placed on the lay-down site near the wind turbine constituents.

The removal of the components from the site will be coordinated to minimise an impact to the environment and existing infrastructure. All non-salvageable waste streams will be assessed and will be managed according to Landfill Waste Classifications and Waste Definitions 1996 (DWER 2019).

3.2 Removal of foundations, roads, and hardstands

Below ground infrastructure will be removed and rehabilitated to the extent agreement with landowners. It is anticipated that these areas can be rehabilitated to its former use or alternatively the prevailing agricultural land use at the time of decommissioning in the event that the land use changes. The area is planned to be covered with available soil and revegetated. Hardstands and crane pad areas intend to be rehabilitated post-construction. Access tracks and roads may be retained or rehabilitated based on the landowner's preference. Disposal and recycling of materials will be managed accordingly.

If a landowner wishes to retain the access tracks and roads, the Proponent will consider the request.

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3.3 Removal of electrical infrastructure

Electrical infrastructure at a wind farm including all Proponent owned overhead power line poles and conductors connecting the project to the substation will be removed. Materials and components, such as steel, conductors, switches, and transformers will be reused, sold as scrap, recycled, or repurposed where possible.

If the removal of transmission line poles poses an environmental risk, the poles may be cut at the base, flush with the ground level.

An environmental assessment plan will be completed prior to decommissioning of buried cables to determine whether excavation and removal will cause more harm than leaving the buried infrastructure in place. If removal is the preferred option, activities will be conducted to minimise the environmental impact, with disturbed areas backfilled and graded to match the surrounding land.

3.4 Removal of buildings

Prior to commencing decommissioning works for the offices, amenities, storage areas, control rooms, workshops, and car parks, the Proponent will consider any landowner requests to retain them.

Facilities that require removal will be decommissioned and either reused, sold as scrap material, or disposed of at an authorised waste facility. Car parks including the viewing car park on Scott River Road will be rehabilitated in accordance with the procedures used for access tracks. Additionally, any remaining infrastructure will be evaluated for potential repurposing to benefit the local community or environment, ensuring a sustainable and responsible decommissioning process.

3.5 Removal of monitoring equipment

Meteorological Masts (Met Masts) will be removed from site with the foundation footings cut off at a minimum 500mm and the area rehabilitated to its previous use. The steel from the Met Masts will be recycled or repurposed.

3.6 Progressive rehabilitation

The Proponent, where practicable, will conduct opportunistic progressive rehabilitation prior to the closure of the wind farm site. Progressive rehabilitation can be undertaken on areas no longer required or identified as requiring rehabilitation ahead of broader site decommissioning.

This work can identify the most effective methods for restoring surrounding vegetation in areas disturbed by wind farm infrastructure, such as turbine pads, access roads, and substations. By testing planting techniques, soil treatments, and erosion control measures,-the Proponent aims to ensure the land can support sustainable vegetation and return to a stable, post-operational condition.

The outcomes of these trials will inform the broader rehabilitation strategy, helping the Proponent meet environmental obligations and stakeholder expectations before the site is formally closed and returned to its intended future use.

3.7 Completion criteria

Prior to the decommissioning process commencing, completion criteria will be developed and endorsed by the relevant landowner(s). These criteria will allow for the definition of specific endpoints of revegetation targets to be identified and tracked. A decommissioning and rehabilitation close-out report will be developed as evidence to support the meeting of the specified completion criteria.

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3.8 Monitoring

To ensure long-term success and tracking of performance relative to completion criteria, periodic site monitoring will be undertaken post-decommissioning. The type and frequency of monitoring will be the subject of consultation with landowners prior to decommissioning. The outcomes of the monitoring will be recorded. Monitoring will inform any required remedial or maintenance works.

3.9 Adaptive management and contingencies

Rehabilitation of the disturbed area may need to be conducted over a period and will be monitored to ascertain that completion criteria are achieved by the landowner in consultation with the Proponent. There will be opportunity for ongoing refinements of the program as the rehabilitation progresses at the Site. An important element of this will be to maintain accurate records of the rehabilitation work completed in the form of spatial, written, and photographic data. Where the need for change in the rehabilitation prescription is identified, this will be done in consultation with relevant stakeholders. The adaptive management framework should aim to follow the feedback process of Plan, Do, Review.

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4 Environmental Management

4.1 Waste management and end of operational life planning.

As the proposed wind farm approaches the end of its operational life, the responsible management of wind turbine components becomes essential. Figure 3 and Figure 4 below outline the hierarchy of proposed waste management techniques under consideration, as well as the decision matrix for determining whether to repower, extend the life of the wind farm, or proceed with decommissioning.

The waste management strategies in Figure 3 are widely accepted and prioritise actions based on their environmental impact: A hierarchy of controls is shown in Figure 3 below.

The hierarchy of the proposed stages:

1. **Avoid and Reuse** – Focuses on preventing waste generation in the first place by designing for durability, extending product life, and reusing components wherever possible.

2. **Resource Recovery –**

   i. Reuse: Directly reapplying components without significant alteration, preserving their original function.

   ii. Recycle: Processing materials to create new products, which typically requires energy and additional resources.

   iii. Energy Recovery: Converting waste into usable energy such as heat, electricity, or fuel through thermal or chemical treatment.

   iv. Treat: Involves preparing waste materials for further recovery or safe disposal through processes such as sorting, cleaning, or mechanical treatment to reduce environmental harm.

3. **Disposal** – The final option, involving the environmentally responsible handling of residual waste that cannot be reused, treated, or recovered, typically through landfilling or incineration without energy recovery.



Figure 3 Wind-turbine-recycling-report-2023.pdf (cleanenergycouncil.org.au)

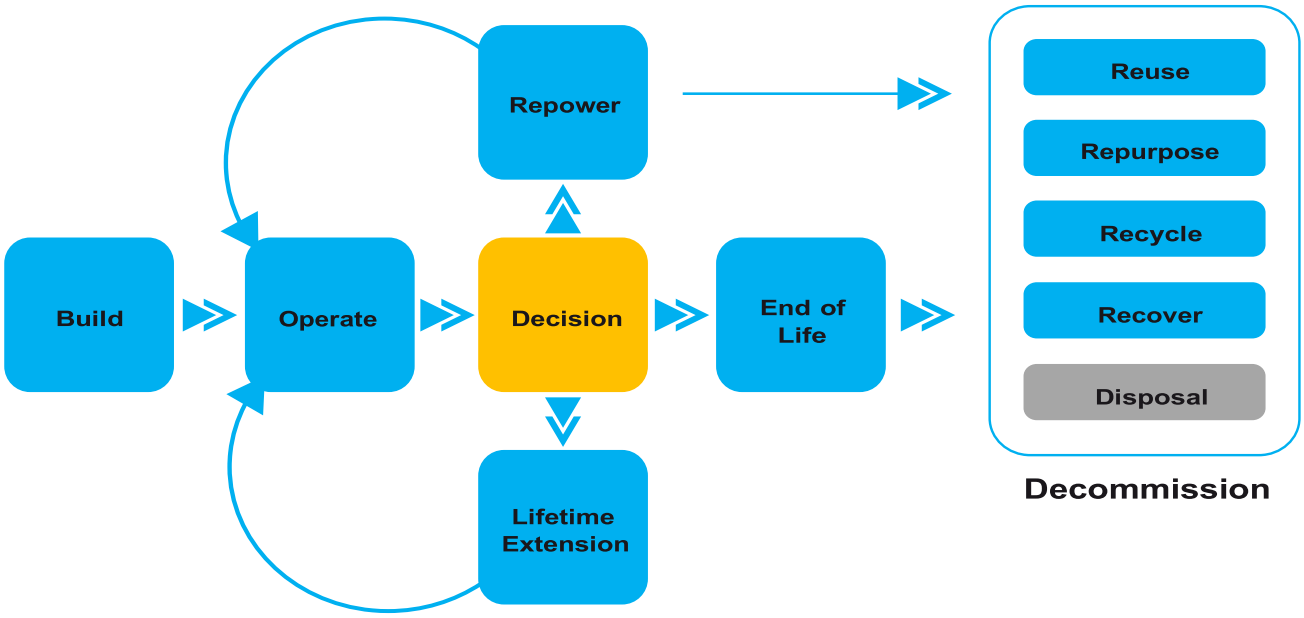

Figure 4 Wind-turbine-recycling-report-2023.pdf (cleanenergycouncil.org.au)

4.2 Soil and Water Management

Soil and water management will be carried out in accordance with the Environmental Management Plan, which may include an Acid Sulfate Soil Management Plan and a Dewatering Management Plan. All activities will be undertaken to ensure full compliance with relevant environmental regulations and best practice standards.

4.3 Remediation

There is a very low likelihood for contamination to be present within the project area at decommissioning. Should any activity occur throughout the life of the wind farm which may lead to the potential for soil or water contamination, investigations will be undertaken to determine its nature and extent. If an unacceptable risk of contamination is identified, a site assessment will be undertaken, and necessary remediation will be undertaken within the earthworks phase.

5 Stakeholder Engagement

5.1 Record of stakeholder engagement

Records of stakeholder engagement undertaken prior, during and following decommissioning of the site will be maintained.

5.2 Landowner consultation

Engagement with landowners will be a key focus throughout the decommissioning and rehabilitation process. One-on-one discussions, or equivalent engagement, will be held with each landholder to understand their preferences regarding the removal or retention of infrastructure. In some cases,

landowners may wish to retain certain elements such as roads, fences, or storage facilities to support ongoing agricultural operations or enhance property value.

Recognising that land use priorities may evolve over time, or that land ownership may change during the wind farm's operational life, further consultation will be conducted prior to the commencement of decommissioning to confirm landholder preferences.

5.3 Stakeholder consultation

Stakeholder consultation will be initiated well in advance of decommissioning activities. The objectives are to ensure that stakeholders are fully informed, to provide opportunities for feedback, and to adapt plans where feasible in response to community input.

Key topics to be addressed include:

i. Timing and staging of decommissioning work to minimise disruption to agricultural operations.

ii. Opportunities for local employment and contractor participation

iii. Traffic and road management

5.4 Communication Plan

A Communication Plan will be developed to ensure consistent and accessible information sharing. This may include:

i. A dedicated project website or portal with regular updates.

ii. Distribution of newsletters, fact sheets, and FAQs.

iii. Use of local media and social media channels to reach a broad audience.

iv. Designated contact points for inquiries and feedback.

6 Decommissioning Schedule

A detailed decommissioning schedule will be developed in future versions of this report. If the wind farm is not repowered or its operational life extended, decommissioning activities are expected to commence within 6 to 8 months after electricity generation has permanently ceased. Most works involving major infrastructure removal is anticipated to be completed within a 12-month period.

Following this, ongoing site monitoring and rehabilitation efforts will continue to ensure compliance with relevant local legislation, regulatory requirements, and any agreements made with stakeholders or landowners.

6.1 Risk assessment.

To determine the method, sequence and timing of the individual activities required to decommission the wind farm, the identification and management of key risks is necessary.

A record of project-related risks, in the form of a risk register that is subject to continual revision throughout the project lifecycle, should be maintained. This register will identify hazards and potential mitigations to reduce likelihood or consequence and thereby reduce the risk. Risk management is a process that will continue throughout the life of the project and into decommissioning.

Key risks identified through the decommissioning planning process include, but are not limited to:

- Safety and Environmental Risk
- Financial Risk
- Schedule Risk
- Reputational Risks

Management of safety, risk and change will be developed and refined throughout the project and captured through the risk register.



synergyRED

Attachment 4 (RSD) – Appendix D

Preliminary Oversize and/or Over Mass (OSOM) Route Study

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BEENUP WIND FARM

OSOM Route Study

Date: April 2024
Client: Bryce Stephens
SynergyRED
Type: Physical Survey
Rev: 1

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Revision History

Revision	Date	Details	Prepared	Checked	Approved
0	03/04/2024	First issue	ICW	ICW	JJM
1	04/04/2024	Updated swept paths to avoid tree clearing	ICW	ICW	JJM

Disclaimer

This report has been prepared for advisory purposes only. Information provided within the report is based on data provided by the Client as well as publicly available information and, to the best of ARES Project Services Pty Ltd's knowledge and experience, is accurate at the time of publication. All proposed routes, methodologies and schedules described in this report are subject to approval and issue of permits from the relevant stakeholders. Transport equipment is based on ARES Project Services Pty Ltd vehicles and trailers, and swept path analysis results may differ if using equipment by third parties.

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Introduction

Beenup WF is a proposed renewable energy development located in Western Australia, consisting of up to 30 wind turbine generators with blades up to 90m long. The project is located approximately 300km south of Perth and 15km north-east of Augusta, in the Shire of Augusta Margaret River.

Ares have been tasked by our customer, SynergyRED, to undertake a Route Survey from the Port of Bunbury to site. The purpose of the study is to determine the pinch points along the route and give best estimates of modifications and works required to enable oversize overmass (OSOM) cargo to be brought to site.

The study is designed for those involved in the project that have a limited knowledge of transportation, including a comprehensive outline of the routes and actions required to achieve delivery.

Murra Warra WF

Murra Warra Stage 1 components had to be transported over 250km from the Port of Portland to site. Cargo included 5.8m diameter towers such as these pictured.

01

Overview

Project Overview

The Beenup WF is a renewable energy development in the south western region of WA currently in the planning and approvals stage.

Scope of Survey

Beenup WF is located in the south west corner of Western Australia, 15km north-east of the town of Augusta.

ARES has been tasked with surveying the route from the proposed Port of Import (Bunbury) to the construction site. The survey includes everything from the discharge berth, transfer to port storage area, road transport from port to site, and an assessment of the turns into potential site entrances.

ARES physically drove the route in March 2024. The aim of the drive was to visually verify the results of an initial desktop study, take physical measurements and obtain drone footage at pinch points where the existing aerial imagery from sources such as Google and Nearmaps was of insufficient quality.

No engagement has been undertaken with the transport authority (Main Roads WA) as yet, as the project is still in the early stages of planning. Once the project scope and route firms, we highly recommend engaging with MRWA as soon as possible to firm up OSOM transport and permit requirements.

Port of Import

The Port of Bunbury serves as a vital import/export hub into the south western region of WA. Much of its operation is driven by mineral, grain and wood exports, and a diverse range of bulk import materials. In recent years, driven by the renewable energy boom, the port has played host to wind turbine components, most recently for the Flat Rocks Wind Farm project in 2023.

The primary berth for break bulk cargo is the general purpose Berth 5, which has large storage areas (~60,000sqm total) nearby to the berth. The layout of the port area is shown in the bird's eye view to the right.

Bunbury Port has excellent connections to both road and rail. For heavy vehicle traffic, there are direct connections to highways to the north, south and east which bypass the built up areas around the town, and the area is generally clear of bridges and other overhead obstructions.

Site

The project construction site is accessed east off Scott River Rd. Due to the early stage of the project, the site access point(s) have not been confirmed, but ARES surveyed four potential entry points as part of our scope.

The wind farm is located in primarily agricultural land and the topography is very flat. There should be no issues with steep gradients on site roads.



Above: Aerial view of Bunbury Port, showing berth (red) and storage areas (green). **Below:** Flat Rocks WF, built in similar terrain to Beenup. (Credit: ABC)



Transport Methodology

Specialised cargo requires specialised transport solutions.

Cargo Dimensions

The transport envelope assumed for this route survey will be as follows:

- Length: 90.2m (Sinoma SI90.2 Blade)
- Width & Height: 6.0m (Base tower section)

The other wind turbine components such as nacelle, drivetrain, hub and other tower sections will fall within this envelope and are hence not considered separately.

The blade is one of the longest known blades of the latest 7MW generation of wind turbine generators which are starting to enter the market. The height of the blade is listed at 3.6m which means that height will not be an issue.

The spacing of the support frames for the blade is important, as this changes the swept path of the trailer. The Sinoma blade has a tip frame spacing of 48m, leaving a rather large overhang of 42m. This means the blade tip will tend to oversail fencelines and stray into private property, and makes avoiding tall assets such as light poles and power poles difficult. Transporting with such a large overhang may also be subject to approval from Main Roads WA.

It is recommended to engage with the blade manufacturer further to see if other tip spacing options are available, such as one which gives a more typical overhang of around 30m.

Tower dimensions are not yet available but we have assumed a diameter of around 6.0m for the widest section, which is typical for a wind turbine tower with hub height of around 120-160m.

Equipment

As an exact turbine model has not been selected, ARES have made some general assumptions on the trailing equipment required to transport a typical next generation wind turbine, shown in the equipment schematic overleaf. This is meant as a rough guide only and designed to give an idea of the sizes of equipment involved.

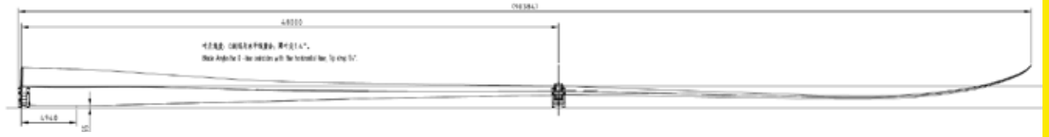
The exception is the Sinoma blade, for which we have exact dimensions and hence has been modelled accurately.

The trailing equipment required to carry the components to site are already in use by specialist oversize transporters in Australia. The blades can be transported by conventional extendable blade trailers or fixed length trailers. The largest towers will likely be transported on either bookend style trailers or low bed platform trailers to keep the transport height down to reduce the number of power lines requiring lifting.

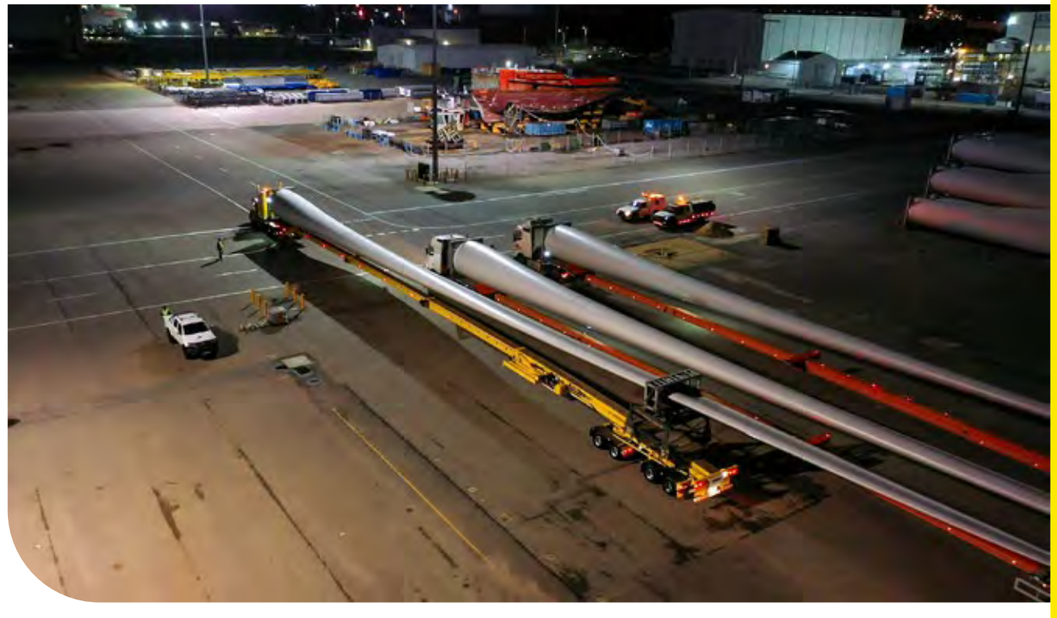
The remainder of components can be transported on platform and low loader trailers which are very commonly used.



Above: Bookend Trailers used by ARES for Murra Warra's 5.8m towers

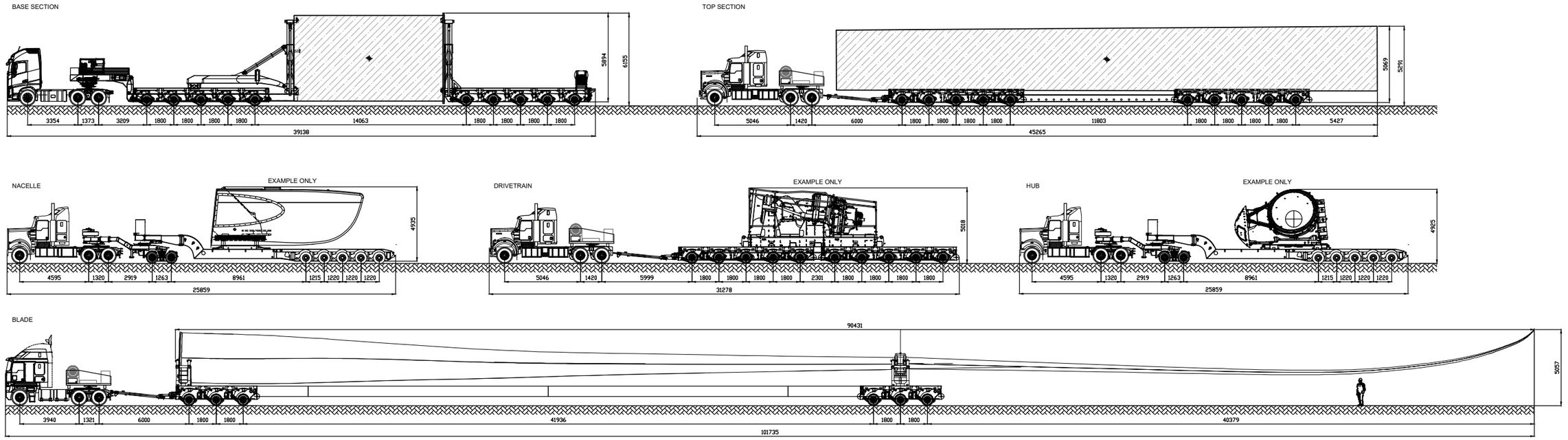


Above: Schematic of Sinoma SI90.2 wind turbine blade

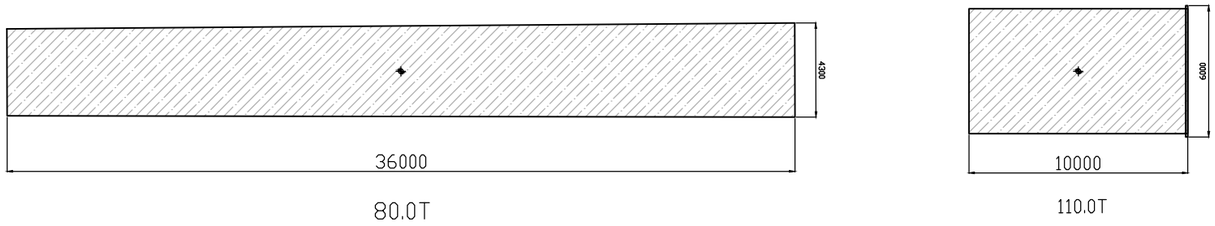


Above: Extendable blade trailers loaded with 75m blades for the Yandin project in Western Australia.

Equipment Schematic



Tower Specifications



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PROJECT:	Beenup WF	SCALE	NTS
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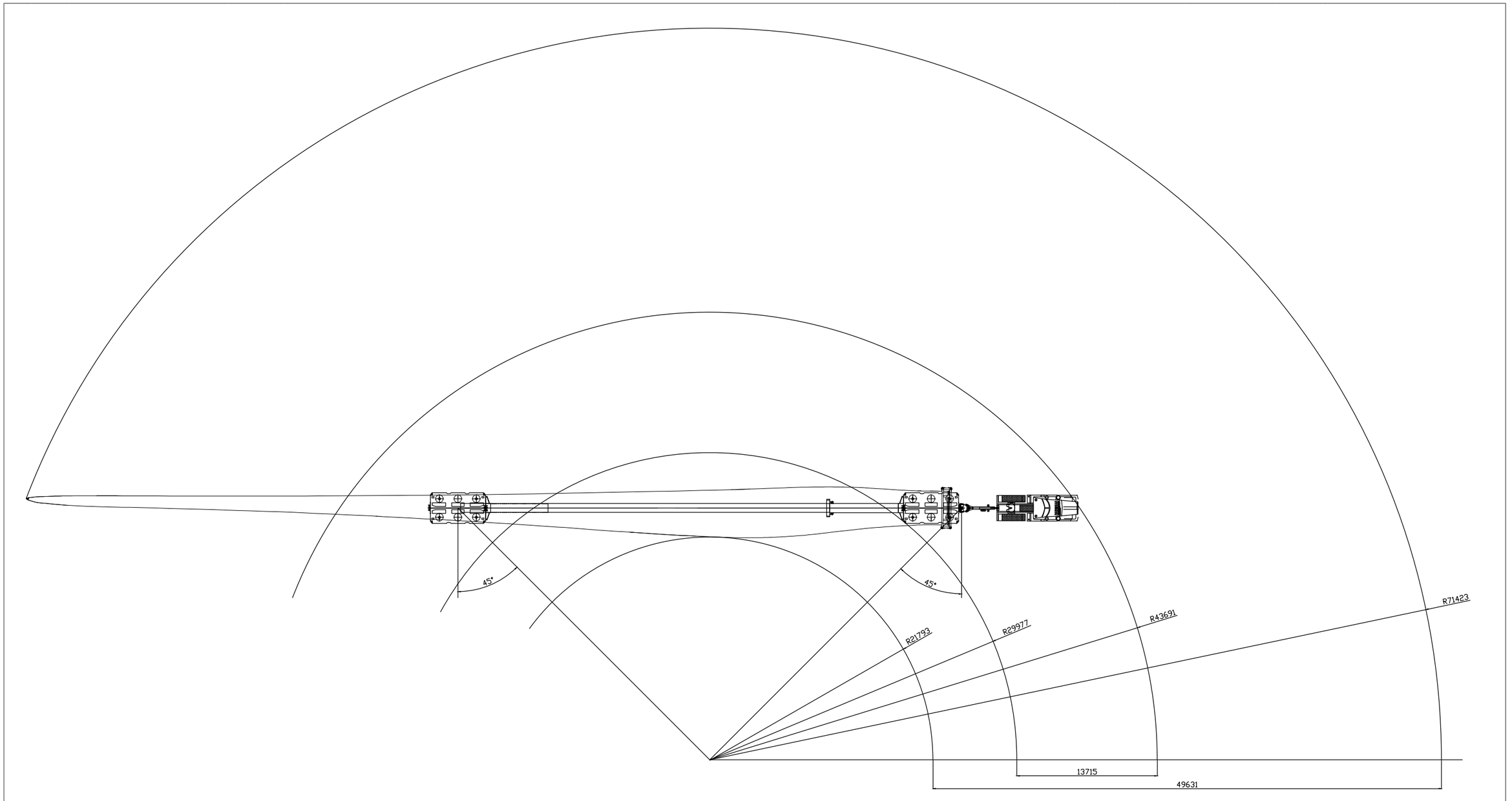
DRAWING NAME:	SYNERGY_BEENUP_R0	REV	

Blade Trailer Turning Circle



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PROJECT:	Beenup WF	SCALE	NTS
DRAWING TITLE:	Blade Trailer Turning Circle	SHEET NO:	
DRAWING NAME:	SYNERGY_BEENUP_R0	REV	

Port Operations at Bunbury

Information pertaining to vessel discharge operations and transfer of cargo to short term storage/ laydown.



Ship Discharge

Berth 5 has a length of 240m and has ample room for manoeuvring trucks and trailers during discharge operations. Trailers required would be blade trailers for the blades, platform trailers (up to 12 axles) for large tower sections and heavier components such as the drivetrain, and low loaders for the other components.

Loading of components onto trailers is expected to be via ship's cranes.

Transfer to Storage

Components follow the route shown on the right to the storage area around 200m away. Care will need to be taken for longer loads such as blades and top tower sections when turning and reversing, and a rear pilot or spotter may be required.

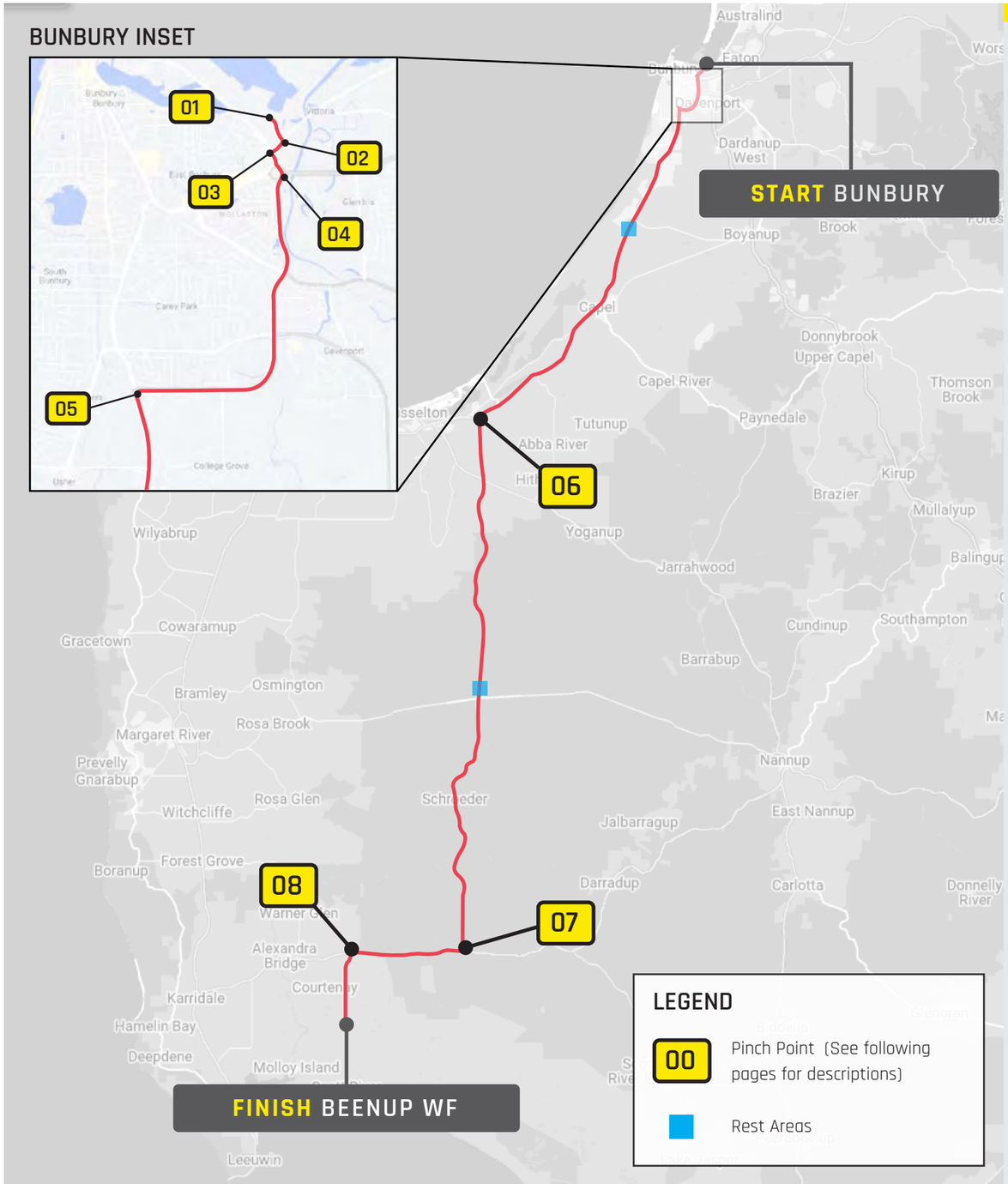
The main storage area has around 35,000sqm of space. There is a further 25,000sqm of space in a secondary area to the south-east which can be used for smaller components. Security fencing, lighting and power will have to be self-provided.



02

Route 1 - Bunbury to Beenup WF

Route Overview



ROUTE 1

	START - Bunbury
0.0 KM	Leschenault Dr
0.4 KM	Estuary Dr
0.6 KM	Koombana Dr
3.4 KM	Robertson Dr
6.2 KM	Bussell Hwy
46.5 KM	Sues Rd
105.3 KM	Brockman Hwy
116.9 KM	Scott River Rd
125.1 KM	**FINISH - Beenup WF**

INTERACTIVE MAP LINK

This route is suitable for all components.

Exiting Bunbury (KP0.0 - KP5.2)

This first section of the route will be slowest due to the number of turns and presence of roadside infrastructure. It is expected that components will leave port in the early morning to clear the Bunbury metro area with as little disruption as possible.

The roads are all dual lane to Bussell Hwy with the exception of Leschanault Dr.

Bussell Hwy (KP5.2 - KP46.5)

Bussell Hwy is a state maintained highway. There are currently duplication works which will see the road being dual carriageway to Sues Rd (estimated to be complete in mid to late 2024). There are no issues with this section of road.

Sues Rd (KP46.5 - KP105.3)

Sues Rd is a major north-south thoroughfare in the area and is an approved B-double route. Whilst single lane, the road is around 7-8m wide along most of its length, and is suitable to take turbine components along. There are a number of winding sections which will require the Traffic Warden and supporting pilots to stop oncoming traffic as the blade tip will swing into the opposite lane.

Brockman Hwy/Scott River Rd (KP105.3 - KP125.1)

Brockman Hwy is a state maintained, single lane road. The section connecting Sues Rd to Scott River Rd is suitable for OSOM traffic but goes through forest and clearance for longer loads will need to be monitored..

Scott River Rd is also single lane, around 6.0-6.5m wide and paved for about 8.5km before becoming gravel. The initial section is through forest before opening up into farmland further south.

Rest Areas

The following locations are suitable for all combinations including blade trailers to stop at.

KP20.5 Truck Parking Area, Bussell Hwy
GPS: https://maps.app.goo.gl/xmyjy2Fr96YhgHmL6

KP52.6 Truck Parking Area, Sues Rd
GPS: https://maps.app.goo.gl/SRJE7wghzNzvUNZf8

Bunbury to Beenup WF

General Route Notes

Road Quality

The transport route is mainly along state maintained highways and roads, which are generally designed to a higher specification and able to handle heavier and higher volumes of traffic.

The entire route is paved, with the exception of a short section of gravel on Scott River Rd (approx. 500m) leading up to the southernmost site entry option.

Overhead Structures

There are no overhead structures such as bridges or overpasses on the route.

Overhead Power Lines

In general, a travel height below around 5.5m is not an issue with respect to power lines. Loads above 5.2m travel height will require a high load permit from the power authorities prior to travel.

An overhead powerline survey (performed by the power authority) is recommended to determine exact line heights and ascertain if any lines need to be temporarily or permanently lifted prior to the load going through.

For this project, with tower sections up to 6.0m in diameter, high load permits will be required. High wire escorts may also be required to accompany the loads and perform any line lifting needed. This will need to be confirmed with the power authorities.

The route traverses through the Western Power distribution network.

Bridges and Culverts

There are only a few bridge and culvert crossings along the route. These are listed below. Consultation with Main Roads WA will be required to ascertain if there are any special requirements to cross these structures, such as axle load limits, speed restrictions, bridge video supervision etc.

Sues Rd over Sabina River
GPS: https://maps.app.goo.gl/Bb2jM2H4oLjkv7Qc8

Sues Rd over cattle underpass
GPS: https://maps.app.goo.gl/iudWTuAD9JLQzjhF7

Sues Rd over East Wonnerup drain
GPS: https://maps.app.goo.gl/4MsEyrV66u2CMRKJ9

Sues Rd over cattle underpass (Sanson Section)
GPS: https://maps.app.goo.gl/WQTBZ9cB7feuENxx8

Sues Rd over Blackwood River
GPS: https://maps.app.goo.gl/omnMqfEUsULAt4NN8

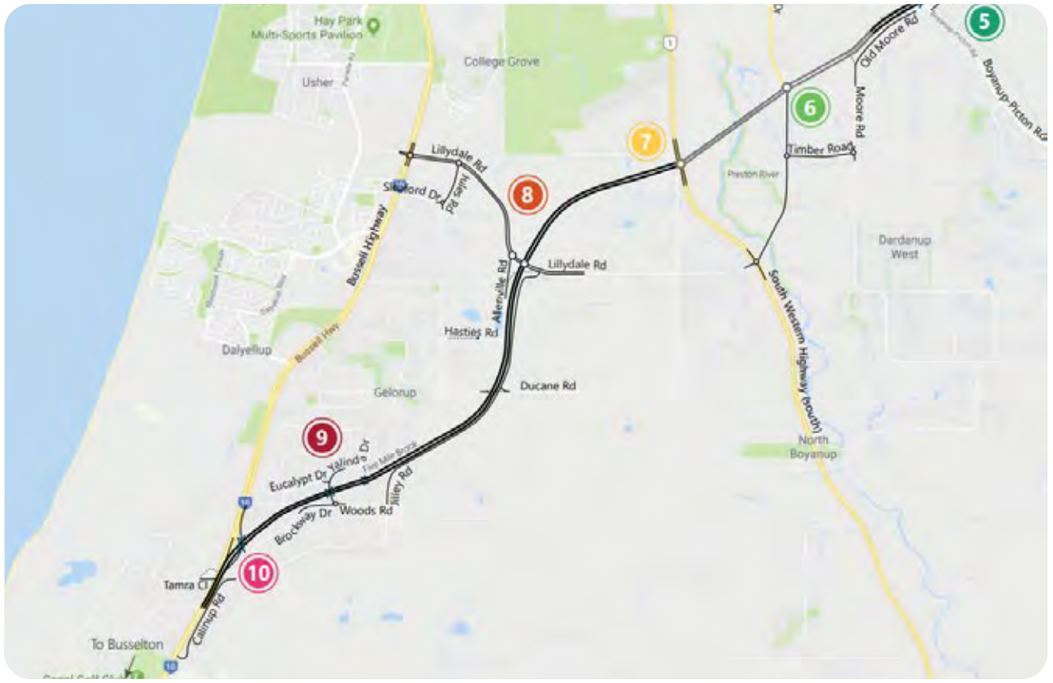
There are a number of minor culverts along Scott River Rd which will need assessment by the local shire.

Note: Bussell Hwy bridges have not been listed, these are assumed to be built to higher specification and suitable for heavy vehicles.

Rail Crossings

There are two rail level crossings along the route as noted below. Permissions will be required from rail authorities to travel through these crossings.

Inner Harbour Access Rd Level Crossing
Rail Authority: Arc Infrastructure
GPS: https://maps.app.goo.gl/nPbDgA4M42k8nCFPA



Above: Bunbury Bypass concept design. (Source: Main Roads WA)

Robertson Dr Level Crossing
Rail Authority: Arc Infrastructure
GPS: https://maps.app.goo.gl/9tpaZDqCesmvhq1G6

Roadworks

There are a number of road upgrade projects planned along the route which may affect transport of project components, depending on timing. These may lead to speed restrictions, curfews, dimensional restrictions, detours or possibly a full halt on deliveries. It is recommended that close liaison with MRWA is maintained throughout the project planning phase to keep abreast of any developments on the following projects, as well as any others which are not yet known:

- Bunbury Outer Ring Road project - estimated completion date Q4 2024
- Bussell Highway Duplication project - estimated completion date Q4 2024

Approvals

All OSOM loads will require Permits from Main Roads WA prior to travel. The permits will state the approved route(s), vehicles and any special conditions which apply to travel. Transport operators will need to hold WA Heavy Vehicle Accreditation.

Blades are classified as “high risk OSOM” moves by MRWA and will require an approved OSOM Transport Management Plan in addition to a Permit.

Modifications to State Roads in WA will require review and approval from MRWA. Modifications to local roads will require approval from the local shire or council.

Third party approvals required include the port authority, rail authorities, and utility providers such as electricity and telecommunications.

Pinch Point

01

COMPOUND TURN
Port Storage &
Leschenault Dr

ROUTE 1

Loads leaving the port storage area in Port of Bunbury will need to negotiate a few turns within the Port area.

The initial left turn out of storage is achievable but the tip clearance to the power pole to the south is tight and will have to be watched closely by spotters Some additional hard stand on the inside of the corner will provide some additional margin for error if necessary.

The following right turn is manageable as well, as the rear of the trailer can run on hard stand already placed on the outside of the corner from previous projects. The blade tip should clear the top of the sign on the outside.

Loads will take the bypass road around the main gate to exit the secured area. See following page for completion of this pinch point.



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Pinch Point

01

COMPOUND TURN
Port Storage &
Leschenault Dr

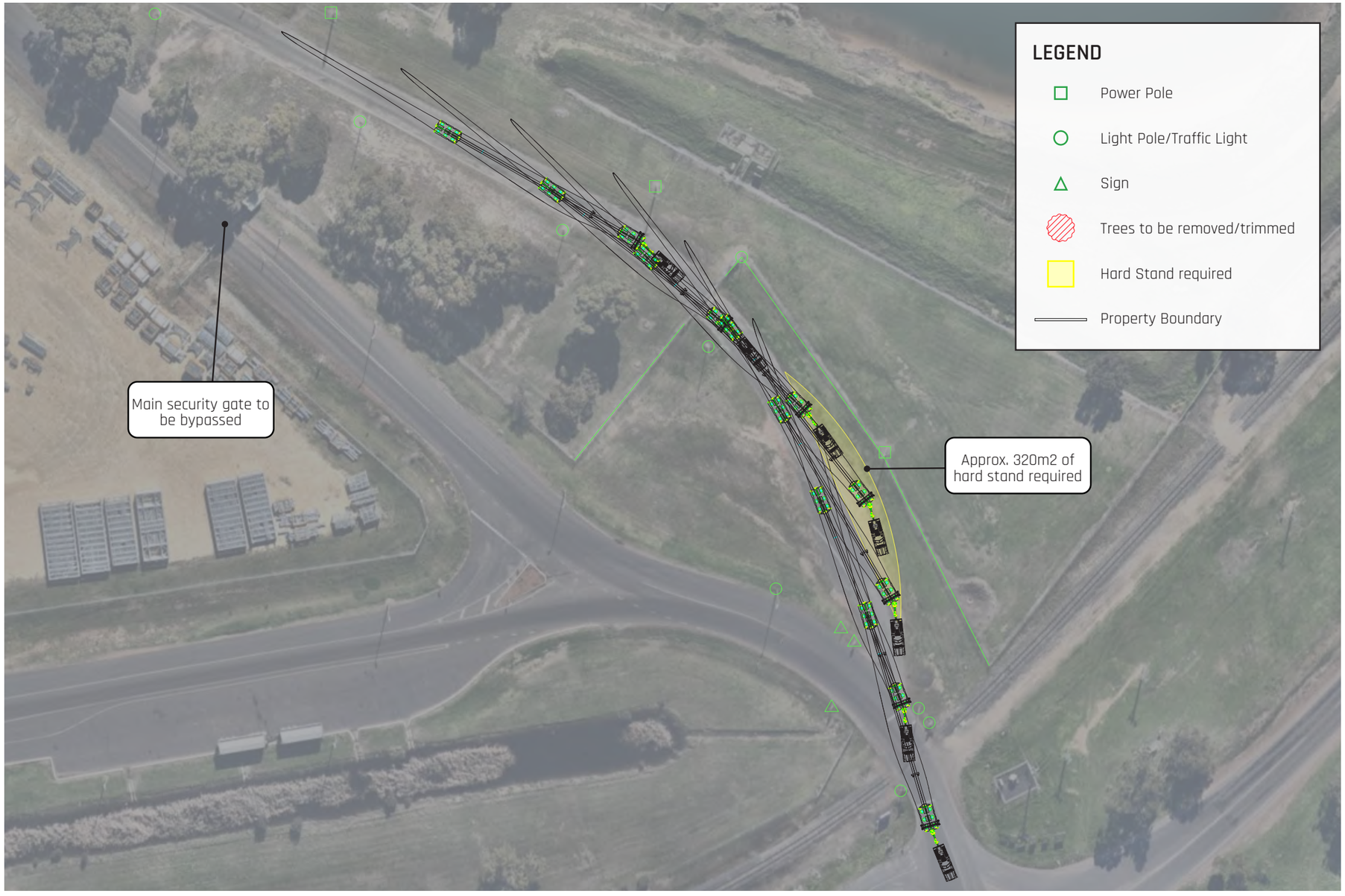
ROUTE 1

(continued)

Blades will need to take the final turn onto Leschenault Dr with care due to the presence of power and light poles on either side of the bypass road.

There is existing hard stand on the outside of the corner from previous projects but for a 90m blade this will need to be extended.

The blade can then drive straight over the rail crossing and past the guard house to exit the port.



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DRAWING NAME:	Route Survey

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SHEET NO:
REV

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Pinch Point

02

RIGHT TURN
Leschenault Dr
& Estuary Dr

ROUTE 1

The roundabout onto Estuary Dr will need to be taken on the incorrect side by blades. To prevent the tip swing from impacting trees to the north, the inside of the corner will need a moderate amount of hard stand material to allow the load to cut the corner, and some existing wire fencing will need to be shortened. A light pole on the inside will also need to be moved.

Clearance to a number of signs will need to be checked during a trial run to ensure the tip can pass safely over them. If not, they will need to be made removeable.

Traffic wardens will hold traffic on Estuary Dr while the turn is being completed.



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Pinch Point

03

LEFT TURN
Estuary Dr &
Koombana Dr

ROUTE 1

To avoid the row of trees on the main traffic island on Estuary Dr, blades will have to stay straight for as long as possible, crossing over the median onto the incorrect side of Koombana Dr before turning sharply left, and crossing back over to the correct side.

One 'Give Way' sign will have to be relocated or temporarily removed, and the inside of the corner will need to be made trafficable.

Traffic wardens will hold traffic on Koombana Dr while the blade contraflows the intersection.



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Pinch Point

04

ROUNDABOUT
Eelup Rotary

ROUTE 1

The large Eelup Rotary roundabout can be taken with minimal modifications - only one sign has to be made removeable. However, due to the number of light poles, traffic lights and signs in the vicinity, extra care and vigilance will need to be taken.



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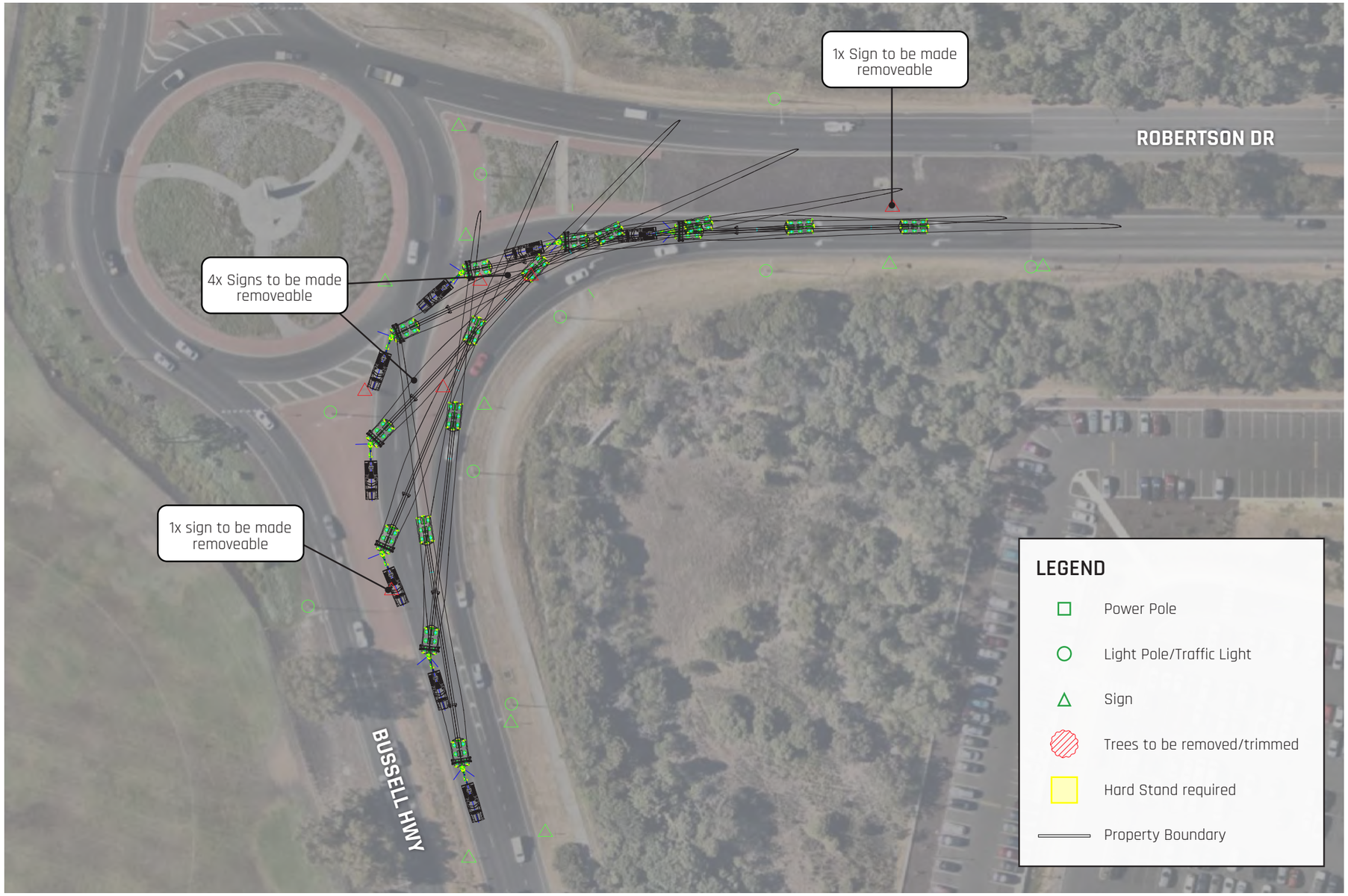
Pinch Point

05

LEFT TURN
Robertson Dr
& Bussell Hwy

ROUTE 1

The turn onto Bussell Hwy is acute and will require traversing over the traffic islands, but the combination can remain on the correct side of the road. A number of signs will need to be made removeable on the traffic island and medians.



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Pinch Point

06

LEFT TURN
Bussell Hwy
& Sues Rd

ROUTE 1

The Sues Rd intersection is currently being upgraded as part of the Bussell Hwy duplication project, with a new roundabout to be installed. We do not have access to a scaled conceptual design drawing to analyse, but based on the current state of works, the turn should be relatively straightforward.

The extent of above-ground infrastructure at this new intersection, e.g. light poles, signage is not clear at this stage and a future review will be required to ensure the swept path of the blades does not impinge upon these assets.



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Pinch Point

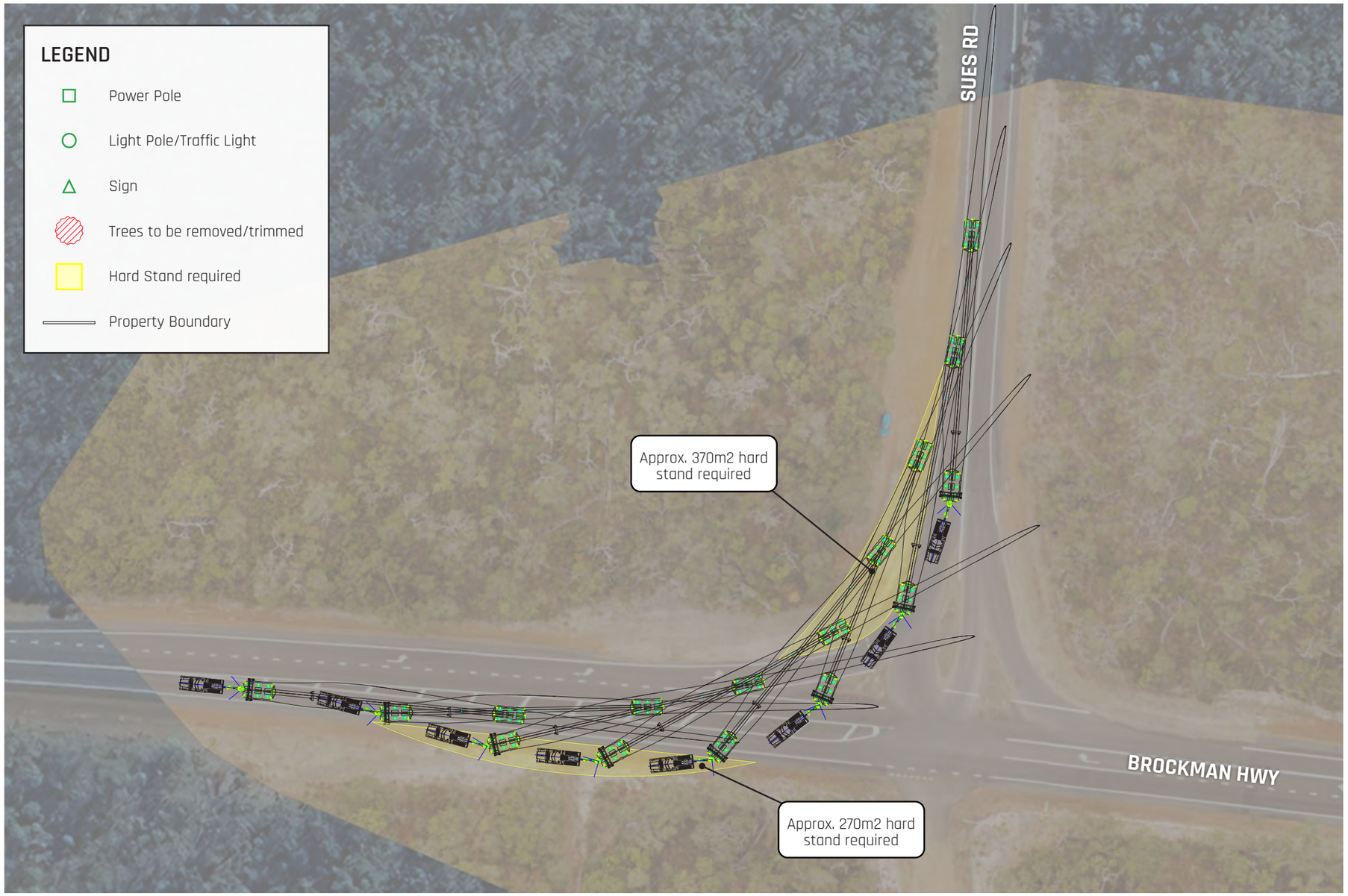
07

RIGHT TURN
Sues Rd &
Brockman Hwy

ROUTE 1

The right turn onto Brockman Hwy is in a forested area, and the sheer length of the blades will mean that to avoid tree trimming and possibly removal, a large amount of hard stand is required on the inside and outside of the corner.

The combination will stay well clear of a protected tree to the south of the intersection.



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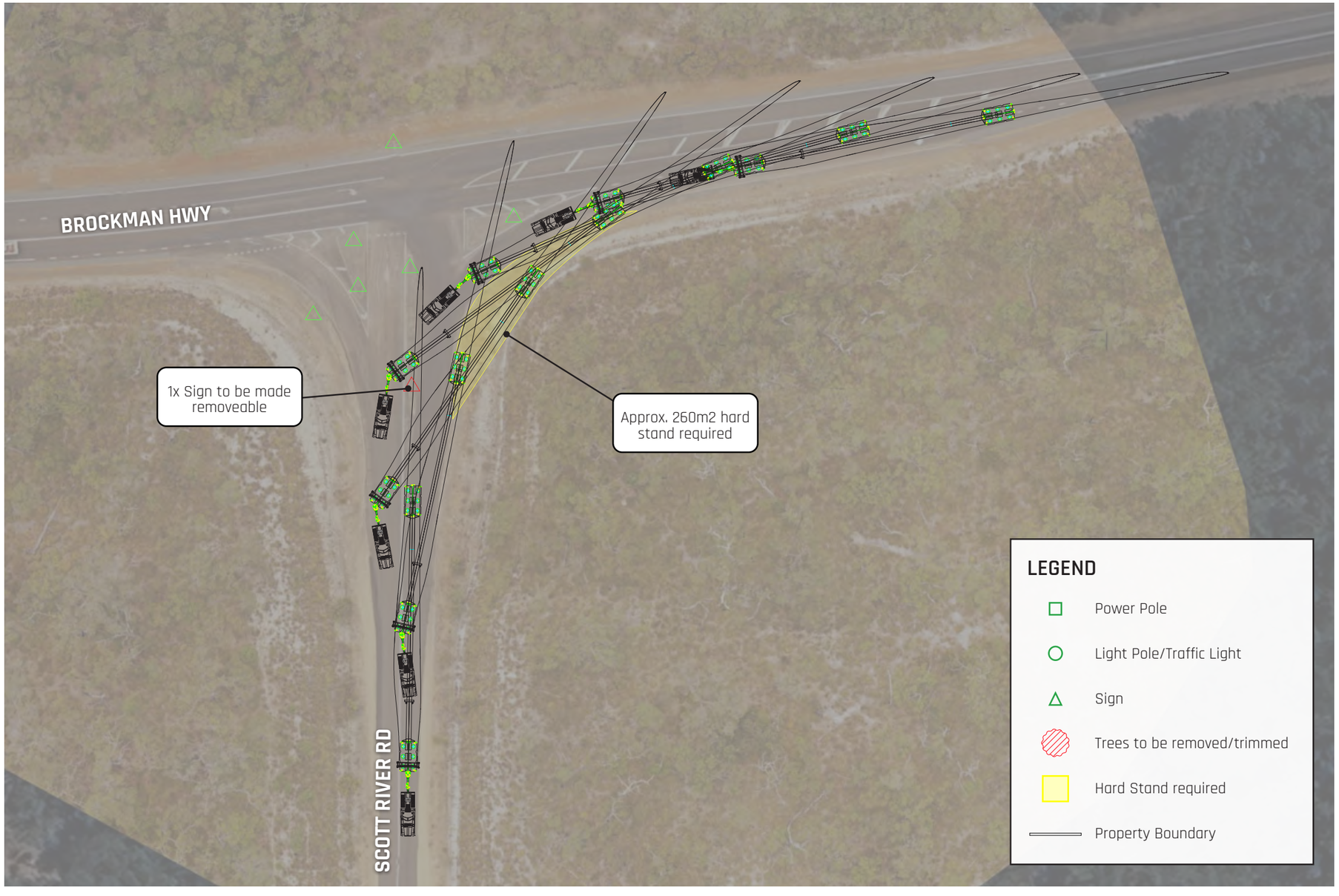
Pinch Point

08

LEFT TURN
Brockman Hwy
& Scott River Rd

ROUTE 1

This intersection is quite wide, allowing the blade to stay clear of all trees. The extent of modifications will be limited to hard stand material on the inside of the corner, and one sign to be made removeable.



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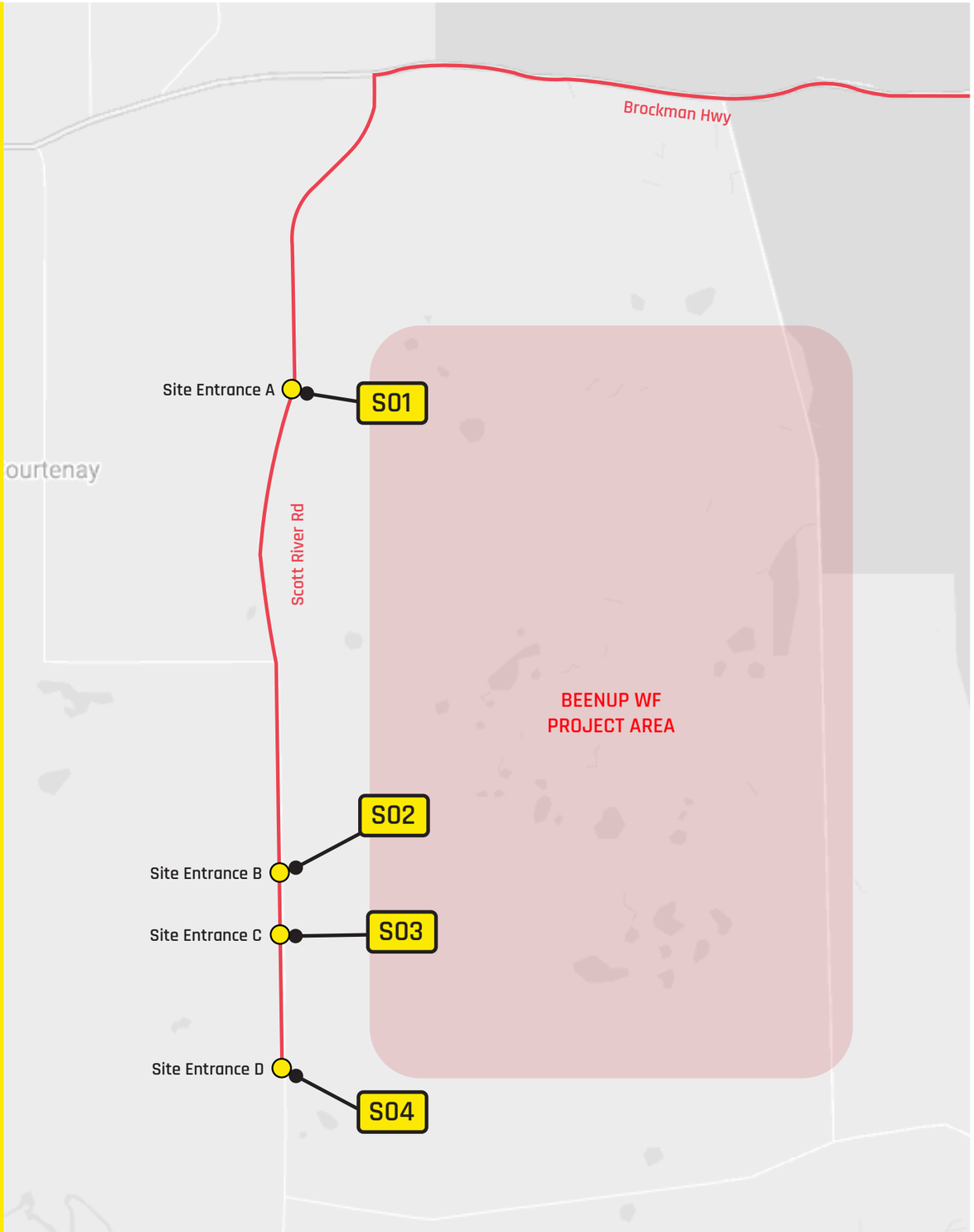
03

Site Entrance Assessment



Beenup WF Site Entrances

There are four proposed site entrances to the Beenup Wind Farm project area, all accessed by turning left off Scott River Rd. From north to south, they are:

- Site Entrance A: existing farm access track
- Site Entrance B: clear area adjacent to fenceline
- Site Entrance C: clear area adjacent to fenceline
- Site Entrance D: rough existing track

ARES performed a swept path analysis on each proposed site entrance to determine the potential impacts to vegetation and land use. These are presented in the following pages and are only intended to give an idea of the clear area required for blades to make the turn into site. Formal civil design of the site entrances will be done by others.

Site Entrance A



Site Entrance B



Site Entrance C



Site Entrance D



Pinch Point

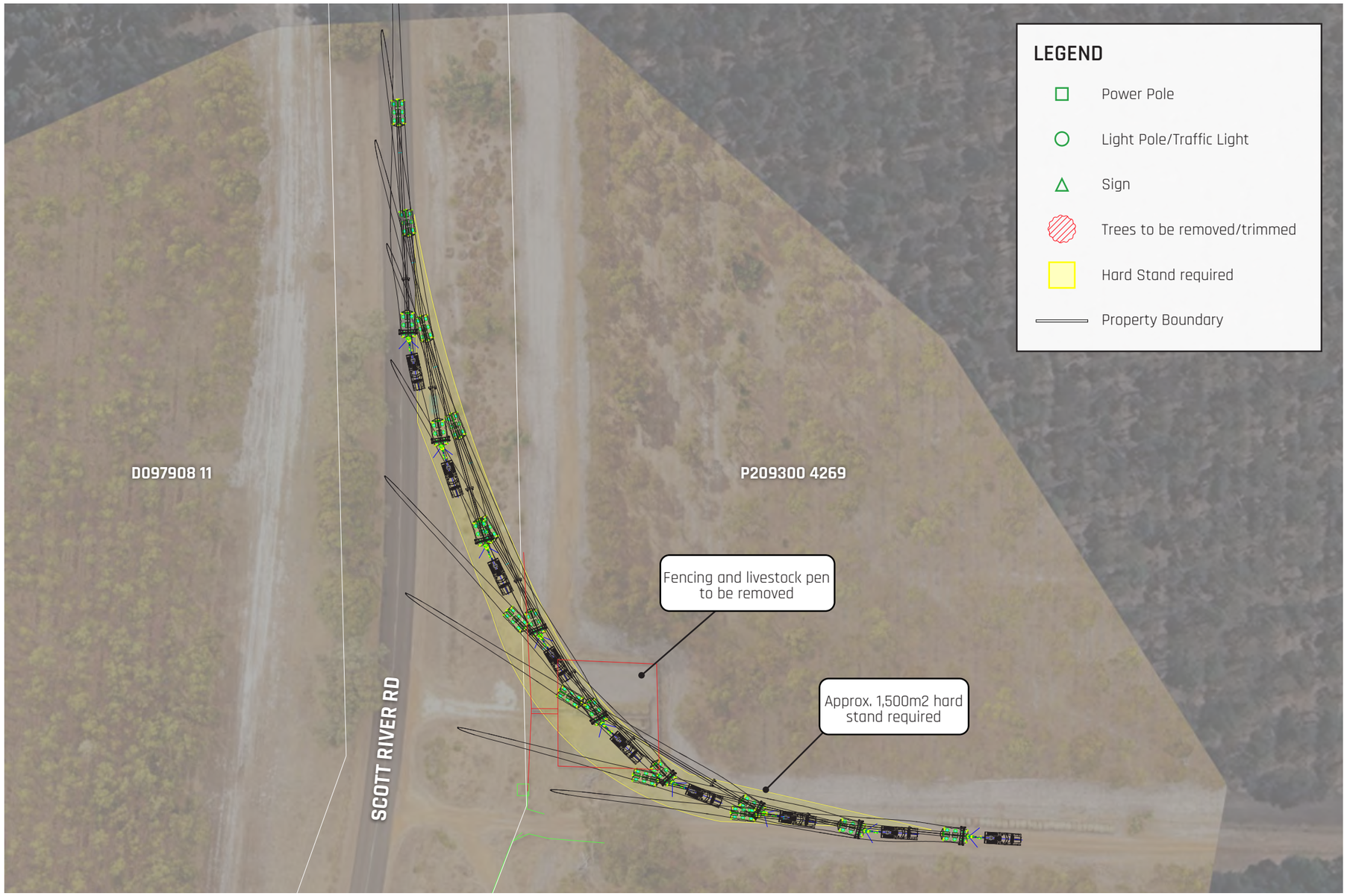
S01

LEFT TURN
Proposed Site
Entrance A

ROUTE 1

Site Entrance A is situated at an existing farm access track. The area is forested and getting blades into this entry point without tree clearing will require a new turn-in track made of hard stand material.

The existing livestock pen and a portion of existing fencing will need to be demolished and replaced with an access gate. This will require the landowner's permission.



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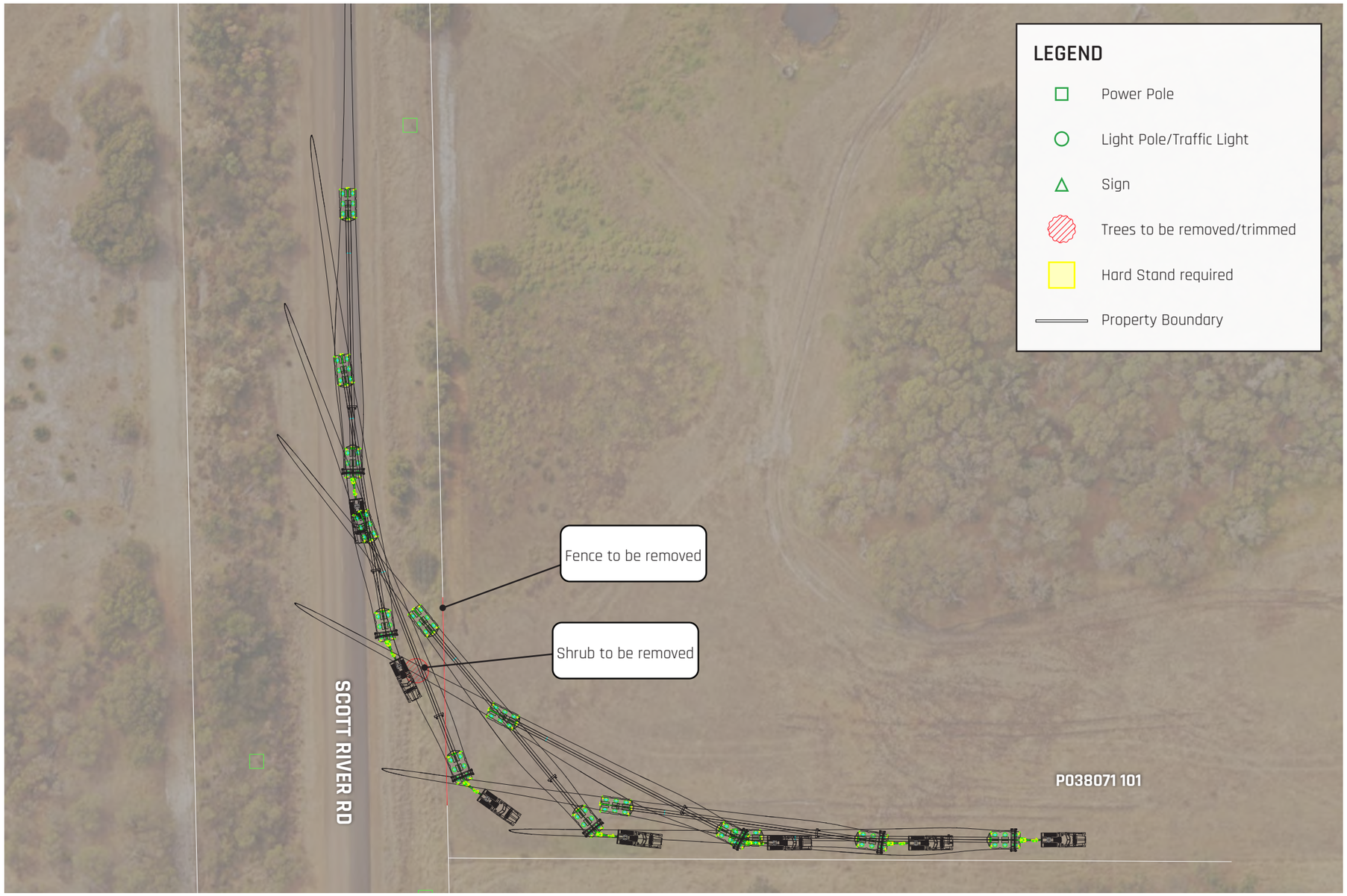
Pinch Point

S02

LEFT TURN
Proposed Site
Entrance B

ROUTE 1

Site Entrance B is at a relatively clear area of farmland. To stay clear of the trees on the west, blades will have to start turning in early. A section of existing fencing will need to be removed, and one small shrub will need to be cleared on the east side of Scott River Rd.



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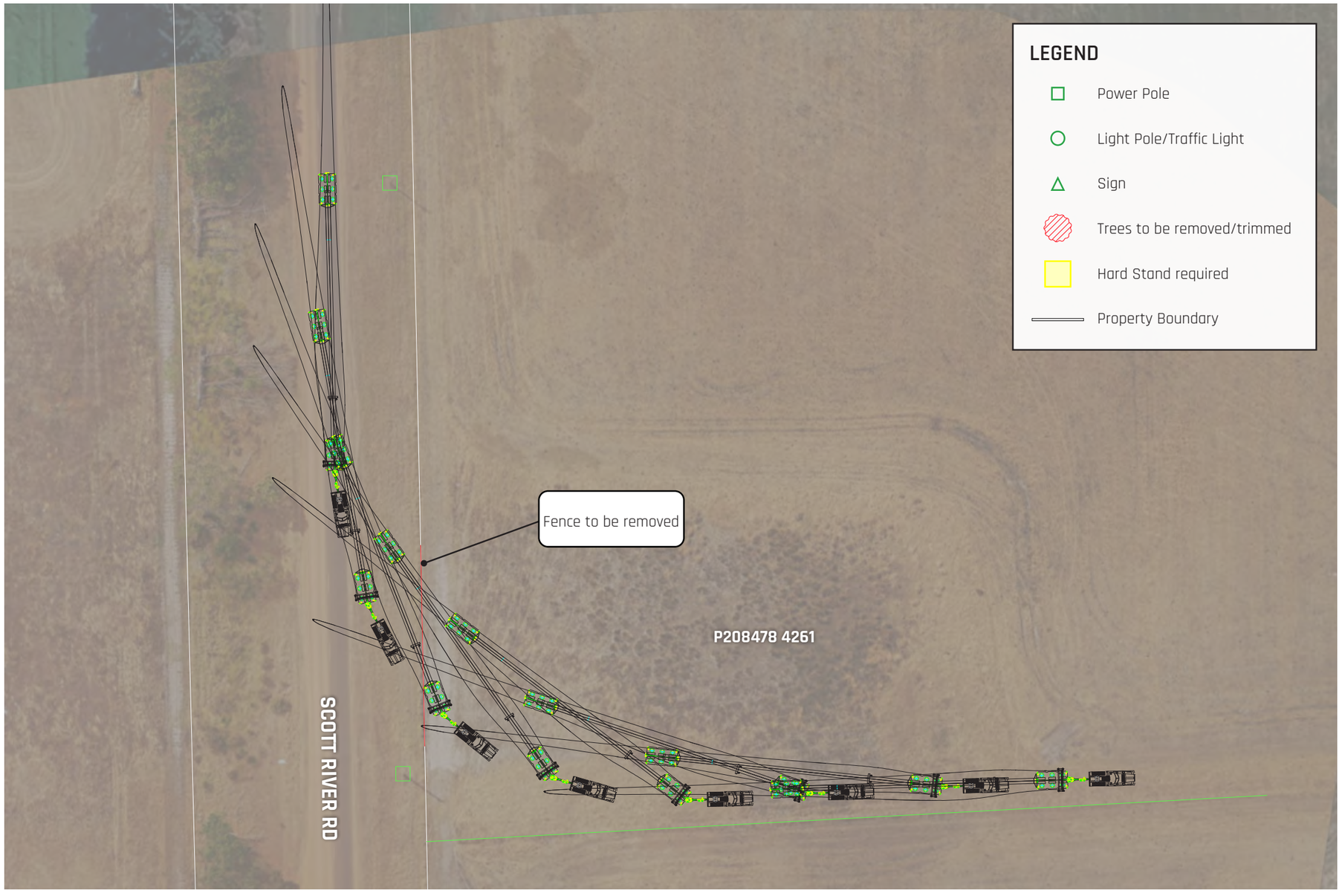
Pinch Point

S03

LEFT TURN
Proposed Site
Entrance C

ROUTE 1

Site Entrance C is just south of Site Entrance B and has very similar characteristics. The blade can be kept clear of the trees on the west, and only the existing fence will need to be modified.



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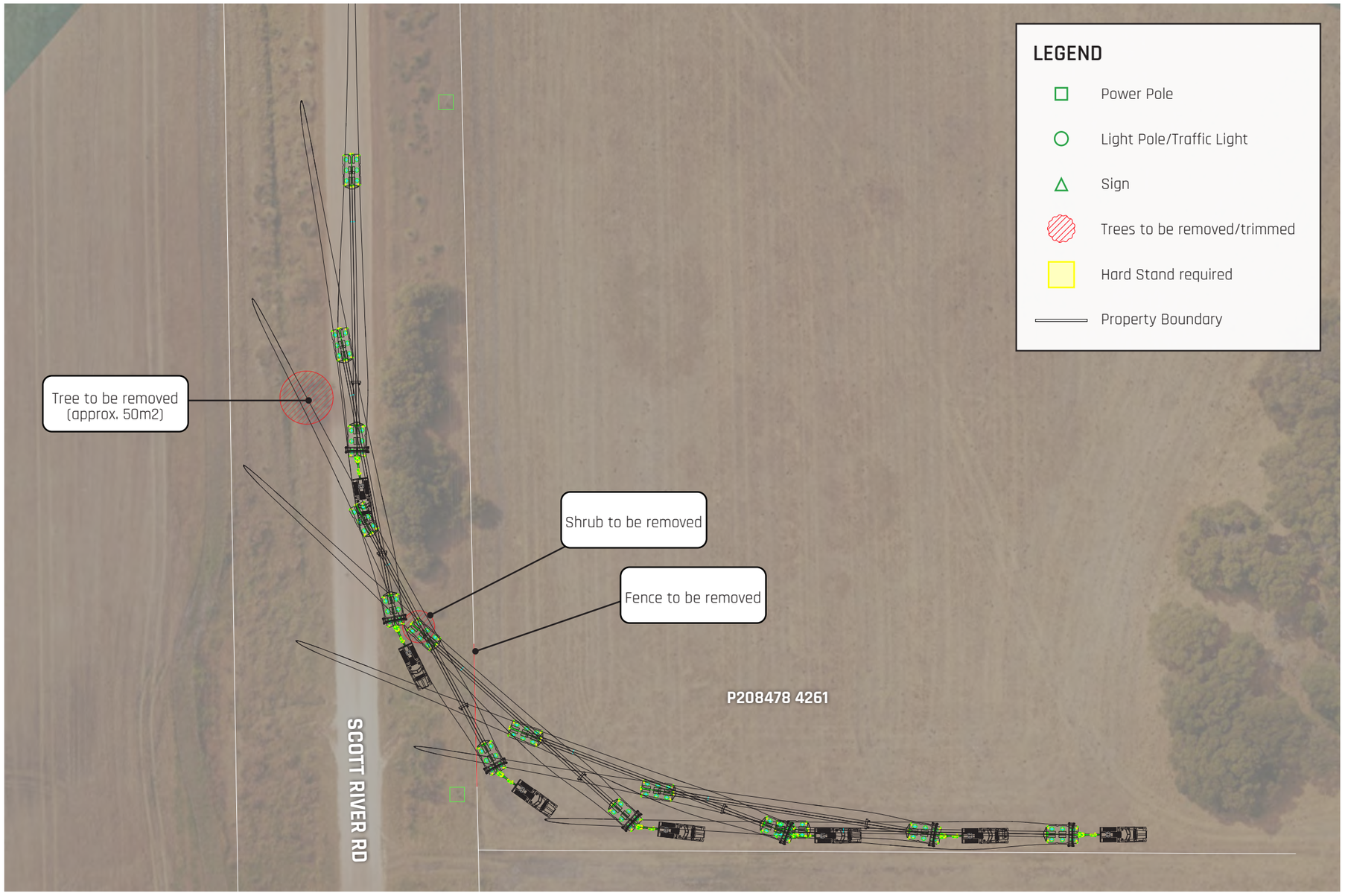
Pinch Point

S04

LEFT TURN
Proposed Site
Entrance D

ROUTE 1

As for the previous two entrances, Site Entrance D is a relatively straightforward left turn in, but there is a tree on the west which cannot be avoided and will need to be removed. The majority of vegetation on the east of Scott River Rd can be avoided, with only one small shrub requiring clearing.



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04

Conclusion

Conclusion

A brief outline of the report's major findings and any recommendations for actions.

Summary

Following our physical survey and analysis, ARES believe that transport of the oversize overmass (OSOM) components (including 90m blades) for the Beenup WF project from the **Port of Bunbury** is feasible with appropriate modifications made to the route as noted in this report.

There are no issues with using Bunbury as the Port of Import as it has a proven capacity for handling wind turbine cargo. Storage areas are sufficient to handle a project of this size.

One transport route was assessed - it is both the most direct and simplest route from Bunbury. There are no overhead obstructions and theoretically there is no limit on the tower size, although we have limited our assessment to 6.0m in diameter for this study. Power line lifting requirements will become significant with towers that are any larger.

The amount of modifications required to the route is relatively minor considering the size of blade and associated swept path under consideration. We have provided Summary of Road Modifications tables on the following page for convenient reference. Modifications on State roads will require approvals from Main Roads WA.

Four potential Site Entrances were assessed. Site Entrance A has significant vegetation clearing requirements, whilst the other three are in clearer areas, require less works and may be preferred for that reason.

Next Steps

To progress the OSOM transport scope further from here, the following steps are recommended:

- Early engagement with transport authorities (MRWA) and local councils (Shire of Augusta Margaret River) to obtain feedback and approval of proposed route, proposed modifications and any special conditions
- Early engagement of power authorities (Western Power) to perform a formal overhead asset survey for the route
- Early engagement with Southern Ports Bunbury regarding project timing, berth and storage area availability
- Selection of wind turbine model and hub height to allow detailed transportation analysis with actual components to be transported

...transport of OSOM components to Beenup WF is feasible.



Level Crossing Removal Project

A 125-ton, 25m-long precast concrete U-trough is unloaded at its destination after travelling through the heart of metropolitan Melbourne.

Summary of Road Modifications

The following table lists all required modifications to allow transport of components to take place.

Pinch Point	Road/Intersection	Modifications Required	Risk
01	Port Storage & Leschenault Dr	Temporary hardstand to be laid down on port land (approx. 320m2)	Medium
02	Leschenault Dr & Estuary Dr	Temporary hardstand to be laid down (approx. 230m2), 1x light pole to be relocated, some wire fencing to be removed	Medium
03	Estuary Dr & Koombana Dr	Temporary hardstand to be laid down (approx. 260m2), 1x sign to be made removeable.	Medium
04	Eelup Rotary	1x sign to be made removeable	Low
05	Robertson Dr & Bussell Hwy	6x signs to be made removeable	Low
06	Bussell Hwy & Sues Rd	Nil at this stage - pending completion of roundabout construction	Low
07	Sues Rd & Brockman Hwy	Temporary hardstand to be laid down (approx. 640m2)	Medium
08	Brockman Hwy & Scott River Rd	Temporary hardstand to be laid down (approx. 260m2), 1x sign to be made removeable	Medium
S01	Site Entrance A	Temporary hardstand to be laid down (approx. 1,500m2), livestock pen and fence to be removed	**High**
S02	Site Entrance B	Shrub removal required, existing fence to be removed/modified	Low
S03	Site Entrance C	Existing fence to be removed/modified	Low
S04	Site Entrance D	1x tree to be removed (approx. 50m2), shrub to be removed, existing fence to be removed/modified	Medium

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Attachment 4 (RSD) -Appendix E

Desktop Assessment of Subterranean Fauna

Desktop Assessment of Subterranean Fauna for a proposed wind farm in Scott River, Western Australia



Report by Invertebrate Solutions for SynergyRED Pty Ltd

August 2024

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Report Version		Date
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2024ISJ0401_F01_20240806	Final V01	6th August 2024

Invertebrate Solutions. (2024). Desktop assessment for subterranean fauna for a proposed wind farm in Scott River, Western Australia. Unpublished report to SynergyRED Pty Ltd, August 2024.

Report Number 2024ISJ04_F01_20240802

Prepared for: SynergyRED Pty Ltd

Frontispiece: The SynergyRED windfarm at Sandpatch, near Albany.

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Executive Summary

SynergyRED Pty Ltd (SynergyRED) are proposing to develop and construct an onshore wind farm in the Scott River Region (the Project). The subject site is approximately 15 km northeast of the town of Augusta within the South West region of Western Australia. SynergyRED proposes to construct up to 20 wind turbines (total maximum capacity of up to 100MW across the site). The indicative locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment.

Turbine foundations vary in size dependent upon the imposed loading, ground conditions, construction methodology and drainage requirements of the subject site. It is anticipated that each turbine will require approximately 600 - 800m³ of buried reinforced concrete foundation. This will be confirmed through the detailed design phase as turbine manufacturers have individual foundation requirements that must be adhered to (considering geotechnical conditions and the turbine model).

The wind turbine sites are planned to be in existing farmland areas, and excavations up to five metres below ground level are anticipated for the turbine bases and associated temporary dewatering. Invertebrate Solutions Pty Ltd (Invertebrate Solutions) has been engaged by SynergyRED to undertake a desktop assessment for subterranean fauna (stygofauna and troglofauna) at the Project area.

The desktop assessment identified four (4) Threatened Ecological Communities (TEC) associated with subterranean fauna within 50 km of the Project, all located in caves that occur between 15.75 – 26.25 km to the west and northwest of the Project area on the opposite side of the Blackwood River to the Project.

No subterranean fauna is known from the Project area, and all subterranean fauna identified during the desktop searches were associated with the caves of the Leeuwin-Naturaliste Ridge (LNR). The Project area is located to the east of the Leeuwin Naturaliste Ridge, on the eastern side of the Blackwood River, thus completely hydrologically separated from the karstic Tamala Limestone of the LNR. The ground surface is largely covered in sandy loam that provides little interconnected void space based on geotechnical cores. The Project area contains no suitable habitat for subterranean fauna, with the upper unsaturated strata being sandy clay and loam providing no interconnected pore spaces for troglofauna. Below the watertable, the strata consist of interbedded clay and sand with no interconnected pore spaces to provide habitat for stygofauna.

No survey work for stygofauna or troglofauna is necessary in order to meet the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA 2021).

1. Introduction

SynergyRED Pty Ltd (SynergyRED) are proposing to develop and construct an onshore wind farm in the Scott River Region. The subject site is approximately 15 km northeast of the town of Augusta within the South West region of Western Australia. SynergyRED proposes to construct up to 20 wind turbines (total maximum capacity of up to 100MW across the site). The indicative locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment.

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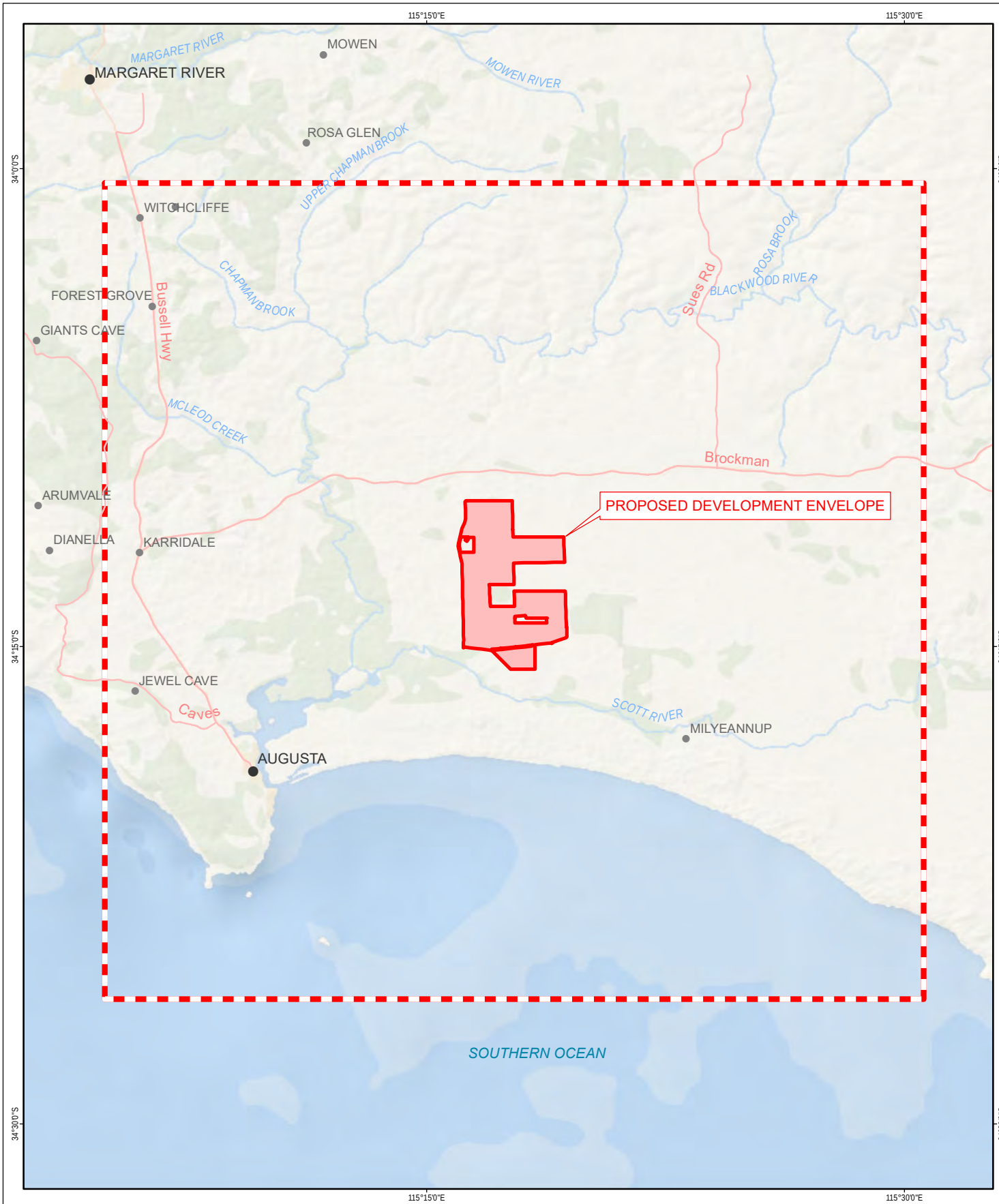
Subterranean fauna is comprised of stygofauna (aquatic subterranean dependent species) and troglofauna (air breathing subterranean dependent species). These are known in particular to form a subterranean faunal biodiversity hotspot on a worldwide scale in the Pilbara and Yilgarn cratons of Western Australia (Guzik et al. 2010). Many species of subterranean fauna have highly restricted ranges and can be considered short range endemics (*sensu* Harvey 2002), with sometimes highly restricted ranges due to habitat connectivity issues and evolutionary history.

The high degrees of local endemism and lack of habitat connectivity make subterranean fauna susceptible to localised impacts imposed by project development, particularly impacts to groundwater resources (Ponder & Colgan 2002), with the potential for species extinction likely if project planning phases do not adequately consider these risks.

1.1. Scope of Works

SynergyRED has requested Invertebrate Solutions to undertake the following scope of works for the Project, Western Australia:

- Undertake a desktop review for stygofauna and troglofauna presence.
- Undertake a risk assessment for impacts to stygofauna and troglofauna from the proposed development.
- Provide recommendations to minimise potential impacts and any suggested requirements for further work to comply with relevant legislation.
- Provide a written report containing the above items.



Legend

- Dekstop Study Area
- Proposed Development Envelope

0 2.5 5 10 km

Scale: 1:300,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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HORIZONTAL DATUM & PROJECTION	DATE
GDA2020	5/08/2024

PROJECT
Scott River Wind Farm

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

SynergyRED

Figure 1

Proposed Scott River Windfarm Location and Desktop Study Area

ENVIRONMAPS t: 0406 590 006 Environmental Mapping Solutions www.environmaps.com.au

C:\GIS\Jobs\Invertebrate Solutions\Scott River Wind Farm\Figures\SRWF_F01 Proposed Scott River Windfarm Location and Desktop Study Area_240805.mxd

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1.2. Study Area and Background Environmental Information

The Project is located approximately 15 km northeast of Augusta, Western Australia (Figure 1). The desktop study area comprises approximately 100,000 ha rectangle bounded by the northwest corner (34.007°S, 115.08°E) and the southeast corner (34.435°S, 115.51°E), centred on the Project.

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information (DCCEEW 2022). The Project is located within the Warren bioregion and a very small area in the north within the Southern Jarrah Forest subregion. The Development Envelope is predominantly comprised of dissected undulating country of the Leeuwin Complex and Albany Orogen with loamy soils supporting Karri forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting paperbark/sedge swamps, and Holocene marine dunes with *Agonis flexuosa* woodlands. (Environment Australia 2000).

The land tenure for the Project area is private freehold, across various landowners. The localised climate is classified as moderate Mediterranean with an average annual rainfall of 948 mm recorded at the Bureau of Meteorology (BoM) Station 009518 at Cape Leeuwin (BoM, 2024), located 40 km south of the Project area. Annual rainfall is seasonal with most rainfall occurring during the winter months, linked to low pressure systems in the Southern Ocean (May to August) (Plate 1).

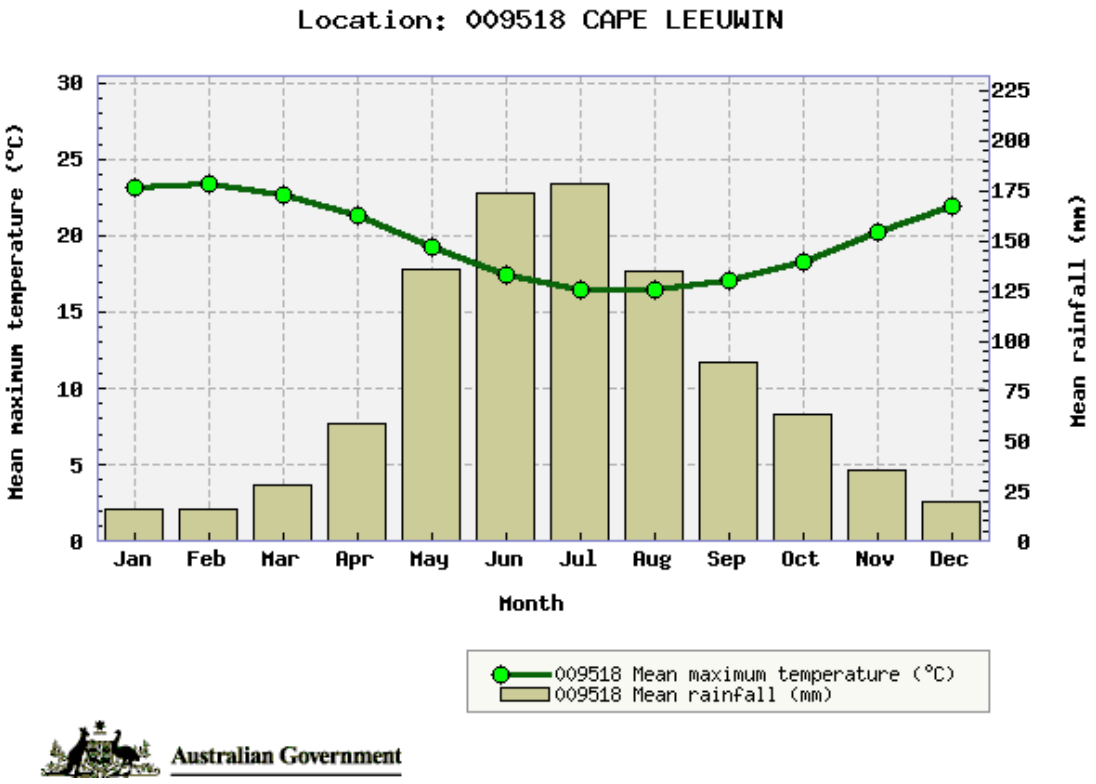


Plate 1 Cape Leeuwin long term climate data (After BOM.gov.au).

1.3. Document Review

The following documents have been examined in the compilation of this report, along with other referenced scientific papers used to provide general background:

- Eberhard, S. (2004). Ecology and hydrology of a threatened groundwater dependent ecosystem: The Jewel Cave karst system in Western Australia. Unpublished PhD thesis, Murdoch University, Western Australia, July 2005, 364p.
- Lowry, D.C., Horwitz, R.C. and Gemuts, I. (1967). Busselton and Augusta 1:250,000 1st Edition. Sheet SI 50-5 and SI 50-9 Geological Map, Geological Survey of Western Australia, Perth.

This report has been prepared with regard to the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA 2021).

1.4. Conservation Legislation and Guidance Statements

Subterranean fauna is protected under state legislation via the *Biodiversity Conservation* (BC) *Act 2016* which came into force on 1st January 2019, replacing the *Wildlife Conservation Act 1950*. The BC Act is aligned with the Federal *Environment Protection and Biodiversity Conservation* (EPBC) Act (1999). The assessment of subterranean fauna for environmental impact assessment (EIA) is undertaken in Western Australia with regard to the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA 2021). A summary flowchart of the assessment process for subterranean fauna is shown in Plate 2.

Part 2 of the BC Act provides for the listings of species that have special protection under Act. Updates to the species list are gazetted periodically by the Minister for Environment. The current Threatened fauna list (October 2023) includes numerous subterranean species, primarily from the Cape Range and Pilbara regions. Included in the list are crustaceans, arachnids and myriapods that are considered to be "rare or likely to become extinct, as critically endangered fauna, or are declared to be fauna that is in need of special protection" (DBCA 2023). In addition to the specially protected fauna, DBCA also maintains a list of Priority fauna considered to be of conservation significance but do not meet the criteria for formal listing under the BC Act. The Priority fauna list is irregularly updated by DBCA and, although it offers no formal legislative protection, these species are generally considered in the EIA process.

The state BC Act also provides for the Minister for Environment to formally list Threatened Ecological Communities (TECs), along with relevant threatening processes. Several subterranean ecological communities are recognised as Threatened including stygal root mat communities in both the Yanchep and Margaret River regions, Bundera Cenote Anchialine community on Cape Range, Cameron's Cave near the townsite of Exmouth on Cape Range, and stygobionts (aquatic subterranean organisms) in the Ethel Gorge aquifer in the Pilbara.

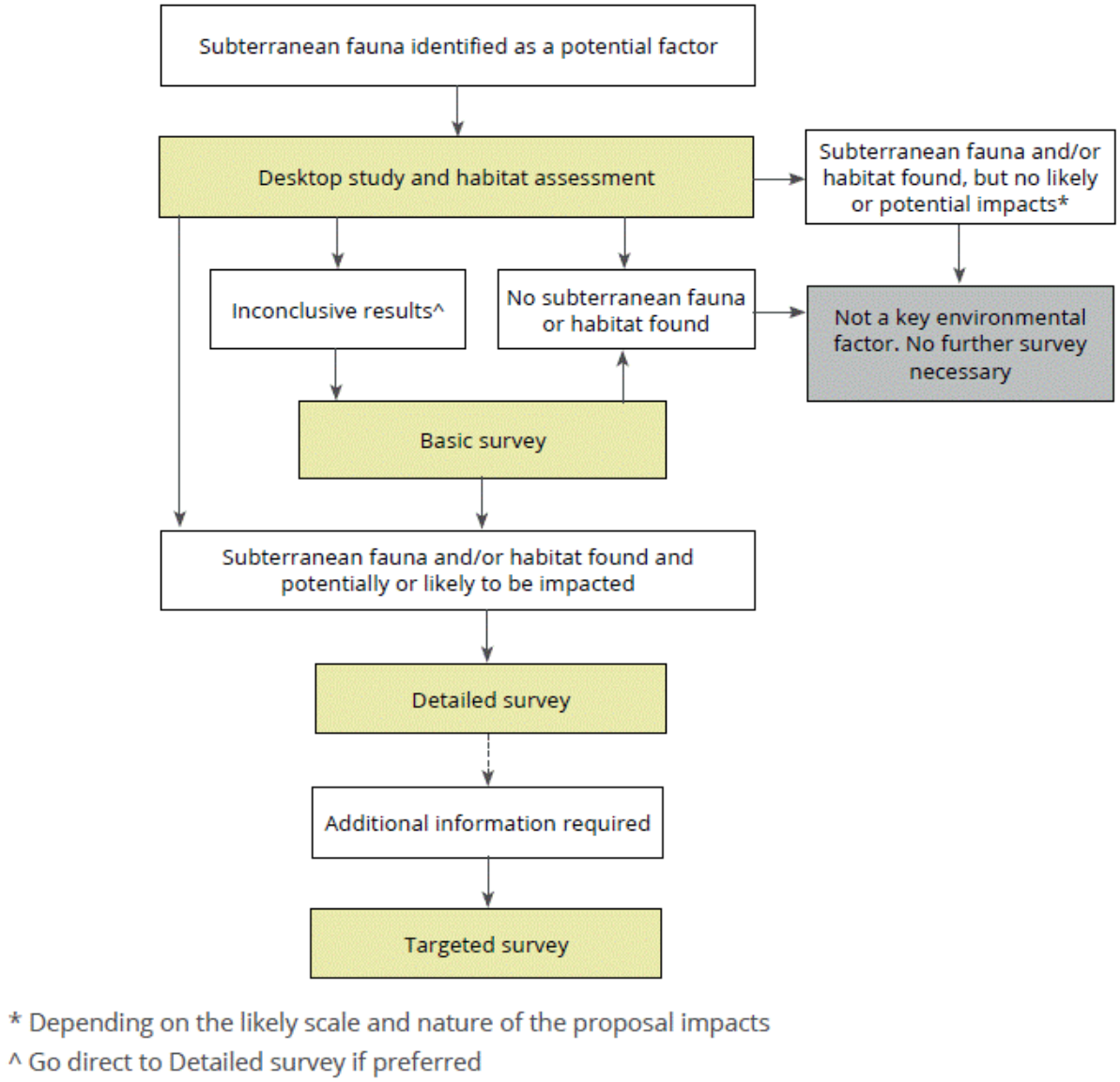


Plate 2 **Flowchart of the process for undertaking subterranean fauna assessments for impact assessment in Western Australia (EPA 2021).**

The EPBC Act (1999) provides federal protection to both species and ecological communities. Listings for subterranean fauna in WA include the Bundera Cenote on the western side of the Cape Range (>1000 km from the Project area), which contains a unique anchialine ecosystem including the stygal Cape Range Remipede *Kumonga exleyi* (Yager and Humphreys 1996), listed as Vulnerable. The Cape Range Gudgeon *Milyeringa veritas* and the Cape Range Blind Cave Eel *Ophisternon candidum* (Humphreys 2008) are also listed as Vulnerable species.

1.5. Subterranean Fauna Classification

Subterranean fauna is a collective term that refers to both troglofauna (terrestrial subterranean fauna inhabiting air voids) and stygofauna (aquatic subterranean fauna) (Humphreys 2000). Extensive amounts of jargon have historically been associated with subterranean fauna and multiple forms of classification have been used through time (Sket 2008). The most accepted classifications divide troglofauna into categories that describe a particular species' degree of dependence upon the

subterranean environment. Due to the reliance upon ecological information to determine if a species is a troglobite, the concept of troglomorphy (Christiansen 1962), specific morphological adaptations to the subterranean environment, is used to define obligate subterranean species. The term troglomorphy, initially confined to morphology, has since been used to describe both morphological or behavioural adaptations (Howarth 1973). This combination provides a practical system, easily applied in the field and requires minimal detailed ecological studies (Sket 2008). The level of subterranean dependency for different ecological groupings is described below:

- Troglobiont: animals that are obligate subterranean species, and mostly show morphological adaptation to subterranean habitats (troglomorphisms) including depigmentation, loss or reduction of eyes, elongation of appendages, flightlessness or wing reduction, and extra sensory hairs.
- Troglophiles: animals that can complete their entire lifecycle within a cave but possess no specific adaptations to the cave environment. These species are capable of living outside caves in suitably dark and moist epigean habitats.
- Trogloxenes: animals that use the subterranean environment but require surface environments to complete part of their lifecycle (generally either feeding or breeding). Common trogloxenes are cave dwelling bats, cave swiftlets and cave crickets that leave subterranean habitats to feed.

The terms above refer to stygofauna when the prefix is altered to 'stygo' (Humphreys 2000).

Species which inhabit the deep soil habitat (Edaphophiles) often exhibit convergent morphological adaptations to those animals found exclusively within caves, such as loss/reduction of eyes, body flattening, loss of pigmentation etc. Soil dwelling species typically lack restrictions in distribution, as these organisms have experienced relatively minimal isolation in evolutionary timeframes, thus, only true troglobitic animals are studied in subterranean fauna surveys. Taxa discussed in this study were assessed upon their combination of loss/reduction of eyes, and reduction in pigmentation, wing development, and elongation of appendages to assess if a taxon was an edaphophile or truly reliant upon the subterranean habitat (Troglobiont).

1.6. Report Limitations and Exclusions

This study was limited to the written scope provided to Eco Logical Australia Pty Ltd by Invertebrate Solutions (1st March 2024) and in Section 1.1. This study was limited to the extent of information made available to Invertebrate Solutions at the time of undertaking the work. Information not made available to this study, or which subsequently becomes available, may alter the conclusions made herein.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Invertebrate Solutions has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Invertebrate Solutions described in this report (this section and throughout this report). Invertebrate Solutions disclaims liability arising from any of the assumptions being incorrect.

Invertebrate Solutions has prepared this report on the basis of information provided by SynergyRED and Eco Logical Australia Pty Ltd and others (including Government authorities), which Invertebrate Solutions has not independently verified or checked beyond the agreed scope of work. Invertebrate Solutions does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Site conditions may change after the date of this report. Invertebrate Solutions does not accept responsibility arising from, or in connection with, any change to the site conditions. Invertebrate Solutions is also not responsible for updating this report if the site conditions change.

1.6.1 Potential Survey Specific Limitations and Assumptions

Invertebrate Solutions has made the following assumptions in the writing of this report and its subsequent conclusions:

- No sustained impacts to the regional water table, from the Project activities as detailed in Section 1.0, are anticipated.

2. Methods

2.1. Desktop Methods

The subterranean fauna desktop review comprises:

- An assessment of the likelihood that subterranean species are present in the habitats located within the broader Desktop study area and the Project area within the Desktop Study area.

The likelihood of stygofauna and troglofauna species occurring in the study area was assessed using a combination of regional information, geological, hydrogeological and database searches including:

- Analysis of published and unpublished reports concerning subterranean fauna from the region.
- Available geological maps.
- Geological, geotechnical, and hydrogeological information available for the Study area.
- Results of a Protected Matters Search from the Australian Government's Department of Climate Change, Energy, Environment, and Water (DCCEEW) website.
- Records of fauna held by the Western Australian Museum.

Based on the analysis of all available information, the study area was assigned a level of likelihood to support subterranean fauna of either 'Low', 'Moderate', 'High', or 'Definite'.

3. Desktop Subterranean Fauna Review

3.1 Regional Information

The southwest of Western Australia contains karstic limestone in a thin coastal strip from north of Jurien Bay to Cape Leeuwin in the south. The primary habitat for subterranean fauna in this coastal limestone is within the Tamala Limestone that forms caves throughout the extent of the Tamala Limestone and is known to contain a moderately diverse assemblage of troglofauna (Moulds 2007) and stygofauna (Bennelongia 2016, Eberhard 2004, Invertebrate Solutions 2023) albeit in low abundance. Very limited stygofauna records are known from fractured rock aquifers in non-karstic lithologies to the east of the Tamala Limestone, predominately within the Darling Scarp east of Perth (Schmidt 2007). The southernmost extent of the Tamala Limestone occurs on the Leeuwin-Naturaliste Ridge (LNR) that is present on the western edge of the Desktop Study area for the Project.

3.1.1 Subterranean fauna of the Tamala Limestone in the northern Swan Coastal Plain

Stygofauna has been sampled within the superficial Gnangara Mound in the Perth region as part of regional stygofauna sampling (Bennelongia 2008). This sampling has shown that stygofauna do occur within the unconfined surficial aquifer, but with low species richness. A moderately extensive regional sampling program recorded 11 species from within the Gnangara Mound between Guilderton in the north, east to the Darling fault and south to the Swan River (Bennelongia 2008). Further repeated stygofauna sampling of 12 shallow bores in the central Perth suburb of Kensington recorded 21 species with 13 of these considered to be stygofaunal species comprising six copepods, three syncarids, three oligochaetes and one annelid species (Bennelongia 2016). All the species were recorded in very low abundances. These results are similar to those found by hoc basis sampling by WAM staff with only 11 species recorded. Sampling of the deeper confined Leederville and Yarragadee aquifers has also been undertaken by the WAM with no occurrence of stygofauna recorded to date.

Schmidt (2007) found relatively few species in groundwater associated with Marbling Brook on the eastern edge of the Darling Scarp in the Chittering catchment, 60 km north-east of Perth. The total yield from seven groundwater bores sampled 12 times was about 21 species, with most being copepods and only two of the 21 species were considered to be stygobionts. Other animals are either known, or likely to be, widespread.

The southern Swan Coastal Plain was sampled by GHD (2010) as part of a drainage and water management plan for the Murray River catchment for the then Western Australian Department of Water (now Department of Water and Environment Regulation (DWER)). The regional survey for stygofauna within the superficial aquifer in the Shire of Murray sampled 20 bores from five different wetland areas and recorded stygofauna from two bores during a single phase sampling survey. A single new species of cyclopoid copepod (*Mixocyclops* sp. nov.) and two species of parabathynellid? were recorded. The copepod specimens from near Pinjarra are closely related to species recorded from Yanchep National Park in the north of the Swan Coastal Plain (GHD 2010).

3.1.2 Subterranean fauna of the Leeuwin Naturaliste Ridge

The LNR was sampled for subterranean fauna by Eberhard (2004) as part of a research program into the Jewel Cave system and its hydrology. This study, focused on within cave sampling, where caves intersect the regional water table investigated the diversity of stygofauna associated with the threatened aquatic root mat communities (1 – 4) (DBCA 2023, DCCEEW 2024). The richness of aquatic cave fauna in the Leeuwin Naturaliste Ridge can be considered rich in total species diversity, however, most of the species recorded are considered to be stygoxenes or stygophiles and are present more widely in epigean aquatic habitats in Western Australia (Eberhard 2004). Only four species represent stygobionts (one amphipod, two copepods and one ostracod) with the remaining taxa being stygophilic or stygoxenes (Eberhard 2004). The aquatic root mat communities show relatively low abundance of individual taxa in most cases, but there are common species from the Leeuwin Naturaliste ridge and the Yanchep root mat communities north of Perth (Jasinska and Knott 2000), although some of the exact taxonomy remains unresolved (Eberhard 2004).

3.1.3 Conservation Significant Fauna and Habitats

A list of conservation significant fauna subterranean invertebrate fauna for LNR was compiled from the DBCA Wildlife Conservation (Specially Protected Fauna – *Biodiversity Conservation Act* 2016) Notice 2023 (DBCA 2023) and the DCCEEW's Protected Matters Search Tool (PMST) within 50 km of the Project area. No subterranean species that are listed under the BC Act and/or the EPBC Act and are likely to occur or have known habitat within the region (Leeuwin – Naturaliste Ridge).

The PMST results listed four (4) Threatened Ecological Communities (TEC) associated with subterranean fauna within 50 km of the Project (Table 1). All four of these TECs are located in caves that occur between 15.75 – 26.25 km to the west and northwest of the Project area, within the Tamala Limestone of the LNR on the western edge of the Desktop Study area. The occurrence of these TECs is well known throughout the LNR from the continued exploration of caves by various speleological groups over the previous 60 years and their locations and extent are well known at a regional scale.

The Project area is located to the east of the LNR, on the eastern side of the Blackwood River, thus completely hydrologically separated from the karstic Tamala Limestone of the LNR.

Table 1 Conservation significant subterranean communities potentially within the region.

Community Name	Description	Conservation listing (BC Act)	Conservation listing (EPBC)	Distance from Project
Aquatic Root Mat Community 1	Root mat communities based upon the rootlets and their associated microflora providing the primary food source for aquatic cavernicoles (cave animals) in these communities include crustaceans, mites, rotifers, microscopic worms, tardigrades, and insects and crustaceans. Some of the species appear to be endemic to these cave systems, and some to be confined to a single cave.	Critically Endangered	Endangered	15.75 km Jewel and Easter Cave
Aquatic Root Mat Community 2		Critically Endangered	Endangered	18.75 km Strongs Cave
Aquatic Root Mat Community 3		Critically Endangered	Endangered	22.4 km Kudjal Yolgah and Budjur Mar Caves
Aquatic Root Mat Community 4		Critically Endangered	Endangered	26.25 km Calgardup Cave

3.2 Subterranean Fauna Habitat of the Project Area

The Project area is located to the east of the LNR, on the eastern side of the Blackwood River, thus completely hydrologically separated from the karstic Tamala Limestone of the LNR. The ground surface contains little suitable habitat for troglofauna due to being largely covered in sandy loam (Figure 2) that provides little interconnected void space based on geotechnical cores (Plate 3, Stantec 2024). There are areas throughout the Development envelope that contain ferricrete at or immediately below the surface (Stantec 2024). Ferricrete, will contain some voids, although they are rarely interconnected and due to the adjacent dune sand, the voids will be filled by sand thus no habitat for subterranean fauna is present within ferricrete horizons.

The upper unsaturated strata consist of sandy clay and loam providing no interconnected pore spaces for troglofauna. Below the watertable, the strata consist of interbedded clay and sand with no interconnected pore spaces to provide habitat for stygofauna.

Based on the above no habitat is present for either troglofauna or stygofauna within the Project area.

Table 2 Geological units in the Proposed Scott River Windfarm Project and Subterranean fauna habitat potential.

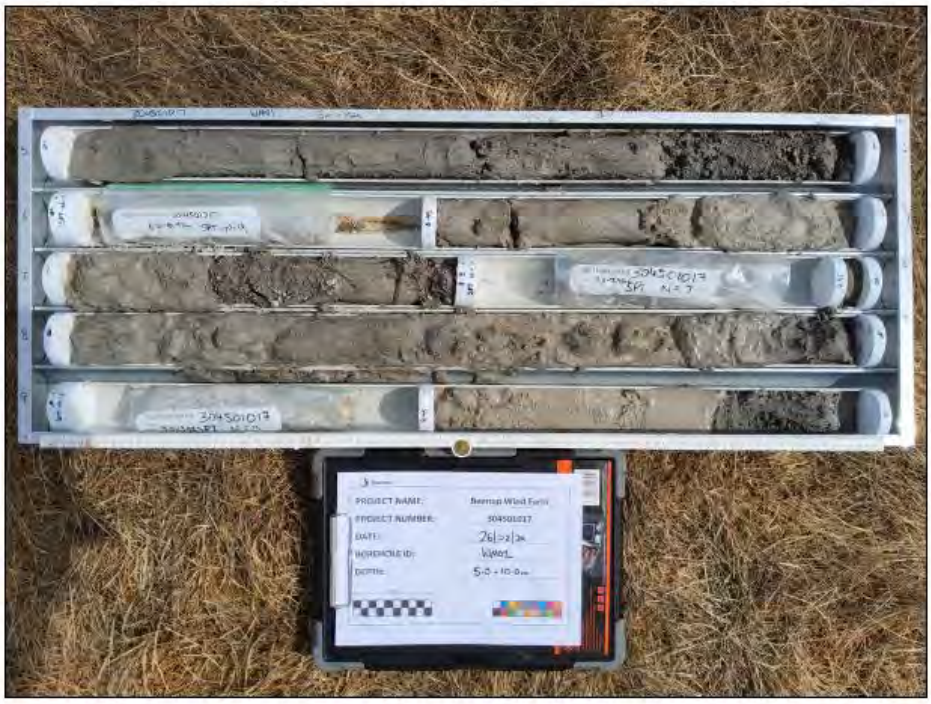
Unit	Description / Remarks	Subterranean Fauna Suitability
Sand dunes	Dune sand altered to podzolic quartz sand, surface ferricrete.	Low for stygofauna and troglofauna.
Laterite and quartz sand	Laterite and associated quartz sand undifferentiated	Low for stygofauna if saturated Low for troglofauna.
Archean basement Gneiss	Granite gneiss and granulite basement rock	Nil for stygofauna and troglofauna unless highly fractured.

Stantec **CORE BOX - PHOTO SHEET** **Borehole No. WM01**

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River Job No: 304501017

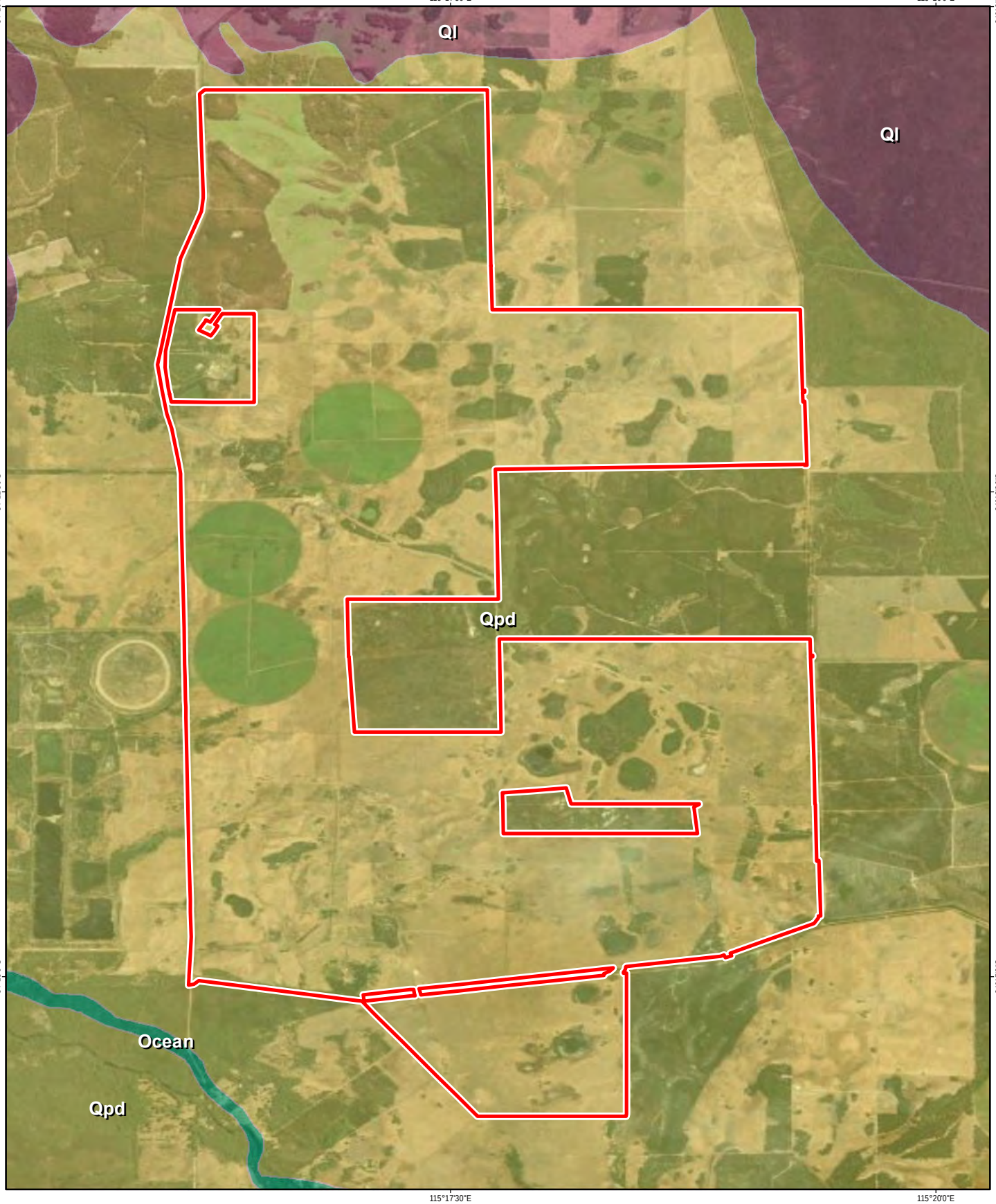


WM01: 0 - 5m,
0.0 - 3.0m



WM01: 5 - 10m,
5.0 - 10.0 m

Plate 3 Core photos of the upper 10m of strata showing the sandy clay composition with no habitat for subterranean fauna present (Image after Stantec 2024).



Legend

Proposed Development Envelope

Geology

Ql: Laterite and associated quartz sand (undifferentiated).

Qpd: Sand dunes - now altered to podzolic quartz sand with underlying ferruginous laterite.

Ocean

0 0.375 0.75 1.5 km

Scale: 1:50,000 @ A4

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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HORIZONTAL DATUM & PROJECTION	DATE
GDA2020	5/08/2024

PROJECT: Scott River Wind Farm

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

SynergyRED

Figure 2
Geology

ENVIRONMAPS t: 0406 590 006
Environmental Mapping Solutions www.environmaps.com.au

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3.3 Likelihood of stygofauna presence

A search was undertaken of the Western Australian Museum databases for Crustaceans (WAM 2024a) and Arachnids/Myriapods (WAM 2024b) centred on the Project. These results, filtered for stygofauna species, are summarised in Table 3.

The only subterranean fauna recorded within the desktop study area are from the Tamala limestone LNR to the west of the Project area and all of the known stygofauna are associated with the four cave root mat TECs (Table 1), which is both geologically and hydrologically separated from the Project area.

Based on the stygofauna records within the desktop study area and the absence of potential habitat in the Project area no stygofauna is anticipated to occur within the Project area.

Table 3 Stygofauna recorded from the Desktop Study Area.

Higher Classification	Family	Genus and Species	Notes
Annelida			
Oligochaeta	Tubificidae	*Ainudrilus (WA14) sp. n.?*	Stygophile
		Aktedrilus WA13	Stygophile
		Pristina longiseta	Stygophile
	Phreodrilidae	*Phreodrilidae WA26*	Stygophile
Crustacea:			
Bathynellacea	Parabathynellidae	*Parabathynellidae indet.*	Stygobiont
Amphipoda	Perthiidae	*Perthia cf. acutitelson*	Stygophile
	Paramelitidae	*Uroctena n. sp.*	Stygobiont
Copepoda	Cyclopoidaa	*Diacyclops humphreysi*	Widespread stygobiont
		Macrocyclops albidus	Stygophile
		Mesocyclops brooksi	Widespread stygophile
		Kinnecaris eberhardi	Stygobiont
Ostracoda		*Acandona admiratio*	Stygobiont
		Candonocypris cf. novaezelandiae	Stygophile
		Penthesilenula brasiliensis	Stygophile
Arachnida			
Acarina	Oribatida	sp. 6	Stygophile
	Halacaridae	*Soldanellonyx monardi*	Stygophile

3.4 Likelihood of troglofauna presence

A search was undertaken of the Western Australian Museum databases for Crustaceans (WAM 2024a) and Arachnids/Myriapods (WAM 2024b) centred on the Project. The results of these filtered for subterranean troglofauna species and shown in Table 4. All troglofauna records from the Desktop Study area are associated with caves on the LNR and no troglobionts are known from the Project area or its immediate surrounds.

Based on the troglofauna records within the desktop study area and the absence of potential habitat within the Project area, no troglofauna is anticipated to occur within the Project area.

Table 4 Troglofauna in WAM databases recorded from within the Study Area.

Higher Classification	Family	Genus and Species	Notes
Arachnida			
Araneomorphae	Stiphidiidae	*Baiami tegenaroides*	Troglophile – Throughout the LNR
Opilionida	Neopilionidae	*Megalopsalis minima*	Troglophile – Throughout the LNR
Pseudoscorpionida	Cheliferidae	*Protochelifer cavernerum*	Troglophile – southern Australian distribution
	Pseudotyrannochthonidae	*Pseudotyrannochthonius giganteus*	Troglophile – Throughout the LNR

4. Discussion and Conclusions

The Project area contains no suitable habitat for subterranean fauna, with the upper unsaturated strata being sandy clay and loam providing no interconnected pore spaces for troglofauna. Below the watertable, the strata consist of interbedded clay and sand with no interconnected pore spaces to provide habitat for stygofauna.

No subterranean fauna is known from the Project area, and all subterranean fauna identified during the desktop searches were associated with the caves of the LNR. The Project area is located to the east of the Leeuwin Naturaliste Ridge, on the eastern side of the Blackwood River, thus completely hydrologically separated from the karstic Tamala Limestone of the LNR.

No further survey work for stygofauna or troglofauna is necessary in order to meet the Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment (EPA2021).

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Appendix 1

Department of Parks and Wildlife Conservation Codes

CONSERVATION CATEGORY DEFINITIONS

For Western Australian Fauna and Flora

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species.

Threatened flora is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species.

The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 2 that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria[3], and is based on the national distribution of the species.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

Examples of use:

- The western ringtail possum (*Pseudocheirus occidentalis*) is listed as a critically endangered threatened species under the *Biodiversity Conservation Act 2016.*
- Western ringtail possum is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CR.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.

Examples of use:

- *Caladenia hopperiana* is listed as an endangered threatened species under the *Biodiversity Conservation Act 2016.*
- *Caladenia hopperiana* is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EN.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Examples of use:

- The forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) is listed as a vulnerable threatened species under the *Biodiversity Conservation Act 2016.*
- Forest red-tailed black cockatoo is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: VU.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Examples of use:

- *Acacia kingiana* is listed as an extinct species under the *Biodiversity Conservation Act 2016.*
- *Acacia kingiana* is listed as extinct under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EX.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no fauna or flora species listed as extinct in the wild.

SP Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act cannot also be listed as specially protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA)[4], China (CAMBA)[5] or The Republic of Korea (ROKAMBA)[6], and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention)[7], an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Examples of use:

- The wedge-tailed shearwater (*Ardenna pacifica*) is listed as a specially protected migratory species under the *Biodiversity Conservation Act 2016.*
- Wedge-tailed shearwater is listed as migratory under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: MI.

CD **Species of special conservation interest (conservation dependent)**

Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Currently only fauna are listed as species of special conservation interest.

Examples of use:

- The wambenger, south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*) is listed as a specially protected species of special conservation interest under the *Biodiversity Conservation Act 2016.*
- Wambenger, south-western brush-tailed phascogale, is listed as conservation dependent under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CD.

OS **Species otherwise in need of special protection (other specially protected)**

Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Currently only fauna are listed as species otherwise in need of special protection.

Examples of use:

- The dugong (*Dugong dugon*) is listed as a specially protected species otherwise in need of special protection under the *Biodiversity Conservation Act 2016.*
- Dugon is listed as other specially protected fauna under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: OS.

P **Priority species**

Priority is not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of priority status is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 **Priority 1: Poorly-known species - known from few locations, none on conservation lands**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, for example, agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under immediate threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Borya stenophylla* is listed as a Priority 1 species by the Department of Biodiversity, Conservation and Attractions.
- *Borya stenophylla* is listed as Priority 1 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P1.

2 Priority 2: Poorly-known species - known from few locations, some on conservation lands

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, for example, national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Caladenia nivalis* is listed as a Priority 2 species by the Department of Biodiversity, Conservation and Attractions.
- *Caladenia nivalis* is listed as Priority 2 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P2.

3 Priority 3: Poorly-known species - known from several locations

Species that are known from several locations and the species does not appear to be under imminent threat or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.

Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.

Examples of use:

- *Acacia nitidula* is listed as a Priority 3 species by the Department of Biodiversity, Conservation and Attractions.
- *Acacia nitidula* is listed as Priority 3 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P3.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as a conservation dependent specially protected species.

(c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.

(d) Other species in need of monitoring.

Examples of use:

- *Banksia aculeata* is listed as a Priority 4 species by the Department of Biodiversity, Conservation and Attractions.
- *Banksia aculeata* is listed as Priority 4 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P4.

[1] The definition of flora includes algae, fungi, and lichens.

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

[3] Western Australia has assigned species to threat categories using the *IUCN Red List of Threatened Species Categories and Criteria* since 1996 (referencing all criteria).

[4] JAMBA - first included in the WA migratory species list in 1980.

[5] CAMBA - first included in the WA migratory species list in 2010.

[6] ROKAMBA - first included in the WA migratory species list in 2010.

[7] Bonn Convention (Birds) - first included in the WA migratory species list in 2015.

Appendix 2

Protected Matters Search Results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 11-Jun-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	11
Listed Threatened Species:	104
Listed Migratory Species:	56

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	14
Commonwealth Heritage Places:	1
Listed Marine Species:	81
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	4
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	63
Regional Forest Agreements:	1
Nationally Important Wetlands:	3
EPBC Act Referrals:	46
Key Ecological Features (Marine):	3
Biologically Important Areas:	16
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Vasse-wonnerup system	Within 10km of Ramsar site	In buffer area only

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only
Commonwealth Marine Areas (EPBC Act)	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Aquatic Root Mat Community 1 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 2 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 4 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In buffer area only
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In buffer area only
Empodisma peatlands of southwestern Australia	Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
Scott River Ironstone Association	Endangered	Community likely to occur within area	In feature area
Shrublands on southern Swan Coastal Plain ironstones	Endangered	Community likely to occur within area	In buffer area only
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat may occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area
Zanda baudinii listed as Calyptorhynchus baudinii			
Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris			
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
CRUSTACEAN			
Cherax tenuimanus			
Hairy Marron, Margaret River Hairy Marron, Margaret River Marron [78931]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Engaewa pseudoreducta			
Margaret River Burrowing Crayfish [82674]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Engaewa reducta			
Dunsborough Burrowing Crayfish [82675]	Critically Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Galaxiella nigrostriata			
Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area	In feature area
Nannatherina balstoni			
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat known to occur within area	In feature area
Nannoperca pygmaea			
Little Pygmy Perch [88315]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
FROG			
[Anstisia alba listed as Geocrinia alba](#) White-bellied Frog, Creek Frog [92544]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Anstisia vitellina listed as Geocrinia vitellina](#) Orange-bellied Frog [92547]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Bettongia penicillata ogilbyi](#) Woylie [66844]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
[Myrmecobius fasciatus](#) Numbat [294]	Endangered	Species or species habitat known to occur within area	In feature area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pseudocheirus occidentalis](#) Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Setonix brachyurus](#) Quokka [229]	Vulnerable	Species or species habitat known to occur within area	In feature area
OTHER			
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In feature area
PLANT			
[Banksia mimica](#) Summer Honeypot [82765]	Endangered	Species or species habitat known to occur within area	In feature area
[Banksia nivea subsp. uliginosa](#) Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area	In feature area
[Banksia squarrosa subsp. argillacea](#) Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Boronia exilis](#) Scott River Boronia [64844]	Endangered	Species or species habitat known to occur within area	In feature area
[Brachyscias verecundus](#) Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
[Caladenia busselliana](#) Bussell's Spider-orchid [24369]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Caladenia excelsa](#) Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Caladenia harringtoniae](#) Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area	In feature area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat may occur within area	In buffer area only
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Darwinia ferricola Scott River Darwinia [56706]	Endangered	Species or species habitat known to occur within area	In feature area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area	In buffer area only
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat may occur within area	In buffer area only
Gastrolobium modestum Broad-leaved Gastrolobium [78361]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area	In feature area
Grevillea brachystylis subsp. australis [55525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grevillea brachystylis subsp. grandis Large-flowered Short-styled Grevillea [85001]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grevillea maccutcheonii McCutcheon's Grevillea [64522]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Kennedia lateritia Augusta Kennedia [45985]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat likely to occur within area	In feature area
Lambertia orbifolia Roundleaf Honeysuckle [15725]	Endangered	Species or species habitat known to occur within area	In feature area
Leptomeria dielsiana Diels' Currant Bush [5146]	Vulnerable	Species or species habitat known to occur within area	In feature area
Morelotia australiensis listed as Tetraria australiensis Southern Tetraria [92784]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Reedia spathacea Reedia [2995]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat known to occur within area	In buffer area only
Verticordia plumosa var. ananeotes Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat known to occur within area	In buffer area only
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
SHARK			
Carcharias taurus (west coast population)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Centrophorus uyato			
Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Megaptera novaeangliae](#) Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area	In buffer area only
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat likely to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area	In buffer area only
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris alba Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area	In buffer area only
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52112]	WA	In buffer area only
Commonwealth Land - [52117]	WA	In buffer area only
Commonwealth Land - [51991]	WA	In buffer area only
Commonwealth Land - [51103]	WA	In buffer area only
Commonwealth Land - [52113]	WA	In buffer area only
Commonwealth Land - [51992]	WA	In buffer area only
Commonwealth Land - [51482]	WA	In buffer area only
Commonwealth Land - [50382]	WA	In buffer area only
Commonwealth Land - [51990]	WA	In buffer area only
Commonwealth Land - [51121]	WA	In buffer area only
Commonwealth Land - [50386]	WA	In buffer area only
Commonwealth Land - [51995]	WA	In buffer area only
Commonwealth Land - [50383]	WA	In buffer area only
Commonwealth Land - [51483]	WA	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Cape Leeuwin Lighthouse	WA	Listed place	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area	In buffer area only
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Stercorarius antarcticus as Catharacta skua			
Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sternula nereis as Sterna nereis			
Fairy Tern [82949]		Breeding known to occur within area	In buffer area only
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalasseus bergii as Sterna bergii			
Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura australe			
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area	In buffer area only
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Mammal			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Reptile			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
[Balaenoptera acutorostrata](#) Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area	In buffer area only
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In buffer area only
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area	In buffer area only
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area	In buffer area only
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area	In buffer area only
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area	In buffer area only
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area	In buffer area only
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area	In buffer area only
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area	In buffer area only

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories	Buffer Status
South-west Corner	National Park Zone (IUCN II)	In buffer area only
South-west Corner	National Park Zone (IUCN II)	In buffer area only
South-west Corner	Special Purpose Zone (Mining Exclusion) (IUCN VI)	In buffer area only
South-west Corner	Special Purpose Zone (Mining Exclusion) (IUCN VI)	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Blackwood River	National Park	WA	In buffer area only
Bramley	National Park	WA	In buffer area only
Chester	Nature Reserve	WA	In buffer area only
D'Entrecasteaux	National Park	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Easter	National Park	WA	In buffer area only
Fish Road	Nature Reserve	WA	In buffer area only
Flinders Bay	Nature Reserve	WA	In buffer area only
Forest Grove	National Park	WA	In buffer area only
Gingilup Swamps	Nature Reserve	WA	In buffer area only
Greater Beedelup	National Park	WA	In buffer area only
Haag	Nature Reserve	WA	In buffer area only
Hamelin Island	Nature Reserve	WA	In buffer area only
Hilliger	National Park	WA	In buffer area only
Leeuwin-Naturaliste	National Park	WA	In buffer area only
Milyeannup	National Park	WA	In buffer area only
Ngari Capes	Marine Park	WA	In buffer area only
NTWA Bushland covenant (0003)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0013)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0036)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0037)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044C)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0065A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0065B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0069)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0116A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0116B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0130)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0144)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0147)	Conservation Covenant	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
NTWA Bushland covenant (0148)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0149)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0152)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0155)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0164)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0168)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0170)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0185)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0186)	Conservation Covenant	WA	In buffer area only
Pagett	Nature Reserve	WA	In feature area
Rapids	Conservation Park	WA	In buffer area only
Scott	National Park	WA	In feature area
Seal Island (WA25645)	Nature Reserve	WA	In buffer area only
St Alouarn Island	Nature Reserve	WA	In buffer area only
Stockdill Road	Nature Reserve	WA	In buffer area only
Sussex Location 2561	NRS Addition - Gazettal in Progress	WA	In buffer area only
Unnamed WA08910	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA12952	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA14567	Nature Reserve	WA	In buffer area only
Unnamed WA15185	Nature Reserve	WA	In buffer area only
Unnamed WA26065	Nature Reserve	WA	In buffer area only
Unnamed WA42377	Nature Reserve	WA	In feature area
Unnamed WA42942	Nature Reserve	WA	In buffer area only
Unnamed WA44676	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA44705	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA45533	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA46400	National Park	WA	In buffer area only
Unnamed WA53843	National Park	WA	In buffer area only
Walburra	Nature Reserve	WA	In buffer area only
Whicher	National Park	WA	In buffer area only
Wiltshire-Butler	National Park	WA	In buffer area only
Yelverton	National Park	WA	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In feature area

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Blackwood River (Lower Reaches) and Tributaries System	WA	In buffer area only
Cape Leeuwin System	WA	In buffer area only
Gingilup-Jasper Wetland System	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Gnarabup Tourism Development: Resort and Beach Village	2022/09224		Assessment	In buffer area only
Gravel Extraction Project	2022/09278		Assessment	In buffer area only
Mara Team Testing Release 37 Dan	2024/09832		Referral Decision	In buffer area only
Mara Team Testing Release 37 Dan 2	2024/09836		Referral Decision	In buffer area only
Mara Team Testing Release 37 Dan 3	2024/09838		Referral Decision	In buffer area only
Controlled action				
Development Guide Plan for 46 ha Residential Subdivision	2008/4102	Controlled Action	Post-Approval	In buffer area only
Flat Rock boating facility	2008/4506	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Lot 32 Tom Cullity Drive, Wilyabrup	2020/8866	Controlled Action	Post-Approval	In buffer area only
Milyeannup Wind Farm	2009/4911	Controlled Action	Post-Approval	In buffer area only
Shark Hazard Mitigation Drum Line Program, WA	2014/7174	Controlled Action	Completed	In buffer area only
Tutunup South Mineral Sands Project	2007/3441	Controlled Action	Post-Approval	In buffer area only
Urban development, multiple lots Northerly Street, Vasse, WA	2019/8494	Controlled Action	Assessment Approach	In buffer area only
Vasse Diversion Drain Upgrade	2017/7932	Controlled Action	Post-Approval	In buffer area only
Vlam Road Gravel Pit, Vlam Road, Karridale, WA	2014/7141	Controlled Action	Post-Approval	In buffer area only
Wonnerup South Mineral Sands Project, Yalyalup, WA	2014/7135	Controlled Action	Post-Approval	In buffer area only
Yalyalup Mineral Sands Project, WA	2017/8094	Controlled Action	Post-Approval	In buffer area only
Yarragadee Water Supply Development	2005/2073	Controlled Action	Completed	In buffer area only
Yoongarillup Mineral Sands Project, WA	2012/6521	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Bussell Highway (Bramley Section) SLK Upgrade	2012/6511	Not Controlled Action	Completed	In buffer area only
Busselton-Margaret River Regional Airport Development Project, WA	2016/7675	Not Controlled Action	Completed	In buffer area only
Busselton to Flinders Bay Rails to Trails Project, WA	2013/6835	Not Controlled Action	Completed	In buffer area only
Busselton to Margaret River Transmission Line	2008/3964	Not Controlled Action	Completed	In buffer area only
Construction of the Margaret River bypass road	2012/6677	Not Controlled Action	Completed	In buffer area only
CTBT - Cape Leeuwin Hydroacoustic Station Proposal	2000/27	Not Controlled Action	Completed	In buffer area only
Geo-science Investigations	2005/2069	Not Controlled Action	Completed	In feature area
Gloucester Park Precinct-expansion of ovals and	2017/7985	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
community facilities, Margaret River, WA				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Installation of stock proof fencing and a stock crossing 8 km from Karridale WA	2012/6427	Not Controlled Action	Completed	In buffer area only
Jalbarragup Telecommunications Tower, WA	2017/8026	Not Controlled Action	Completed	In buffer area only
Nuttman Road, Busselton Gravel Extraction, WA	2017/8086	Not Controlled Action	Completed	In buffer area only
Proposed Expansion of Existing Gracetown Townsite & Upgrade of Existing Associa	2010/5358	Not Controlled Action	Completed	In buffer area only
Reinstating of Firebreaks at McLeod Creek, South West WA	2012/6402	Not Controlled Action	Completed	In buffer area only
Residential & Light Industrial Development, Vasse WA	2013/6932	Not Controlled Action	Completed	In buffer area only
Residential Development Riverslea Estate Stage 8, Margaret River, WA	2014/7227	Not Controlled Action	Completed	In buffer area only
Residential-Rural Subdivision, Lot 1 Kudardup Rd, Kudardup, WA	2012/6471	Not Controlled Action	Completed	In buffer area only
Vegetation clearing for sand extraction, Lot 268 Leeuwin Road, Augusta	2013/6860	Not Controlled Action	Completed	In buffer area only
West's gravel pit development, Cowaramup, WA	2015/7586	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Ambergate North Residential Development	2009/4802	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Clearing of understorey vegetation for fire management purposes	2010/5788	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Locations 2629, 2699 & 2991 - Jamisons Road	2002/771	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Waterloo to Busselton 132kV Transmission Line	2002/816	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Ambergate North Residential Community (4896 lots)	2008/4617	Referral Decision	Completed	In buffer area only
Construction of 14.5km 132kV transmission line	2009/4995	Referral Decision	Completed	In buffer area only
Controlled Burn	2001/440	Referral Decision	Completed	In buffer area only

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Ancient coastline at 90-120m depth	South-west	In buffer area only
Cape Mentelle upwelling	South-west	In buffer area only
Western rock lobster	South-west	In buffer area only

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna carneipes			
Flesh-footed Shearwater [82404]	Foraging (in high numbers)	Known to occur	In buffer area only
Eudyptula minor			
Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In buffer area only
Hydroprogne caspia			
Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In buffer area only
Larus pacificus			
Pacific Gull [811]	Foraging (in high numbers)	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Onychoprion anaethetus			
Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In buffer area only
Onychoprion fuscata			
Sooty Tern [82847]	Foraging	Known to occur	In buffer area only
Pelagodroma marina			
White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur	In buffer area only
Pterodroma macroptera macroptera			
Great-winged Petrel (macroptera race) [1035]	Foraging (provisioning young)	Known to occur	In buffer area only
Pterodroma mollis			
Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur	In buffer area only
Puffinus assimilis tunneyi			
Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In buffer area only
Sternula nereis			
Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In buffer area only
Thalassarche chlororhynchos bassi			
Indian Yellow-nosed Albatross [85249]	Foraging (in high numbers)	Known to occur	In buffer area only
Sharks			
Carcharodon carcharias			
White Shark [64470]	Foraging	Known to occur	In buffer area only
Whales			
Balaenoptera musculus brevicauda			
Pygmy Blue Whale [81317]	Distribution	Known to occur	In buffer area only
Megaptera novaeangliae			
Humpback Whale [38]	Migration (north)	Known to occur	In buffer area only
Megaptera novaeangliae			
Humpback Whale [38]	Migration (north and south)	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Attachment 4 (RSD) -Appendix F

Greenhouse Gas Assessment Summary Report



PROPOSED WIND FARM IN SCOTT RIVER, WESTERN AUSTALIA

GREENHOUSE GAS ASSESSMENT SUMMARY REPORT

Version 1.5

Prepared by **Greenbase Pty Ltd**

For **Eco Logical Australia Pty Ltd** on behalf of **Synergy Renewable Energy Developments Pty Ltd**

Prepared August 2024

Disclaimer

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Rounding of Amounts

All CO_2-e amounts included in this document have been rounded to the nearest tonne except when rounding would result in a zero.

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Table 1 Document History

VER.	DATE	DETAILS	NAME	STATUS
1.5	20/09/2024	Finalised report	Greenbase (A.Feng)	Final
1.4	11/09/2024	Capital goods, upstream transportation, and waste generated emissions updated	Greenbase (A.Feng)	Draft
1.3	13/08/2024	Eco Logical Review	Eco Logical (A.Bowley)	Draft
1.2	08/08/2024	Employee commuting emissions updated	Greenbase (A.Feng)	Draft
1.1	02/08/2024	Greenbase internal review	Greenbase (H.Ko)	Draft
1.0	01/08/2024	Initial document prepared	Greenbase (A.Feng)	Draft

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1 Summary

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is the proponent for the Proposed Wind Farm in Scott River (Project), located approximately 15 kilometres northeast of Augusta, Western Australia.

This greenhouse gas (GHG) assessment has been prepared to support the referral under section 38 of the *Environmental Protection Act 1986* (EP Act), taking into account the requirements of the Environmental Protection Authority's (EPA) Environmental Factor Guideline for Greenhouse Gas Emissions (EPA, 2023).

Total scope 1 emissions are estimated as 8,492 tCO_2-e over the life of the project (3,799 tCO_2-e in the construction phase and 4,693 tCO_2-e in the operation phase). Total scope 2 emissions are estimated as 4,179 tCO_2-e (149 tCO_2-e in the construction phase and 4,030 tCO_2-e in the operation phase).

Total scope 3 emissions are estimated as 101,911 tCO_2-e (99,958 tCO_2-e in the construction phase, 1,205 tCO_2-e in the operation phase, and 747 tCO_2-e in the closure phase). Scope 3 emissions have been assessed with the following emissions sources: capital goods, fuel- and energy-related activities, waste generated in operations, and employee commuting.

The scope 1, 2, and 3 emissions intensity is estimated as 0.00987 tCO_2-e/MWh electricity generated, based on the forecast electricity generation over the life of the project.

2 GHG Inventory

2.1 Project Description

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is proposing a wind farm (the Project) in the Scott River region of Western Australia, approximately 15 kilometres northeast of Augusta.

The wind farm will have an electricity generation capacity of 100 MW. There will be a maximum of twenty wind turbines installed in the wind farm, the final number dependent on the model of turbines selected for the Project.

The development envelope is primarily farmland, with some small areas of native vegetation present.

2.2 Project Activities

The key infrastructure and principal activities to be undertaken by the Project have been identified and outlined below:

- Wind turbines (the GHG assessment is based on the maximum number of turbines),
- Connection to existing transmission line,
- Possible clearing of native vegetation (the GHG assessment is based on the 'worst case' scenario of maximum hectares cleared).

2.3 GHG Emissions Calculation

GHG emissions can include both *direct* and *indirect* emissions, i.e. scope 1, scope 2 and scope 3 emissions. Sources of emissions identified for the Project, and how they are calculated in the GHG assessment, are described in the following sections.

2.3.1 Scope 1 GHG Emissions Calculation

Scope 1 GHG emissions are *direct* emissions from sources within the boundary of the facility, e.g. fuel combusted on site.

The significant sources of scope 1 emissions resulting from the activities at the Project are as follows:

- Fuel consumption by construction and maintenance vehicles,
- Fuel consumption from the transport of wind turbines,
- Leakage of sulphur hexafluoride in switchgear (SF_6), and
- Possible clearing of native vegetation (loss of sequestration potential and decomposition of organic matter).

Fuel Consumption

Diesel will be consumed by construction vehicles in the construction phase. Diesel will also be consumed by maintenance vehicles in the operational phase, as well as emergency diesel generators for unforeseen outages.

Emissions from diesel are estimated using methods and emission factors from Schedule 1 of the National Greenhouse and Energy Reporting (NGER) Determination, applicable to the 2023-24 financial year. The emission factors, as shown in Table 2, are provided in carbon dioxide equivalents (CO_2-e) and include global warming potentials (GWPs).

Table 2 Scope 1 GHG Emission Factors for Fuel Consumption

FUEL	ENERGY CONTENT	EMISSION FACTOR ($kgCO_2$-e/GJ)			
		CO_2	CH_4	N_2O	Total
GWP		1	28	265	
Diesel (stationary)	38.6 GJ/kL	69.90	0.10	0.20	70.20
Diesel (transport)	38.6 GJ/kL	69.90	0.10	0.40	70.40

Transport of Turbines

Diesel will be consumed by trucks delivering the wind turbines to site. It is assumed that the turbines will be delivered by trucks from Bunbury Port.

Emissions from the transport of turbines are estimated using freighting emission factors from the UK Department for Business, Energy & Industrial Strategy's *Conversion Factors 2023*. The emission factor of 0.1186 $kgCO_2$-e/t.kilometre for heavy rigid vehicles is applied to the tonnes of turbines transported from Bunbury Port.

Sulphur Hexafluoride (SF_6)

Sulphur hexafluoride (SF_6) will be used as an electrical insulator for circuit breakers and switches (switchgear).

Emissions from switchgear leakages are estimated using methods and emission factors from Schedule 1 of the NGER Determination, applicable to the 2023-24 financial year. Switchgear has a default annual leakage rate of 0.0089 and SF_6 has a GWP of 23,500 tCO_2-e/t.

Land Clearing

The current design of the Project does not require clearing of native vegetation, however, land clearing emissions have been calculated as a 'worst-case scenario' in the GHG assessment. The 'worst-case scenario' is based on 2 hectares of native vegetation cleared: 1 hectare of open woodland and 1 hectare of open forest.

Emissions from land clearing are estimated using emission factors from the *Greenhouse Gas Assessment Workbook for Road Projects*, published by the Transport Authorities Greenhouse Group (TAGG, 2013).

It is assumed that all cleared vegetation will be converted into CO_2 emissions and released into the atmosphere over the life of the project.

Table 3 Scope 1 GHG Emission Factors for Land Clearing (TAGG, 2013)

VEGETATION CLASS	EMISSION FACTOR (tCO_2-e/ha)
Open woodland	307
Open forest	316

2.3.2 Scope 2 GHG Emissions Calculation

Scope 2 GHG emissions are *indirect* emissions from the consumption of purchased electricity, steam, or heat produced by another organisation.

Electricity will be purchased in the construction phase for dewatering. Electricity will also be purchased in the operational phase to keep the operations running during downtime. The Project will purchase electricity from the South West Interconnected System (SWIS) grid.

Emissions from electricity purchased from the grid are estimated using methods from the NGER Determination and projected emission factors from the DCCEEW's *Australia's Emissions Projections 2023*. The projected emission factors are shown in Table 4. Because emission factors are only projected up to 2035, the emission factor for 2035 is used to calculate the following years of operation.

Table 4 Scope 2 and 3 GHG Emission Factors for the SWIS Grid (DCCEEW, 2023)

GRID	EMISSION FACTOR ($kgCO_2$-e/kWh)										
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Scope 2	0.47	0.44	0.34	0.29	0.27	0.18	0.18	0.16	0.15	0.15	0.14
Scope 3	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01

2.3.3 Scope 3 GHG Emissions Calculation

Scope 3 emissions are all other *indirect* emissions that are of a consequence of an organisation's activities but are not from sources owned or controlled by the organisation, e.g., the emissions associated with the extraction, refinement, and delivery of diesel to site.

The GHG Protocol (2011) categorises scope 3 GHG emissions into fifteen categories, divided into two groups depending on the financial transactions of the company:

- Upstream indirect emissions related to purchased or acquired goods and services,
- Downstream indirect emissions related to sold goods and services.

Table 5 outlines all scope 3 categories and their relevancy to the Project and indicates those included in the GHG assessment. A full list and description of the scope 3 categories, as well as definitions of their relevancy, are outlined in Appendix B.

Table 5 Scope 3 GHG Emissions Categories (Greenhouse Gas Protocol, 2011)

CATEGORY	RELEVANCY	INCLUDED IN ASSESSMENT
1. Purchased goods and services	Purchase of goods and services other than fuel and energy. Not material, but directly influenced by the company.	Combined with scope 3 category 2
2. Capital goods	Purchase of wind turbines and concrete. Material and directly influenced by the company; should be calculated.	Included
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	Consumption of fuel and electricity. Material and directly influenced by the company; should be calculated.	Included
4. Upstream transportation and distribution	Transport of wind turbines to site. Material and directly influenced by the company; should be calculated.	Calculated as scope 1 for this project
5. Waste generated* *originally named 'waste generated in operations', but renamed, because only end-of-life waste is considered in calculation	Recycling and disposal of wind turbine components at the end of the project. Material and directly influenced by the company; should be calculated.	Included
6. Business travel	Not material.	Not calculated
7. Employee commuting	Not material, but directly influenced by the company.	Included
8. Upstream leased assets	Use of hired vehicles for construction and maintenance. Material and directly influenced by the company; should be calculated.	Calculated as scope 1 for this project
9. Downstream transportation and distribution	Transmission of electricity to the grid. Material, but not directly influenced by the company.	Not calculated
10. Processing of sold products	Not material.	Not calculated
11. Use of sold products	Not material.	Not calculated
12. End-of-life treatment of sold products	Not applicable.	Not calculated
13. Downstream leased assets	Not applicable.	Not calculated
14. Franchises	Not applicable.	Not calculated
15. Investments	Not applicable.	Not calculated

To calculate scope 3 GHG emissions, the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) has been consulted and the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (2013) referenced where required.

The two main methods of quantifying scope 3 GHG emissions are direct measurement and calculation. Direct measurement involves monitoring, mass balance or stoichiometry to quantify emissions, while calculation uses an emission factor and activity data to calculate emissions. Due to the difficulty in direct measurement the calculation method is typically used. The general formula for calculating emissions is outlined below:

$$GHG\ emissions = activity\ data \times emission\ factor$$

A variety of emission factor sources were used, including but not limited to:

- Australia DCCEEW's *National Greenhouse Accounts Factors* (NGA, 2023),
- UK Department for Business, Energy & Industrial Strategy's *Conversion Factors* (UK BEIS, 2023), and
- Various scientific studies.

When estimating the scope 3 emissions, fuel-based or goods and distance-based methods are considered the most appropriate. These methods involve tracking the quantity of fuel, or goods used and the distance they travel, respectively. However, in cases where the necessary data is not available, spend-data methods are used. Spend-data methods involve estimating scope 3 emissions based on the expenditure involved for a given activity. While spend-data methods may not be as accurate as fuel-based or goods and distance-based methods, they still provide a useful estimate for calculating scope 3 emissions when the required data is not available.

The methods selected for scope 3 emissions calculations are shown in Table 6.

Table 6 Calculation Methodologies for Scope 3 Categories

CATEGORY	CALCULATION METHODOLOGY	EXPLANATION
2. Capital goods	Goods-based	Industry average emission factors for the manufacture of wind turbines are applied to the total electricity generated over the life of the project.
3. Fuel and energy related activities	Fuel-based	Fuel and energy are aggregated by type (diesel, electricity, etc.), and industry average emission factors are applied.
5. Waste generated	Goods-based	Wind turbines are broken down into components that are disposed and components that are recycled, and industry average emission factors for disposal and recycling are applied. It is assumed that 80% of the turbine will be recycled.
7. Employee commuting	Distance-based	Industry average emission factors are applied to drive-in drive-out (DIDO) passenger kilometres.

2.4 Limitations and Exclusions

The following emissions sources have been excluded from the assessment as they were deemed either minor sources or no use was identified (exclusions from the scope 3 are outlined in Table 5):

- Oils and greases,
- Hydro fluorocarbons (HFCs), and
- Perfluorocarbons (PFCs),

Whilst the estimates in this assessment have been calculated using the best available information, it should be noted that potential for technology change (implementation of best available technology) and updates to costing over the life of the project may result in adjustments to emission estimates.

2.5 GHG Emissions Estimates

GHG emissions have been estimated for the Project activities over the expected life of the project. The key inputs used to calculate the GHG emissions are outlined in Table 7.

Table 7 Key Project Inputs

INPUT	VALUE (OVER LOP)
LOP - construction + operation + closure	Construction: 2 years (2026-2028) Operation: 30 years (2028-2057) Closure: 1 year (2057)
Total electricity generation	11,608,802 MWh
Total electricity consumption	26,718 MWh
Total diesel consumption	1,309 kL
Cleared area of native vegetation	2 ha

2.5.1 Scope 1 GHG Emissions Estimates

Fuel Consumption

The estimated scope 1 emissions for the Project are shown in Table 8. Emissions have been broken down into the construction phase and operation phase.

The average annual scope 1 emissions in the operation phase are 156 tCO_2e/year.

Table 8 Estimated Scope 1 GHG Emissions

PHASE	ACTIVITIES	EMISSIONS OVER LOP (tCO_2-e)	ANNUAL EMISSIONS (tCO_2-e)[1]
Construction	Construction diesel	2,937	N/A
	Transport diesel	240	N/A
	Land clearing	623	N/A
	Total	3,799	N/A
Operation	Maintenance diesel	614	20
	SF_6 leakage	4,078	136
	Total	4,693	156
Combined	Total	8,492	265

[1]Average operation emissions are calculated from 2028-2057. Average combined emissions are calculated from 2026 to 2057.

2.5.2 Scope 2 GHG Emissions Estimates

The estimated scope 2 emissions for the Project are shown in Table 9. Emissions have been broken down into the construction phase and operation phase.

The average annual scope 2 emissions in the operation phase are 134 tCO_2e/year.

Table 9 Estimated Scope 2 GHG Emissions

ACTIVITIES	EMISSIONS OVER LOP (tCO_2-e)	ANNUAL EMISSIONS (tCO_2-e)[1]
Construction	149	N/A
Operation	4,030	134
Combined	4,179	131

[1]Average operation emissions are calculated from 2028-2057. Average combined emissions are calculated from 2026 to 2057.

2.5.3 Scope 3 GHG Emissions Estimates

Four categories of scope 3 emissions are determined to be material for the GHG assessment, as specified in Section 2.3.3.

The estimated scope 3 emissions for the Project are shown in Table 10. Emissions have been broken down into the construction phase, operation phase, and closure phase.

Table 10 Estimated Scope 3 GHG Emissions

PHASE	CATEGORIES	EMISSIONS OVER LOP (tCO_2-e)	ANNUAL EMISSIONS (tCO_2-e)
Construction	2. Capital goods	98,270	N/A
	3. Fuel- and energy-related activities	737	N/A
	7. Employee commuting	952	N/A
	Total	99,958	N/A
Operation	3. Fuel- and energy-related activities	440	15
	7. Employee commuting	765	26
	Total	1,205	40
Closure	5. Waste generated	747	N/A
	Total	747	N/A
Combined	Total	101,911	2,380

[1]Average operation emissions are calculated from 2028-2057. Average combined emissions are calculated from 2026 to 2057.

2.6 GHG Emissions Trajectories

The following figures show the trajectory of emissions over the life of the project, including emissions from the construction, operation, and closure phases.

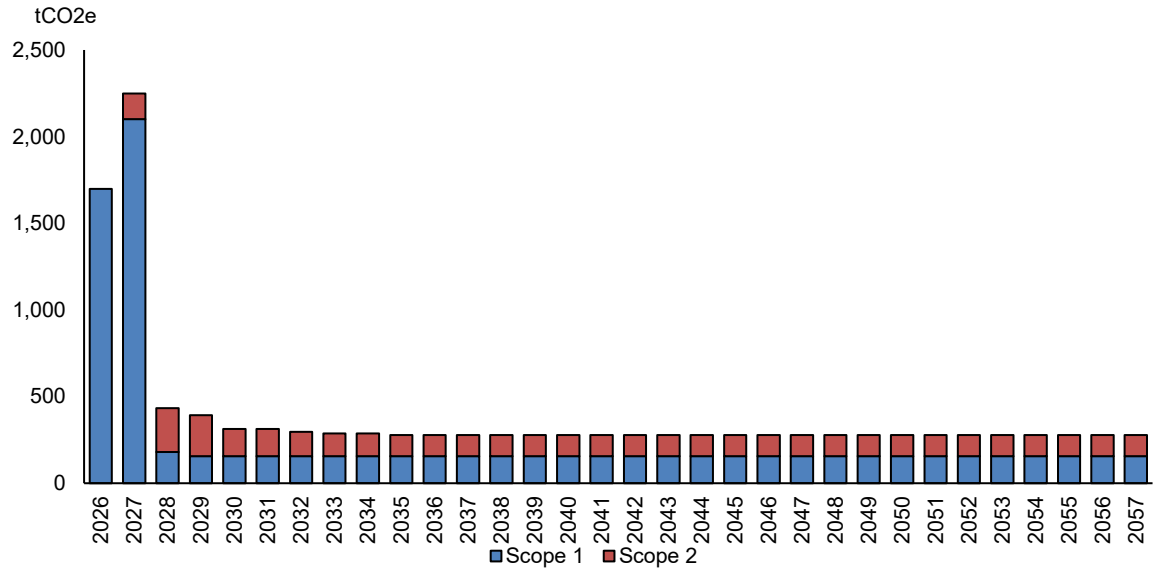

Figure 1 Estimated Scope 1 and 2 GHG Emissions Trajectory

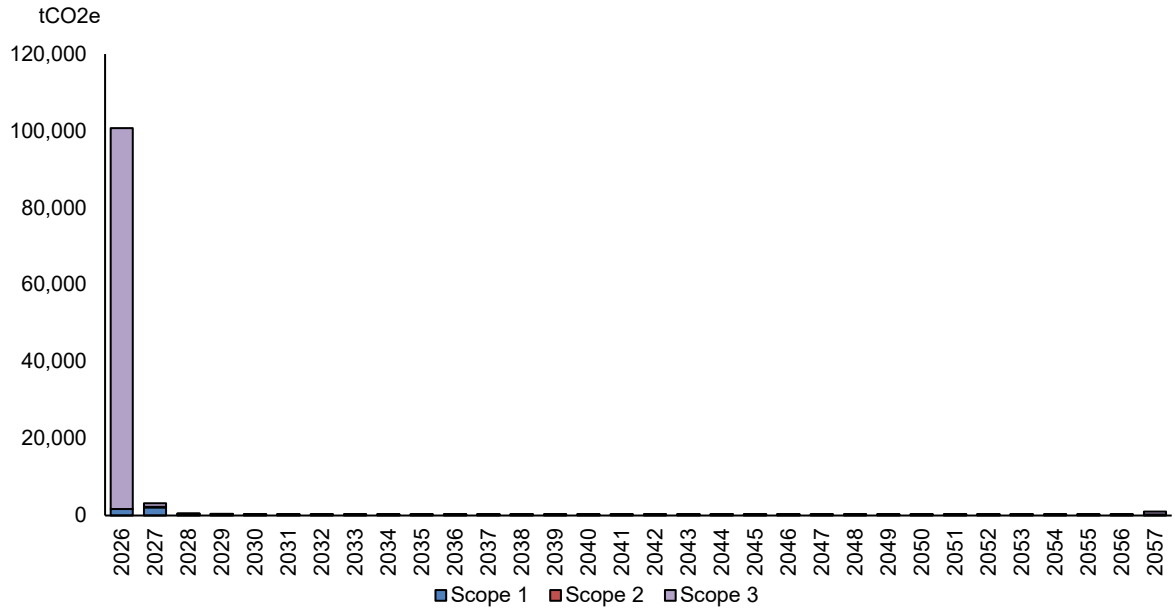

Figure 2 Estimated Scope 1, 2, and 3 GHG Emissions Trajectory

3 GHG Emissions Intensity and Benchmarking

The emissions intensity is estimated based on forecasted electricity generation.

$$emission\ intensity = \frac{GHG\ emissions}{electricity\ generated}$$

The scope 1 emissions intensity for the Proposal is estimated as 0.00073 tCO_2-e/MWh electricity generated, including emissions from construction. The average scope 1 and 2 emissions intensity is estimated as 0.00109 tCO_2-e/MWh, including emissions from construction. The average scope 1, 2, and 3 emissions intensity is estimated as 0.00987 tCO_2-e/MWh, including emissions from construction and closure.

The operational scope 1 and 2 emissions intensity of the Project, excluding emissions construction, is estimated as 0.00075 tCO_2-e/MWh. The operational emissions intensity is compared with other wind farms in Western Australia in Table 11. The emissions intensities for the wind farm are calculated from the published NGER electricity sector data for the 2022-23 financial year.

Table 11 GHG Emission Intensities Benchmark

PROJECT	ELECTRICITY GENERATION (MWh/year)	SCOPE 1 + 2 EMISSIONS (tCO_2-e/year)	EMISSIONS INTENSITY (tCO_2-e/MWh)
Badgingarra Wind Farm	444,705	195	0.00044
Yandin Wind Farm	772,393	568	0.00074
Scott River Wind Farm	**386,960**	**291**	**0.00075**
Emu Downs Wind Farm	239,254	179	0.00075
Albany Windfarm	85,783	69	0.00080
Mumbida Wind Farm	223,597	242	0.00108
Warradarge Wind Farm	582,602	665	0.00114
Collgar Wind Farm	669,912	1,240	0.00185
Alinta Wind Farm	266,793	636	0.00238

Appendix A Glossary

TERMS	DEFINITIONS
CER	Clean Energy Regulator
CH_4	Methane
CO_2	Carbon Dioxide
CO_2-e	Carbon dioxide equivalence, the amount of the gas multiplied by a value specified in the regulations in relation to that kind of greenhouse gas.
Determination	The NGER Determination 2008
Downstream emissions	Indirect GHG emissions related to sold goods and services
EPA	Western Australian Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
Facility	Is a single enterprise that undertakes an activity, or a series of activities that involve greenhouse gas emissions, the production of energy or the consumption of energy.
GHG	All greenhouse gases mentioned in the NGER Act
LOP	Life of Project
N_2O	Nitrous Oxide
NGER	National Greenhouse and Energy Reporting
NGER Act	The National Greenhouse and Energy Reporting Act 2007 as it applies to the current reporting year
Non-transport	Includes purposes for which fuel is combusted that do not involve transport energy purposes, see Sections 2.20, and 2.42 of the Determination.
Regulations	The NGER Regulations 2008
Scope 1	Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility.
Scope 2	Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of one or more activities that generate electricity, heating, cooling or steam that is consumed by the facility but that do not form part of the facility.
Scope 3	Indirect emissions of greenhouse gas, that are not included in scope 2, that occur in the value chain of the reporting company.
SF_6	Sulphur Hexafluoride – a gas used in switchgear and circuit breakers for insulation.
Transport	Includes purposes for which fuel is combusted for transport by vehicles registered for road use, rail transport, marine navigation, and air transport, see Sections 2.20, and 2.42 of the Determination
UNFCCC	United Nations Framework Convention on Climate Change
Upstream emissions	Indirect GHG emissions related to purchased or acquired goods and services

Appendix B Scope 3 Emission Categories and Relevancy

CATEGORY	DESCRIPTION
1. Purchased goods and services	All emissions from the production of products and services purchased or acquired by the reporting company in the reporting period. *Example: The emissions associated with the extraction, production and transportation (between suppliers) of copper that is purchased by the reporting company to create bronze.*
2. Capital goods	All upstream emissions from the production of capital goods purchased by the company in the reporting period. *Example: Emissions associated with the production of excavators used by the reporting company.*
3. Fuel- and energy-related activities (Not included in scope 1 or scope 2)	All emissions related to the production (extraction, processing, transport etc.) of fuel and energy purchased by the reporting company, that are not included in the company's scope 1 and scope 2 emissions. *Example: The emissions from extracting crude oil, processing it to form diesel and transporting it to a site run by the reporting company.*
4. Upstream transportation and distribution	All emissions resulting from the transportation and distribution of purchased products, between a company's tier 1 suppliers and its own operations, in vehicles not owned by the reporting company, as well as any third-party transportation and distribution services purchased by the reporting company between a company's own facilities. *Example: Emissions from transportation of purchased copper between the supplier and the reporting company's bronze manufactoring facility.*
5. Waste generated in operations	All emissions from third-party treatment and disposal of waste that is generated by the company in the reporting period. *Example: Waste sent from the reporting company's site facilities for recycling, disposal at landfills, incineration, composting, etc.*
6. Business travel	All emissions from the transportation of employees for business-related activities in vehicles owned or operated by third-parties. *Example: Flights to business conferences and meeting suppliers.*
7. Employee commuting	All emissions from the transportation of employees between their homes and worksites. *Examples: FIFO and DIDO to site.*
8. Upstream leased assets	All emissions from the operation of leased assets that are not included in the company's scope 1 and 2 emissions inventory. *Example: Emissions from leased cars, offices and buildings.*
9. Downstream transportation and distribution	All emissions from third-party transport and distribution of the company's sold products in the reporting period. *Example: Emissions from third-party marine transportation of iron ore sold by the reporting company to be processed by another company.*
10. Processing of sold products	All emissions from processing of sold intermediate products by third-parties, subsequent to the sale of the product by the reporting company. *Example: Emissions from processing of iron ore sold by the reporting company to create steel.*

11. Use of sold products	All emissions from the use of goods and services sold by the reporting company in the reporting period. *Example: Emissions from the combustion of diesel, produced by the reporting company, as fuel for cars.*
12. End-of-life treatment of sold products	All emissions from the waste disposal or treatment of products sold by the company in the reporting period, at the end of their life. *Example: Emissions from recycling of metal cans sold by the reporting company.*
13. Downstream leased assets	All emissions from the operation of assets owned by the company and leased to third-parties in the reporting period, if they are not included in the company's scope 1 and scope 2 emissions. *Example: Emissions from electricity used in offices/buildings leased by the reporting company to other operations.*
14. Franchises	All emissions from the operation of franchises, by franchisees, not included in the franchisor's scope 1 and scope 2 emissions. *Example: Emissions from operations associated with a company's trademark.*
15. Investments	All emissions associated with operating the reporting company's investments in the reporting period. *Example: Emissions associated with a mine a company has a financial investment in but not operational control.*

CRITERIA	DESCRIPTION
Size	They contribute significantly to the company's total anticipated scope 3 emissions.
Influence	There are potential emissions reductions that could be undertaken or influenced by the company.
Risk	They contribute to the company's risk exposure (e.g., climate change related risks such as financial, regulatory, supply chain, product and customer, litigation, and reputational risks).
Stakeholders	They are deemed critical by key stakeholders (e.g., customers, suppliers, investors, or civil society).
Outsourcing	They are outsourced activities previously performed in-house or activities outsourced by the reporting company that are typically performed in-house by other companies in the reporting company's sector.
Sector guidance	They have been identified as significant by sector-specific guidance.
Other	They meet any additional criteria for determining relevance developed by the company or industry sector.

Source: GHG Protocol (2011)

Appendix C References

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Attachment 4 (RSD) -Appendix G

Preliminary Geotech and Baseline Contamination Report

PROPOSED WIND FARM IN SCOTT RIVER

Preliminary Geotechnical and Baseline Contamination Report

1 July 2024

Prepared for:
Synergy Renewable Energy Developments Pty Ltd

Prepared by:
Stantec Australia Pty Ltd

Project Number:
304501017

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Rev.	Description	Author	Date	Technical Review	Date	Independent Review	Date
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1	Final	BP & MH	24/06/24	AO	01/07/24	KC	01/07/24

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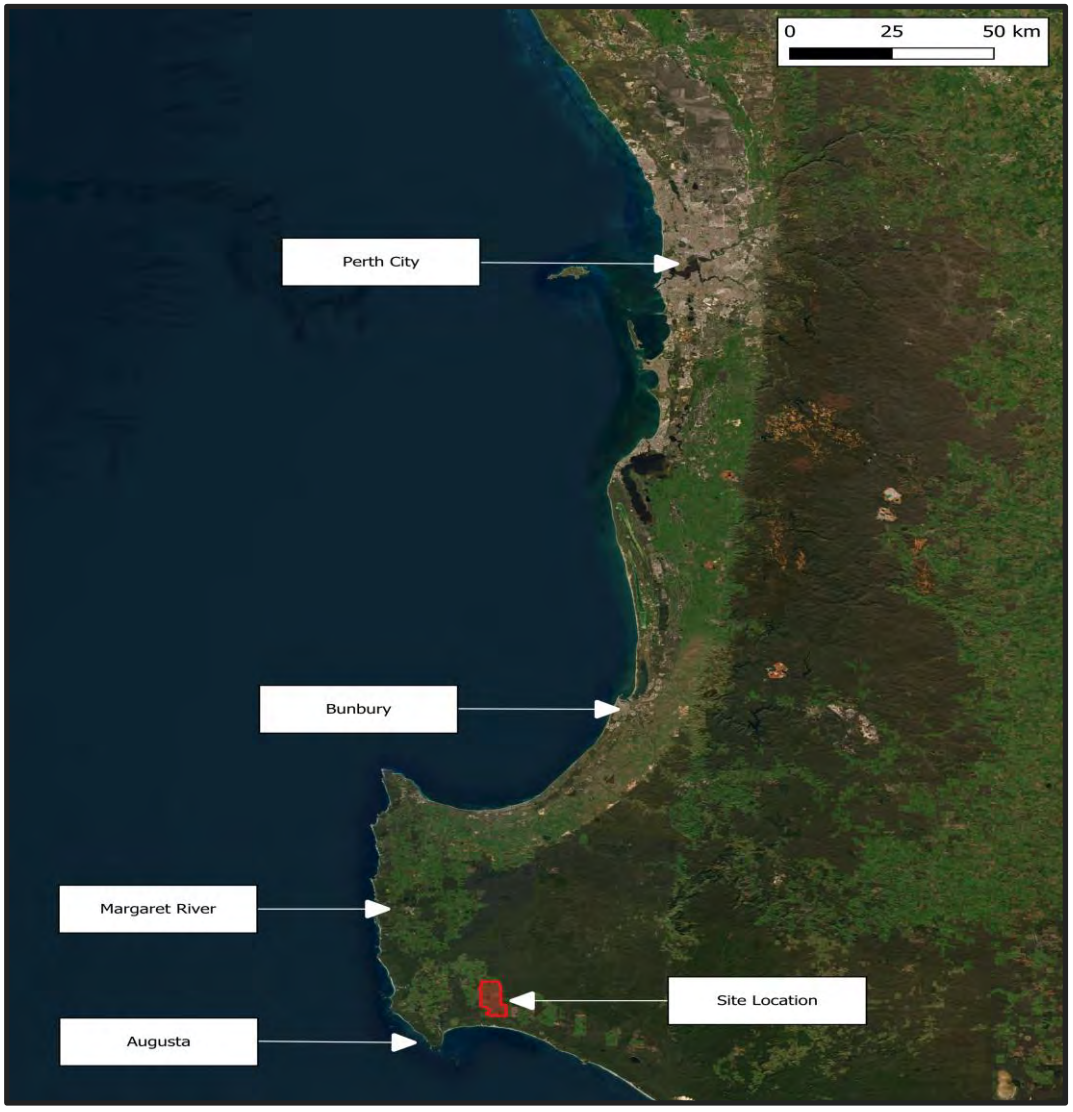
1 Introduction

Synergy Renewable Energy Developments Pty Ltd (Synergy) is currently progressing through the planning and approvals phase for the Proposed Wind Farm in Scott River (the project), which will be developed approximately 15 km north-east of Augusta in WA's Margaret River region as shown on the project location plan below (Figure 1-1).

It is understood that the project layout to be implemented is not yet finalised, however, preliminary plans and information provided by Synergy suggest that the project will likely comprise the installation of up to 22 wind turbines as well as the associated supporting infrastructure. At this stage of the project, preliminary geotechnical and contamination information is required to enable design and construct proponents to more accurately tender for the project. This report presents the findings of a preliminary geotechnical and baseline contamination investigation undertaken to recover such information.

Figure 1-1 Project Location Plan



1.1 Aims

Based on the scope requested from Synergy, given the scale of the site and the intent of the preliminary investigation, the primary objectives of the investigation is to provide:

- A presentation of factual information regarding the investigation undertaken and the results obtained;
- A preliminary summary of the subsurface conditions encountered across the project, including depth to rock and groundwater (if/where encountered);
- Preliminary comments and recommendations regarding earthworks and site preparation, including:
  - Removal of topsoil and uncontrolled fill;
  - Proof compaction
  - Structural fill specification requirements; and
  - Temporary slopes during earthworks.
- Preliminary comments and recommendations regarding Potential Acid Sulfate Soil and Baseline contamination.

It is noted that during subsequent phases of work, additional geotechnical information will be required specific to the confirmed project layout in order to progress design objectives.

1.2 Desktop Study Report

A geotechnical and contamination desktop study report was prepared for this project for Synergy by Stantec in July 2023 (refer Appendix F of this report). Desktop level information is therefore not re-presented in great detail again within this preliminary investigation report.

2 Investigation

2.1 Fieldwork

A preliminary geotechnical and contamination investigation was undertaken at the proposed wind farm project area between February and March 2024 and comprised intrusive testing (geotechnical boreholes and test pits) with the aim of achieving a relatively uniform distribution of data at accessible locations as planned by Synergy. A test location plan which shows the approximate location of each completed test is presented as Appendix A of this report.

2.1.1 SUPERVISION

Fieldwork was undertaken under the supervision of a representative from Stantec who was responsible for both the technical direction and oversight of staff and subcontractors as well as the safe execution of the scope of works.

2.1.2 UNDERGROUND SERVICES

Before commencing testing onsite, a dial before you dig (BYDA) enquiry was submitted, with the results of relevant asset owners reviewed to ensure appropriate clearances at proposed test locations. In addition, the intrusive works were carried out under Synergy's ground disturbance permit system, with Synergy having undertaken their due diligence prior to planning regarding private asset locations across the project area.

2.1.3 GEOTECHNICAL BOREHOLES

Three (3) geotechnical boreholes (WM01, WM02 & WM03) were drilled across the project area at the locations shown on Appendix A to a depth of 25 m below ground level (bgl) using a track mounted Geoprobe model 7822DT, operated by a suitably qualified subcontractor of Stantec. The boreholes were advanced using a combination of direct push probe (DPP) and diamond coring (HQ-3) drilling techniques to achieve the target depth, with Standard Penetration Test (SPT) undertaken at nominal 1.5 m intervals to assist in assessing soil strengths throughout the ground profile.

The recovered material was placed in 1 m length core trays, logged in accordance with AS1726, 2017, sampled and photographed by a geotechnical engineer / engineering geologist (field engineer) from Stantec with the geotechnical logs presented as Appendix B of this report.

2.1.3.1 Standpipe Piezometer

A standpipe piezometer was installed by a Class 3 driller within each of the boreholes to allow for ongoing groundwater level and quality testing (separate scope of works). A graphic of the well design for each borehole is presented within their respective borehole log (Appendix B).

Initial groundwater level readings were recovered by the field engineer after groundwater levels had presumably stabilised. A water level logger was installed in each of the wells for long-term groundwater level data monitoring.

2.1.3.2 Additional Shallow Standpipe Piezometers

Additional standpipes were installed during the geotechnical investigation to allow for shallow groundwater monitoring and a hydrogeological assessment to be undertaken (separate scope of works to this investigation report). The locations of the wells, however, have been presented alongside the geotechnical test locations on the test location plan of Appendix A.

2.1.4 GEOTECHNICAL TEST PITS

Twenty geotechnical test pits (TP01 to TP20) were excavated across the project area at the locations presented within Appendix A, using an 11-tonne backhoe operated by a suitably experienced contractor to Stantec. The test pits were excavated to a target depth of 3 m bgl, or prior refusal (caused by collapsing soils, inundation of groundwater or intersection of rock strength materials).

Bulk and disturbed sampling was undertaken from the excavated materials, targeted by the field engineer as to best capture material variation and representative conditions across the project area. The recovered material and side walls of the test pits were logged in accordance with AS1726-2017 and photographed before completion.

Upon completion, the test pits were backfilled using the excavated spoil. Material was compacted in layers using the bucket before the excess at the surface was mounded and wheel rolled to prevent future excessive settlement.

A summary of the test pits, including their coordinates and final termination depths is presented in Table 2-1 below. Geotechnical logs are included within Appendix B of this report.

Table 2-1 Summary of Test Pits

Test ID	Coordinates (MGA94)		Termination Depth (m bgl)	Termination Comment
	Easting	Northing		
TP01	340863	6216098	2.1	Refusal (machine limit - penetration)
TP02	341925	6215486	1	Refusal (machine limit - penetration)
TP03	344783	6212893	2	Practical Refusal (side wall collapse)
TP04	343930	6212893	1.75	Practical Refusal (side wall collapse)
TP05	341167	6209303	0.9	Refusal (machine limit - penetration)
TP06	344443	6210783	0.7	Refusal (machine limit - penetration)
TP07	340730	6210619	1.7	Practical Refusal (side wall collapse)
TP08	343190	6213977	2	Practical Refusal (side wall collapse)
TP09	343986	6214241	1.5	Practical Refusal (side wall collapse)
TP10	345034	6214318	1.2	Refusal (machine limit - penetration)
TP11	341041	6211370	2	Practical Refusal (side wall collapse)
TP12	342786	6210510	0.2	Refusal (machine limit - penetration)
TP13	343538	6211851	2	Practical Refusal (side wall collapse)
TP14	344875	6211256	0.4	Refusal (machine limit - penetration)
TP15	341697	6209876	1	Refusal (machine limit - penetration)
TP16	342673	6209242	0.15	Refusal (machine limit - penetration)

Test ID	Coordinates (MGA94)		Termination Depth (m bgl)	Termination Comment
	Easting	Northing		
TP17	343812	6209922	0.5	Refusal (machine limit - penetration)
TP18	343477	6208439	0.15	Refusal (machine limit - penetration)
TP19	343836	6207845	0.6	Refusal (machine limit - penetration)
TP20	345245	6209951	0.9	Refusal (machine limit - penetration)

2.1.5 DYNAMIC CONE PENETROMETER

A Dynamic Cone Penetrometer (DCP) test was undertaken adjacent to each of the test pits to assist in assessing the strength and variability of the soil profile. Penetration refusal was encountered in all test locations prior to the 3 m target depth. The results of the DCP tests are presented graphically in the geotechnical logs (Appendix B).

2.1.6 CONTAMINATION AND ACID SULFATE SOILS SAMPLING

Environmental sampling was undertaken from each of the geotechnical intrusive tests (geotechnical boreholes and test pits) in general accordance with the following documents:

- Department of Water and Environmental Regulation (DWER) (2021) Assessment and management of contaminated sites guideline.
- National Environment Protection Council (NEPC) (2013) National Environment Protection (Assessment of Site Contamination) Measure (NEPM).
- AS4482.1-2005 Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 1: Non-volatile and semi volatile compounds.
- AS 4482.2-1999 Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 2: Volatile substances.
- Friebel, E. & Nadebaum, P. (2011) Health screening levels for petroleum hydrocarbons in soil and groundwater. Summary, CRC CARE Technical Report no. 10.
- Department of Health (DoH) (2009) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia.

The following sampling and analysis program was undertaken:

- Environmental soil samples were recovered from surface level (0.0 m) and at subsequent 0.5 m intervals to a maximum depth of 1.5 m bgl. Screening for volatile organic compounds (VOC) using a calibrated photoionisation detector (PID) was also undertaken on recovered samples and recorded on the geotechnical logs.
- Sampling was undertaken for potential acid sulphate soils at 0.0 m and subsequent 0.25 m intervals to a maximum depth of 10 m bgl.
- Quality assurance and quality control (QA/QC) samples were recovered and transported for laboratory analyses at the following frequency:
- Soil duplicate samples – 1 per 20 primary samples.
- Soil triplicate samples – 1 per 20 primary samples.

- Rinsate samples – 1 per each day.
- Field blank samples – 1 per each day.
- Transport blank (laboratory supplied) samples – 1 per laboratory batch.

2.1.6.1 Laboratory Testing

2.1.7 GEOTECHNICAL

Samples were transported from the project area to a NATA accredited laboratory in Perth where the following was undertaken (scheduled based on the material types and quantities recovered):

- 14 nos. Natural Moisture Content tests;
- 9 nos. Particle Size Distribution (PSD) tests;
- 8 nos. Atterberg Limits tests;
- 5 nos. Modified Maximum Dry Density (MMDD) tests;
- 2 nos. California Bearing Ratio (CBR) tests (4-days soaked);
- 3 nos. Thermal Resistivity tests;
- 2 nos. Emerson Class tests;
- 8 nos. Aggressivity Suite tests (pH, EC, Cl- & SO42-);
- 2 nos. Direct Shear (multi-stage) tests; and
- 1 no. Point Load Index (PLI) Strength test.

2.1.8 CONTAMINATION

Samples recovered for environmental, contamination and ASS purposes were stored, chilled / frozen (where required), and transported in laboratory supplied coolers in accordance with the above guidelines to a NATA accredited laboratory in Perth. The following subsections provide a summary of the analysis undertaken.

2.1.9 CONTAMINANTS OF POTENTIAL CONCERN

The number of primary samples associated with the contaminants of potential concern (CoPC) are presented below:

- 50 nos. Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- 50 nos. Total Recoverable Hydrocarbons (TRH) (NEPM 2013 fractions);
- 50 nos. Metals (aresnic, beryllium, boron, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium and zinc);
- 50 nos Organochlorine (OC) and Organophosphate (OP) pesticides;
- 50 nos. Nutrients (ammonia, nitrate, nitrite, nitrate and nitrite (NOx-N), total kjeldahl nitrogen (TKN), total nitrogen (TN), reactive phosphorus, total phosphorus); and

- 52 nos. Asbestos in soil (fibrous)
- 10 nos. Per- and polyfluoroalkyl substances (PFAS)

2.1.10 ACID SULFATE SOILS

A review of the Acid Sulphate Soil Risk Map indicates that the area is in a high to moderate risk of acid sulfate soil (ASS) occurring within 3 m of natural soil surface.

An ASS assessment was undertaken as presented below:

- 206 nos. field suite tests (pH_F & pH_{FOX}); and
- 70 nos. confirmatory analyses suspension peroxide oxidation combined acidity and sulfate (SPOCAS) suite tests.

3 Assessment Criteria

3.1 Contaminants of Potential Concern

The material characterisation soil results were compared against the soil assessment criteria presented in Table 3-1 to assess human health and ecological risks.

Table 3-1 Contaminants of Potential Concern Assessment Criteria

Soil Assessment Criteria	Justification for Use
CRC Care 2011 Soil HSL Intrusive Maintenance Worker (shallow trench)	Vapour intrusion from soil is a potential pathway.
CRC Care 2011 Soil HSL Direct Contact (Intrusive Maintenance Worker)	Direct contact between workers and impacted soils
NEPM 2013 HSL Screening levels (HSL) for vapour intrusion Commercial / Industrial	Vapour intrusion from soil is a potential pathway.
NEPM 2013 Health Investigation Levels (HILs) Commercial / Industrial	Exposure to soils impacted by contaminants of potential concern (COPC) by future users
NEPM 2013 Ecological Screening levels (ESL) Commercial / Industrial	Ephemeral creeks are present across each of the mine sites
NEPM 2013 Ecological Investigation Levels (EIL) Commercial / Industrial	Ephemeral creeks are present across each of the mine sites

3.2 Per- and Polyfluoroalkyl Substances

Criteria for PFAS are adopted from the PFAS NEMP (2020). The PFAS NEMP (version 2, 2020) provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination. It supports collaborative action on PFAS by the Commonwealth, state and territory and local governments around Australia. The NEMP is an Appendix to the Intergovernmental Agreement on a National Framework Responding to PFAS Contamination.

The identification of PFAS above relevant guideline values acts as a trigger to undertake further investigations (such as site-specific risk assessment, as opposed to the assumption that harm will have occurred). The guideline values can also prompt consideration of management action to meet the environmental values and mitigate, where practicable, human health and ecological risks.

3.2.1 HUMAN HEALTH

The human health-based assessment criteria for soil were derived using a methodology consistent with assumptions set out in the ASC NEPM for the health investigation levels (HILs). The following assessment criteria has been adopted based on current and future exposure pathways:

- Industrial/commercial - Assumes 8 hours is spent indoors and 1 hour spent outdoors at a site such as a shop, office, factory or industrial site. If the typical exposure for a site is predominantly outdoors with significant earthen areas, recalculation of a site-specific value is recommended.

It is noted that assessment criteria developed for soils should not be applied directly to the assessment of sediments and the Interim sediment quality guidelines (ISQG) should be adopted. However, the ISQG only provide criteria for a number of common metal, metalloid and organometallic contaminants and organics, principally PAHs and organochlorine pesticides (OCPs), with no sediment criteria for PFAS developed, therefore, assessment criteria developed within the PFAS NEMP for soils have been adopted. The adopted human health assessment criteria for soil and sediment are shown in Table 3-2.

Table 3-2 Human Health PFAS Assessment Criteria

Land Use	PFOS (mg/kg)	PFOS + PFHxS (mg/kg)	PFOA (mg/kg)
Industrial/commercial	Refer to value for PFOS + PFHxS*	20	50
1) Notes: 2) * - Table 2 PFAS NEMP (2020)			

3.2.2 ECOLOGICAL

The ecological assessment criteria within the NEMP are currently interim. The direct exposure ecological soil criteria apply specifically to protection of organisms that live within, or in close contact with soil, such as earthworms and plants. This direct exposure value can be used to assess the possibility of direct harm to these organisms. In the absence of acceptable and sufficient published guideline values for direct exposure, human health soil criteria are recommended as an interim position. The adopted ecological assessment criteria for soil and sediment are shown in Table 3-3.

Table 3-3 Ecological PFAS Assessment Criteria

Land Use	PFOS (mg/kg)	PFOS + PFHxS (mg/kg)	PFOA (mg/kg)
Ecological direct exposure	1	No value	10
Ecological indirect exposure	0.01	No value	0.005
Ecological indirect exposure (no secondary consumers)	0.14	No value	No value
Notes: * - Table 3 PFAS NEMP (2020)			

The ecological indirect exposure guideline value is based on dietary exposure of a secondary consumer as the most sensitive exposure pathway assessed. This value may not be protective of specific animals relevant to Australia, including predatory animals such as quolls, antechinus and reptiles. The value of 0.14 mg/kg has been based on an intensively developed site with no secondary consumers and minimal potential for indirect ecological exposure.

4 Results

4.1 Project Area Description

The Proposed Wind Farm in Scott River is located in the southwestern region of Western Australia, approximately 15 km northeast of the township of Augusta (within the Shire of Augusta-Margaret River).

The current project area spans more than 5,500 Ha across private agricultural land, bound by the Blackwood River to the South, Scott River Road to the West, Dennis Road to the East and the other private land parcels to the North as shown on Figure 4-1.

Figure 4-1 Current Site Boundary



The regional topography comprises a widely undulating but generally increasing elevation profile northwards from the Indian Ocean shoreline to the South. The local topography at the project area comprises a broad and gently undulating surface with lower lying areas often supporting wetland and creek vegetation.

Although the project area is primarily used for agricultural purposes (predominantly cattle grazing), several land parcels of native forest and gum plantation exist, identifiable as darker green patches on the plan. At the time of the investigation, the remainder of the project area's surface comprised vast open fields blanketed by short, dry grasses and sporadic trees (<10 m height) persisting throughout. Numerous wire fence lines separate land parcels and paddocks throughout the project area.

Where exposed, the surface soils were observed to be dry, loose and primarily comprising grey and pale brown sands. However, outcrops of iron cemented rock (Ferricrete) are found scattered across the project area.

Some representative photos of the project area are presented as Figure 4-2 to Figure 4-6 below.

Figure 4-2 Typical Ferricrete Exposure



Figure 4-3 Typical Grassy Fields and Small Trees



Figure 4-4 Typical Fencing and Surface Conditions



Figure 4-5 Typical Fencing and Surface Conditions



Figure 4-6 Typical Plantation Area



4.2 Encountered Subsurface Conditions

4.2.1 FIELD TESTING

Logs pertaining to the intrusive testing undertaken as part of this preliminary investigation are presented as Appendix B of this report and should be referred to for geotechnical information inherent to specific locations / infrastructure.

Due to the relatively large distances between test locations, developing a ground model for the >5,500 Hectare project area based on the limited data recovered would unlikely be representative and therefore, has not been developed. The geotechnical information contained within this report should only be relied upon for discussion and high-level costing purposes.

It is understood that additional geotechnical testing will be undertaken to inform design objectives at a later time.

4.2.1.1 Test Pits

Based on the conditions encountered within the test pit excavations across the project area, the shallow (<3 m) sub-surface profile generally comprised a thin layer of topsoil, overlying sand (of various silty fines fraction), often overlying iron cemented rock strength material (ferricrete). Where ferricrete was not encountered, further sand was present to termination depth though, some layers of rich organic materials were encountered.

DCP testing undertaken through the sandy soils encountered a range of resistance through the ground profile with interpreted relative densities ranging from Loose to Very Dense. A table of the DCP results is presented below Table 4-1.

Table 4-1 DCP Test Results

ID / Blows Depth	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08	TP09	TP10	TP11	TP12	TP13	TP14	TP15	TP16	TP17	TP18	TP19	TP20
0.0-0.1	2	2	30	35	2	2	1	4	2	6	2	2	2	3	2	**R**	2	**R**	4	2
0.1-0.2	3	3	3	5	2	3	2	3	2	4	4	**R**	1	5	3		**R**		5	3
0.2-0.3	4	3	2	3	4	3	5	2	2	4	4		3	**R**	3				6	5
0.3-0.4	5	4	3	2	4	3	6	2	2	4	5		2		5				6	6
0.4-0.5	4	4	3	2	5	6	7	1	2	4	6		2		4				8	6
0.5-0.6	4	3	2	3	6	**R**	7	2	1	4	6		3		4				8	6
0.6-0.7	5	4	2	3	5		8	2	2	5	8		3		5				8	6
0.7-0.8	6	4	3	3	4		9	1	2	4	8		3		6				**R**	6
0.8-0.9	5	**R**	3	3	**R**		8	2	2	3	7		3		**R**					**R**
0.9-1.0	6		3	2			7	2	1	3	5		3							
1.0-1.1	5		2	2			8	3	2	3	4		5							
1.1-1.2	7		2	3			9	4	2	**R**	5		5							
1.2-1.3	7		3	3			9	4	3		5		6							
1.3-1.4	7		2	3			10	4	4		6		8							
1.4-1.5	11		2	3			9	6	25		4		10							
1.5-1.6	23		2	3			26	10	**R**		6		15							
1.6-1.7	28		2	4			24	25			8		20							
1.7-1.8	**R**		2	4			25	22			6		15							
1.8-1.9			3	3			23	30			7									
1.9-2.0			3	4			22	35			7									
2.0-2.1			3	4			23	40			8									
2.1-2.2			4	5			25	**R**			8									
2.2-2.3			4	5			**R**				7									
2.3-2.4			5	6							6									
2.4-2.5			5	5							5									
2.5-2.6			4	4							6									
2.6-2.7			6	5																
2.7-2.8			6	6																
2.8-2.9			7	6																
2.9-3.0			8	6																

4.2.1.2 Geotechnical Boreholes

Subsurface conditions encountered within the geotechnical boreholes varied significantly, particularly between the north of the project area (WM01) and the southern and central portions of the project area (WM02 and WM03 respectively).

A range of SPT values were recovered which are presented graphically in Figure 4-7. A brief summary of the conditions encountered within each borehole is provided below.

WM01

A thin layer of dune sands (< 1.6 m) was present immediately overlying saturated grey and dark grey, interbedded / alternating bands of clayey and sandy soils and frequent pockets of organic and peaty material. Though little published geological information specific to the project area was available for reference, the deeper conditions underlying thin Quaternary Dune Deposits are likely residual soils derived from the Leederville Formation. This unit was encountered to the boreholes termination depth (~25 m).

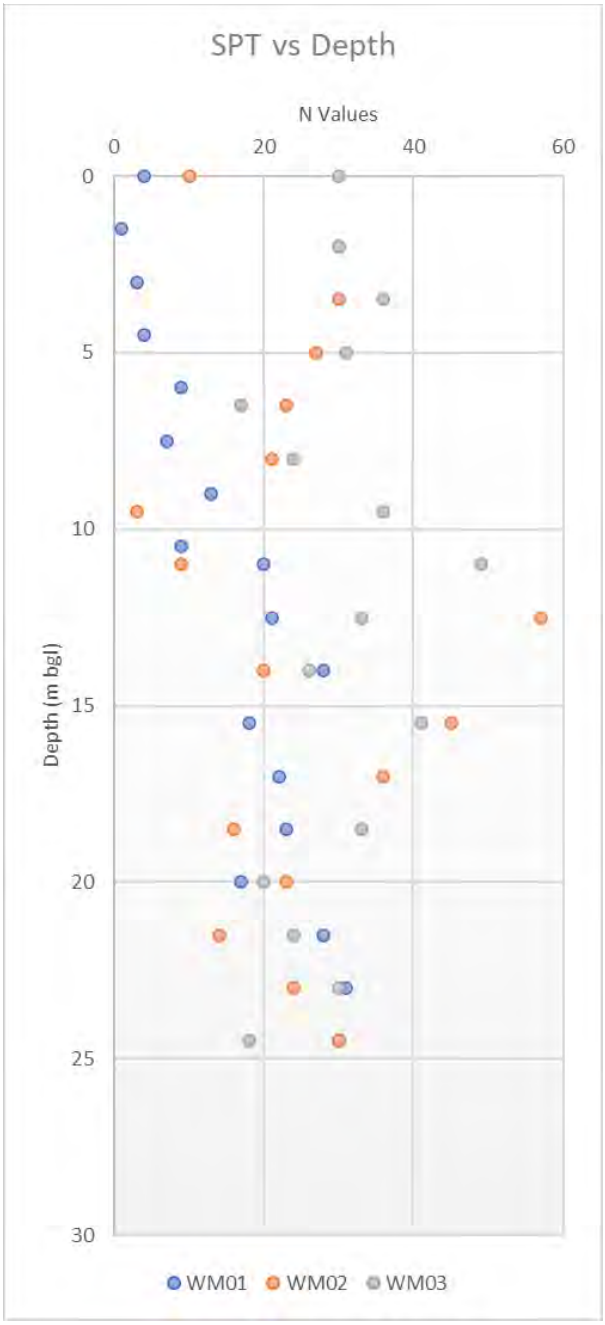
WM02

A thin layer of dune sands (<1.0 m) was present overlying iron-cemented sands (Ferricrete), indurated to a DI grade duricrust. The Ferricrete was encountered as a 1.7 m thick, massive rock unit directly overlying weakly cemented (easily broken apart by hand) organic rich sands, likely associated with historic dune swales and lacustrine depositional environments. Residual sands and clays likely derived from the Leederville Formation are present underlying this unit, which were encountered to termination depth (~25 m).

WM03

Similar to WM02, though Ferricrete was present only 0.35 m below surface, underlying topsoil and dune sands, and was encountered as a 2.05 m thick, massive rock unit (Grade DI duricrust). Weakly cemented organic rich sands were present directly beneath Ferricrete, extending to 6.2 m before intersecting clayey and sandy soils likely residuals of the Leederville Formation. A thin layer of sandstone was encountered at 19.65 m overlying more residual soils which were encountered to the base of the hole (~25 m).

Figure 4-7 SPT Plot



4.2.2 GEOTECHNICAL TEST RESULTS

The laboratory test certificates for the geotechnical, contamination, and acid sulphate soils testing are presented in Appendix C.1 and C.2 respectively.

The results of geotechnical laboratory testing are summarised in Table 4-2 and Table 4-3 with a graphical representation of the classification test results shown in Figure 4-8 and Figure 4-9.

As expected, based on the logging undertaken in the field and considering the large distances between test locations, significant variability exists across the project area, both in the material classification and performance characteristics.

Table 4-2 Thermal Resistivity Test Results

Sample ID	Moisture Content (%)	Thermal Resistivity (K.M/W)
TP10 - 1.0m	0	1.96
	3.5	0.653
	8.6	0.389
	11.9	0.289
TP13 - 1.5m	0.1	1.76
	5.3	0.616
	11.4	0.348
	16.7	0.216
TP15 - 1.0m	0.1	1.47
	4.6	0.653
	9.8	0.469
	14.5	0.39
Note: **All samples were compacted to a target of 95% MMDD**		

Table 4-3 Laboratory Testing (Geotechnical)

Borehole ID	Depth (m bgl)	Moisture Content (%)	Particle Size Distribution (%)			Atterberg Limits (%)			MMDD (t/m^3)	OMC (%)	CBR (%)*	Direct Shear**		Emerson Class	Point Load Index (MPa)		Aggressivity Suite		
			G	S	F	LL	PI	LS				Peak (°)	Residual (°)		Is	Is(50)	pH	Cl^- (mg.kg)	$SO4^{2-}$ (mg/kg)
WM01	1.0 - 1.6	7.3	0	85	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WM01	4.0 - 5.0	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
WM01	17.0 - 18.0	30.2	0	18	82	61	27	9.5	-	-	-	-	-	-	-	-	5.4	26	810
WM01	22.0 - 23.0	0.5	2	71	27	26	9	4	-	-	-	-	-	-	-	-	5.1	41	190
WM02	4.5 - 5.0	9.3	0	97	3	N.P	-	-	-	-	-	-	-	-	-	-	3.6	34	5200
WM02	10.0 - 11.0	5.9	0	87	13	N.P	-	-	-	-	-	-	-	-	-	-	2.6	20	1800
WM02	16.0 - 17.0	0.4	5	90	5	N.P	-	-	-	-	-	-	-	-	-	-	4.1	54	1100
WM03	0.35 - 3.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2.21	2.90	-	-	-
WM03	4.0 - 5.0	7.3	0	85	5	N.P	-	-	-	-	-	-	-	-	-	-	4	50	1800
WM03	24.0 - 24.9	17.1	9	60	31	34	14	5.5	-	-	-	-	-	-	-	-	5.3	33	110
TP07	1.7	15.0	-	-	-	-	-	-	1.79	15.0	-	45.00	35.37	-	-	-	-	-	-
TP08	2.0	13.5	-	-	-	-	-	-	1.93	13.5	-	47.47	39.69	-	-	-	-	-	-
TP10	1.0	12.0	-	-	-	-	-	-	1.93	11.5-12.0	25	-	-	-	-	-	-	-	-
TP11	2.0	20.2	1	94	5	N.P	-	-	-	-	-	-	-	5	-	-	5.2	51	790
TP13	1.5	17.0	-	-	-	-	-	-	1.76	17.0	-	-	-	-	-	-	-	-	-
TP15	1.0	14.5	-	-	-	-	-	-	1.95	12.5	20	-	-	-	-	-	-	-	-

Notes:

G = Gravel
S = Sand
F = Fines

N.P = Non-plastic
LL = Liquid Limit
PI = Plasticity Index
LS = Linear Shrinkage

MMDD = Modified Maximum Dry Density
OMC = Optimum Moisture Content
CBR = California Bearing Ratio

*Samples compacted to a target of 95% MMDD and at OMC
**Samples compacted to a target of 98% MMDD and at OMC

Figure 4-8 PSD Curves

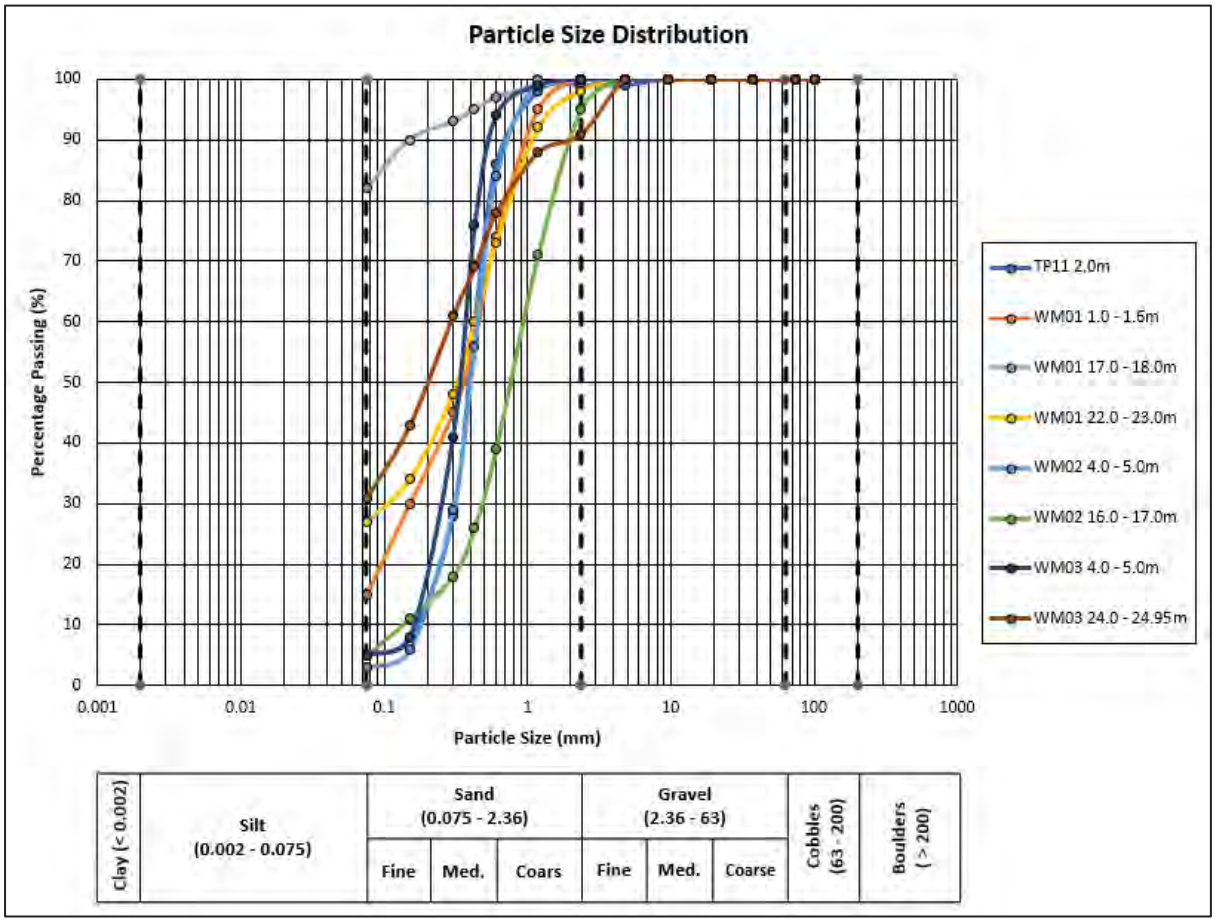
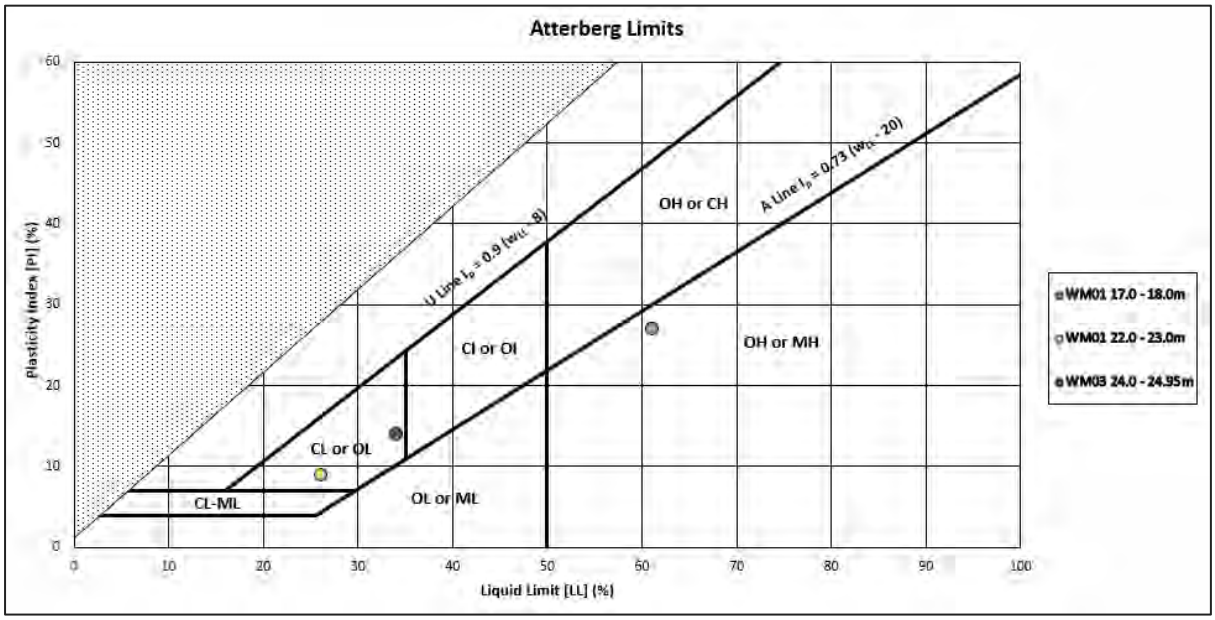


Figure 4-9 Atterberg Limits Plot



4.2.3 CONTAMINANTS OF POTENTIAL CONCERN

The laboratory test certificates for the CoPC are presented in Appendix C.2, with an analytical results table presenting all data against adopted assessment criteria in Appendix E.

4.2.3.1 Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN)

All BTEXN concentrations were recorded below the laboratory limit of reporting (LOR).

4.2.3.2 Total Recoverable Hydrocarbons (TRH)

A total of 50 primary samples were submitted for TRH analysis. A total of nine samples recorded TRH (C_{10} – C_{40}) concentrations above the laboratory LOR. Details of the TRH results recording concentrations above the laboratory LOR are presented in Table 4-4.

The highest TRH fraction concentrations were reported within the surface sample at TP01; however, all TRH concentrations were recorded below the adopted assessment criteria.

Table 4-4 Soil Analytical Results - TRH

Analyte	No. Samples	No. Detects	Max Conc (mg/kg)	Ecological Screening Levels[1]		Health Screening Levels – Vapour Intrusion[2]		Health Screening Levels – Direct Contact[3]				Management Limits[4]	
				Com / Ind (mg/kg)	No. of Conc > Criteria	HSL-D (mg/kg)	No. of Conc > Criteria	HSL-D (mg/kg)	No. of Conc > Criteria	Int Main Worker (mg/kg)	No. of Conc > Criteria	Com / Ind (mg/kg)	No. of Conc > Criteria
C_6 – C_{10}	50	0	<20	NC	-	NC	-	26,000	0	82,000	0	700	0
F1 (C_6 - C_{10} minus BTEX)	50	0	<00	215	0	250	0	NC	-	NC	-	NC	-
C_{10} – C_{16}	50	1	150 (TP01 – 0.0)	NC	-	NC	-	20,000	0	62,000	0	1,000	0
F2 (C_{10} - C_{16} minus Naphthalene)	50	1	150 (TP01 – 0.0)	170	0	NC	-	NC	-	NC	-	NC	-
F3 C_{16} – C_{34}	50	11	1,600 (TP01 – 0.0)	1,700	0	NC	-	27,000	0	85,000	0	3,500	1
F4 C_{34} – C_{40}	50	3	380 (TP01 – 0.0)	3,300	0	NC	-	38,000	0	120,000	0	10,000	0
C_{10} – C_{40}	50	11	2,130 (TP01 – 0.0)	NC	-	NC	-	NC	-	NC	-	NC	-

Notes:
1. Ecological Screening Levels from NEPC (2013). Values for coarse soil texture applied
2. Health Screening Levels from NEPC (2013). Vaues for coarse soils at 0 to <1.0m depth applied.
3. Health Screening Levels from Friebel & Nadebaum (2011) CRCCARE
4. Management Limits from NEPC (2013). Values for coarse soil texture applied
5. “NC”: no criteria adopted.

4.2.3.3 Metals

Concentrations of arsenic, cadmium, copper, lead, manganese, mercury, nickel and zinc were recorded above the laboratory LOR. A summary of the heavy metal concentrations recorded are presented in Table 4-5, however, all concentrations were recorded below the adopted assessment criteria.

Table 4-5 Soil Analytical Results - Metals

Metal	**No. Samples**	**No. Detects**	Max Conc (mg/kg)	Location of Max Concentration	HIL Recreational (mg/kg)	HIL Comm/Ind (mg/kg)
Arsenic	50	3	11	WM03-0.5	300	3,000
Cadmium	50	3	0.8	TP03 - 0.0	100	800
Copper	50	21	12	TP03 - 0.0	20,000	250,000
Lead	50	16	20	WM03-0.5	600	1,500
Manganese	50	10	27	TP04 - 0.0	9,000	40,000
Mercury	50	7	0.05	WM03-0.0 WM03-0.5	400	4,000
Nickel	50	2	2.6	TP09 - 1.0	800	4,000
Zinc	50	6	32	TP04 - 0.0	30,000	400,000

4.2.3.4 Organochlorine (OC) and Organophosphate (OP) pesticides

All OC and OP pesticides concentrations were recorded below the laboratory LOR.

4.2.3.5 Nutrients

Concentrations of KNT, nitrate, nitrite, nitrogen and phosphorus were recorded above the laboratory LOR. A summary of the nutrient concentrations recorded are presented in Table 4-6, however, it is noted that there are no assessment criteria for nutrients.

Table 4-6 Soil Analytical Results - Nutrients

Metal	No of Conc > LOR	Min Conc (mg/kg)	Max Conc (mg/kg)	Location of Max Concentration
KNT	50	40	5,200	WM03-0.0
Nitrate	29	<1	37	TP11-0.0
Nitrite	9	1	15	WM02-0.0
Nitrogen	50	40	5,200	WM03-0.0
Phosphorus	50	1.7	1,300	TP03 - 0.0

4.2.3.6 Asbestos in soil (fibrous)

Asbestos was not detected in any of the samples.

4.2.3.7 Per- and polyfluoroalkyl substances (PFAS)

All PFAS concentrations were recorded below the laboratory LOR.

4.2.4 ACID SULFATE SOILS

The laboratory test certificates for the CoPC are presented in Appendix C.2.

4.2.4.1 Preliminary Acid Sulfate Soils Assessment

The results of the initial laboratory screening of pH_F and pH_{FOX} analysis are summarised in Table 4-7 below and in further detail in Appendix D.1. The results were assessed under the framework provided in Table A1 and A2 of the Department of Water and Environmental Regulation (DWER) Identification and investigation of acid sulfate soils and acidic landscapes (June 2015).

Table 4-7 ASS Field Screening Test Results

Location	No. of Samples	Max Sample Depth (m BGL)	Average pH_F	Average pH_{FOX}	ΔpH	Reaction Rate
TP01	8	2.0	4.66	3.56	1.10	Moderate
TP02	5	1.0	4.80	3.80	1.00	Moderate
TP03	3	1.0	6.23	4.57	1.67	Moderate
TP04	5	1.75	5.88	3.96	1.92	Moderate
TP05	4	0.75	5.95	3.48	2.48	Moderate
TP06	3	0.5	4.93	4.13	0.80	Moderate
TP07	7	1.5	6.27	4.89	1.39	Moderate
TP08	9	2.0	5.47	4.23	1.24	Moderate
TP09	4	1.5	5.45	4.68	0.78	Moderate
TP10	2	1.0	6.05	4.05	2.00	Moderate
TP11	9	2.0	6.09	4.10	1.99	Moderate, with a single extreme reaction @ 2.0 m BGL
TP12	1	0.0	6.00	4.10	1.90	Moderate
TP13	9	2.0	4.84	4.17	0.68	Moderate
TP14	2	0.25	5.65	3.60	2.05	Moderate
TP15	5	1.0	5.74	4.54	1.24	Moderate
TP16	1	0.0	5.80	3.00	2.80	Moderate
TP17	3	0.5	5.30	3.00	2.30	Moderate

Location	No. of Samples	Max Sample Depth (m BGL)	Average pH_F	Average pH_{FOX}	ΔpH	Reaction Rate
TP18	1	0.0	5.90	3.80	2.10	Moderate
TP19	3	0.5	5.63	4.67	0.97	Moderate
TP20	1	0.0	5.20	4.60	0.60	Moderate
WM01	41	10.0	5.93	2.71	3.22	Moderate, with extreme reactions below 5.25 m BGL
WM02	41	10.0	5.83	3.23	2.58	Moderate, with extreme reactions below 3.5 m BGL
WM03	39	10.0	6.17	3.38	2.79	Moderate, with extreme reactions below 3.25 m BGL

The initial ASS field screening test results indicate that none of the sample locations recorded an average pH_F value in excess of 6.3 indicating the potential occurrence of marine muds, and reflecting seawater influence, and the presence of potential acid sulfate soils (PASS).

The pH_{FOX} test is used to indicate the presence of iron sulfides or PASS. This test involves adding 30 per cent hydrogen peroxide (pH adjusted to 4.5–5.5) to a sample of soil. If sulfides are present a reaction will occur. The reaction can be influenced by the amount of sulfides present in the sample, the presence of organic matter, or the presence of manganese.

All reactions recorded moderate to extreme reactions indicating the possible presence of PASS. This is supported by the difference between the pH_F and pH_{FOX} results, with the samples collected from the groundwater monitoring bores indicating an average 2.5 or greater difference.

4.2.4.2 SPOCAS Assessment

The complete SPOCAS method provides 12 individual analytes (plus five calculated parameters), enabling the quantification of some key fractions in the soil sample, leading to better prediction of its likely acid-generating potential. It involves the measurement of pH, titratable acidity, sulfur and cations on two soil sub-samples. One soil sub-sample is oxidised with hydrogen peroxide and the other is not. The differences between the two values of the analytes from the two sub-samples are then calculated.

A summary of the SPOCAS results are presented in Appendix D.2.

The results indicate that 50 of the 70 samples submitted for SPOCAS analysis exceeded the net acidity action criteria.

5 Comments and Recommendations

The information presented below is preliminary and should be further refined, where required, based on future investigations closer to confirmed infrastructure locations.

5.1 Preliminary Baseline Contamination Conditions

It is considered based on the soil investigation completed that the concentrations of the identified CoPC do not pose a risk to human health or the environment.

5.2 Preliminary Acid Sulphate Soil Conditions

The initial ASS field screening test results indicate that none of the sample locations recorded an average pHF value in excess of 6.3 indicating the potential occurrence of marine muds, and reflecting seawater influence, and the presence of potential acid sulfate soils (PASS).

The pHFOX test is used to indicate the presence of iron sulfides or PASS. This test involves adding 30 per cent hydrogen peroxide (pH adjusted to 4.5–5.5) to a sample of soil. If sulfides are present a reaction will occur. The reaction can be influenced by the amount of sulfides present in the sample, the presence of organic matter, or the presence of manganese.

All reactions recorded moderate to extreme reactions indicating the possible presence of PASS. This is supported by the difference between the pHF and pHFOX results, with the samples collected from the groundwater monitoring bores indicating an average 2.5 or greater difference.

The results indicate that 50 of the 70 samples submitted for SPOCAS analysis exceeded the net acidity action criteria. An ASS management plan (ASSMP) will need to be developed and implemented for disturbance of ASS for the project.

5.3 Construction Recommendations

5.3.1 GENERAL EARTHWORKS (LIGHT STRUCTURES AND PAVEMENTS)

It is recommended where light structures and pavements are proposed, general earthworks shall be undertaken conforming to the following:

All uncontrolled fill, vegetation, soil horizons with >5% fines content (<75 microns), rich in organics and / or topsoil material (if present) should be stripped and stockpiled for disposal off-site or for landscaping purposes, exposing the natural competent subgrade.

Should fill be required to achieve design levels, it should comprise clean granular material with <5% fines content and a maximum particle size of 100 mm, that is moisture conditioned to within ± 3% of the soil's optimum moisture content. The pale coloured, natural dune sands located across the project area are likely suitable for re-use as engineered fill, provided oversize and deleterious materials are removed. Similarly, where suitable crushing of Ferricrete is undertaken, this may also be used.

Assuming the above have been undertaken, excavations to design subgrade levels are expected to recover sand which should be readily excavated using a conventional earthmoving plant. However, extensive Ferricrete was observed across the project area, often at or immediately below the surface which would likely require rock breaking and ripping to remove.

At the completion of excavations to design levels (including foundations), the subgrade shall be compacted to achieve at least 95% compaction with respect to Modified Maximum Dry Density (MMDD). Proof rolling of the subgrade shall also be undertaken where practicable. Any loose/soft, weak or organic materials observed during the proof roll shall be removed and replaced with compacted clean fill.

Material for use as fill shall be moisture conditioned and compacted in layers not exceeding 300 mm to achieve at least 95% compaction with respect to MMDD, as defined above. This includes material placed adjacent to foundations. Care must be exercised when compacting in the vicinity of existing structures, particularly if vibratory compaction is being carried out.

Temporary cut batters above the water table may be excavated to a gradient of up to 1V:2H to maximum heights of 3 m, provided no load-bearing structures or heavy loadings are positioned within 2 m of the batter crest. Cut batters exceeding 3 m in height must be benched (minimum 1.5 m wide level benches). Permanent cut and fill batters should be created at a gradient of no steeper than 1V:3H.

The poorly graded sandy nature of the surface soils in the project area will mean that they will dry quickly where exposed and the trafficability of construction vehicles will be poor, leading to significant rutting. In addition, the Emerson Class tests undertaken indicate the soils may be susceptible to erosion from surface water flow. We recommend that all completed earthworks surfaces be hydro-seeded or dust stop be used, to prevent erosion and excess dust on the project.

The technical and control requirements for Engineered Fill, including site observation and compaction testing, are outlined in AS3798. We recommend that this work, and in particular, determining the depth and extent of any uncontrolled fill removal during earthworks, is completed under the direction and control of a suitably experienced Geotechnical Professional familiar with the contents of this report.

5.3.2 WTG FOUNDATION EXCAVATIONS

5.3.2.1 Dewatering

It is noted that groundwater levels were recorded at shallow depths in each of the boreholes. Given the potential for excavations for WTG foundations to be up to 6m deep, significant dewatering may be required to facilitate construction. A dewatering management plan to inform the disposal conditions is recommended to be developed. This dewatering will likely require dewatering spears to be installed to maintain groundwater level at least 1m beneath foundation subgrade level.

5.3.2.2 Forward Planning

The presence of interbedded sandy and clayey material (noted in WM01) significantly increases the potential for softening and disturbance of footing bases during and following excavation. Once wetting and softening of the footing occurs it will be necessary to remove the softened disturbed material and replace it with compacted granular fill unless it can be dried out and compacted.

It is therefore imperative that footing excavations, inspection and base blinding is planned to occur quickly, using excavation and haulage plant that minimises rutting and disturbance of the excavation base, and is planned and timed to coincide with weather windows where rainfall is not forecasted. Provision should also be made to drain water from footing bases even after blinding is placed. To

facilitate this, it is recommended that lined sumps be installed to minimise the risk of sapping back of the side of the sump disturbing the footing footprint.

Even in the absence of rainfall some softening due to absorption of atmospheric moisture can occur. The excavations should be scheduled so that they can be excavated, inspected and blinded in the shortest practical window to minimise the impact of atmospheric softening.

5.3.2.3 Excavatability

Excavations to design subgrade levels and footing excavations are expected to be through superficial sand, ferricrete duricrust and sandy clay. Refusal during backhoe excavation was encountered on the ferricrete duricrust.

The duricrust is likely to have variable strength, from soil strength to well cemented rock strength material. Given the large size of the WTG foundation excavations an excavator of >40T is likely required which, using a toothed bucket, may prove sufficiently effective to excavate through the rock mass. However, it is possible that isolated areas may require the use of a mechanical rock breaker. Given the variable thickness of the unit across such a large project area and with only limited rock strength information, the potential requirement of adopting drill & blast techniques should be considered. Additional geotechnical (particularly rock strength and extent) information to each wind turbine and infrastructure locations and excavatability methods will be required to be assessed during the detailed design and construct phase. Given the history of farming practices and developments across the project area, existing landowners/stakeholders may offer some additional insight into historical rock removal techniques adopted in the area, particularly whether drill and blast has historically been required.

5.3.2.4 Batter Angles and Formwork

It is understood that the WTG foundations generally require lateral support surrounding the foundation. Therefore, it may be preferable to excavate vertical sides rather than batter back and undertake the construction of foundation formwork. It is noted that, in accordance with West Australian codes of practice, a person must not work within an excavation which is greater than 1.5m deep without adequate shoring or safe batter angles provided. It is recommended that the sides of the excavation are benched to achieve stable and safe batters to allow personnel to access the excavation.

The effect of any load bearing structures, stockpiles, crane or plant loadings etc. located within 2.0 m of the cut slope crest must also be considered.

5.3.2.5 Base Protection and Preparation

Recommendations associated with this work are summarised as follows:

At the completion of excavation to design level, the upper 300mm of the exposed subgrade must be moisture conditioned and compacted to achieve at least 95% compaction with respect to Modified Maximum Dry Density (MMDD);

Given the potential variation in soil conditions across a large diameter (20 – 25 m) foundation excavation, the exposed subgrade must be assessed by a geotechnical engineer to ensure consistency and to check that naturally occurring or construction induced soft zones are present. This should be undertaken by observing a proof roll, by visual assessment and by Dynamic Cone

Penetrometer (DCP) and or shear vane testing. It may be necessary to undertake excavation and replacement with either compacted fill or lean mix concrete where unsuitable soils are encountered. The requirement for, and size of, this remediation can be decided on a case by case basis during earthworks and based on the final design.

5.3.2.6 Footing Base Backfilling

Once concrete has cured and formwork removed the footing based should be backfilled. Granular fill shall be selected for backfill and compacted in 300 mm layers to achieve a modified density ratio of 95%. This specification pertains to geotechnical engineering (material strength) characteristics to satisfy structural designs only. If confinement of groundwater surrounding footings is required based on environmental or hydrogeological assessments, additional backfill requirements and treatment options would likely be required whilst still maintaining sufficient load bearing capacities, such as use of grout or ground improvement techniques. Additional design by specialist wind turbine foundation designers will likely be required to meet these objectives.

The finished surface around footings should be graded to shed surface water way from the footing and to minimise the potential for water to seep into backfill materials.

APPENDICES

Appendix A Test Location Plan

Beenup Wind Farm

Preliminary Geotechnical and Baseline Contamination Investigation

Test Location Plan

Project Code: 304501017

Drawn By: Singh, Edvinder, Checked By: BP

Date: (2024-05-15)

Appendix A

Stantec

Legend

- Boundary Extents

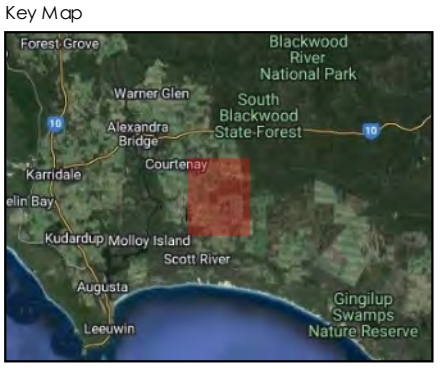
Geotechnical Investigation Type

- Geotechnical Boreholes (WM)
- Shallow Wells
- Geotechnical Test Pits (TP)

0 500 1,000 m

Scale at A3: 1:30000

Key Map



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Appendix B Geotechnical Logs

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SOIL AND ROCK EXPLANATORY NOTES, ABBREVATIONS & TERMS (DESCRIPTIONS, CLASSIFICATION CHARTS AND LOG KEYS)

CLASSIFICATION AND INFERRED STRATISGRAPHY

Soil and rock are classified and described in accordance with the recommendations of Australian Standard AS 1726-2017 Geotechnical Site Investigations which unless mentioned otherwise has been used to prepare these notes. The material properties are assessed in the field by visual/tactile methods. The order in which descriptions are provided on logs is as follows:

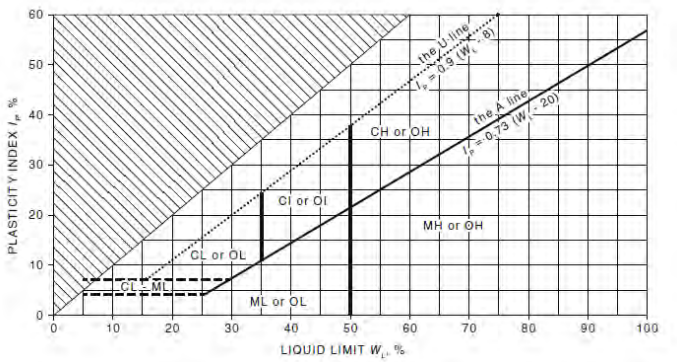
SOIL TYPE (AS 1726-2017 Classification) using BLOCK LETTERS, colour, structure, particle characteristics, geological origin, other minor components. The consistency/density and moisture conditions are listed as abbreviations in separate columns.

The presence of FILL and TOPSOIL shall be indicated at the beginning of the description using BLOCK LETTERS.

Particle Size Definitions

Fraction	Components	Sub Division	Particle Size
Oversize	BOULDERS		> 200mm
	COBBLES		63 – 200mm
Coarse Grained	GRAVEL	Coarse	19 – 63mm
		Medium	6.70 – 19mm
		Fine	2.36 – 6.70mm
	SAND	Coarse	0.60 – 2.36mm
		Medium	0.21 – 0.60mm
		Fine	0.075 – 0.21mm
Fine Grained	SILT		0.002 – 0.075mm
	CLAY		< 0.002mm

Plasticity Properties



NOTE: The U line is an approximate upper bound for most natural soils. Data which plots above the U line may represent unusual/problem soil behaviour, or unreliable data and should be considered carefully.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Major Soil Group	Descriptor	
G - Gravel **S** - Sand	**W** - Well-Graded **P** - Poorly-Graded **S** - Silty **C** - Clayey	**Coefficient of Uniformity (C_u) :** $C_u = D_{60} / D_{10}$
		Coefficient of Curvature (C_c) : $C_c = (D_{30})^2 / (D_{10}D_{60})$
		D_{10} – Grain Diameter (mm) Corresponding to 10% Soil Passing
		D_{30} – Grain Diameter (mm) Corresponding to 30% Soil Passing
		D_{60} – Grain Diameter (mm) Corresponding to 60% Soil Passing
M - Silt **C** - Clay **O** - Organic	**L** - Low Plasticity (LL < 35%) **H** - High Plasticity (LL > 50%)	**NOTE:** Well-Graded Sand (SW) : $C_u > 6$ and $C_c = 1\text{-}3$ Well-Graded Gravel (GW) : $C_u > 4$ and $C_c = 1\text{-}3$

Organic – The soil has between 20% – 75% Organic Matter / Medium Plasticity (Fine Grained Clay Soils ONLY): 35% < LL < 50%

MINOR COMPONENTS

Zoning	Description
Layer	The zone is continuous across the exposure or sample
Lens	Discontinuous layer of different material, with lenticular shape
Pocket	Irregular inclusions of different material
Interbedded / Interlaminated	Layers of alternating soil types are too thin to be described individually

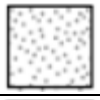
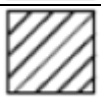
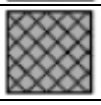
The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse-grained soils may be described as strongly or weakly cemented.

Cementation State	Description
Uncemented (Uc)	No cementation present
Weakly Cemented (Wk)	The soil may be easily disaggregated by hand in air or water
Moderately Cemented (Mo)	Effort is required to disaggregate the soil by hand in air or water

Terminology	Field Guide	Coarse Grained Soils		Fine Grained Soils
		Percentage Fines	Percentage Coarse	Percentage Coarse
Trace	Presence just detectable	≤ 5%	≤ 15%	≤ 15%
With	Presence easily detectable	> 5% / ≤ 12%	> 15% / ≤ 30%	> 15% / ≤ 30%

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading

SYMBOLS

	GRAVEL (GW / GP / GM /GC)		COBBLES & BOULDERS
	SAND (SW / SP / SM / SC)		PEAT (Pt)
	SILT (ML / OL / MH / OH)		TOPSOIL
	CLAY (CL / OL / CH / OH)		FILL

Combinations of these basic graphic symbols may be used to indicate and describe mixed materials such as Gravelly CLAY. EXAMPLE: GP-GC = Poorly-Graded GRAVEL with Silt

SOIL ORIGIN DESCRIPTIONS

Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity and/or water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by streams and rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual Soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely Weathered Material	Formed by in-situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

MOISTURE CONDITIONS (COARSE GRAINED AND FINED GRAINED SOILS)

Symbol	Term	Description
Coarse Grained Soils -		
D	Dry	Non-cohesive and free running/flowing
M	Moist	Soil feels cool, darkened in colour, soil tends to stick together
W	Wet	Soil feels cool, darkened in colour, soil tends to stick together, free water forms when handling
Fine Grained Soils -		
w < PL	Moist	Moist, Dry of Plastic Limit (PL), hard and friable or powdery
w ≈ PL		Moist, near Plastic Limit (PL), soils can be moulded at a moisture content approximately equal to the Plastic Limit (PL)
w > PL		Moist, Wet of Plastic Limit (PL), soils usually weakened and free water forms on hands when handling
w ≈ LL	Wet	Wet, near Liquid Limit (LL)
w > LL		Wet, Wet of Liquid Limit (LL)

MOISTURE CONDITIONS (ROCK)		
Symbol	**Term**	**Description**
D	Dry	Looks and feels dry
M	Moist	Feels cool, darkened in colour, nut no water is visible on the surface
W	Wet	Feels cool, darkened in colour, water film or droplets visible on the surface

GROUNDWATER	
	Water Level at Date Shown
	Water Inflow - Water Flowing/Flooding into Hole
	Water Outflow - Partial Water Loss
	Water Outflow - Complete Water Loss
GROUNDWATER NOT OBSERVED	The observation of groundwater, whether present or not, was not possible due to drilling water surface seepage or cave in of the borehole and/or test pit
GROUNDWATER NOT ENCOUNTERED	The borehole and/or test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole and/or test pit been left open for a longer period.

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

DENSITY / CONSISTENCY (COARSE GRAINED AND FINE GRAINED SOILS)

Relative Density (Coarse Grained Soils) -

Symbol	Term	Density Index (%)	SPT (150mm) *	DCP (100mm) *	DCP (150mm) *
VLs	Very Loose	Less than 15%	0 - 4	0 - 1	0 - 1
Ls	Loose	15% - 35%	4 - 10	1 - 2	1 - 3
MD	Medium Dense	35% - 65%	10 - 30	2 - 5	3 - 8
D	Dense	65% - 85%	30 - 50	5 - 10	8 - 15
VD	Very Dense	More than 85%	> 50	> 10	> 15

Consistency (Fine Grained Soils) -

Symbol	Term	Undrained Shear Strength (kPa)	Field Guide	DCP (100mm) *	DCP (150mm) *
VS	Very Soft	Less than 12kPa	Exudes between fingers when squeezed in hand	0	0
S	Soft	12kPa - 25kPa	Can be moulded by light finger pressure	0 -1	0 - 1.5
F	Firm	25kPa - 50kPa	Can be moulded by strong finger pressure	1 - 2	1.5 - 3
St	Stiff	50kPa - 100kPa	Cannot be moulded by fingers, can be indented by thumb	2 - 4	3 - 6
VSt	Very Stiff	100kPa - 200kPa	Can be easily indented by thumb nail	4 - 8	6 - 12
Hd	Hard	More than 200kPa	Can be indented with difficult by thumb nail	> 8	> 12

(*) - Number of blows are depth related and can vary significantly. In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material. SPT and DCP are not stated in AS 1726-2017, and may be subject to corrections for overburden pressure and equipment type. Corrections have not been performed in preparing the following logs.

C	Curved	The defect has a gradual change in orientation.
U	Undulating	The defect has a wavy surface.
St	Stepped	The defect has one or more well defined steps.
I	Irregular	The defect has many sharp changes of orientation.
Alternatively, the surface roughness may be characterised by the Joint Roughness Coefficient (JRC) [AS 1726:2017 – Figure 9]		
Defect Coatings and Composition of Seams -		
KL	Clean	No visible coatings.
S	Stained	No visible coating but surfaces are discoloured.
V	Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy.
C	Coating	A visible coating up to 1mm thick. Thicker soil material shall be described using defect terms (e.g. infilled seam). Thicker rock strength material shall be described as a vein.

DRILLING / EXCAVATION METHODS

Subsurface investigations may be conducted by either one or a combination of the following methods.

Test Pitting: Excavation/Trench [TP] -		**Spiral Flight Auger Drilling [SFAD] -**	
BH	Backhoe Bucket	AS	Auger Screwing
EX	Excavator Bucket	AD/V	Continuous Flight Auger with V-Bit
R	Ripper	AD/T	Continuous Spiral Flight Auger with TC-Bit
H	Hydraulic Hammer	ADH	Continuous Hollow Flight Auger
EE	Existing Excavation	**Rotary Non-Core Drilling [RNCD] -**	
N	Natural Exposure	WB	Washbore Drilling
Manual Drilling: Hand Operated Tools [MD] -		RR	Rock Roller
HA	Hand Auger	AIRCORE	Air Core
HAND	Excavated by Hand Methods	JET	Jetting
Continuous Sample Drilling [CSD] -		**Rotary Core Drilling [RCD] -**	
PT	Push Tube Sampling	PQ3	83mm - Diamond Wire Line Core Barrel
EPT	Extruded Push Tube	HMLC	63mm - Diamond Wire Line Core Barrel
PS	Percussion Sampling	HQ3	61mm - Diamond Wire Line Core Barrel
SONIC	Sonic Drilling	NMLC	52mm - Diamond Conventional Core Barrel
Hammer Drilling [HD] -		NQ3	45mm - Diamond Wire Line Core Barrel
AH	Air Hammer	DTC	Diatube Concrete Coring
AT	Air Track		
RAB	Percussion Rotary Air Blast		
RC	Reverse Circulation		

Boreholes -	
Vertical Boreholes	The dip (inclination from horizontal) of the defect is given
Inclined Boreholes	The inclination is measured as the acute angle between the core axis and the vertical direction

PENETRATION / EXCAVATION RESISTANCE

VE	Very Easy	Rapid penetration possible with very little effort from the equipment used
E	Easy	Rapid penetration possible with little effort from the equipment used
F	Firm	Excavation possible at an acceptable rate with moderate effort from the equipment used
H	Hard	Further penetration is possible at a slow rate and requires significant effort from the equipment used
VH	Very Hard	Further penetration is possible at a very slow rate and requires maximum effort from the equipment used
These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.		

EXCAVATION STABILITY CONDITIONS	
Stable	No obvious/gross short-term instability noted
Unstable	Collapse of the majority, or one or more faces of the excavation
Flooding	Excavation filled with water
Major Spalling	Major material falling into excavation
Minor Spalling	Minor material falling into excavation

CORE DRILLING PARAMETERS

There are a number of parameters that may be measured during core drilling (of both soil and rock profiles), and which may provide useful investigation data. The measurements that define these parameters should be taken during the drilling process, when drill core is relatively undamaged.

Symbol	Term	Calculation Formula
TCR	Total Core Recovery	$\text{TCR} = \frac{\text{Length of Core Recovered}}{\text{Length of Core Run}} \times 100\%$
RQD	Rock Quality Designation	$\text{RQD} = \frac{\sum \text{Length of Sound Core Pieces} > 100\text{mm in Length}}{\text{Length of Core Run}} \times 100\%$
FF	Fracture Frequency	$\text{FF} = \frac{\text{Number of Defects}}{\text{Length of Core Recovered (m)}}$

SAMPLING METHODS

BDS	Bulk Disturbed Sample	SPT	Standard Penetration Test Sample
DS	Disturbed Sample	ES	Environmental Soil Sample
U	Thin Wall Tube Undisturbed Sample	WS	Environmental Water Sample
C	Core Sample	ASS	Acid Sulfate Soil Sample

TESTING METHODS

SPT	Standard Penetration Test (AS 1289.6.3.1) – Blows per 150mm and N Value
N	Blows per 300mm Penetration following 150mm seating (First 150mm)
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and the rod weight only
HB	Hammer double bouncing on anvil
HP / PP	Hand/Pocket Penetrometer Test expressed as instrument reading in kPa
PSP	Perth Sand Penetrometer (AS 1289.6.3.3) – Blows per 150mm
DCP	Dynamic Cone Penetrometer (AS 1289.6.3.2) – Blows per 150mm
CPT	Cone Penetration Test
CPTu	Cone Penetration Test with Pore Pressure (u) measurement
WPT	Water Pressure Test
FP	Field Permeability Test over section noted
FV	Field Vane Shear Test expressed as Uncorrected Shear Strength (sv = Peak Value / sr = Residual Value)
PID	Photoionisation Detector Reading in ppm (Parts Per Million)
PM	Pressuremeter Test over section noted

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 1 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects
PT	PVC	1	39	1	TS		0.10m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics, dark black brown mottled; with silt. (Topsoil)	Uc	VLs to Ls	SPT 0.00 - 0.45 m 2, 2, 2 N*=4	100	0		0.00: PID: 6.6ppm 0.00: PID: 6.6ppm; SPT Recovery: 0.45 m 0.00: QC1
					QDD		SAND (SP): fine to coarse grained, sub-rounded to sub-angular, pale grey brown to; with silty fines. (Aeolian)							0.50: PID: 4.0ppm
														1.00: PID: 4.6ppm
		2	38	2			1.60m Sandy CLAY (CI): medium plasticity, pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; zones of clay high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded; (Residual Soil)		VS	SPT 1.50 - 1.95 m 1, 0, 1 N*=1	100	0		1.50: PID: 5.3ppm 1.50: PID: 5.3ppm; SPT Recovery: 0.45 m
									S to F					
		3	37	3						SPT 3.00 - 3.45 m 0, 1, 2 N*=3	100	0		3.00: SPT Recovery: 0.45 m
			36	4										
		4	35	5						SPT 4.50 - 4.95 m 2, 1, 3 N*=4	100	0		4.50: SPT Recovery: 0.45 m
									St					
		5	34	6						SPT 6.00 - 6.45 m 1, 4, 5 N*=9	100	0		6.00: SPT Recovery: 0.45 m
			33	7						SPT 7.50 - 7.95 m 1, 3, 4 N*=7				7.50: SPT Recovery: 0.45 m

Leederville Formation

Water Level

Monitoring Well Details: WM01 - 0.7m stickup

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DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 2 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
PT		6	31	9			Sandy CLAY (Cl): medium plasticity, pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; zones of clay high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded; (Residual Soil) *(continued)*	Uc	St		100	0				
											100	0		9.00: SPT Recovery: 0.75 m		
										SPT 9.00 - 9.45 m 6, 8, 5 N*=13						
		7	30	10							100	0				
										SPT 10.50 - 10.95 m 6, 6, 3 N*=9				10.50: SPT Recovery: 0.45 m		
		8	29	11			11.00m				100	0		11.00: SPT Recovery: 0.45 m		
					Leederville Formation		SAND (SP): medium to coarse grained, sub-rounded to sub-angular, quartz and lithics, pale grey mottled dark grey; with clay high plasticity; frequent lenses of clay and sandy clay, medium to high plasticity; (Residual Soil)		MD	SPT 11.00 - 11.45 m 3, 9, 11 N*=20						
		9	28	12							100	0				
										SPT 12.50 - 12.95 m 6, 10, 11 N*=21				12.50: SPT Recovery: 0.45 m		
HQ-3		10	27	13				CL			24	0		12.95-13.8: Core Loss		
								Uc	MD							
			26	14						SPT 14.00 - 14.45 m 5, 14, 14 N*=28				14.00: SPT Recovery: 0.45 m		
		11	25	15			15.10m				100	0				
							Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics and peat, dark grey; high plasticity; trace black peat fragments; (Residual Soil) 15.40m									
									VSt					15.50: SPT Recovery: 0.45 m		
							CLAY (CH): high plasticity, dark grey and black; with peat; (Residual Soil) 15.70m		MD	SPT 15.50 - 15.95 m 5, 9, 9 N*=18						

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017

Hole No: WM01

Position: E341346.000 N6215506.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt | **Mounting:** Track | **Contractor:** National Geotech
Data Started: 26/2/24 | **Date Completed:** 27/2/24 | **Logged By:** ES | **Checked By:** BP

Drilling | Material Description | Defect Description

Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3					Leederville Formation		16.10m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics and peat, dark grey; high plasticity; trace black peat fragments; (Residual Soil) *(continued)*	Uc	VSt to Hd		100	0				
		12					CLAY (CH): high plasticity, dark grey and black; with peat; frequent lenses of clayey sand & sandy clay; (Residual Soil)				100	0				
			23	17						SPT 17.00 - 17.45 m 5, 9, 13 N*=22				17.00: SPT Recovery: 0.45 m		
		13	22	18							100	0				
							18.55m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics, pale grey; high plasticity; (Residual Soil)		MD	SPT 18.50 - 18.95 m 6, 10, 13 N*=23				18.50: SPT Recovery: 0.45 m		
		14	21	19							100	0				
			20	20			19.90m CLAY (CH): high plasticity, dark grey and black; with peat; frequent lenses of clayey sand & sandy clay; (Residual Soil)		VSt	SPT 20.00 - 20.45 m 6, 7, 10 N*=17				20.00: SPT Recovery: 0.45 m		
		15	19	21			21.00m Clayey SAND (SC): fine to coarse grained, sub-rounded to sub-angular, quartz, lithics, pale grey; low plasticity. (Residual Soil)	CL			52	0		21-21.5: Core Loss		
									MD to D	SPT 21.50 - 21.95 m 8, 11, 17 N*=28				21.50: SPT Recovery: 0.45 m		
		16	18	22							100	0				
			17	23						SPT 23.00 - 23.45 m 9, 13, 18 N*=31				23.00: SPT Recovery: 0.45 m		
		17					23.90m				100	0				

DRILLING
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HFA Hollow flight auger
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Water Level on date shown
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water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM01

Job No: 304501017 **Sheet:** 4 of 4

Position: E341346.000 N6215506.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 26/2/24 **Date Completed:** 27/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		17	15	25	Leederville Formation		CLAY (CH): high plasticity, dark grey and black; with Peat; frequent lenses of clayey sand & sandy clay; (Residual Soil) *(continued)*	Uc	Hd		100	0				
							24.80m			SPT 24.50 - 24.95 m 6, 15, 15 N*=30				24.50: SPT Recovery: 0.45 m		
							24.95m Clayey SAND (SC): fine to medium grained, sub-rounded to sub-angular, quartz, lithics, grey; high plasticity; (Residual Soil)		MD to D						
							TERMINATED AT 24.95 m Target depth									
			14	26												
			13	27												
			12	28												
			11	29												
			10	30												
			9	31												

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
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water inflow
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P Parting
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FL Foliation
V Vein
CSM Crushed Seam
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HB Handing Break
DB Drilling Break

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ROUGHNESS
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COATING
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INFILL MATERIALS
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MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

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CORE BOX - PHOTO SHEET Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



WM01: 0 - 5m,
0.0 - 3.0m



WM01: 5 - 10m,
5.0 - 10.0 m

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CORE BOX - PHOTO SHEET

Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM01: 10 - 15m,
10.0 - 15.0m



WM01: 15 - 20m,
15 m to 20m

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CORE BOX - PHOTO SHEET

Borehole No. WM01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM01: 20 - 25m,
20.0 - 25.0 m

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 1 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
PT	PVC	1	30	1	TS		0.10m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics, dark black brown mottled; with silt. (Topsoil)	Uc	Ls	SPT 0.00 - 0.45 m 2, 4, 6 N*=10				0.00: PID: 3.2ppm 0.00: PID: 3.2ppm; SPT Recovery: 0.45 m 0.00: QC1		WM02 - 0.7m stickup
					QDD		SAND (SP): fine to medium grained, sub-rounded to sub-angular, pale grey brown to; trace; (Aeolian)							0.50: PID: 4.6ppm		
							1.00m							1.00: PID: 6.4ppm		
					Duricrust		FERRICRETE: granular, fine to coarse grained, dark orange brown to red-brown; <10% vuggs (DI Duricrust).	Mo	M to H		100			1.50: PID: 3.2ppm		
			29	2						SPT 2.00 - 2.05 m 30/50mm N*=R				2.00: 50mm 2.00: SPT Recovery: 0.45 m; 50mm		
		2					2.70m									
			28	3	Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown to grey; with silty fines. (Aeolian)	Uc	MD to D		100			3.50: SPT Recovery: 0.45 m		
										SPT 3.50 - 3.95 m 11, 15, 16 N*=31						
		3	27	4							100					
			26	5						SPT 5.00 - 5.45 m 6, 10, 17 N*=27				5.00: SPT Recovery: 0.45 m 5.45: Core was recovered but driller dropped core upon transfer to split		
		4	25	6							100					
										SPT 6.50 - 6.95 m 5, 10, 13 N*=23				6.50: SPT Recovery: 0.45 m		
		5	24	7							100					
														8.00: SPT Recovery:		

HQ-3

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

STANTEC AUSTRALIA PTY LTD

2023_03_16_STANTEC PERTH GEOTECH LIBRARY - UPDATE 2024-03-06.GLB Log STANTEC PERTH - HYBRID LOG - 05/03/2024 304501017_BH_REVA.GPJ <<DrawingFile>> 17/05/2024 15:23 10.03.00.09 Datgel AGS RTA, Photo, Monitoring Tools

Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 2 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		6	22	9	Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown to grey; with silty fines. (Aeolian) *(continued)*	Uc	MD to D	SPT 8.00 - 8.45 m 4, 7, 14 N*=21	100			0.45 m		
							9.25m									
		7	21	10	Leederville Formation		Sandy CLAY (CI): medium plasticity; pale grey and dark grey; sand, fine to medium grained, sub angular to sub rounded; zones of clay, high plasticity; zones of sand; medium to coarse grained, sub angular to sub rounded. (Residual Soil)		F to St	SPT 9.50 - 9.95 m 0, 0, 3 N*=3	100			9.50: SPT Recovery: 0.45 m		
		8	20	11			11.00m							11.00: SPT Recovery: 0.45 m		
							CLAY (CH): high plasticity, dark grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)			SPT 11.00 - 11.45 m 1, 5, 4 N*=9	100					
		9	19	12			12.70m							12.50: SPT Recovery: 1.05 m		
							SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil)		VD	SPT 12.50 - 12.95 m 12, 27, 30 N*=57	100					
									MD							
		10	17	14						SPT 14.00 - 14.45 m 11, 13, 7 N*=20				14.00: SPT Recovery: 1.05 m		
			16	15			15.10m				100					
							CLAY (CH): high plasticity, dark grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)		Hd							
							15.55m							15.50: SPT Recovery: 1.05 m		
							SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil)		D	SPT 15.50 - 15.95 m 5, 17, 28 N*=45						

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
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VL Very Low

ROCK WEATHERING
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SW Slightly Weathered
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DEFECT TYPE
J Joint
P Parting
SM Seam
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PLANARITY
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ROUGHNESS
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COATING
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VN Veneer (thin or patchy)
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INFILL MATERIALS
X Carbonaceus
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 3 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		11	14	17	Leederville Formation		SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; trace clayey fines. (Residual Soil) *(continued)*	Uc	D		100					
											100					
										SPT 17.00 - 17.45 m 9, 17, 19 N*=36				17.00: SPT Recovery: 1.05 m		
		12	13	18			17.90m SAND (SP): fine to coarse grained, sub-rounded to sub-angular; dark grey; with clay, medium plasticity. (Residual Soil)		MD		100					
										SPT 18.50 - 18.95 m 5, 9, 7 N*=16				18.50: SPT Recovery: 1.05 m		
		13	12	19							100					
			11	20			20.10m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey; with clay, low to medium plasticity. (Residual Soil)			SPT 20.00 - 20.45 m 7, 10, 13 N*=23				20.00: SPT Recovery: 1.05 m		
		14	10	21			20.90m CLAY (CH): medium plasticity, pale grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil)		VSt to Hd		100					
										SPT 21.50 - 21.95 m 4, 4, 10 N*=14				21.50: SPT Recovery: 1.05 m		
		15	9	22							100					
			8	23						SPT 23.00 - 23.45 m 7, 11, 13 N*=24				23.00: SPT Recovery: 1.05 m		
		16									100					

DRILLING
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WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
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EH Extremely High
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM02

Job No: 304501017 **Sheet:** 4 of 4

Position: E343044.000 N6208189.000 **Angle from Horizontal:** 90° **Surface Elevation:** 31.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 27/2/24 **Date Completed:** 28/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description							Defect Description			
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		16	6	25	Leederville Formation		CLAY (CH): medium plasticity, pale grey and black; frequent lenses of clayey sand & sandy clay. (Residual Soil) *(continued)*	Uc	VSt to Hd	SPT 24.50 - 24.95 m 10, 14, 16 N*=30	100			24.50: SPT Recovery: 1.05 m		
							24.95m									
			5	26			TERMINATED AT 24.95 m Target depth									
			4	27												
			3	28												
			2	29												
			1	30												
			0	31												

DRILLING
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Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
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CORE BOX - PHOTO SHEET Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No: 304501017**



**WM02: 0 - 0.5m,
0.0 - 5.0**



**WM02: 5 - 10m,
5.0 - 10.0**

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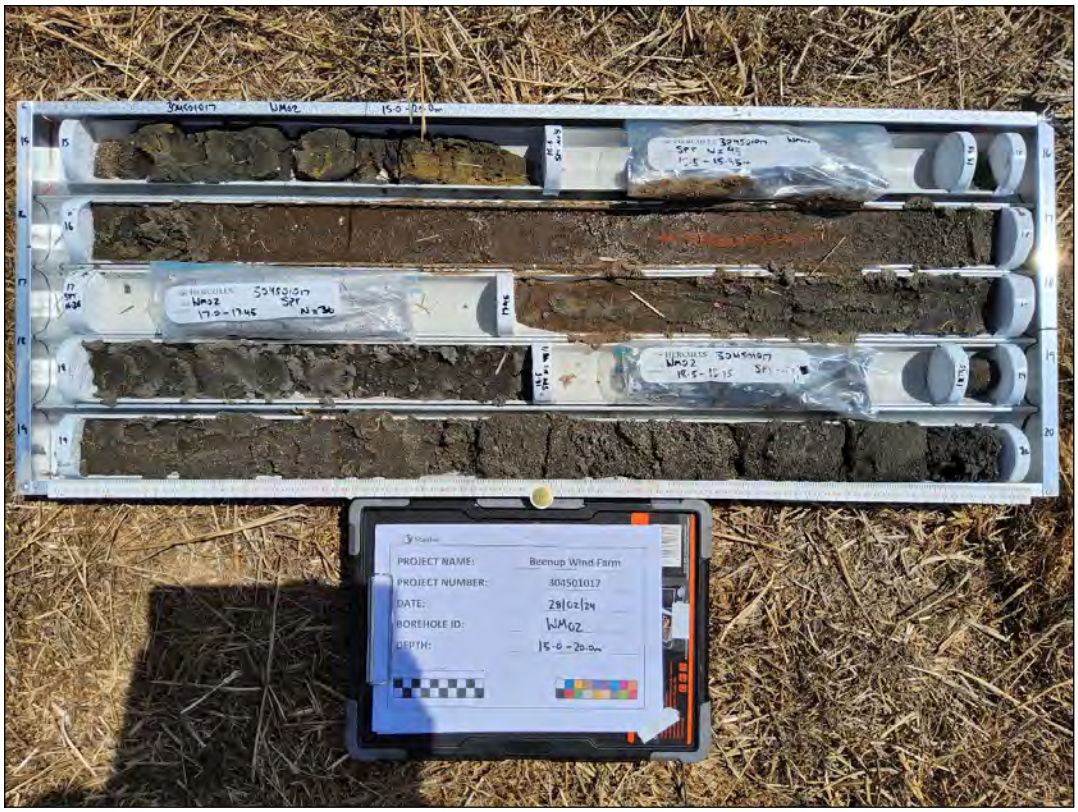
Stantec

CORE BOX - PHOTO SHEET Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



**WM02: 10 - 15m,
10.0 - 15.0**



**WM02: 15 - 20m,
15.0 - 20.0**

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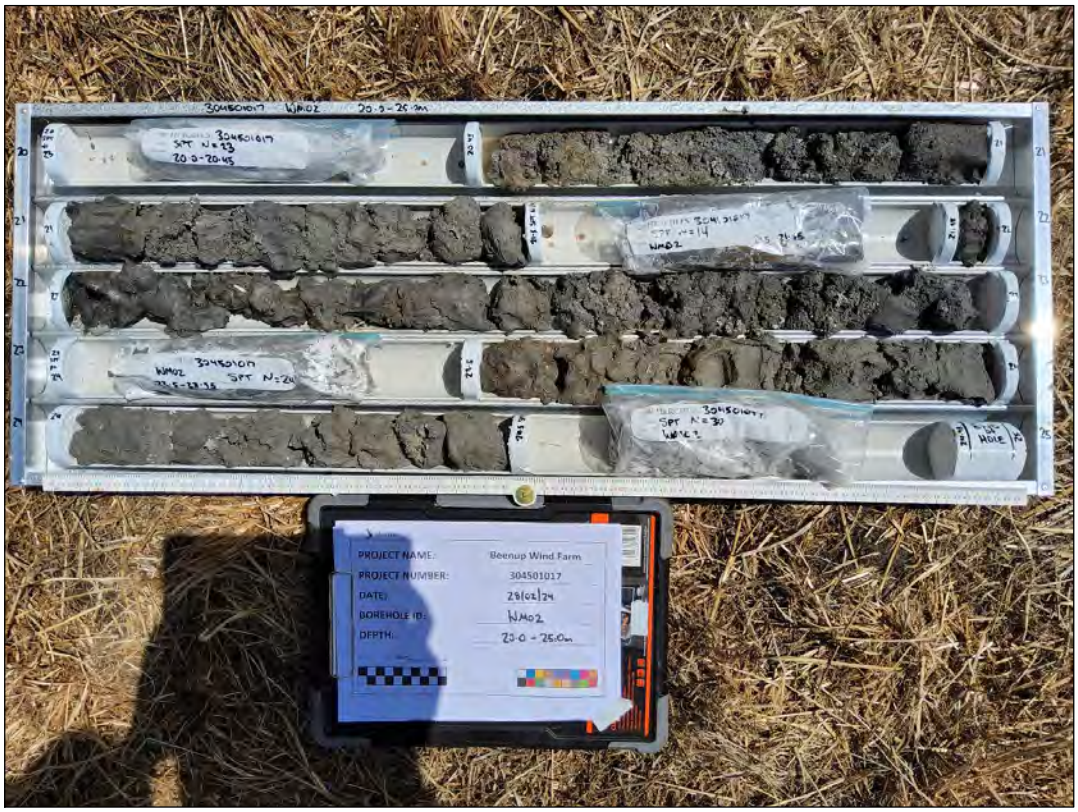
CORE BOX - PHOTO SHEET

Borehole No. WM02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



WM02: 20 - 25m,
20.0 - 25.0

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 1 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm)	Observations / Description of Defects	Water Level	Monitoring Well Details
PT	PVC	1	31	1	TS		0.20m TOPSOIL: SAND: fine to coarse grained, sub-rounded to sub-angular, quartz and organics; dark black & mottled brown; with silty fines. (Topsoil)	Uc	Ls	SPT 0.00 - 0.40 m 3, 6, 30/100mm N*=R	100		20 60 200 600 2000	0.00: PID: 6.1ppm; 400mm 0.00: PID: 6.1ppm; SPT Recovery: 0.45 m; 400mm 0.00: QC1		WM03 - 0.7m stickup
					QD		0.35m SAND (SP): fine to medium grained, sub-rounded to sub-angular, pale grey-brown. (Aeolian)	Mo	M to H					0.50: PID: 3.8ppm		
					Duricrust		FERRICRETE: granular, fine to coarse grained, dark orange brown to red-brown; <10% vuggs (DI Duricrust).							1.00: PID: 4.3ppm		
														1.50: PID: 5.4ppm		
		2	30	2						SPT 2.00 - 2.07 m 30/70mm N*=R	100			2.00: 70mm 2.00: SPT Recovery: 0.07 m; 70mm		
			29	3			3.40m									
					Quaternary Dune Deposits		SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz, lithics and rich in organics; dark brown mottled orange; trace silty fines. (Aeolian)	Wk	D					3.50: SPT Recovery: 0.45 m		
			28	4				Uc		SPT 3.50 - 3.95 m 13, 18, 18 N*=36	100					
		3														
			27	5						SPT 5.00 - 5.45 m 9, 15, 16 N*=31				5.00: SPT Recovery: 0.45 m		
		4	26	6							100					
							6.18m									
					Leederville Formation		SAND (SP): fine to medium grained, sub-rounded to sub-angular, dark grey, mottled black. (Residual Soil)		MD					6.50: SPT Recovery: 0.45 m		
										SPT 6.50 - 6.95 m 8, 9, 8 N*=17						
		5	25	7							100			8.00: SPT Recovery:		

HQ-3

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
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WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

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COATING
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INFILL MATERIALS
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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 2 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		6	23	9	Leederville Formation		SAND (SP): fine to medium grained, sub-rounded to sub-angular, dark grey, mottled black. (Residual Soil) *(continued)*	Uc	MD	SPT 8.00 - 8.45 m 7, 10, 14 N*=24	100			0.45 m		
									D					9.50: SPT Recovery: 0.45 m		
		7	22	10						SPT 9.50 - 9.95 m 7, 16, 20 N*=36	100					
			21	11						SPT 11.00 - 11.45 m 11, 21, 28 N*=49				11.00: SPT Recovery: 0.45 m		
		8	20	12							100					
										SPT 12.50 - 12.95 m 7, 15, 18 N*=33				12.50: SPT Recovery: 0.45 m		
							12.90m									
		9	19	13			SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; pale grey to dark grey; trace clayey fines. (Residual Soil)		MD		100					
			18	14						SPT 14.00 - 14.45 m 5, 12, 14 N*=26				14.00: SPT Recovery: 0.45 m		
		10	17	15							100					
							from 15.4m... with medium plasticity clay.		D	SPT 15.50 - 15.95 m 4, 12, 29 N*=41				15.50: SPT Recovery: 0.45 m		

DRILLING
- AD/V Solid flight auger: V-Bit
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- EH Extremly High
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CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017

Hole No: WM03

Sheet: 3 of 4

Position: E342583.000 N6210534.000 | **Angle from Horizontal:** 90° | **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt | **Mounting:** Track | **Contractor:** National Geotech
Data Started: 28/2/24 | **Date Completed:** 29/2/24 | **Logged By:** ES | **Checked By:** BP

Drilling: Method	Drilling: Casing	Drilling: Core Run	RL (m AHD)	Depth (m)	Material Description: Geology	Material Description: Graphic Log	Material Description: LITHOLOGY	Material Description: Weathering / Cementation	Material Description: Strength / Density / Consistency	Material Description: Sample or Field Test	Defect Description: TCR (%)	Defect Description: RQD (%)	Defect Description: Average Natural Defect Spacing (mm)	Defect Description: Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		11	15	17	Leederville Formation		SAND (SP): fine to coarse grained, rounded to sub-rounded, quartz & lithics; pale grey to dark grey; trace clayey fines. (Residual Soil) *(continued)*	Uc	D		100					
											100					
									VD	SPT 17.00 - 17.24 m 19, 30/90mm N*=R				17.00: 180mm 17.00: SPT Recovery: 0.45 m; 180mm		
							17.40m									
		12	14	18			SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey to dark grey; layers of clay, low to medium plasticity. (Residual Soil)		MD		100					
														18.50: SPT Recovery: 0.45 m		
										SPT 18.50 - 18.95 m 10, 12, 21 N*=33						
		13	13	19							100					
							19.65m									
							19.80m SANDSTONE: fine grained, siliceous; dark grey-brown. (Weathered Rock)									
							SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz & lithics; pale grey; with clay, low plasticity. (Residual Soil)									
		14	12	20										20.00: SPT Recovery: 0.45 m		
										SPT 20.00 - 20.45 m 8, 9, 11 N*=20						
											100					
			11	21										21.50: SPT Recovery: 0.45 m		
										SPT 21.50 - 21.95 m 9, 12, 12 N*=24						
		15	10	22							100					
														23.00: SPT Recovery: 0.45 m		
			9	23						SPT 23.00 - 23.45 m 8, 13, 17 N*=30						
		16					23.90m				100					

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

CORE LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: WM03

Job No: 304501017 **Sheet:** 4 of 4

Position: E342583.000 N6210534.000 **Angle from Horizontal:** 90° **Surface Elevation:** 32.000 m AHD
Rig Type: Geoprobe 7822dt **Mounting:** Track **Contractor:** National Geotech
Data Started: 28/2/24 **Date Completed:** 29/2/24 **Logged By:** ES **Checked By:** BP

Drilling					Material Description						Defect Description				
Method	Casing	Core Run	RL (m AHD)	Depth (m)	Geology	Graphic Log	LITHOLOGY	Weathering / Cementation	Strength / Density / Consistency	Sample or Field Test	TCR (%)	RQD (%)	Average Natural Defect Spacing (mm) 20 60 200 600 2000	Observations / Description of Defects	Water Level	Monitoring Well Details
HQ-3		16	7	25	Leederville Formation		Sandy CLAY (Cl): medium plasticity, fine to coarse grained, sub-rounded to sub-angular; pale grey and dark grey; sand, fine to coarse grained, sub angular to sub rounded; interbedded high plasticity clays and fine to coarse-grained, sub-rounded to angular sands; trace fine gravel. (Residual Soil) *(continued)*	Uc	VSt	SPT 24.50 - 24.95 m 4, 7, 11 N*=18	100			24.50: SPT Recovery: 0.45 m		
							24.95m TERMINATED AT 24.95 m Target depth									
			6	26												
			5	27												
			4	28												
			3	29												
			2	30												
			1	31												

DRILLING
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller
PQ Rotary core (85mm)
HQ Rotary core (63.5mm)
NMLC Rotary core (51.94mm)
DT Diatube concrete coring
PT Push tube
PS Percussion sampling
SON Sonic drilling
AH Air hammer

WATER
Water Level on date shown
water inflow
water outflow

ROCK QUALITY DESCRIPTIONS
RQD Rock Quality Designation (%)
TCR Total Core Recovery (%)

ROCK STRENGTH
EH Extremly High
VH Very High
H High
M Medium
L Low
VL Very Low

ROCK WEATHERING
FR Fresh
SW Slightly Weathered
MW Moderately Weathered
HW Highly Weathered
XW Extremly Weathered

DEFECT TYPE
J Joint
P Parting
SM Seam
SZ Sheared zone
FL Foliation
V Vein
CSM Crushed Seam
FZ Fracture Zone
HB Handing Break
DB Drilling Break

PLANARITY
PL Planar
IR Irregular
CU Curved
DIS Discontinuous
ST Stepped
UN Undulose

ROUGHNESS
VR Very Rough
RO Rough
SO Smooth
SL Slockensided
POL Polished

COATING
CN Clean
STN Stained
VN Veneer (thin or patchy)
CT Coating (up to 1mm)

INFILL MATERIALS
X Carbonaceus
MU Unidentified minteral
MS Secondary mineral
KT Chlorite
CA Calcite
Fe Iron Oxide
Qz Quartz

Refer to explanatory notes for details of abbreviations and basis of descriptions

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CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



**WM03: 0 - 0.5m,
0.0 - 5.0**



**WM03: 5 - 10m,
5.0 - 10.0**

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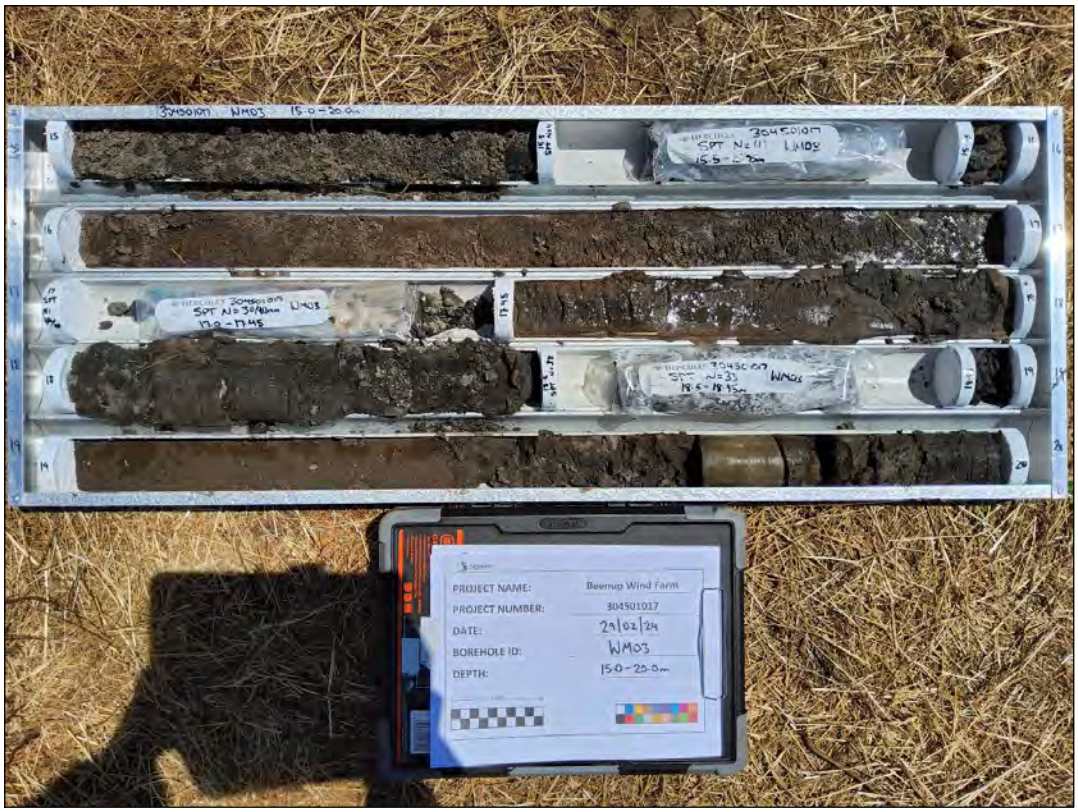
Stantec

CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No: 304501017**



**WM03: 10 - 15m,
10.0 - 15.0**



**WM03: 15 - 20m,
15.0 - 20.0**

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Stantec

CORE BOX - PHOTO SHEET Borehole No. WM03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River **Job No:** 304501017



WM03: 20 - 25m,
20.0 - 25.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP01

Job No: 304501017 **Sheet:** 1 of 1

Position: E340863.000 N6216098.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	▽	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; with gravel, sub-angular, iron cemented sand nodules; trace silty fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 3.5ppm
										0.10m SAND (SP): fine to coarse grained, sub-rounded, quartz; pale grey with dark grey; trace fines. (aeolian)			MD	
				ES 0.25 m	3 4 5								D	
				ES 0.50 m	4 4	39.5	0.5							0.50 m: PID - 2.8ppm
				ES 0.75 m	5 6									
				ES 1.00 m	5 6	39.0	1.0	Quaternary Dune Deposits (QDD)						1.00 m: PID - 4.1ppm
				ES 1.25 m	5 6 7									
				ES 1.50 m	7 7	38.5	1.5						VD	
				ES 1.75 m	11 23									
					Refusal 28									
	H		▽	D 2.00 m		38.0	2.0			2.00m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; brown to dark brown; pockets of organics. (aeolian).	W	Wk		
										2.10m TERMINATED AT 2.10 m Refusal (machine limit - penetration)				
						37.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP01

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP01: Downhole



TP01: Coretray - 0.0 - 2.1

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP02

Job No: 304501017 **Sheet:** 1 of 1

Position: E341925.000 N6215486.000 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.50m (Length) by 4.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
EX	VE	Stable	Not Encountered	ES 0.00 m	2	43.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace silty fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 2.3ppm
										0.10m				
				ES 0.25 m	3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to coarse grained, sub-rounded, quartz; pale grey, with dark grey; trace silty fines. (aeolian)			MD to D	
					3									
				ES 0.50 m	4	42.5	0.5							0.50 m: PID - 3.2ppm
					4									
				ES 0.75 m	3									
					4								VD	
	VH				4					0.90m				
					Refusal 2			DI		FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				ES 1.00 m		42.0	1.0			1.00m				1.00 m: PID - 4.1ppm
										TERMINATED AT 1.00 m Refusal on rock				
						41.5	1.5							
						41.0	2.0							
						40.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP02

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP02: Downhole



TP02: Coretray - 0.0 - 1.0m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP03

Job No: 304501017 **Sheet:** 1 of 1

Position: E344783.000 N6212893.000 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing				Material Description							
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m	Cap refusal - dug through 30	43.0	0.0	Fill		FILL: Gravelly SAND: Fine to Coarse, sub angular to sub rounded, white sand; Fine to coarse, sub angular, white gravel. (Unsealed Road).	D	Uc	VD	
										0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)			MD	
				ES 0.25 m	3 2									
				ES 0.50 m	3 3	42.5	0.5	Quaternary Dune Deposits (QDD)		0.50m SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz; white. (aeolian)				
				ES 0.75 m	2 2									
				ES 1.00 m	3 3	42.0	1.0							
				ES 1.25 m	3 2									
				ES 1.50 m	2 2	41.5	1.5							
				ES 1.75 m	2 2									
				ES 2.00 m	3 3	41.0	2.0			2.00m TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
					4 4									
					5 5	40.5	2.5							
					4 6									
					6									

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
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MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
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D - Dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP03

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP03: Downhole



TP03: Coretray - 0.0. - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP04

Job No: 304501017 **Sheet:** 1 of 1

Position: E343930.000 N6212893.000 **Angle from Horizontal:** 90° **Surface Elevation:** 41.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	Refusal on surface 35			TS		TOPSOIL: Gravelly SAND: fine to coarse grained, sub angular to sub rounded, grey sand; Fine to coarse,Sub angular, white gravel; trace fines; Organics; (Topsoil)	D	Uc	VD	0.00 m: PID - 1.8ppm
										0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey mottled pale brown. (aeolian)			D	
				ASS 0.25 m	5 3 2								MD	
													Ls to MD	
					2	40.5	0.5			0.50m SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz; white. (aeolian)			MD	0.50 m: PID - 2.2ppm
				ES 0.75 m	3 3 3 3			Quaternary Dune Deposits (QDD)						
				ES 1.00 m	2 2	40.0	1.0							1.00 m: PID - 4.3ppm
				ES 1.25 m	3 3 3 3									
				ES 1.50 m	3 3 3	39.5	1.5						D	
				ES 1.75 m	4 4 3 4 4					1.75m TERMINATED AT 1.75 m Practical Refusal (side wall collapse)				
					5 5 6	39.0	2.0							
					5 4 5 6	38.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP04

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP04: Downhole



TP04: Core tray - 0.0 - 1.75m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP05

Job No: 304501017 **Sheet:** 1 of 1

Position: E341167.000 N6209303.000 **Angle from Horizontal:** 90° **Surface Elevation:** 27.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace silty fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 2.0ppm
				ES 0.25 m	2 4					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey, mottled dark brown. (aeolian)			D	
				ES 0.50 m	4 5	26.5	0.5	Quaternary Dune Deposits (QDD)			M			0.50 m: PID - 4.5ppm
				ES 0.75 m	6 5								VD	
	VH				4			D		0.85m				
				Refusal	1					0.90m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (Dl duricrust).		We	M	
						26.0	1.0			TERMINATED AT 0.90 m Refusal on rock				
						25.5	1.5							
						25.0	2.0							
						24.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP05

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP05: Downhole



TP05: Coretray - 0.0 - 0.9m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP06

Job No: 304501017 **Sheet:** 1 of 1

Position: E344443.000 N6210783.000 **Angle from Horizontal:** 90° **Surface Elevation:** 40.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.00m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		0.10m TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID- 1.5ppm
								Quaternary Dune Deposits (QDD)		SAND (SP): fine to medium grained, rounded to angular quartz; pale grey, mottled pale brown. (aeolian)			MD	
				ES 0.25 m	3 3 3									
				ES 0.50 m	6	39.5	0.5							0.50 m: PID- 3.3ppm
	VH				Refusal 2			D		0.65m 0.70m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
										TERMINATED AT 0.70 m Refusal on rock				
						39.0	1.0							
						38.5	1.5							
						38.0	2.0							
						37.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP06

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP06: Downhole



TP06: Coretray - 0.0 - 0.7m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP07

Job No: 304501017 **Sheet:** 1 of 1

Position: E340730.000 N6210619.000 **Angle from Horizontal:** 90° **Surface Elevation:** 25.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	1			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 1.6ppm
										0.10m				
				ES 0.25 m	2 5					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey; trace silty fines. (aeolian)	M		D	
				ES 0.50 m	6 7 7	24.5	0.5							0.50 m: PID - 3.1ppm
				ES 0.75 m	8 9 8									
				ES 1.00 m	8 7 8	24.0	1.0	Quaternary Dune Deposits (QDD)		1.00m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz; dark grey, mottled dark brown; pockets of organics. (aeolian)			VD	1.00 m: PID - 4.8ppm
				ES 1.25 m	9 9 10									
			▽	ES 1.50 m	9	23.5	1.5				W			
					26/100 26					1.70m				
				Bs 1.70 m	24/100 24 25 23 22 23	23.0	2.0			TERMINATED AT 1.70 m Practical Refusal (side wall collapse)				
					Practical refusal 25	22.5	2.5							

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- Bs - Bulk disturbed sample
- D - Disturbed sample
- E - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- Hd - Hard

RELATIVE DENSITY
- VLs - Very Loose
- Ls - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP07

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP07: Downhole



TP07: Coretray - 0.0 - 1.7m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP08

Job No: 304501017 **Sheet:** 1 of 1

Position: E343189.728 N6213977.040 **Angle from Horizontal:** 90° **Surface Elevation:** 43.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.50m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	4	43.0	0.0	TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 2.0ppm
										0.10m				
				ES 0.25 m	3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to coarse grained, rounded to sub-angular, quartz; pale grey; trace silty fines. (aeolian)			MD	
					2								Ls to MD	
				ES 0.50 m	2	42.5	0.5				M			0.50 m: PID - 2.5ppm
					1									
				ES 0.75 m	2									
					2									
				ES 1.00 m	1	42.0	1.0				W		D	1.00 m: PID - 5.6ppm
					2									
					2									
				ES 1.25 m	3									
					4									
					4									
				ES 1.50 m	4	41.5	1.5						VD	
					6									
					10							Wk		
				ES 1.75 m	25									
					22									
					30					1.95m				
				ES 2.00 m	35	41.0	2.0			SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; pale grey, mottled dark brown. (aeolian)		We		
				Bs 2.00 m	Refusal 40					2.00m				
										TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
						40.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP08

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP08: Downhole view



TP08: Core tray 0.0 - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP09

Job No: 304501017 **Sheet:** 1 of 1

Position: E343986.000 N6214241.000 **Angle from Horizontal:** 90° **Surface Elevation:** 46.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.00m (Length) by 3.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	▽	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey. (Topsoil).	D	Uc	Ls to MD	0.00 m: PID - 2.0 ppm
										0.10m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)				
				ES 0.25 m	2									
					2									
					2									
				ES 0.50 m	2	45.5	0.5							0.50 m: PID - 5.6 ppm
					1									
				ES 0.75 m	2									
					2									
					2									
				ES 1.00 m	1	45.0	1.0							1.00 m: PID - 6.7ppm
					2									
				ES 1.25 m	2								MD	
					3								D	
					4					1.40m				
			▽	ES 1.50 m	refusal 25	44.5	1.5			1.50m SAND (SP): fine to medium grained, sub-rounded to sub-angular, quartz and iron oxide; pale yellow and stained dark brown. (aeolian)	M to W		VD	
				Bs 1.50 m						TERMINATED AT 1.50 m Practical Refusal (side wall collapse)				
						44.0	2.0							
						43.5	2.5							

Quaternary Dune Deposits (QDD)

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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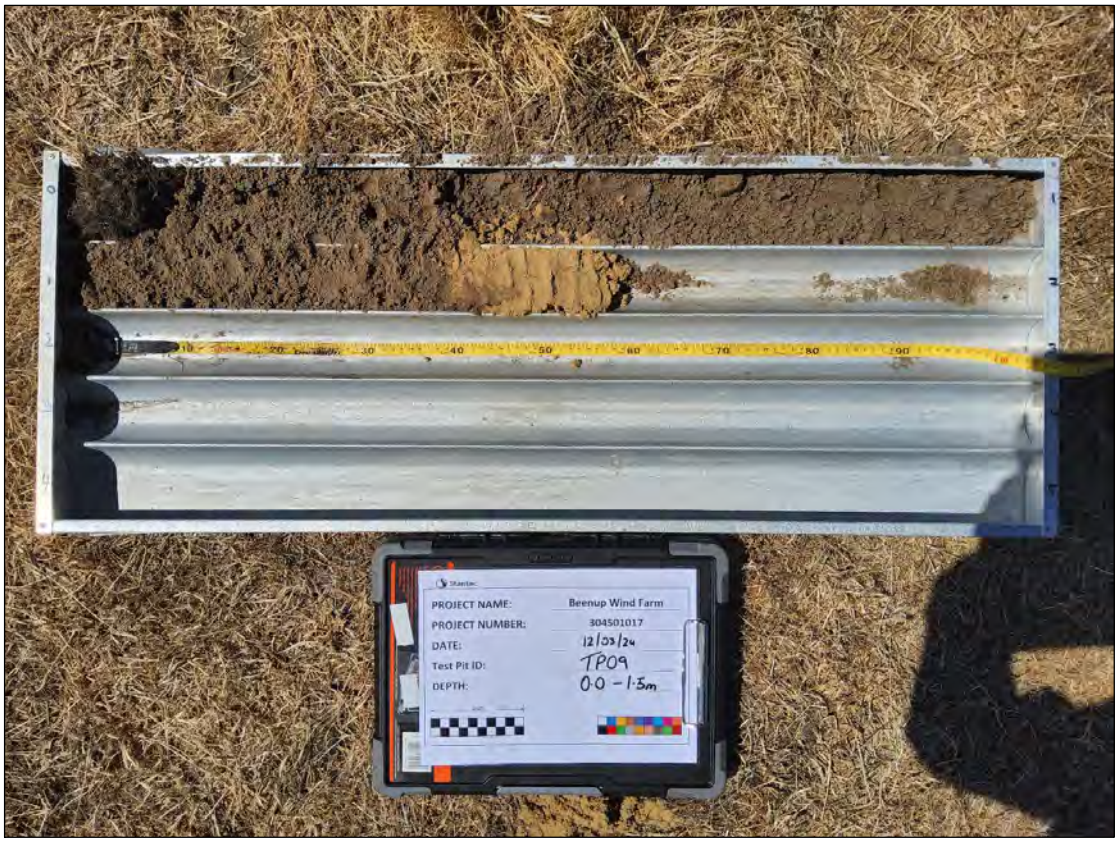
TEST PIT - PHOTO SHEET

Test Pit No. TP09

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP09: Downhole



TP09: Core tray 0.0- 1.5

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP10

Job No: 304501017 **Sheet:** 1 of 1

Position: E345034.000 N6214318.000 **Angle from Horizontal:** 90° **Surface Elevation:** 39.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 12/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	6			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular, dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 6.9ppm
					4					0.10m SAND (SP): fine to coarse grained, rounded to sub-angular, quartz; pale grey; trace silty fines; dark grey. (aeolian)				
				ES 0.25 m	4									
					4									
					4									
				ES 0.50 m	4	38.5	0.5	Quaternary Dune Deposits (QDD)						0.50 m: PID - 4.3ppm
					4									
				ES 0.75 m	5								MD	
					4									
					2 3									
				Bs 1.00 m ES 1.00 m Bs 1.00 m	2 3	38.0	1.0							1.00 m: PID - 2.5ppm
	VH				3 3					1.10m				
					4 refusal 4			D		FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust). 1.20m	M	We	M	
										TERMINATED AT 1.20 m Refusal on rock				
						37.5	1.5							
						37.0	2.0							
						36.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP10

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP10: 0.0 - 1.2



TP10: Downhole view

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP11

Job No: 304501017 **Sheet:** 1 of 1

Position: E341041.000 N6211370.000 **Angle from Horizontal:** 90° **Surface Elevation:** 28.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.50m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing				Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)	RL (m AHD)	Depth (m)	Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.3ppm 0.01 m: had to move to new location due to spraying
										0.10m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz with lithics; pale brown to brown. (aeolian)			D	
				ES 0.25 m	4 4 5									
				ES 0.50 m	6 6	27.5	0.5				M			0.50 m: PID - 3.6ppm
				ES 0.75 m	8 8 7									
				ES 1.00 m	5 4	27.0	1.0	Quaternary Dune Deposits (QDD)						1.00 m: PID - 4.3ppm
				ES 1.25 m	5 5 6									
				ES 1.50 m	4 6	26.5	1.5							
				ES 1.75 m	8 6 7					1.70m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; brown to dark brown; pockets of organics. (aeolian).				
				ES 2.00 m D 2.00 m	7 8 8 7 6	26.0 25.5	2.0 2.5			2.00m TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP11

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP11: Downhole



TP11: Coretray - 0.0 - 2.0m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP12

Job No: 304501017 **Sheet:** 1 of 1

Position: E342786.000 N6210510.000 **Angle from Horizontal:** 90° **Surface Elevation:** 36.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls	0.00 m: PID - 3.4ppm
	VH				Refusal 1			Q		0.10m 0.15m SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale yellow-brown. (aeolian)		We	M	
								D	F	0.20m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).				
										TERMINATED AT 0.20 m Refusal on rock				
						35.5	0.5							
						35.0	1.0							
						34.5	1.5							
						34.0	2.0							
						33.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP12

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP12: Downhole



TP12: Coretray - 0.0 - 0.2m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP13

Job No: 304501017 **Sheet:** 1 of 1

Position: E343538.000 N6211851.000 **Angle from Horizontal:** 90° **Surface Elevation:** 39.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation				Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability	Water	Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Unstable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.7ppm
										0.10m				
				ES 0.25 m	1 3			Quaternary Dune Deposits (QDD)		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled dark grey. (aeolian)				
				ES 0.50 m	2 2 3	38.5	0.5						MD	0.50 m: PID - 2.9ppm
				ES 0.75 m	3 3 3									
				ES 1.00 m	3 3 3	38.0	1.0						D	1.00 m: PID- 4.2ppm
				ES 1.25 m	5 5 6								VD	
				ES 1.50 m Bs 1.50 m	8 10	37.5	1.5				M			
				ES 1.75 m	15 20 Refusing 15					1.70m				
								Duricrust		SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and lithics; dark grey; pockets of organics. (aeolian)		Wk		
										2.00m				
				ES 2.00 m D 2.00 m		37.0	2.0			TERMINATED AT 2.00 m Practical Refusal (side wall collapse)				
						36.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP13

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP13: Downhole



TP13: Corebox - 0.0 - 2.0

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP14

Job No: 304501017 **Sheet:** 1 of 1

Position: E344875.000 N6211256.000 **Angle from Horizontal:** 90° **Surface Elevation:** 38.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ASS 0.00 m	3			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	MD to D	0.00 m: PID - 2.5ppm
										0.10m				
				ES 0.25 m	5			QDD		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled pale brown. (aeolian)				
					Refusal 4					0.35m				
	VH							D		0.40m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
						37.5	0.5			TERMINATED AT 0.40 m Refusal on rock				
						37.0	1.0							
						36.5	1.5							
						36.0	2.0							
						35.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP14

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP14: Downhole



TP14: Corebox - 0.0 - 0.4

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP15

Job No: 304501017 **Sheet:** 1 of 1

Position: E341697.000 N6209876.000 **Angle from Horizontal:** 90° **Surface Elevation:** 28.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.5ppm
					2 3									
				ES 0.25 m	3								MD to D	
					5					SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz and iron oxide; dark yellow, stained dark orange. (aeolian)				
				ES 0.50 m	4	27.5	0.5	Quaternary Dune Deposits (QDD)			M			0.50 m: PID - 1.5ppm
					4									
				ES 0.75 m	5									
	VH				6									
					Refusal on coffee rock			D		0.95m				
				Bs 1.00 m ES 1.00 m		27.0	1.0			1.00m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	1.00 m: PID - 2.9ppm
										TERMINATED AT 1.00 m Refusal on rock				
						26.5	1.5							
						26.0	2.0							
						25.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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TEST PIT - PHOTO SHEET

Test Pit No. TP15

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP15: Downhole



TP15: Coretray - 0.0 - 1.0m

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Stantec

TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP16

Job No: 304501017 **Sheet:** 1 of 1

Position: E342673.000 N6209242.000 **Angle from Horizontal:** 90° **Surface Elevation:** 30.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 1.50m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m DUP 0.00 m TRIP 0.00 m				TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	VD	0.00 m: PID - 0.6ppm
	VH				Refusal on coffee rock			D		0.10m 0.15m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust). TERMINATED AT 0.15 m Refusal on rock		We	M	
						29.5	0.5							
						29.0	1.0							
						28.5	1.5							
						28.0	2.0							
						27.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

TEST PIT - PHOTO SHEET

Test Pit No. TP16

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP16: Downhole



TP16: Coretray - 0.0 - 0.15m

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Stantec

TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP17

Job No: 304501017 **Sheet:** 1 of 1

Position: E343812.000 N6209922.000 **Angle from Horizontal:** 90° **Surface Elevation:** 37.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows 3 6 9 12			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m				TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.6ppm
										0.10m				
				ES 0.25 m	Refusal 2 2			QDD		SAND (SP): fine to medium grained, rounded to angular, quartz; pale grey, mottled dark grey. (aeolian)			VD	
										0.45m				
	VH							D		0.50m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				ES 0.50 m		36.5	0.5			TERMINATED AT 0.50 m Refusal on rock				0.50 m: PID - 1.6ppm
						36.0	1.0							
						35.5	1.5							
						35.0	2.0							
						34.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
Bs - Bulk disturbed sample
D - Disturbed sample
E - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

TEST PIT - PHOTO SHEET

Test Pit No. TP17

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP17: Downhole



TP17: Coretray - 0.0. - 0.5m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP18

Job No: 304501017 **Sheet:** 1 of 1

Position: E343477.000 N6208439.000 **Angle from Horizontal:** 90° **Surface Elevation:** 33.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 2.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	N.E	ES 0.00 m				TS		0.10m TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	VD	0.00 m: PID - 1.0ppm
	VH				Refusal			D	F	0.15m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
										TERMINATED AT 0.15 m Refusal on rock				
						32.5	0.5							
						32.0	1.0							
						31.5	1.5							
						31.0	2.0							
						30.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
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PSP - Perth Sand Penetrometer
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PBT - Plate Bearing Test
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VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
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U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
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PL - Plastic limit
LL - Liquid limit
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SOIL CONSISTENCY
VS - Very Soft
S - Soft
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St - Stiff
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Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
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TEST PIT - PHOTO SHEET

Test Pit No. TP18

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP18: Downhole



TP18: Coretray - 0.0 - 0.15m

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TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP19

Job No: 304501017 **Sheet:** 1 of 1

Position: E343836.000 N6207845.000 **Angle from Horizontal:** 90° **Surface Elevation:** 35.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 14/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m	4	35.0	0.0	QDTS		0.10m TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	D	0.00 m: PID - 0.7ppm
				ES 0.25 m	5 6 6			Quaternary Dune Deposits (QDTS)		SAND (SP): fine to medium grained, rounded to angular; pale grey, mottled dark grey. (aeolian)	M			
	VH			ES 0.50 m	8	34.5	0.5			0.55m				0.50 m: PID - 2.3ppm
					8			Q	F	0.60m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
					8					TERMINATED AT 0.60 m				
					Refusal 4	34.0	1.0			Refusal on rock				
						33.5	1.5							
						33.0	2.0							
						32.5	2.5							

METHOD
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R Ripper
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PT Push tube
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AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

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E Easy
F Firm
H Hard
VH Very Hard (Refusal)

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Water Level on Date shown
water inflow
water outflow

FIELD TESTS
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VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

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TEST PIT - PHOTO SHEET

Test Pit No. TP19

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP19: Downhole



TP19: Coretray - 0.0 - 0.6m

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Stantec

TEST PIT LOG SHEET

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River

Hole No: TP20

Job No: 304501017 **Sheet:** 1 of 1

Position: E345245.000 N6209951.000 **Angle from Horizontal:** 90° **Surface Elevation:** 33.000 m AHD
Machine Type: Backhoe **Excavation Method:** 600mm Toothed Trenching Bucket
Excavation Dimensions: 3.00m (Length) by 1.00m (Width) **Contractor:** RemX Australia
Date Excavated: 13/3/24 **Logged By:** ES **Checked By:** BP

Excavation			Water	Sampling & Testing		RL (m AHD)	Depth (m)	Material Description						
Method	Resistance	Stability		Sample or Field Test	DCP TEST Blows (3 6 9 12)			Geology	Graphic Log	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Cementation / Weathering	Consistency / Relative Density	STRUCTURE & Other Observations
BH	VE	Stable	Not Encountered	ES 0.00 m DUP 0.00 m TRIP 0.00 m	2			TS		TOPSOIL: SAND: fine to medium grained, sub-rounded to sub-angular; dark grey; trace fines. (Topsoil)	D	Uc	Ls to MD	0.00 m: PID - 0.1ppm
				ES 0.25 m	3 5 6					0.10m SAND (SP): fine to coarse grained, sub-rounded to sub-angular, quartz; pale yellow stained orange-brown. (aeolian)				
				ES 0.50 m	6 6 6	32.5	0.5	QDD					MD	0.50 m: PID - 1.7ppm
				ES 0.75 m	6 6					0.85m				
	VH				Refusal on coffee rock			D		0.90m FERRICRETE: fine grained; dark orange brown; massive; variably cemented comprising soil and rock strength fragments. (DI duricrust).		We	M	
				ES 1.00 m		32.0	1.0			TERMINATED AT 0.90 m Refusal on rock				
						31.5	1.5							
						31.0	2.0							
						30.5	2.5							

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
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VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

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U - Thin wall tube 'undisturbed'

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M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
Hd - Hard

RELATIVE DENSITY
VLs - Very Loose
Ls - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

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Stantec

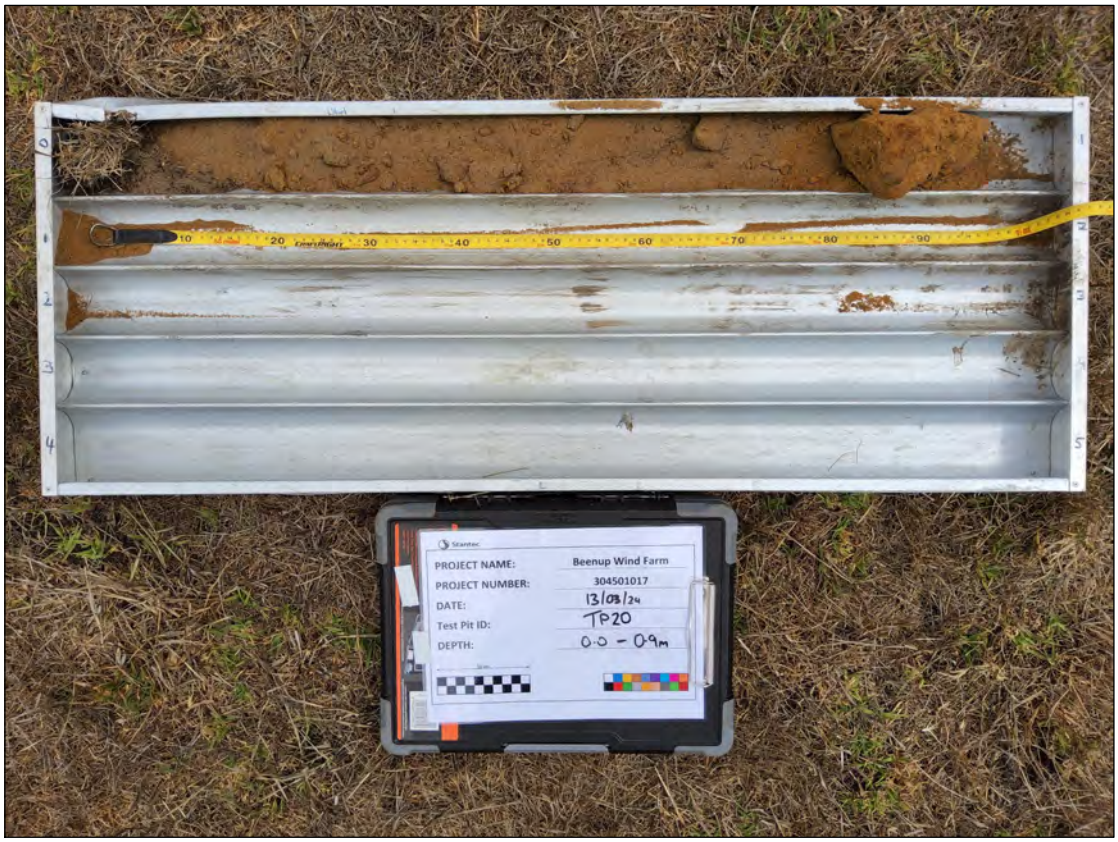
TEST PIT - PHOTO SHEET

Test Pit No. TP20

Client: Synergy RED
Project: Beenup Windfarm Project - Preliminary Geotechnical Investigation
Location: Shire of Augusta Margaret River
Job No: 304501017



TP20: Downhole



TP20: Corebox - 0.0 - 0.9m

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Appendix C Laboratory Test Certificates

C.1 Geotechnical

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.2.1.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5025-5032_1_MC
Project:	Beenup Wind Farm	*Sample No.*	WG24.5025-5032
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	Various - see below	*Date Tested:*	3/04/2024

TEST RESULTS - Soil Moisture Content

Sampling Method: **Sampled by Client, Tested as Received**

Sample Number	Sample Identification	Moisture Content (%)
WG24.5025	WM01 (17.0-18.0)m	30.2
WG24.5026	WM01 (22.0-23.0)m	0.5
WG24.5027	WM02 (10.0-11.0)m	5.9
WG24.5028	WM02 (16.0-17.0)m	0.4
WG24.5029	WM03 (4.0-5.0)m	7.3
WG24.5030	WM03 (24.0-24.95)m	17.1
WG24.5031	WM01 (1.0-1.6)m	7.3
WG24.5032	WM02 (4.0-5.0)m	9.3

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12/April/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

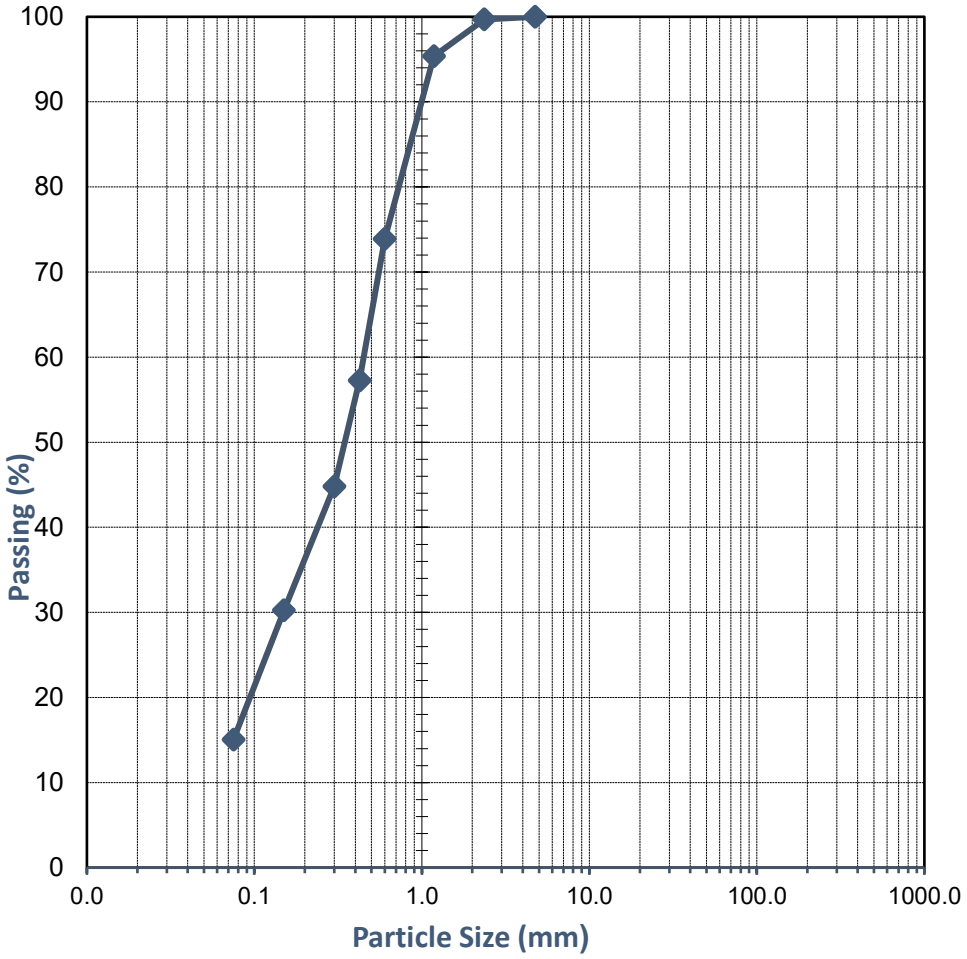
TEST REPORT - AS 1289.3.6.1, *AS 1289.1.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5031_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5031
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (1.0-1.6)m	*Date Tested:*	05/04 - 08/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	95
0.600	74
0.425	57
0.300	45
0.150	30
0.075	15



*Comments: *AS 1289.1.1- Deviation from standard: Insufficient sample according to test method requirements. NATA accreditation does not cover the performance of this service.*

Approved Signatory:

Name: Matthew Lichon

Date: 08/April/2024

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5024_1_ECN
Project:	Beenup Wind Farm	*Sample No.*	WG24.5024
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (4.0-5.0)m	*Date Tested:*	9/04/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Silty Sand**
Water Used:	**Distilled**

EMERSON CLASS NUMBER

5

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 10/April/2024

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

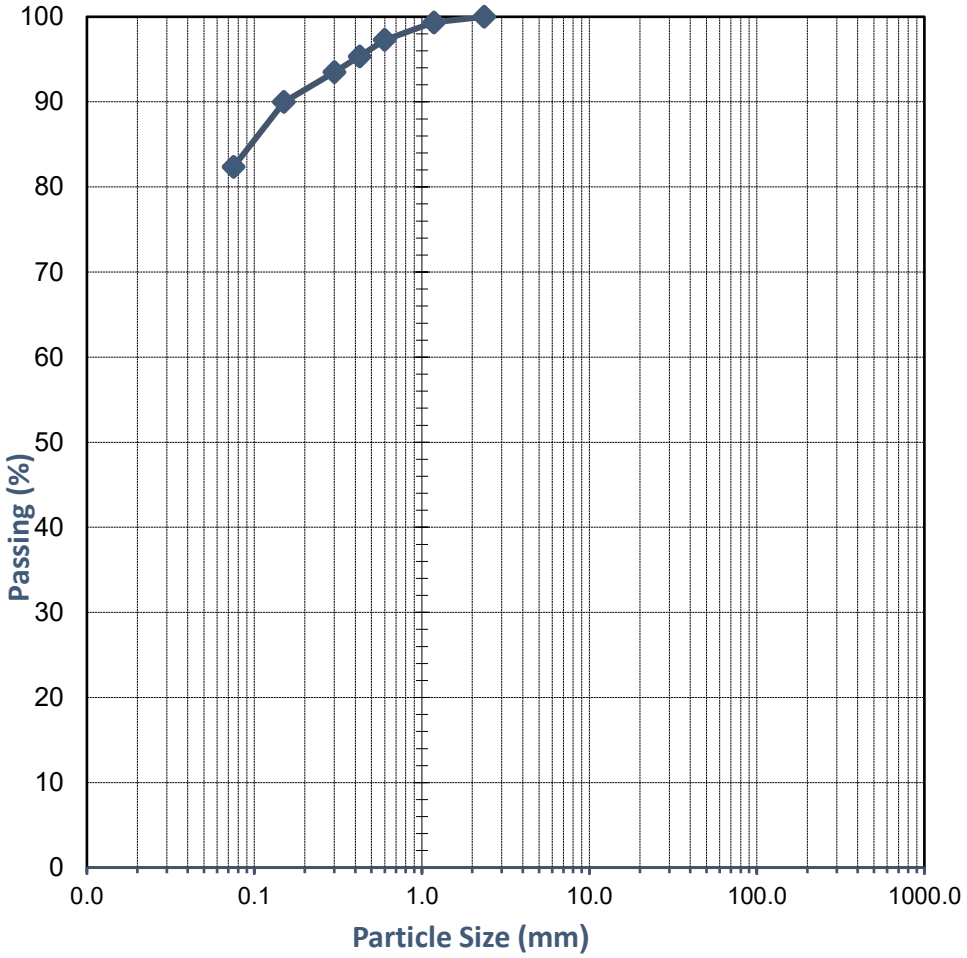
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5025_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5025
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (17.0-18.0)m	*Date Tested:*	09/04 - 10/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	99
0.600	97
0.425	95
0.300	93
0.150	90
0.075	82



Comments:

Approved Signatory:

Name: Natasha Bielawski

Date: 10/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5025_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5025
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (17.0-18.0)m	*Date Tested:*	11/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**61**
AS 1289.3.2.1	**Plastic Limit (%)**	**34**
AS 1289.3.3.1	**Plasticity Index (%)**	**27**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**9.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 12/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

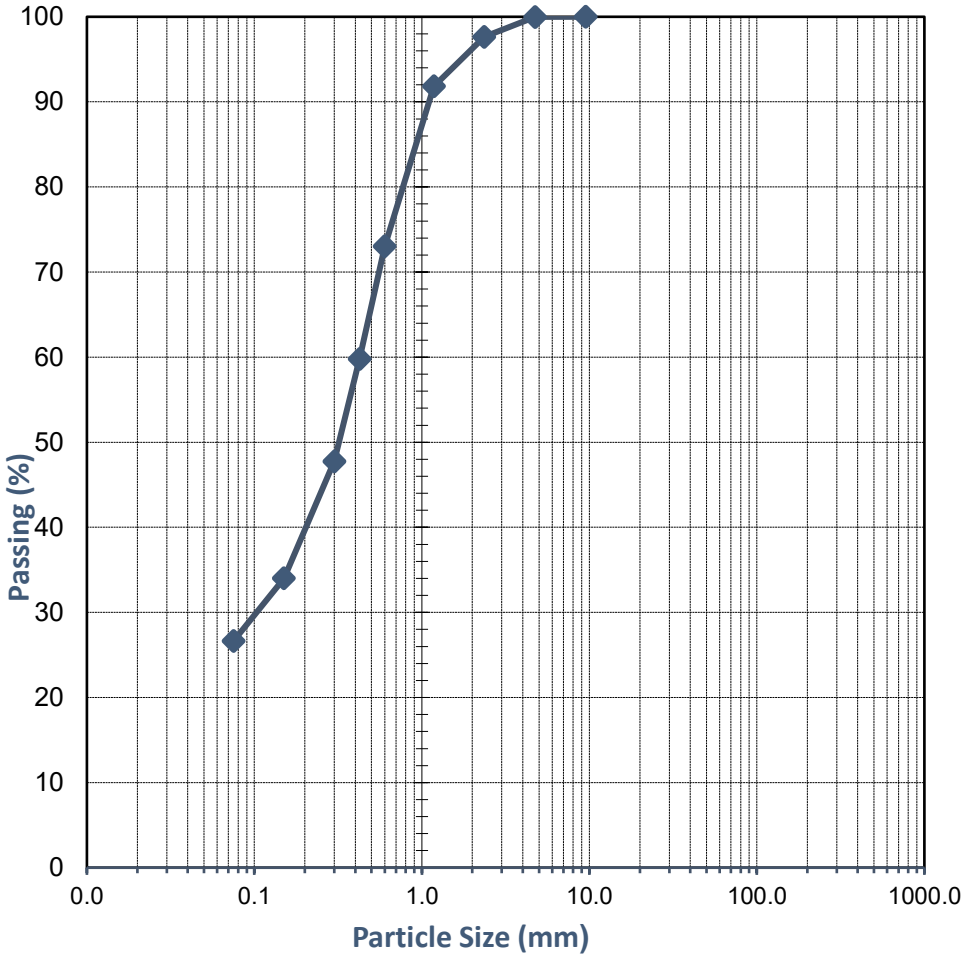
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5026_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5026
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (22.0-23.0)m	*Date Tested:*	05/04 - 08/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	98
1.18	92
0.600	73
0.425	60
0.300	48
0.150	34
0.075	27



Comments:

Approved Signatory:

Name: Natasha Bielawski

Date: 08/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5026_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5026
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM01 (22.0-23.0)m	*Date Tested:*	9/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**17**
AS 1289.3.3.1	**Plasticity Index (%)**	**9**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**4.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 10/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

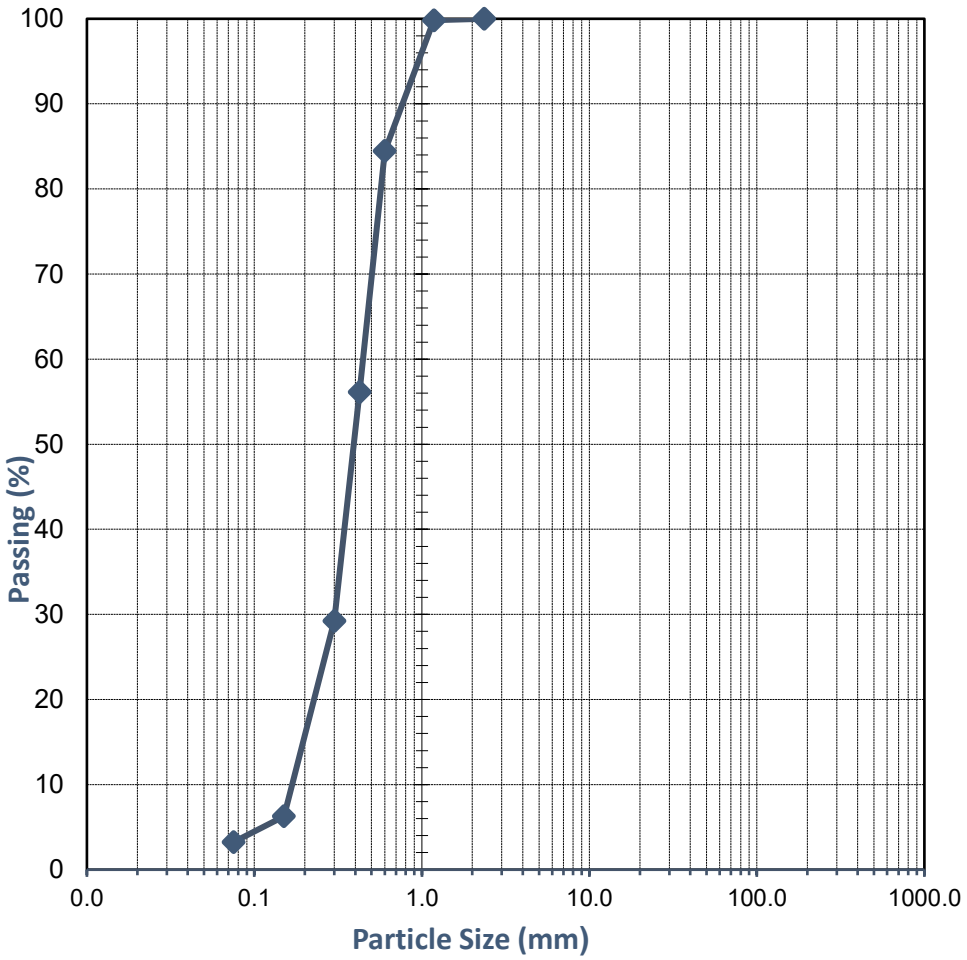
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5032_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5032
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (4.0-5.0)m	*Date Tested:*	05/04 - 08/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	84
0.425	56
0.300	29
0.150	6
0.075	3



Comments:

Approved Signatory:

Name: Matthew Lichon

Date: 08/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5032_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5032
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (4.0-5.0)m	*Date Tested:*	11/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**0.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 12/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

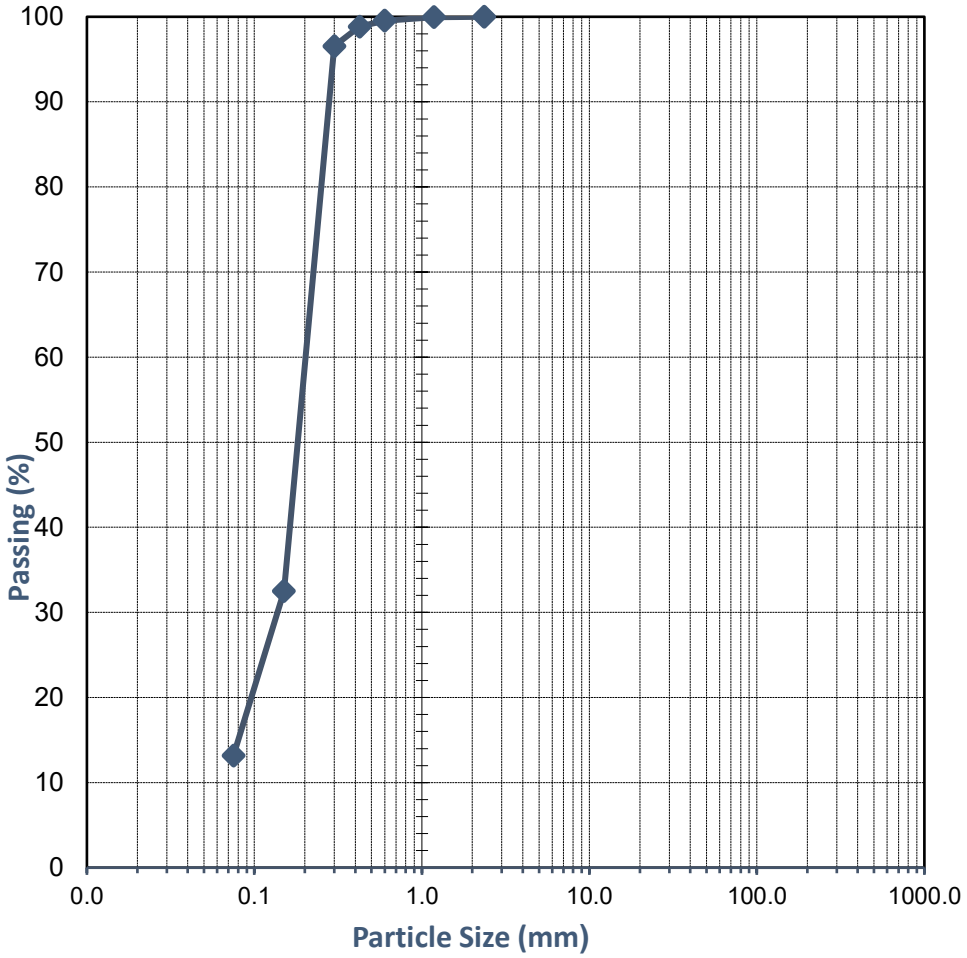
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5027_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5027
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (10.0-11.0)m	*Date Tested:*	096/04 - 11/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	100
0.425	99
0.300	97
0.150	33
0.075	13



Comments:

Approved Signatory: Cody O'Neill

Name: Cody O'Neill

Date: 11/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5027_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5027
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (10.0-11.0)m	*Date Tested:*	11/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**0.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 12/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

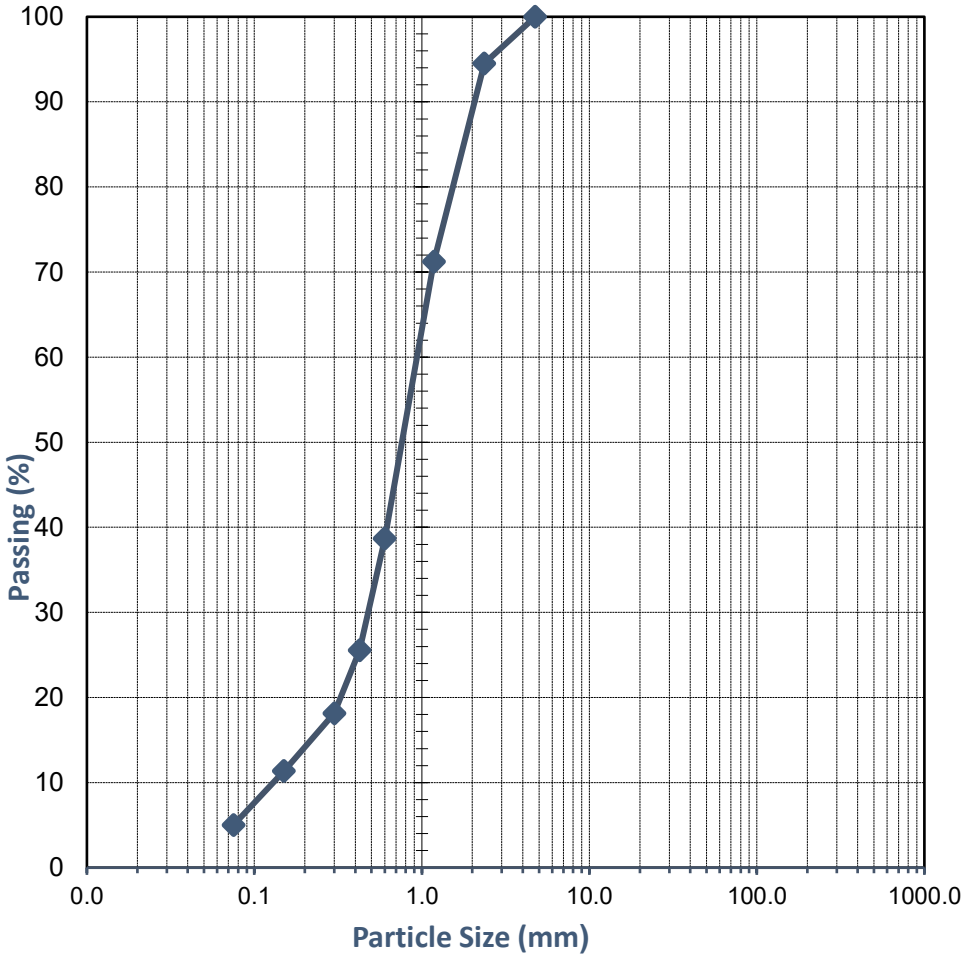
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5028_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5028
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (16.0-17.0)m	*Date Tested:*	05/04 - 08/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	95
1.18	71
0.600	39
0.425	26
0.300	18
0.150	11
0.075	5



Comments:

Approved Signatory:

Name: Natasha Bielawski

Date: 08/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5028_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5028
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM02 (16.0-17.0)m	*Date Tested:*	8/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**0.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 09/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

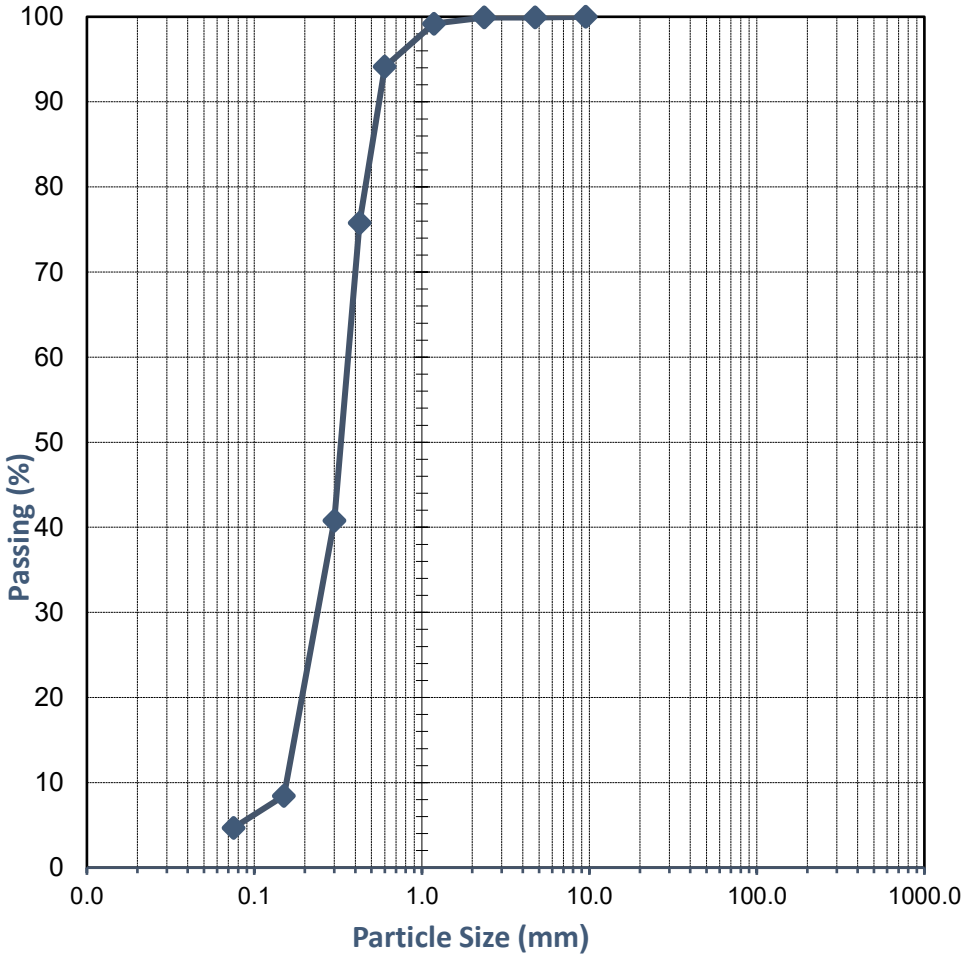
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5029_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5029
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM03 (4.0-5.0)m	*Date Tested:*	05/04 - 08/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	100
4.75	100
2.36	100
1.18	99
0.600	94
0.425	76
0.300	41
0.150	8
0.075	5



Comments:

Approved Signatory:

Name: Matthew Lichon

Date: 08/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5029_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5029
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM03 (4.0-5.0)m	*Date Tested:*	8/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**0.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 09/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

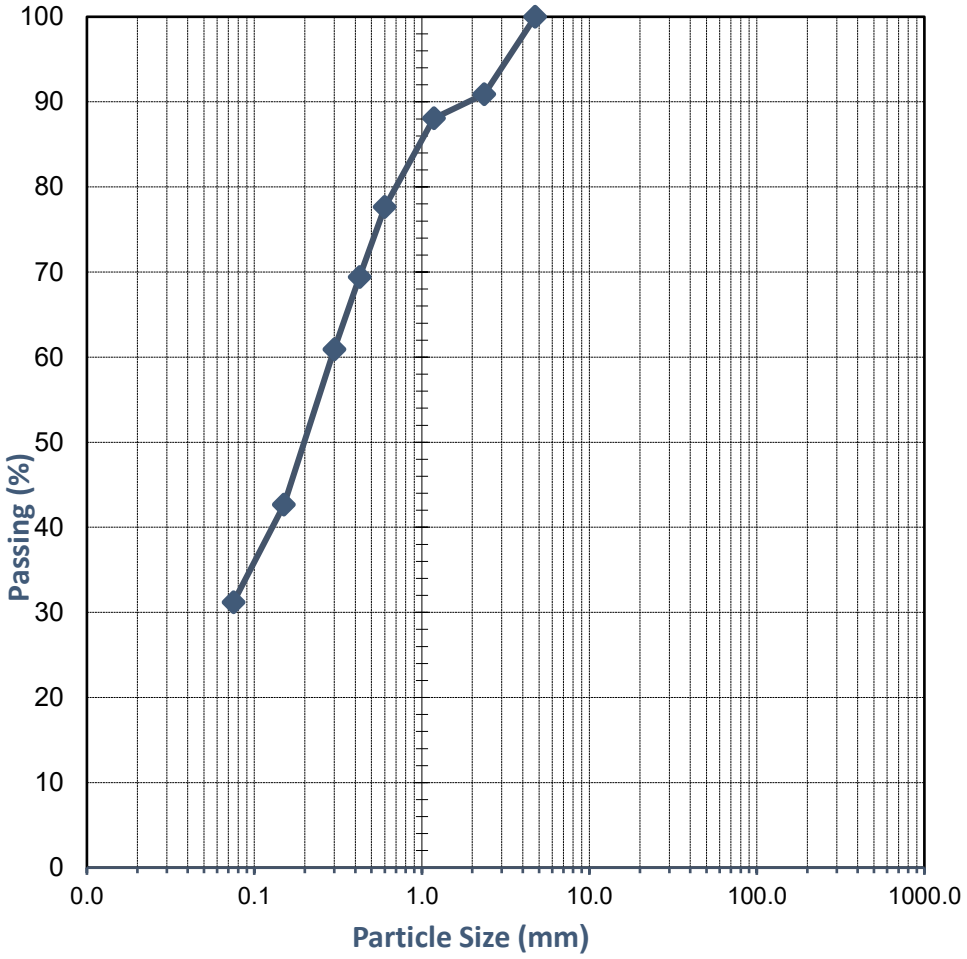
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5030_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5030
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM03 (24.0-24.95)m	*Date Tested:*	09/04 - 11/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	91
1.18	88
0.600	78
0.425	69
0.300	61
0.150	43
0.075	31



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 11/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12721
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5030_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5030
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	WM03 (24.0-24.95)m	*Date Tested:*	11/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**34**
AS 1289.3.2.1	**Plastic Limit (%)**	**20**
AS 1289.3.3.1	**Plasticity Index (%)**	**14**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**125**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 12/April/2024

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ARC LABORATORY SERVICES

AGGREGATE | ROCK | CONCRETE

TEST REPORT - AS 4133.4.1

Client:	Stantec	*Ticket No.*	S0120
Client Address:	Ground Floor - 226 Adelaide Terrace, Perth WA 6000	*Report No.*	ARC-R24.1599_1_PL
Project:	Beenup Wind Farm	*Sample No.*	ARC-R24.1599
Location:	Beenup	*Date Sampled:*	*14/03/2024*
Sample Identification:	WM03 (0.35-3.40)m	*Date Tested:*	*5/04/2024*

TEST RESULTS - Rock Strength Tests - Determination of Point Load Strength Index

Sampling Method: ***Sampled by Client, Tested as Received***

Sample Number:	ARC-R24.1599
Sample Identification:	WM03
Depth:	(0.35-3.40)m
Test Type:	Axial
Lithology/Description:	Sedimentary
Moisture Condition:	As Submitted
Diameter (mm):	60.45
Length (mm):	55.56
Length/Diameter Ratio:	0.92
Mode of Failure:	Axial Split
Load at Failure (kN):	10.440
Is (MPa):	2.61
Is (50)(MPa):	2.90

Comments

Specimen Dimensions, Load at Failure and Specific Failure Mode Not covered by scope of Accreditation, reported as per clients request. Job Reference - 304501017

Approved Signatory:

Name: Beau Griffiths
Function: Laboratory Manager
Date: 05/April/2024

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AGGREGATE | ROCK | CONCRETE

TEST REPORT - AS 4133.4.1

Client:	Stantec	*Ticket No.*	S0120
Client Address:	Ground Floor - 226 Adelaide Terrace, Perth WA 6000	*Report No.*	ARC-R24.1599_1_PL
Project:	Beenup Wind Farm	*Sample No.*	ARC-R24.1599
Location:	Beenup	*Date Sampled:*	*14/03/2024*
Sample Identification:	WM03 (0.35-3.40)m	*Date Tested:*	*5/04/2024*

TEST PHOTOS - Pre Testing



Comments

Photo's as per client's request, photo's are not required as per AS 4133.4.1 - not covered under scope of accreditation. Job Reference - 304501017

AGGREGATE | ROCK | CONCRETE

TEST REPORT - AS 4133.4.1

Client:	Stantec	*Ticket No.*	S0120
Client Address:	Ground Floor - 226 Adelaide Terrace, Perth WA 6000	*Report No.*	ARC-R24.1599_1_PL
Project:	Beenup Wind Farm	*Sample No.*	ARC-R24.1599
Location:	Beenup	*Date Sampled:*	*14/03/2024*
Sample Identification:	WM03 (0.35-3.40)m	*Date Tested:*	*5/04/2024*

TEST PHOTOS - Post Testing



Comments

Photo's as per client's request, photo's are not required as per AS 4133.4.1 - not covered under scope of accreditation. Job Reference - 304501017

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PFD0332

Client Details

Client	Western Geotechnical & Laboratory Services
Contact	Brooke Elliot
Address	235 Bank Street, WELSHPOOL, WA, 6101

Sample Details

Your Reference	S122721 - Beenup Wind Farm
Number of Samples	7 Soil
Date Samples Received	04/04/2024
Date Instructions Received	04/04/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	11/04/2024
Date of Issue	12/04/2024

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Authorisation Details

Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFD0332

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFD0332-01	WG24.5025 - WM01 (17.0-18.0)m	Soil	04/04/2024	04/03/2024
PFD0332-02	WG24.5026 - WM01 (22.0-23.0)m	Soil	04/04/2024	04/03/2024
PFD0332-03	WG24.5027 - WM02 (10.0-11.0)m	Soil	04/04/2024	04/03/2024
PFD0332-04	WG24.5028 - WM02 (16.0-17.0)m	Soil	04/04/2024	04/03/2024
PFD0332-05	WG24.5029 - WM03 (4.0-5.0)m	Soil	04/04/2024	04/03/2024
PFD0332-06	WG24.5030 - WM03 (24.0-24.95)m	Soil	04/04/2024	04/03/2024
PFD0332-07	WG24.5032 - WM02 (4.0-5.0)m	Soil	04/04/2024	04/03/2024

Sample Comments

General Comment	No sampling date(s) was/were provided by client. Therefore the sampling date(s) is/are assigned as the date(s) of sample receipt to the laboratory.

Certificate of Analysis PFD0332

Inorganics - General Physical Parameters (Soil)

Envirolab ID	Units	PQL	PFD0332-01	PFD0332-02	PFD0332-03	PFD0332-04	PFD0332-05
Your Reference			WG24.5025 - WM01 (17.0-18.0)m	WG24.5026 - WM01 (22.0-23.0)m	WG24.5027 - WM02 (10.0-11.0)m	WG24.5028 - WM02 (16.0-17.0)m	WG24.5029 - WM03 (4.0-5.0)m
Date Sampled			04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024
pH	pH units		5.4	5.1	2.6	4.1	4.0

Envirolab ID	Units	PQL	PFD0332-06	PFD0332-07
Your Reference			WG24.5030 - WM03 (24.0-24.95)m	WG24.5032 - WM02 (4.0-5.0)m
Date Sampled			04/04/2024	04/04/2024
pH	pH units		5.3	3.6

Certificate of Analysis PFD0332

Inorganics - General Chemical Parameters (Soil)

Envirolab ID	Units	PQL	PFD0332-01	PFD0332-02	PFD0332-03	PFD0332-04	PFD0332-05
Your Reference			WG24.5025 - WM01 (17.0-18.0)m	WG24.5026 - WM01 (22.0-23.0)m	WG24.5027 - WM02 (10.0-11.0)m	WG24.5028 - WM02 (16.0-17.0)m	WG24.5029 - WM03 (4.0-5.0)m
Date Sampled			04/04/2024	04/04/2024	04/04/2024	04/04/2024	04/04/2024
Chloride	mg/kg	10	26	41	20	54	50
Sulfate	mg/kg	10	810	190	18000	1100	1800

Envirolab ID	Units	PQL	PFD0332-06	PFD0332-07
Your Reference			WG24.5030 - WM03 (24.0-24.95)m	WG24.5032 - WM02 (4.0-5.0)m
Date Sampled			04/04/2024	04/04/2024
Chloride	mg/kg	10	33	34
Sulfate	mg/kg	10	110	5200

Method Summary

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFD0332

Client Details

Client	Western Geotechnical & Laboratory Services
Your Reference	S122721 - Beenup Wind Farm
Date Issued	12/04/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFD0332

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
pH | Soil	1-7	04/04/2024	08/04/2024	09/04/2024	Yes
Chloride | Soil	1-3, 5-6	04/04/2024	08/04/2024	11/04/2024	Yes
	4, 7	04/04/2024	08/04/2024	12/04/2024	Yes
Sulfate | Soil	1-2, 5-6	04/04/2024	08/04/2024	11/04/2024	Yes
	3-4, 7	04/04/2024	08/04/2024	12/04/2024	Yes

No sampling date(s) was/were provided by client. Therefore the sampling date(s) is/are assigned as the date(s) of sample receipt to the laboratory.

Quality Control PFD0332

INORG-001 | Inorganics - General Physical Parameters (Soil) | Batch BFD0899

Analyte	Units	PQL	Blank	DUP1 BFD0899-DUP1# Samp | QC | RPD %	DUP2 PFD0332-06 Samp | QC | RPD %	LCS %
pH	pH units		5.6	9.7 | 9.7 | 0.103	5.3 | 5.3 | 0.00	102

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081 | Inorganics - General Chemical Parameters (Soil) | Batch BFD0900

Analyte	Units	PQL	Blank	DUP1 PFD0332-01 Samp | QC | RPD %	LCS %	Spike % PFD0332-02
Chloride	mg/kg	10	<10	25.6 | 25.6 | 0.121	113	128
Sulfate	mg/kg	10	<10	805 | 807 | 0.175	109	120

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.2.1.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5050_1_MC
Project:	Beenup Wind Farm	*Sample No.*	WG24.5050
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	Various - see below	*Date Tested:*	3/04/2024

TEST RESULTS - Soil Moisture Content

Sampling Method: **Sampled by Client, Tested as Received**

Sample Number	Sample Identification	Moisture Content (%)
WG24.5050	TP11 - 01 : 2.0m (S)	20.2

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 04/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5046_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5046
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP07 - 01,02,03,04 1.7m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

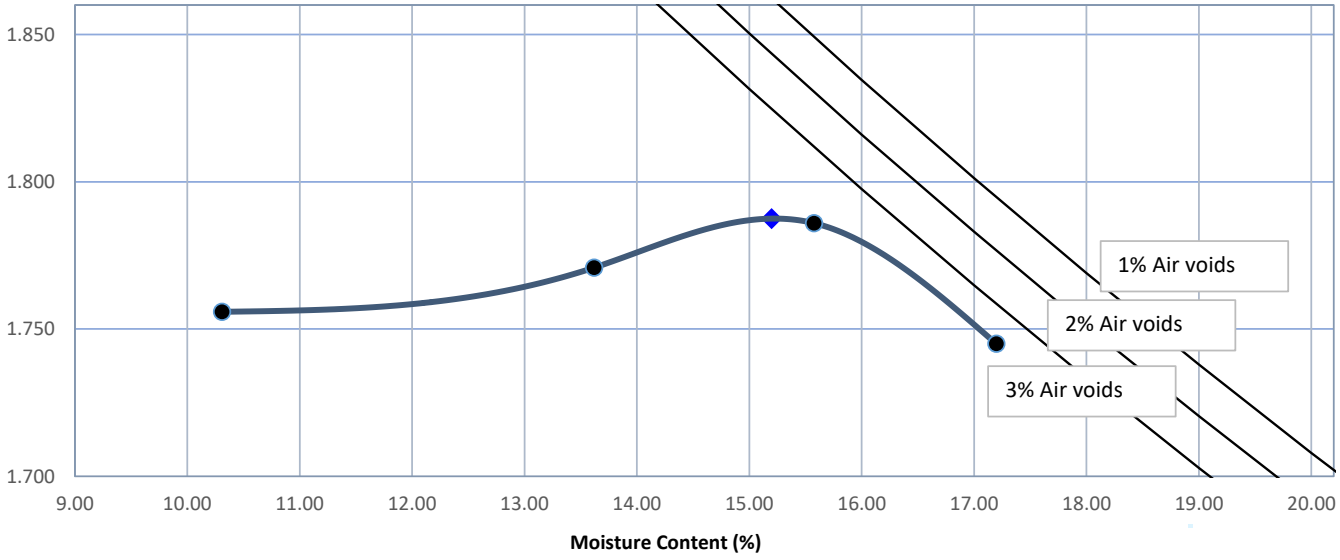
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**10.3**	**13.6**	**15.6**	**17.2**	
Dry Density (t/m³)	**1.756**	**1.771**	**1.786**	**1.745**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.79**

Optimum Moisture Content (%) **15.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.634 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

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WA 6155
Ph: (08) 9418 8742
E-mail: Phillip.li@eprecisionlab.com

E-Precision Laboratory

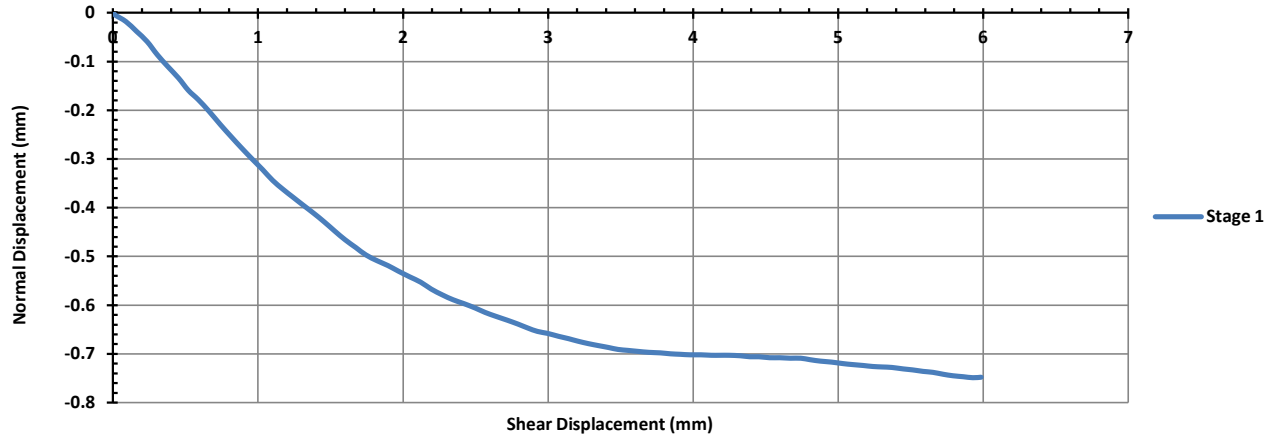
MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

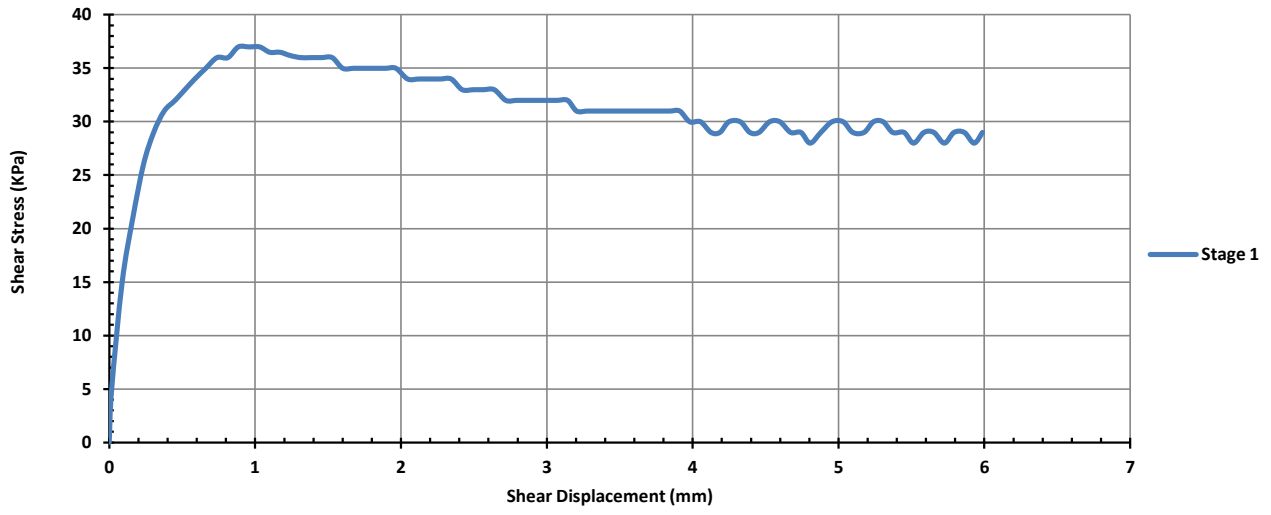
Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP07	Lab:	EPLab
Sample ID:	WG24_5046_IDST1		
Depth (m):	1.7	Room Temperature at Test:	20°

Type of Test:	Multistage Drained DST	**Sample Description:**	98% Remolding
Dimensions (mm):	83.10 x 83.10 (Circular)	**Shear Plane Dip Angle (°):**	N/A
Rate of Strain (mm/min):	0.015	**Initial Bulk Density (t/m³):**	2.02
Failure Criteria:	Horizontal Shear	**Initial Moisture Content (%):**	14.95

Normal Displacement Vs Shear Displacement Plot



Shear Stress Vs Shear Displacement Plot



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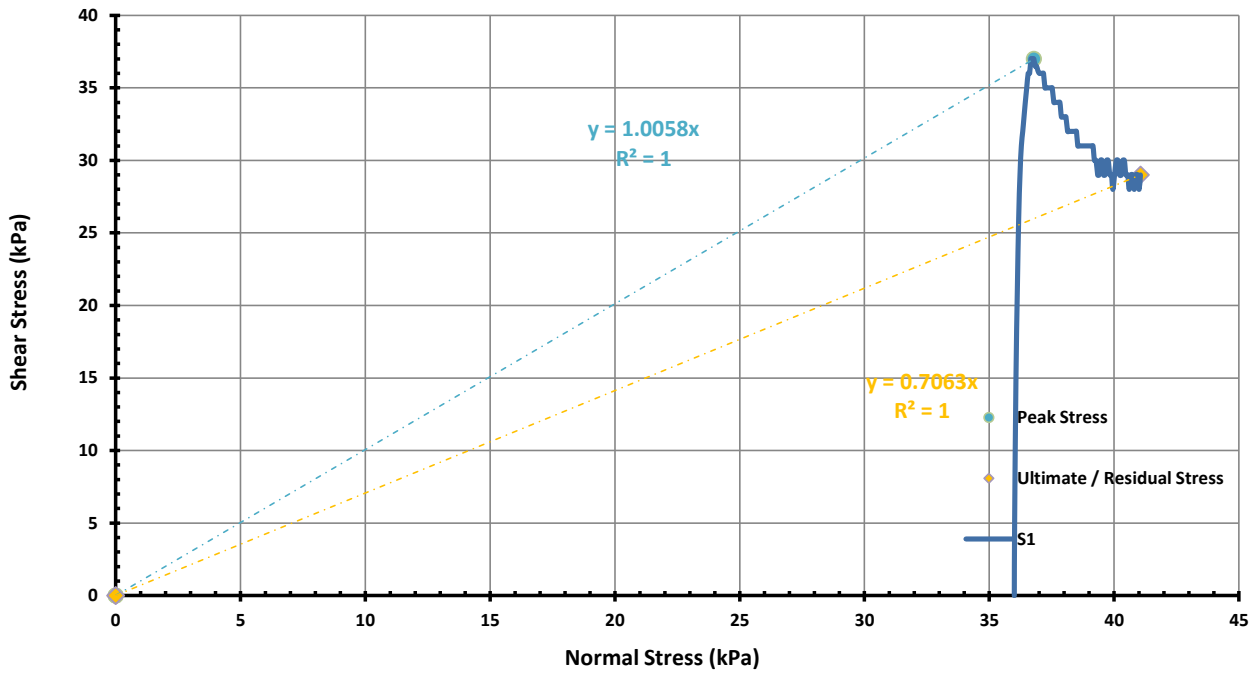
MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP07	Lab:	EPLab
Sample ID:	WG24_5046_IDST1		
Depth (m):	1.7	Room Temperature at Test:	20°

(Peak / Ultimate) Normal Stress Vs Shear Stress (Effective Stress)



Defect Surface:	N/A
Dip Angle (°):	N/A

Peak	**Shear Angle (°)**	45.00	**Normal Stress (kPa)**		**Shear Stress (kPa)**	
	Cohesion (kPa)	0.00	Stage 1	37	Stage 1	37
	R²	1.0000	Stage 2	0	Stage 2	0
* Assume Cohesion is 0kPa			Stage 3	0	Stage 3	0
Ultimate / Residual	**Shear Angle (°)**	35.37	**Normal Stress (kPa)**		**Shear Stress (kPa)**	
	Cohesion (kPa)	0.00	Stage 1	41	Stage 1	29
	R²	1.0000	Stage 2	0	Stage 2	0
* Assume Cohesion is 0kPa			Stage 3	0	Stage 3	0

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E-Precision Laboratory

MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP07	Lab:	EPLab
Sample ID:	WG24_5046_IDST1		
Depth (m):	1.7	Room Temperature at Test:	20°

Photo of Sample Post Testing



Notes: ***Sample remolded to 98% MDD @ OMC***

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature (Geotechnical Engineer):

The results of tests performed apply only to the specific sample at time of test unless otherwise clearly stated. Reference should be made to E-Precision Laboratory's "Standard Terms and Conditions" E-Precision Laboratory ABN 431 559 578 87

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5047_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5047
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP08 - 01,02,03,04 2.0m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

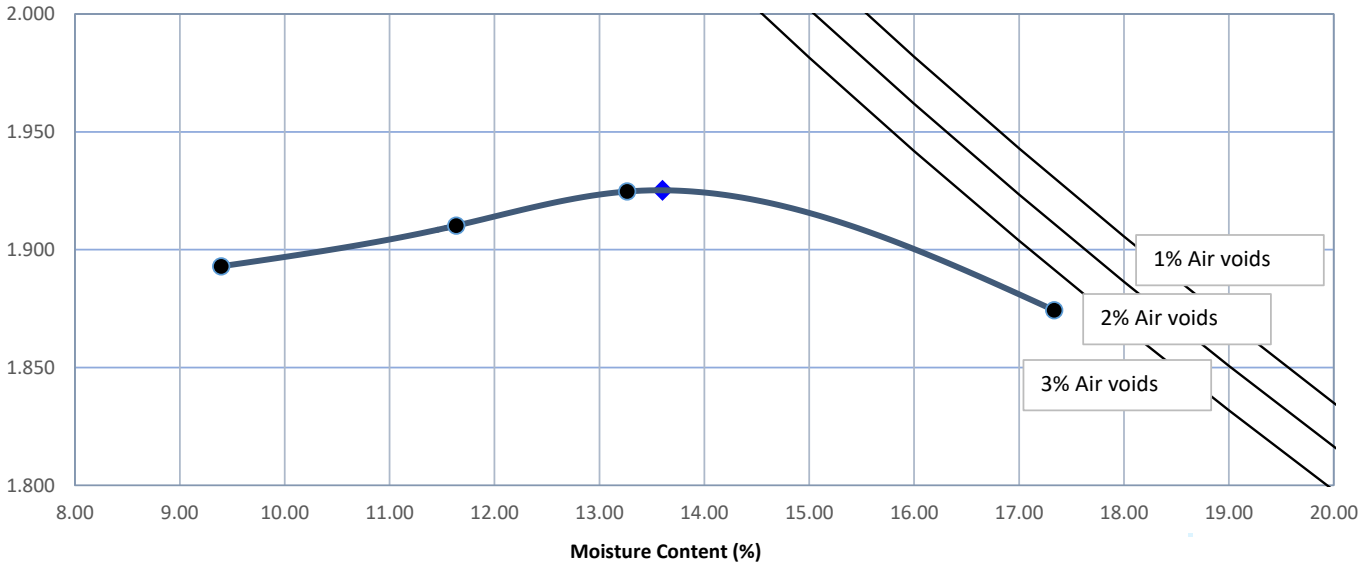
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 1 **Material + 37.5mm (%)** -

Moisture Content (%)	**9.4**	**11.6**	**13.3**	**17.3**	
Dry Density (t/m³)	**1.893**	**1.910**	**1.925**	**1.874**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.93**

Optimum Moisture Content (%) **13.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.945 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 08/April/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

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E-Precision Laboratory

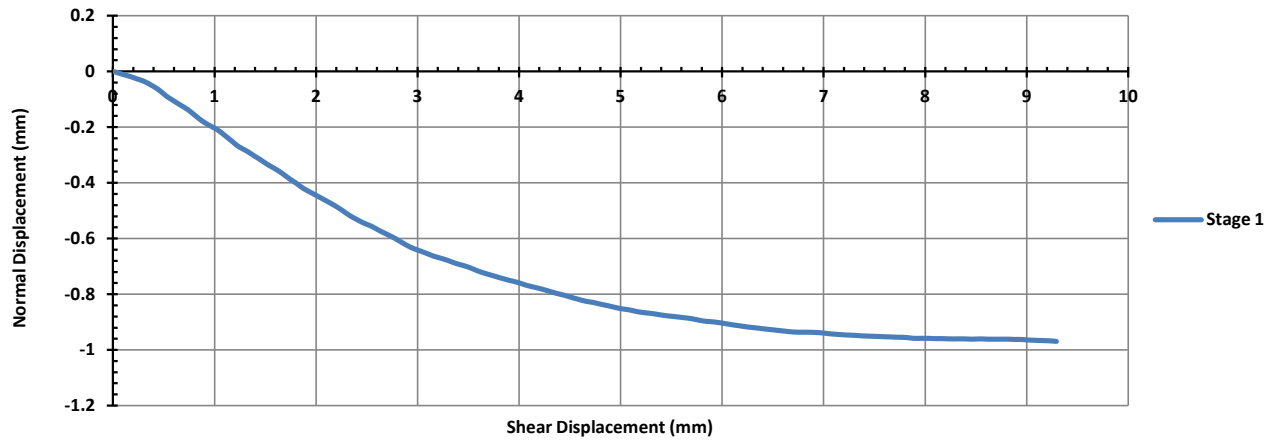
MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

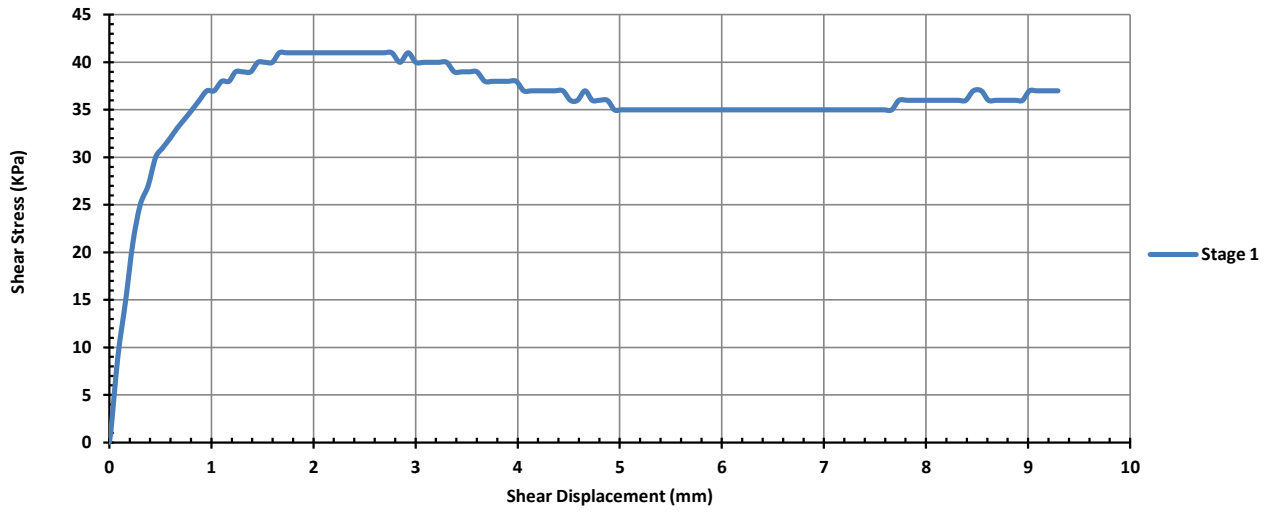
Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP08	Lab:	EPLab
Sample ID:	WG24_5047_IDST1		
Depth (m):	2	Room Temperature at Test:	20°

Type of Test:	Multistage Drained DST	**Sample Description:**	98% Remolding
Dimensions (mm):	83.10 x 83.10 (Circular)	**Shear Plane Dip Angle (°):**	N/A
Rate of Strain (mm/min):	0.015	**Initial Bulk Density (t/m³):**	2.15
Failure Criteria:	Horizontal Shear	**Initial Moisture Content (%):**	13.55

Normal Displacement Vs Shear Displacement Plot



Shear Stress Vs Shear Displacement Plot



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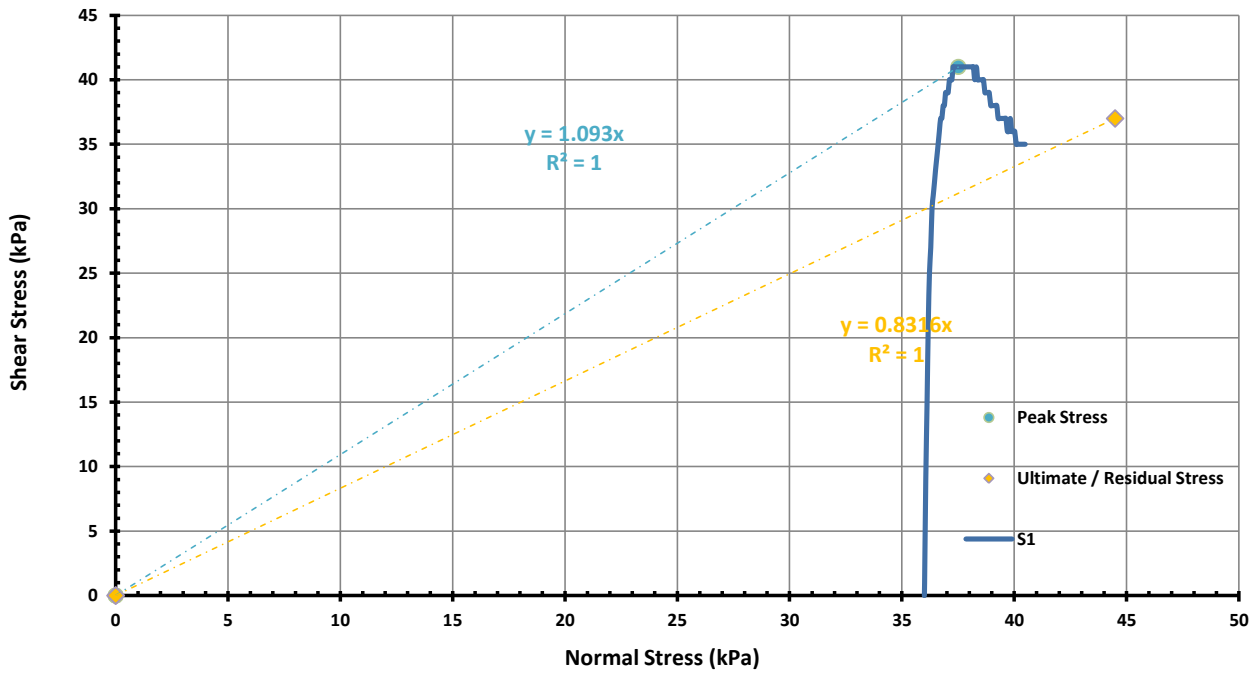
MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP08	Lab:	EPLab
Sample ID:	WG24_5047_IDST1		
Depth (m):	2	Room Temperature at Test:	20°

(Peak / Ultimate) Normal Stress Vs Shear Stress (Effective Stress)



Defect Surface:	N/A
Dip Angle (°):	N/A

Peak	**Shear Angle (°)**	47.47	**Normal Stress (kPa)**		**Shear Stress (kPa)**	
	Cohesion (kPa)	0.00	Stage 1	38	Stage 1	41
	R²	1.0000	Stage 2	0	Stage 2	0
* Assume Cohesion is 0kPa			Stage 3	0	Stage 3	0
Ultimate / Residual	**Shear Angle (°)**	39.69	**Normal Stress (kPa)**		**Shear Stress (kPa)**	
	Cohesion (kPa)	0.00	Stage 1	44	Stage 1	37
	R²	1.0000	Stage 2	0	Stage 2	0
* Assume Cohesion is 0kPa			Stage 3	0	Stage 3	0

Integrity Precision Innovation

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E-Precision Laboratory

MULTISTAGE DRAINED DIRECT SHEAR TEST REPORT

Method: AS1289.6.2.2 / In-house Method

Client:	Western Geotechnical Lab Services	Date Tested:	22/04/2024
Project:	Beenup Wind Farm	EP Lab Job Number:	WGEO
Sample No:	TP08	Lab:	EPLab
Sample ID:	WG24_5047_IDST1		
Depth (m):	2	Room Temperature at Test:	20°

Photo of Sample Post Testing



Notes: ***Sample remolded to 98% MDD @ OMC***

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signature (Geotechnical Engineer):

The results of tests performed apply only to the specific sample at time of test unless otherwise clearly stated. Reference should be made to E-Precision Laboratory's "Standard Terms and Conditions" E-Precision Laboratory ABN 431 559 578 87

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5049_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5049
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP10 - 04 1.0m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

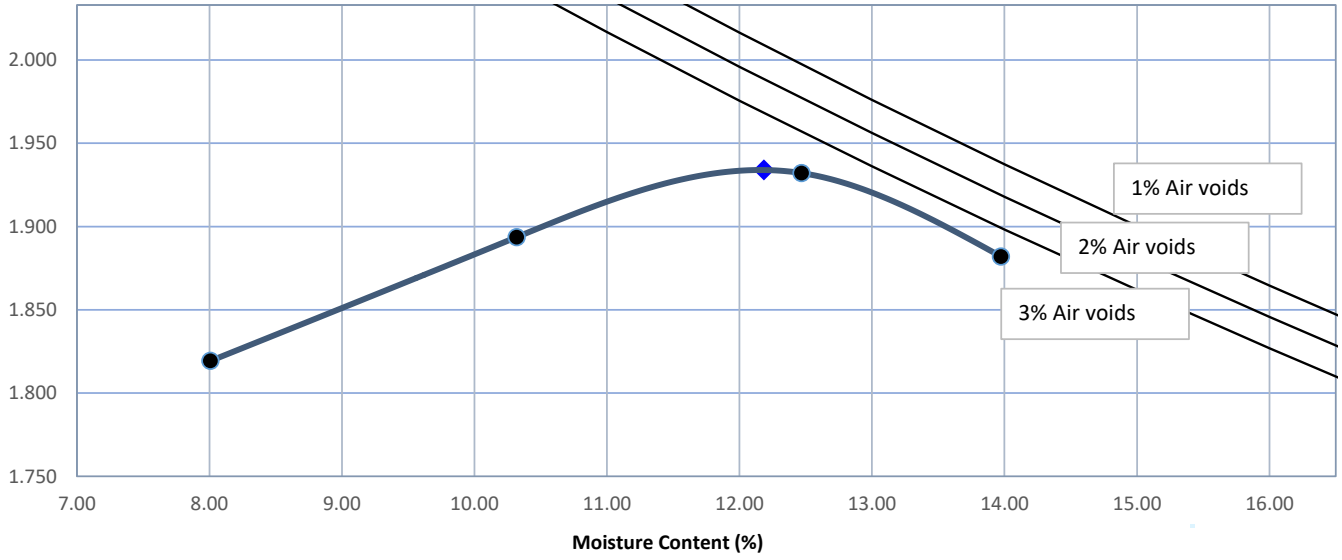
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**8.0**	**10.3**	**12.5**	**14.0**	
Dry Density (t/m³)	**1.819**	**1.894**	**1.932**	**1.882**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.93**

Optimum Moisture Content (%) **12.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.696 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

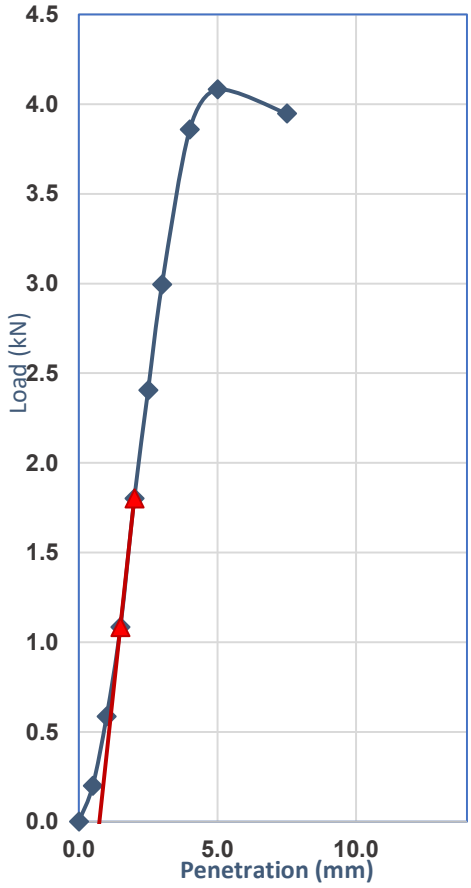
Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5049_1_SCBR
Project:	Beenup Wind Farm	*Sample No.*	WG24.5049
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP10 - 04 1.0m	*Date Tested:*	04/04 - 09/04/2024

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	2.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.93	Optimum Moisture (%)	12.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.84	Moisture Content (%)	11.8
Density Ratio (%)	95.5	Moisture Ratio (%)	96.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.84	Dry Density Ratio (%)	95.5
Moisture Content (%)	12.8	Moisture Ratio (%)	105.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	12.2	Remaining Depth (%)	12.8

Correction applied to Penetration: 0.7mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 25%

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 10/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5048_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5048
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP10 - 01,02,03 1.0m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

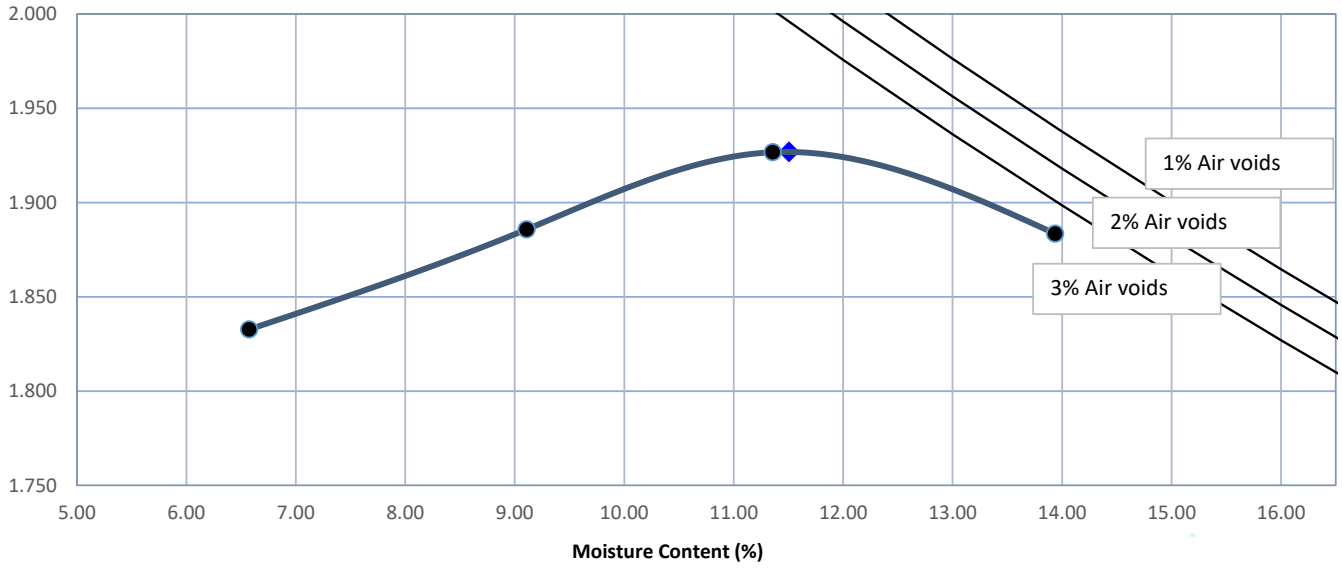
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**6.6**	**9.1**	**11.4**	**13.9**	
Dry Density (t/m³)	**1.833**	**1.886**	**1.927**	**1.883**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.93**

Optimum Moisture Content (%) **11.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.696 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - ǂIEEE Standard 442, ǂ ASTM D5334, AS 1289.2.1.1 & AS 1289.5.2.1

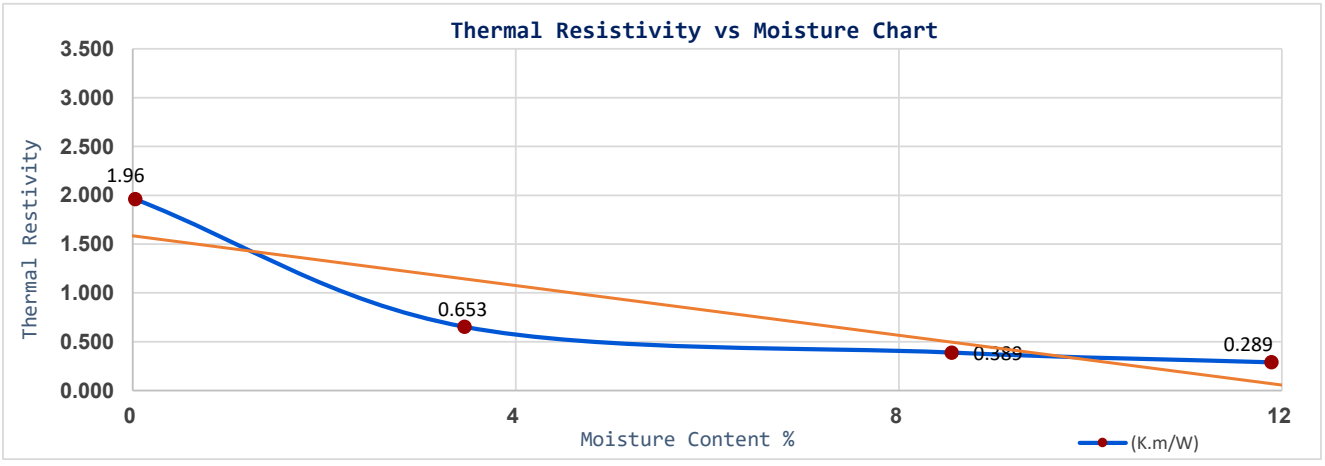
Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5048_1_TR
Project:	Beenup Wind Farm	*Sample No.*	WG24.5048
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP10 - 01,02,03 : 1.0m	*Date Tested:*	8/04/2024

TEST RESULTS - THERMAL RESISTIVITY & CONDUCTIVITY

Sampling Method: Sampled by Client, Tested as Received

Compaction Details		Reference MDD Details	
Maximum Dry Density (t/m^3)	1.930	Compaction Type	Modified
Optimum Moisture Content (%)	11.5	Compactive Effort (kJ/m^3)	2703
Target Dry Density Ratio (%)	95	Mass of Rammer (kg)	4.5
Target Moisture Ratio (%)	See Below	Number of Layers	5
% Retained on the 19.0mm Sieve	0	Blows per Layer	20

Specimen Conditions At Test and After Compaction				
Specimen No.	1	2	3	4
Dry Density Ratio (%)	94.8	94.9	94.8	94.5
Target Moisture Ratio (%)	0.0	3.5	8.5	11.5
Moisture Content (%)	0.0	3.5	8.6	11.9
ǂ - Thermal Resistivity (K.m/W	1.960	0.653	0.389	0.289



Comments: Material dried back to 0%

ǂ - NATA Accreditation does not cover the performance of this service .

Approved Signatory:

Name: Matt van Herk

Date: 10/April/2024

Accreditation No. 20599

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SOIL | AGGREGATE | CONCRETE | CRUSHING

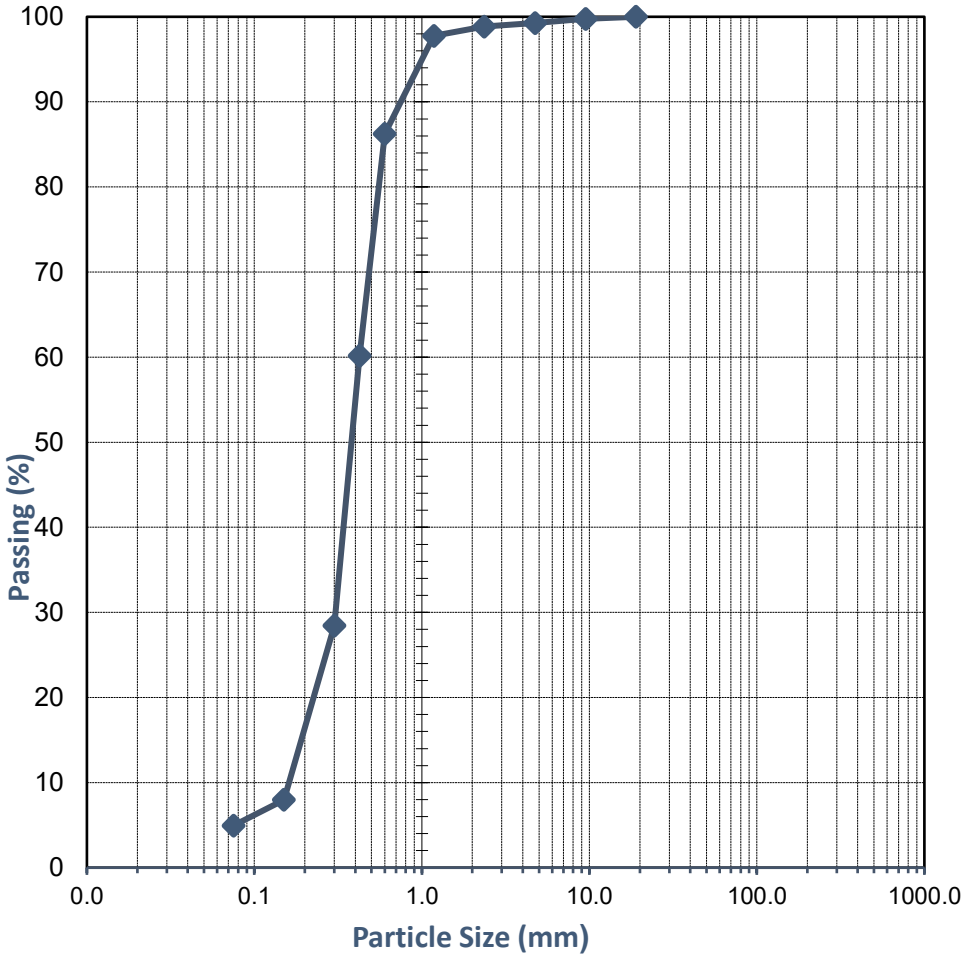
TEST REPORT - AS 1289.3.6.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5050_1_PSD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5050
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP11 - 01 2.0m (S)	*Date Tested:*	04/04 - 05/04/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	99
2.36	99
1.18	98
0.600	86
0.425	60
0.300	28
0.150	8
0.075	5



Comments:

Approved Signatory:

Name: Natasha Bielawski

Date: 08/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5050_1_PI
Project:	Beenup Wind Farm	*Sample No.*	WG24.5050
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP11 - 01 2.0m (S)	*Date Tested:*	5/04/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**0.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory:

Name: Linda Chiu

Date: 08/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5050_1_ECN
Project:	Beenup Wind Farm	*Sample No.*	WG24.5050
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP11 - 01 2.0m (S)	*Date Tested:*	9/04/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Sand**
Water Used:	**Distilled**

EMERSON CLASS NUMBER

5

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 10/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5051_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5051
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP13 - 01,02,03 1.5m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

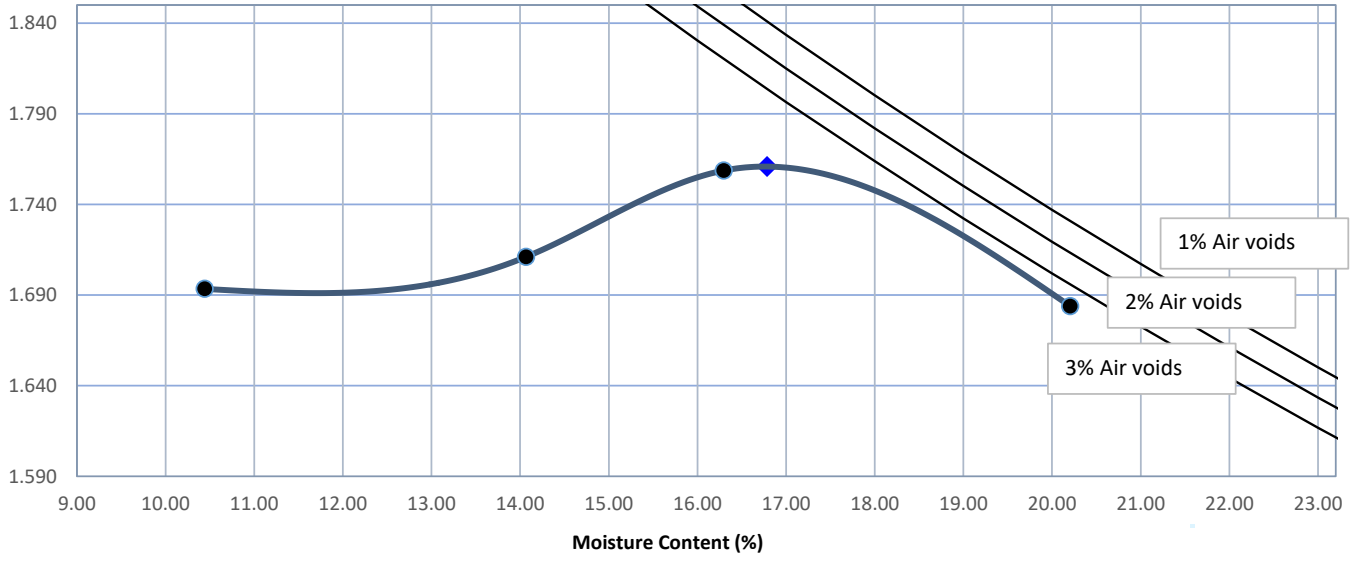
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**10.4**	**14.1**	**16.3**	**20.2**	
Dry Density (t/m³)	**1.693**	**1.711**	**1.759**	**1.684**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.76**

Optimum Moisture Content (%) **17.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.703 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - ǂIEEE Standard 442, ǂ ASTM D5334, AS 1289.2.1.1 & AS 1289.5.2.1

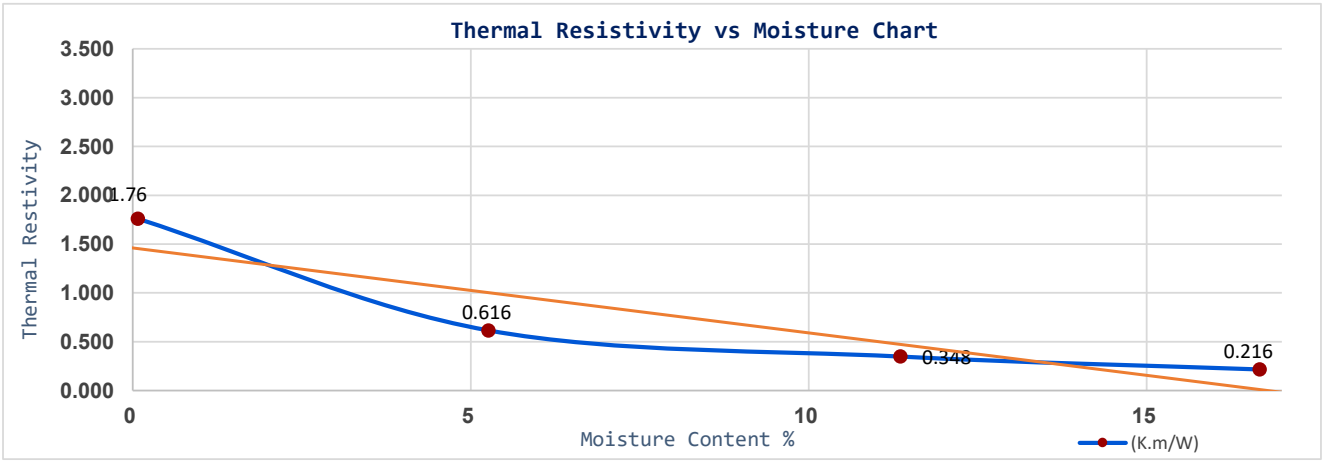
Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5051_1_TR
Project:	Beenup Wind Farm	*Sample No.*	WG24.5051
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP13 - 01,02,03 : 1.5m	*Date Tested:*	9/04/2024

TEST RESULTS - THERMAL RESISTIVITY & CONDUCTIVITY

Sampling Method: Sampled by Client, Tested as Received

Compaction Details		Reference MDD Details	
Maximum Dry Density (t/m^3)	1.760	Compaction Type	Modified
Optimum Moisture Content (%)	17.0	Compactive Effort (kJ/m^3)	2703
Target Dry Density Ratio (%)	95	Mass of Rammer (kg)	4.5
Target Moisture Ratio (%)	See Below	Number of Layers	5
% Retained on the 19.0mm Sieve	0	Blows per Layer	20

Specimen Conditions At Test and After Compaction				
Specimen No.	1	2	3	4
Dry Density Ratio (%)	94.7	95.0	95.0	95.1
Target Moisture Ratio (%)	0.0	5.5	11.5	17.0
Moisture Content (%)	0.1	5.3	11.4	16.7
ǂ - Thermal Resistivity (K.m/W	1.760	0.616	0.348	0.216



Comments: Material dried back to 0%

ǂ - NATA Accreditation does not cover the performance of this service .

Approved Signatory:

Name: Matt van Herk

Date: 10/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5053_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5053
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP15 - 04 1.0m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

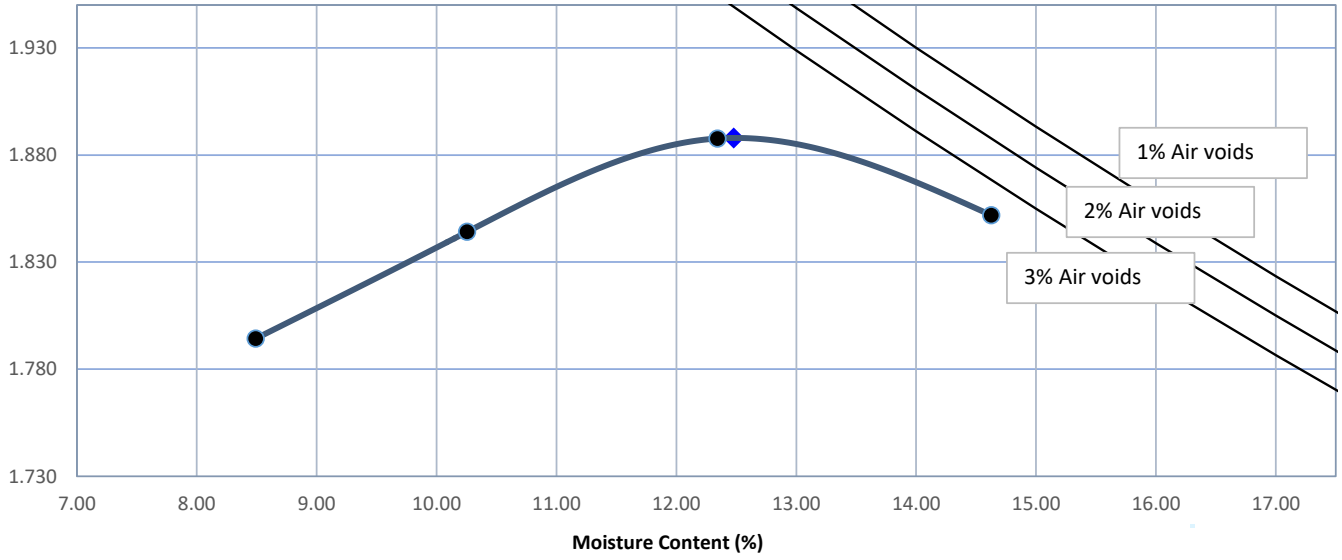
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	8.5	10.3	12.3	14.6	
Dry Density (t/m³)	1.794	1.844	1.888	1.852	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.89**

Optimum Moisture Content (%) **12.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.681 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

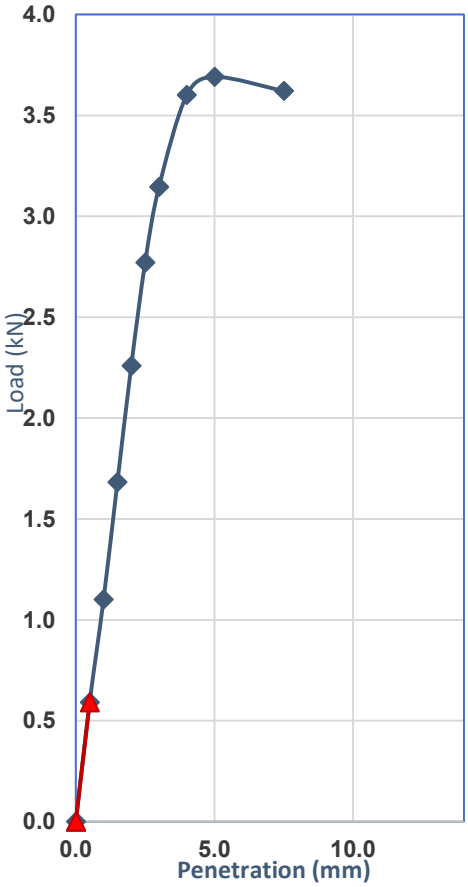
Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5053_1_SCBR
Project:	Beenup Wind Farm	*Sample No.*	WG24.5053
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP15 - 04 1.0m	*Date Tested:*	04/04 - 09/04/2024

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	2.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.89	Optimum Moisture (%)	12.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.80	Moisture Content (%)	12.1
Density Ratio (%)	95.0	Moisture Ratio (%)	97.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.80	Dry Density Ratio (%)	95.0
Moisture Content (%)	15.3	Moisture Ratio (%)	122.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	14.7	Remaining Depth (%)	15.3

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 20%

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 10/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5052_1_MMDD
Project:	Beenup Wind Farm	*Sample No.*	WG24.5052
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP15 - 01,02,03 1.0m	*Date Tested:*	4/04/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

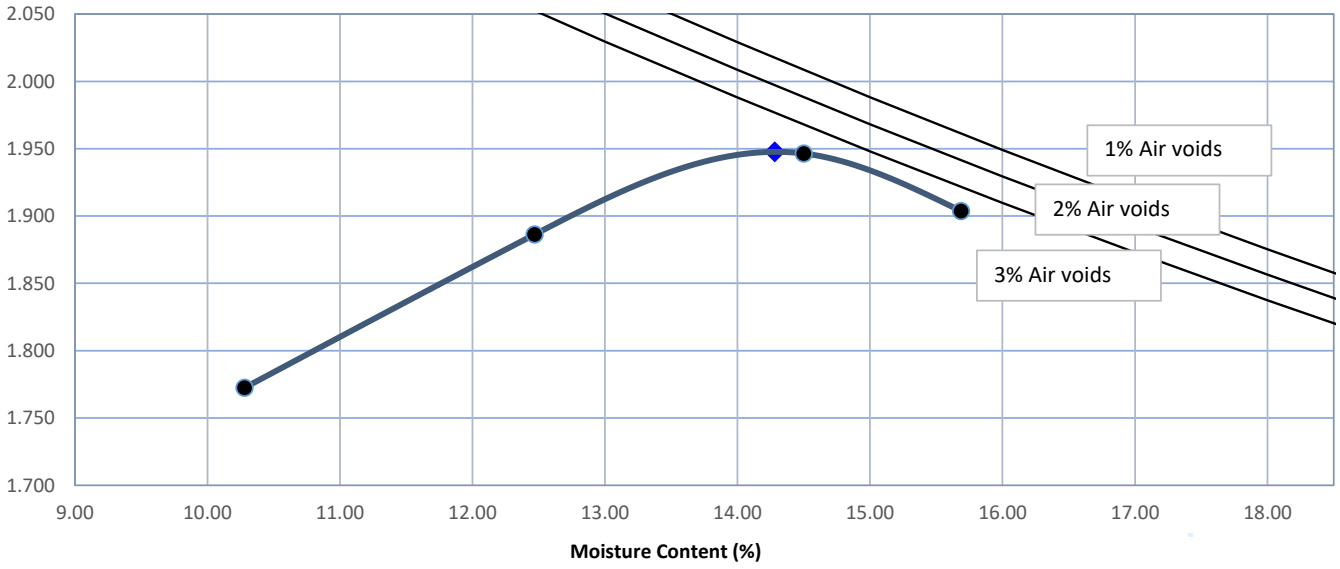
Sample Curing Time (Hours): 2

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**10.3**	**12.5**	**14.5**	**15.7**	
Dry Density (t/m³)	**1.773**	**1.886**	**1.946**	**1.904**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.95**

Optimum Moisture Content (%) **14.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.874 t/m³*

Approved Signatory:

Name: Madhav Basnet

Date: 05/April/2024

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - ǂIEEE Standard 442, ǂ ASTM D5334, AS 1289.2.1.1 & AS 1289.5.2.1

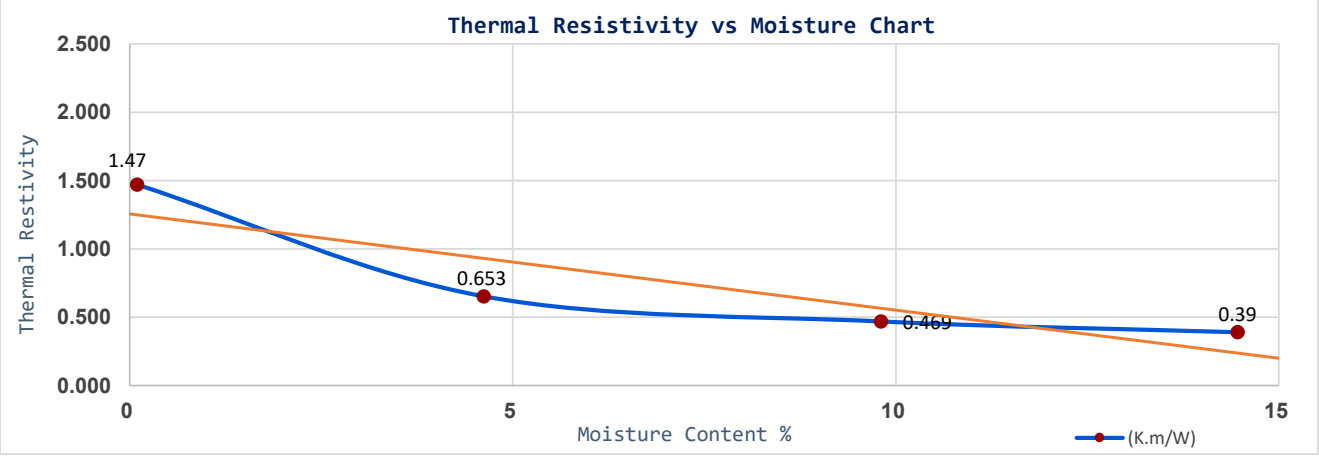
Client:	Stantec	*Ticket No.*	S12725
Client Address:	11 Harvest Terrace, West Perth WA 6005	*Report No.*	WG24.5052_1_TR
Project:	Beenup Wind Farm	*Sample No.*	WG24.5052
Location:	Beenup	*Date Sampled:*	14/03/2024
Sample Identification:	TP15 - 01,02,03 : 1.0m	*Date Tested:*	9/04/2024

TEST RESULTS - THERMAL RESISTIVITY & CONDUCTIVITY

Sampling Method: Sampled by Client, Tested as Received

Compaction Details		Reference MDD Details	
Maximum Dry Density (t/m^3)	1.950	Compaction Type	Modified
Optimum Moisture Content (%)	14.5	Compactive Effort (kJ/m^3)	2703
Target Dry Density Ratio (%)	95	Mass of Rammer (kg)	4.5
Target Moisture Ratio (%)	See Below	Number of Layers	5
% Retained on the 19.0mm Sieve	20	Blows per Layer	0

Specimen Conditions At Test and After Compaction				
Specimen No.	1	2	3	4
Dry Density Ratio (%)	94.7	94.7	94.6	94.9
Target Moisture Ratio (%)	0.0	4.5	9.5	14.5
Moisture Content (%)	0.1	4.6	9.8	14.5
ǂ - Thermal Resistivity (K.m/W	1.470	0.653	0.469	0.390



Comments: Material dried back to 0%

ǂ - NATA Accreditation does not cover the performance of this service .

Approved Signatory:

Name: Matt van Herk

Date: 10/April/2024

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ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PFD0330

Client Details

Client	Western Geotechnical & Laboratory Services
Contact	Brooke Elliot
Address	235 Bank Street, WELSHPOOL, WA, 6101

Sample Details

Your Reference	S12725 - Beenup Wind Farm
Number of Samples	1 Soil
Date Samples Received	04/04/2024
Date Instructions Received	04/04/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	11/04/2024
Date of Issue	11/04/2024

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Authorisation Details

Results Approved By	Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFD0330

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFD0330-01	WG24.505 - TP11 - 01 : 2.0m (S)	Soil	04/04/2024	04/04/2024

Sample Comments

General Comment	No sampling date(s) was/were provided by client. Therefore the sampling date(s) is/are assigned as the date(s) of sample receipt to the laboratory.

Certificate of Analysis PFD0330

Inorganics - General Physical Parameters (Soil)

Envirolab ID	Units	PQL	PFD0330-01
Your Reference			WG24.505 - TP11 - 01 : 2.0m (S)
Date Sampled			04/04/2024
pH	pH units		5.2

Certificate of Analysis PFD0330

Inorganics - General Chemical Parameters (Soil)

Envirolab ID	Units	PQL	PFD0330-01
Your Reference			WG24.505 - TP11 - 01 : 2.0m (S)
Date Sampled			04/04/2024
Chloride	mg/kg	10	51
Sulfate	mg/kg	10	790

Method Summary

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFD0330

Client Details

Client	Western Geotechnical & Laboratory Services
Your Reference	S12725 - Beenup Wind Farm
Date Issued	11/04/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFD0330

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
pH | Soil	1	04/04/2024	05/04/2024	09/04/2024	Yes
Chloride | Soil	1	04/04/2024	05/04/2024	11/04/2024	Yes
Sulfate | Soil	1	04/04/2024	05/04/2024	11/04/2024	Yes

No sampling date(s) was/were provided by client. Therefore the sampling date(s) is/are assigned as the date(s) of sample receipt to the laboratory.

Quality Control PFD0330

INORG-001 | Inorganics - General Physical Parameters (Soil) | Batch BFD0687

Analyte	Units	PQL	Blank	DUP1 BFD0687-DUP1# Samp | QC | RPD %	LCS %
pH	pH units		5.5	9.6 | 9.6 | 0.00	101

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081 | Inorganics - General Chemical Parameters (Soil) | Batch BFD0688

Analyte	Units	PQL	Blank	DUP1 BFD0688-DUP1# Samp | QC | RPD %	DUP2 BFD0688-DUP2# Samp | QC | RPD %	LCS %	Spike % BFD0688-MS1#
Chloride	mg/kg	10	<10	5430 | 5420 | 0.00623	316 | 315 | 0.305	115	101
Sulfate	mg/kg	10	<10	584 | 585 | 0.0753	53.2 | 53.0 | 0.493	111	72.3

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

C.2 Contamination and Acid Sulfate Soils

Stantec Australia Pty Limited
6F 226,Adelaide Terrace
Perth
WA 6000

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Brenton Petracca**

Report **1075587-S**
Project name BEENUP WIND FARM
Received Date Mar 05, 2024

Client Sample ID			**WM01-0.0**	**WM01-0.5**	**WM01-1.0**	**WM01-1.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ma0013729**	**L24-Ma0013730**	**L24-Ma0013731**	**L24-Ma0013732**
Date Sampled			**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	82	104	57	83
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			WM01-0.0	WM01-0.5	WM01-1.0	WM01-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013729	L24-Ma0013730	L24-Ma0013731	L24-Ma0013732
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	36	37	38	36
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	7.9	< 1	< 1	< 1
Nitrate-N	1	mg/kg	1.6	1.3	1.2	< 1
Nitrite-N	1	mg/kg	1.6	1.3	1.2	< 1
NOx-N	1	mg/kg	1.6	1.4	1.2	< 1
Total Kjeldahl Nitrogen	10	mg/kg	370	680	280	40
Total Nitrogen	10	mg/kg	370	680	280	40
Phosphorus	1	mg/kg	19	27	4.5	3.4
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	< 1	< 1	< 1	< 1
Lead	1	mg/kg	5.2	4.6	7.8	6.1
Manganese	5	mg/kg	< 5	< 5	5.9	< 5
Mercury	0.02	mg/kg	< 0.02	< 0.02	0.02	< 0.02
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	< 5	< 5	< 5	< 5
Sample Properties						
% Moisture	1	%	11	4.4	20	16

Client Sample ID			WM02-0.0	WM02-0.5	WM02-1.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013733	L24-Ma0013734	L24-Ma0013735	L24-Ma0013737
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	61	< 50	180
TRH C29-C36	50	mg/kg	< 50	68	< 50	190
TRH C10-C36 (Total)	50	mg/kg	< 50	129	< 50	370
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	99	90	97	116
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	110	< 100	310
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	100
TRH >C10-C40 (total)*	100	mg/kg	< 100	110	< 100	410
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			WM02-0.0	WM02-0.5	WM02-1.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013733	L24-Ma0013734	L24-Ma0013735	L24-Ma0013737
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	37	36	39	52
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1	< 1	< 1	1.1
Nitrate-N	1	mg/kg	15	13	2.2	< 1
Nitrite-N	1	mg/kg	15	13	2.2	< 1
NOx-N	1	mg/kg	< 1	< 1	2.4	< 1
Total Kjeldahl Nitrogen	10	mg/kg	1200	700	86	5200
Total Nitrogen	10	mg/kg	1200	700	88	5200
Phosphorus	1	mg/kg	190	45	5.3	610
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	2.9	< 1	< 1	6.5
Lead	1	mg/kg	< 1	< 1	< 1	4.1
Manganese	5	mg/kg	< 5	< 5	< 5	14
Mercury	0.02	mg/kg	0.03	0.03	0.03	0.05
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	5.4	< 5	< 5	8.4
Sample Properties						
% Moisture	1	%	< 1	2.6	20	6.6

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	< 50	-	-	-
TRH C29-C36	50	mg/kg	< 50	-	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	-
Toluene	0.1	mg/kg	< 0.1	-	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	-

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
BTEX						
o-Xylene	0.1	mg/kg	< 0.1	-	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	79	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	-
TRH C6-C10	20	mg/kg	< 20	-	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	< 100	-	-	-
TRH >C34-C40	100	mg/kg	< 100	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
Bifenthrin	0.2	mg/kg	< 0.2	-	-	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	-
Chlordane	0.01	mg/kg	< 0.01	-	-	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
p.p-DDD	0.01	mg/kg	< 0.01	-	-	-
p.p-DDE	0.01	mg/kg	< 0.01	-	-	-
p.p-DDT	0.01	mg/kg	< 0.01	-	-	-
o.p-DDT	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	-
Lindane	0.01	mg/kg	< 0.01	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Oxychlordane	0.01	mg/kg	< 0.01	-	-	-
Diazinon	0.2	mg/kg	< 0.2	-	-	-
Ethion	0.05	mg/kg	< 0.05	-	-	-
Fenitrothion	0.1	mg/kg	< 0.1	-	-	-
Malathion	0.1	mg/kg	< 0.1	-	-	-
Trifluralin	0.2	mg/kg	< 0.2	-	-	-
Ammonia-N	10	mg/kg	43	-	-	-
Chromium (VI)	1	mg/kg	< 1	-	-	-
Filterable Reactive Phosphorus	1	mg/kg	< 1	-	-	-
Nitrate-N	1	mg/kg	3.1	-	-	-

Client Sample ID			WM03-0.5	WM01-0.0	WM01-0.25	WM01-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013738	L24-Ma0013753	L24-Ma0013754	L24-Ma0013755
Date Sampled			Feb 29, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Nitrite-N	1	mg/kg	3.1	-	-	-
NOx-N	1	mg/kg	3.2	-	-	-
Total Kjeldahl Nitrogen	10	mg/kg	1100	-	-	-
Total Nitrogen	10	mg/kg	1100	-	-	-
Phosphorus	1	mg/kg	30	-	-	-
Heavy Metals						
Arsenic	2	mg/kg	11	-	-	-
Beryllium	2	mg/kg	< 2	-	-	-
Boron	10	mg/kg	< 10	-	-	-
Cadmium	0.1	mg/kg	< 0.1	-	-	-
Cobalt	5	mg/kg	< 5	-	-	-
Copper	1	mg/kg	< 1	-	-	-
Lead	1	mg/kg	20	-	-	-
Manganese	5	mg/kg	< 5	-	-	-
Mercury	0.02	mg/kg	0.05	-	-	-
Nickel	1	mg/kg	< 1	-	-	-
Selenium	2	mg/kg	< 2	-	-	-
Zinc	5	mg/kg	< 5	-	-	-
Sample Properties						
% Moisture	1	%	25	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.2	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.9	3.9	3.7
Reaction Ratings*[S05]	0	comment	-	2.0	2.0	2.0

Client Sample ID			WM01-0.75	WM01-1.0	WM01-1.25	WM01-1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013756	L24-Ma0013757	L24-Ma0013758	L24-Ma0013759
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.4	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.5	3.6	3.9
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-1.75	WM01-2.0	WM01-2.25	WM01-2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013760	L24-Ma0013761	L24-Ma0013762	L24-Ma0013763
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.4	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	2.9	3.4
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-2.75	WM01-3.0	WM01-3.25	WM01-3.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013764	L24-Ma0013765	L24-Ma0013766	L24-Ma0013767
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	5.8	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.0	3.1	2.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-3.75	WM01-4.0	WM01-4.25	WM01-4.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013768	L24-Ma0013769	L24-Ma0013770	L24-Ma0013771
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.1	6.0	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.6	2.6	2.5
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM01-4.75	WM01-5.0	WM01-5.25	WM01-5.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013772	L24-Ma0013773	L24-Ma0013774	L24-Ma0013775
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.3	6.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.4	2.4	2.3
Reaction Ratings*[S05]	0	comment	2.0	2.0	4.0	2.0

Client Sample ID			WM01-5.75	WM01-6.0	WM01-6.25	WM01-6.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013776	L24-Ma0013777	L24-Ma0013778	L24-Ma0013779
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.0	6.1	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	2.3	2.3	2.4
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-6.75	WM01-7.0	WM01-7.25	WM01-7.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013780	L24-Ma0013781	L24-Ma0013782	L24-Ma0013783
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.1	6.7	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.3	2.3	2.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-7.75	WM01-8.0	WM01-8.25	WM01-8.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013784	L24-Ma0013785	L24-Ma0013786	L24-Ma0013787
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.4	6.4	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.4	2.3	2.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-8.75	WM01-9.0	WM01-9.25	WM01-9.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013788	L24-Ma0013789	L24-Ma0013790	L24-Ma0013791
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.2	6.4	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.5	2.3	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM01-9.75	WM01-10.0	WM02-0.0	WM02-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013792	L24-Ma0013793	L24-Ma0013794	L24-Ma0013795
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	5.4	5.5	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.3	3.6	3.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	2.0	2.0

Client Sample ID			WM02-0.5	WM02-0.75	WM02-1.0	WM02-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013796	L24-Ma0013797	L24-Ma0013798	L24-Ma0013799
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.3	6.4	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.1	4.5	4.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM02-1.5	WM02-1.75	WM02-2.0	WM02-2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013800	L24-Ma0013801	L24-Ma0013802	L24-Ma0013803
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	5.7	6.2	7.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.3	5.0	3.2
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM02-2.5	WM02-2.75	WM02-3.0	WM02-3.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013804	L24-Ma0013805	L24-Ma0013806	L24-Ma0013807
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	7.6	7.2	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	2.6	2.8	2.8
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	3.0

Client Sample ID			WM02-3.50	WM02-3.75	WM02-4.0	WM02-4.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013808	L24-Ma0013809	L24-Ma0013810	L24-Ma0013811
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.1	7.2	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.7	2.8	3.1
Reaction Ratings*[S05]	0	comment	3.0	4.0	4.0	4.0

Client Sample ID			WM02-4.50	WM02-4.75	WM02-5.0	WM02-5.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013812	L24-Ma0013813	L24-Ma0013814	L24-Ma0013815
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.8	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.9	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-5.50	WM02-5.75	WM02-6.0	WM02-6.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013816	L24-Ma0013817	L24-Ma0013818	L24-Ma0013819
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	6.5	6.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.8	2.7	2.4
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-6.50	WM02-6.75	WM02-7.0	WM02-7.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013820	L24-Ma0013821	L24-Ma0013822	L24-Ma0013823
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	4.6	7.7	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.5	2.5	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-7.50	WM02-7.75	WM02-8.0	WM02-8.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013824	L24-Ma0013825	L24-Ma0013826	L24-Ma0013827
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	5.0	4.8	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.7	2.6	2.3
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-8.50	WM02-8.75	WM02-9.0	WM02-9.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013828	L24-Ma0013829	L24-Ma0013830	L24-Ma0013831
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	4.9	5.0	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.7	2.8	2.6
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM02-9.50	WM02-9.75	WM02-10.0	WM03-0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013832	L24-Ma0013833	L24-Ma0013834	L24-Ma0013835
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.2	4.8	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	3.0

Client Sample ID			WM03-0.25	WM03-0.5	WM03-0.75	WM03-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013836	L24-Ma0013837	L24-Ma0013838	L24-Ma0013839
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	6.2	5.5	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.3	4.6	4.4
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM03-1.25	WM03-2.0	WM03-2.25	WM03-2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013840	L24-Ma0013843	L24-Ma0013844	L24-Ma0013845
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.6	4.4	4.6
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			WM03-2.75	WM03-3.0	WM03-3.25	WM03-3.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013846	L24-Ma0013847	L24-Ma0013848	L24-Ma0013849
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.8	6.1	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.1	3.3	3.0
Reaction Ratings*[S05]	0	comment	2.0	2.0	4.0	4.0

Client Sample ID			WM03-3.75	WM03-4.0	WM03-4.25	WM03-4.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013850	L24-Ma0013851	L24-Ma0013852	L24-Ma0013853
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	7.3	6.7	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	2.7	3.0	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-4.75	WM03-5.0	WM03-5.25	WM03-5.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013854	L24-Ma0013855	L24-Ma0013856	L24-Ma0013857
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.2	7.8	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.2	2.5	2.5
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-5.75	WM03-6.0	WM03-6.25	WM03-6.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013858	L24-Ma0013859	L24-Ma0013860	L24-Ma0013861
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.9	7.0	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.5	2.9	3.1
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-6.75	WM03-7.0	WM03-7.25	WM03-7.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013862	L24-Ma0013863	L24-Ma0013864	L24-Ma0013865
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	6.4	5.2	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.7	3.1	2.9
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-7.75	WM03-8.0	WM03-8.25	WM03-8.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013866	L24-Ma0013867	L24-Ma0013868	L24-Ma0013869
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.7	6.6	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.4	3.2	3.2
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-8.75	WM03-9.0	WM03-9.25	WM03-9.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013870	L24-Ma0013871	L24-Ma0013872	L24-Ma0013873
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.7	6.2	5.5	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.2	2.9	3.0
Reaction Ratings*[S05]	0	comment	4.0	4.0	4.0	4.0

Client Sample ID			WM03-9.75	WM03-10.0	Trip Blank
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013874	L24-Ma0013875	L24-Ma0013882
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	20	mg/kg	-	-	< 20
BTEX					
Benzene	0.1	mg/kg	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3
BTEX					
4-Bromofluorobenzene (surr.)	1	%	-	-	79
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5

Client Sample ID			WM03-9.75	WM03-10.0	Trip Blank
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ma0013874	L24-Ma0013875	L24-Ma0013882
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	6.4	5.6	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	-
Reaction Ratings*[S05]	0	comment	4.0	4.0	-
Total Recoverable Hydrocarbons					
TRH C6-C10	20	mg/kg	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
NEPM 2013 Metals : Metals M12	Welshpool	Mar 08, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
OCOP in Soil	Welshpool	Mar 09, 2024	14 Days
- Method: ARL003 - OCOP and PCB in Soil			
Ammonia-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL304 - Ammonia in Soil and Sediment by Discrete Analyser			
Chromium (VI)	Welshpool	Mar 08, 2024	28 Days
- Method: ARL051 - Hexavalent Chromium in Soil			
Filterable Reactive Phosphorus	Welshpool	Mar 08, 2024	7 Day
- Method: ARL120 - Filterable Reactive Phosphorus in Soil			
Nitrate-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Nitrite-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL312 - Nitrite in Soil and Sediment by Discrete Analyser			
Phosphorus	Welshpool	Mar 08, 2024	7 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Acid Sulfate Soils Field pH Test	Welshpool	Mar 06, 2024	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
NOx-N	Welshpool	Mar 08, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Total Kjeldahl Nitrogen	Welshpool	Mar 08, 2024	7 Days
- Method: ARL118 - Total Phosphorus and TKN in Soil and Biosolids			
Total Nitrogen	Welshpool	Mar 06, 2024	7 Days
- Method: ARL No. 330 - Persulfate Method for Simultaneous Determination of TN & TP			
Naphthalene	Welshpool	Mar 08, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Welshpool	Mar 07, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
% Moisture	Welshpool	Mar 06, 2024	14 Days
- Method: ARL135 Moisture in Solids			

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1075587
Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																		
1	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013729	X			X	X		X	X	X		X		X		X		X	
2	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013730	X			X	X		X	X	X		X		X		X		X	
3	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013731	X			X	X		X	X	X		X		X		X		X	
4	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013732	X			X	X		X	X	X		X		X		X		X	
5	WM02-0.0	Feb 28, 2024		Soil	L24-Ma0013733	X			X	X		X	X	X		X		X		X		X	
6	WM02-0.5	Feb 28, 2024		Soil	L24-Ma0013734	X			X	X		X	X	X		X		X		X		X	
7	WM02-1.0	Feb 28, 2024		Soil	L24-Ma0013735	X			X	X		X	X	X		X		X		X		X	
8	WM03-0.0	Feb 29, 2024		Soil	L24-Ma0013737	X			X	X		X	X	X		X		X		X		X	
9	WM03-0.5	Feb 29, 2024		Soil	L24-Ma0013738	X			X	X		X	X	X		X		X		X		X	
10	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013741														X				
11	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013742														X				
12	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013743														X				
13	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013744														X				
14	WM02-0.0	Feb 28, 2024		Soil	L24-Ma0013745														X				

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Company Name: Stantec Australia Pty Ltd (WA)
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Order No.:
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Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
15	WM02-0.5	Feb 28, 2024		Soil	L24-Ma0013746														X				
16	WM02-1.0	Feb 28, 2024		Soil	L24-Ma0013747														X				
17	WM02-1.5	Feb 28, 2024		Soil	L24-Ma0013748														X				
18	WM03-0.0	Feb 29, 2024		Soil	L24-Ma0013749														X				
19	WM03-0.5	Feb 29, 2024		Soil	L24-Ma0013750														X				
20	WM03-1.0	Feb 29, 2024		Soil	L24-Ma0013751														X				
21	WM03-1.5	Feb 29, 2024		Soil	L24-Ma0013752														X				
22	WM01-0.0	Feb 26, 2024		Soil	L24-Ma0013753										X								
23	WM01-0.25	Feb 26, 2024		Soil	L24-Ma0013754										X								
24	WM01-0.5	Feb 26, 2024		Soil	L24-Ma0013755										X								
25	WM01-0.75	Feb 26, 2024		Soil	L24-Ma0013756										X								
26	WM01-1.0	Feb 26, 2024		Soil	L24-Ma0013757										X								
27	WM01-1.25	Feb 26, 2024		Soil	L24-Ma0013758										X								
28	WM01-1.5	Feb 26, 2024		Soil	L24-Ma0013759										X								
29	WM01-1.75	Feb 26, 2024		Soil	L24-Ma0013760										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
30	WM01-2.0	Feb 26, 2024		Soil	L24-Ma0013761										X								
31	WM01-2.25	Feb 26, 2024		Soil	L24-Ma0013762										X								
32	WM01-2.5	Feb 26, 2024		Soil	L24-Ma0013763										X								
33	WM01-2.75	Feb 26, 2024		Soil	L24-Ma0013764										X								
34	WM01-3.0	Feb 26, 2024		Soil	L24-Ma0013765										X								
35	WM01-3.25	Feb 26, 2024		Soil	L24-Ma0013766										X								
36	WM01-3.50	Feb 26, 2024		Soil	L24-Ma0013767										X								
37	WM01-3.75	Feb 26, 2024		Soil	L24-Ma0013768										X								
38	WM01-4.0	Feb 26, 2024		Soil	L24-Ma0013769										X								
39	WM01-4.25	Feb 26, 2024		Soil	L24-Ma0013770										X								
40	WM01-4.50	Feb 26, 2024		Soil	L24-Ma0013771										X								
41	WM01-4.75	Feb 26, 2024		Soil	L24-Ma0013772										X								
42	WM01-5.0	Feb 26, 2024		Soil	L24-Ma0013773										X								
43	WM01-5.25	Feb 26, 2024		Soil	L24-Ma0013774										X								
44	WM01-5.50	Feb 26, 2024		Soil	L24-Ma0013775										X								

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Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
45	WM01-5.75	Feb 26, 2024		Soil	L24-Ma0013776										X								
46	WM01-6.0	Feb 26, 2024		Soil	L24-Ma0013777										X								
47	WM01-6.25	Feb 26, 2024		Soil	L24-Ma0013778										X								
48	WM01-6.50	Feb 26, 2024		Soil	L24-Ma0013779										X								
49	WM01-6.75	Feb 26, 2024		Soil	L24-Ma0013780										X								
50	WM01-7.0	Feb 26, 2024		Soil	L24-Ma0013781										X								
51	WM01-7.25	Feb 26, 2024		Soil	L24-Ma0013782										X								
52	WM01-7.50	Feb 26, 2024		Soil	L24-Ma0013783										X								
53	WM01-7.75	Feb 26, 2024		Soil	L24-Ma0013784										X								
54	WM01-8.0	Feb 26, 2024		Soil	L24-Ma0013785										X								
55	WM01-8.25	Feb 26, 2024		Soil	L24-Ma0013786										X								
56	WM01-8.50	Feb 26, 2024		Soil	L24-Ma0013787										X								
57	WM01-8.75	Feb 26, 2024		Soil	L24-Ma0013788										X								
58	WM01-9.0	Feb 26, 2024		Soil	L24-Ma0013789										X								
59	WM01-9.25	Feb 26, 2024		Soil	L24-Ma0013790										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
60	WM01-9.50	Feb 26, 2024		Soil	L24-Ma0013791										X								
61	WM01-9.75	Feb 26, 2024		Soil	L24-Ma0013792										X								
62	WM01-10.0	Feb 26, 2024		Soil	L24-Ma0013793										X								
63	WM02-0.0	Feb 26, 2024		Soil	L24-Ma0013794										X								
64	WM02-0.25	Feb 26, 2024		Soil	L24-Ma0013795										X								
65	WM02-0.5	Feb 26, 2024		Soil	L24-Ma0013796										X								
66	WM02-0.75	Feb 26, 2024		Soil	L24-Ma0013797										X								
67	WM02-1.0	Feb 26, 2024		Soil	L24-Ma0013798										X								
68	WM02-1.25	Feb 26, 2024		Soil	L24-Ma0013799										X								
69	WM02-1.5	Feb 26, 2024		Soil	L24-Ma0013800										X								
70	WM02-1.75	Feb 26, 2024		Soil	L24-Ma0013801										X								
71	WM02-2.0	Feb 26, 2024		Soil	L24-Ma0013802										X								
72	WM02-2.25	Feb 26, 2024		Soil	L24-Ma0013803										X								
73	WM02-2.5	Feb 26, 2024		Soil	L24-Ma0013804										X								
74	WM02-2.75	Feb 26, 2024		Soil	L24-Ma0013805										X								

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Project Name: BEENUP WIND FARM

Order No.:
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Phone: 0458 839 200
Fax:

Received: Mar 5, 2024 10:56 AM
Due: Mar 12, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	CANCELLED	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	HOLD	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
75	WM02-3.0	Feb 26, 2024		Soil	L24-Ma0013806										X								
76	WM02-3.25	Feb 26, 2024		Soil	L24-Ma0013807										X								
77	WM02-3.50	Feb 26, 2024		Soil	L24-Ma0013808										X								
78	WM02-3.75	Feb 26, 2024		Soil	L24-Ma0013809										X								
79	WM02-4.0	Feb 26, 2024		Soil	L24-Ma0013810										X								
80	WM02-4.25	Feb 26, 2024		Soil	L24-Ma0013811										X								
81	WM02-4.50	Feb 26, 2024		Soil	L24-Ma0013812										X								
82	WM02-4.75	Feb 26, 2024		Soil	L24-Ma0013813										X								
83	WM02-5.0	Feb 26, 2024		Soil	L24-Ma0013814										X								
84	WM02-5.25	Feb 26, 2024		Soil	L24-Ma0013815										X								
85	WM02-5.50	Feb 26, 2024		Soil	L24-Ma0013816										X								
86	WM02-5.75	Feb 26, 2024		Soil	L24-Ma0013817										X								
87	WM02-6.0	Feb 26, 2024		Soil	L24-Ma0013818										X								
88	WM02-6.25	Feb 26, 2024		Soil	L24-Ma0013819										X								
89	WM02-6.50	Feb 26, 2024		Soil	L24-Ma0013820										X								

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Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
90	WM02-6.75	Feb 26, 2024		Soil	L24-Ma0013821										X								
91	WM02-7.0	Feb 26, 2024		Soil	L24-Ma0013822										X								
92	WM02-7.25	Feb 26, 2024		Soil	L24-Ma0013823										X								
93	WM02-7.50	Feb 26, 2024		Soil	L24-Ma0013824										X								
94	WM02-7.75	Feb 26, 2024		Soil	L24-Ma0013825										X								
95	WM02-8.0	Feb 26, 2024		Soil	L24-Ma0013826										X								
96	WM02-8.25	Feb 26, 2024		Soil	L24-Ma0013827										X								
97	WM02-8.50	Feb 26, 2024		Soil	L24-Ma0013828										X								
98	WM02-8.75	Feb 26, 2024		Soil	L24-Ma0013829										X								
99	WM02-9.0	Feb 26, 2024		Soil	L24-Ma0013830										X								
100	WM02-9.25	Feb 26, 2024		Soil	L24-Ma0013831										X								
101	WM02-9.50	Feb 26, 2024		Soil	L24-Ma0013832										X								
102	WM02-9.75	Feb 26, 2024		Soil	L24-Ma0013833										X								
103	WM02-10.0	Feb 26, 2024		Soil	L24-Ma0013834										X								
104	WM03-0.0	Feb 26, 2024		Soil	L24-Ma0013835										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
105	WM03-0.25	Feb 26, 2024		Soil	L24-Ma0013836										X								
106	WM03-0.5	Feb 26, 2024		Soil	L24-Ma0013837										X								
107	WM03-0.75	Feb 26, 2024		Soil	L24-Ma0013838										X								
108	WM03-1.0	Feb 26, 2024		Soil	L24-Ma0013839										X								
109	WM03-1.25	Feb 26, 2024		Soil	L24-Ma0013840										X								
110	WM03-2.0	Feb 26, 2024		Soil	L24-Ma0013843										X								
111	WM03-2.25	Feb 26, 2024		Soil	L24-Ma0013844										X								
112	WM03-2.5	Feb 26, 2024		Soil	L24-Ma0013845										X								
113	WM03-2.75	Feb 26, 2024		Soil	L24-Ma0013846										X								
114	WM03-3.0	Feb 26, 2024		Soil	L24-Ma0013847										X								
115	WM03-3.25	Feb 26, 2024		Soil	L24-Ma0013848										X								
116	WM03-3.50	Feb 26, 2024		Soil	L24-Ma0013849										X								
117	WM03-3.75	Feb 26, 2024		Soil	L24-Ma0013850										X								
118	WM03-4.0	Feb 26, 2024		Soil	L24-Ma0013851										X								
119	WM03-4.25	Feb 26, 2024		Soil	L24-Ma0013852										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
120	WM03-4.50	Feb 26, 2024		Soil	L24-Ma0013853										X								
121	WM03-4.75	Feb 26, 2024		Soil	L24-Ma0013854										X								
122	WM03-5.0	Feb 26, 2024		Soil	L24-Ma0013855										X								
123	WM03-5.25	Feb 26, 2024		Soil	L24-Ma0013856										X								
124	WM03-5.50	Feb 26, 2024		Soil	L24-Ma0013857										X								
125	WM03-5.75	Feb 26, 2024		Soil	L24-Ma0013858										X								
126	WM03-6.0	Feb 26, 2024		Soil	L24-Ma0013859										X								
127	WM03-6.25	Feb 26, 2024		Soil	L24-Ma0013860										X								
128	WM03-6.50	Feb 26, 2024		Soil	L24-Ma0013861										X								
129	WM03-6.75	Feb 26, 2024		Soil	L24-Ma0013862										X								
130	WM03-7.0	Feb 26, 2024		Soil	L24-Ma0013863										X								
131	WM03-7.25	Feb 26, 2024		Soil	L24-Ma0013864										X								
132	WM03-7.50	Feb 26, 2024		Soil	L24-Ma0013865										X								
133	WM03-7.75	Feb 26, 2024		Soil	L24-Ma0013866										X								
134	WM03-8.0	Feb 26, 2024		Soil	L24-Ma0013867										X								

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
135	WM03-8.25	Feb 26, 2024		Soil	L24-Ma0013868										X								
136	WM03-8.50	Feb 26, 2024		Soil	L24-Ma0013869										X								
137	WM03-8.75	Feb 26, 2024		Soil	L24-Ma0013870										X								
138	WM03-9.0	Feb 26, 2024		Soil	L24-Ma0013871										X								
139	WM03-9.25	Feb 26, 2024		Soil	L24-Ma0013872										X								
140	WM03-9.50	Feb 26, 2024		Soil	L24-Ma0013873										X								
141	WM03-9.75	Feb 26, 2024		Soil	L24-Ma0013874										X								
142	WM03-10.0	Feb 26, 2024		Soil	L24-Ma0013875										X								
143	WM01-QC1	Feb 26, 2024		Water	L24-Ma0013876			X										X			X		X
144	WM02-QC1	Feb 28, 2024		Water	L24-Ma0013877			X										X			X		X
145	WM03-QC1	Feb 29, 2024		Water	L24-Ma0013878			X										X			X		X
146	WM02-QC2	Feb 29, 2024		Soil	L24-Ma0013879		X																
147	WM03-QC3	Feb 29, 2024		Soil	L24-Ma0013880		X																
148	Sample 1	Feb 29, 2024		Water	L24-Ma0013881						X												
149	Trip Blank	Feb 29, 2024		Soil	L24-Ma0013882												X						
						9	2	3	9	9	1	9	9	9	121	9	1	12	12	9	3	9	3

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Perth Laboratory - NATA # 2377 Site # 2370	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																		
Test Counts	9	2	3	9	9	1	9	9	9	121	9	1	12	12	9	3	9	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
OCOP in Soil							
Aldrin	mg/kg	< 0.01			0.01	Pass	
alpha-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
beta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
delta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
Bifenthrin	mg/kg	< 0.2			0.2	Pass	
Bromophos Ethyl	mg/kg	< 0.05			0.05	Pass	
Chlordane	mg/kg	< 0.01			0.01	Pass	
Chlorpyrifos	mg/kg	< 0.02			0.02	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
p.p-DDD	mg/kg	< 0.01			0.01	Pass	
p.p-DDE	mg/kg	< 0.01			0.01	Pass	
p.p-DDT	mg/kg	< 0.01			0.01	Pass	
o.p-DDT	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan Sulfate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor Epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene (HCB)	mg/kg	< 0.01			0.01	Pass	
Lindane	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Oxychlordane	mg/kg	< 0.01			0.01	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.05			0.05	Pass	
Fenitrothion	mg/kg	< 0.1			0.1	Pass	
Malathion	mg/kg	< 0.1			0.1	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Trifluralin	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Chromium (VI)	mg/kg	< 1			1	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Total Kjeldahl Nitrogen	mg/kg	< 10			10	Pass	
Phosphorus	mg/kg	< 1			1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 1			1	Pass	
Lead	mg/kg	< 1			1	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.02			0.02	Pass	
Nickel	mg/kg	< 1			1	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	105			70-130	Pass	
TRH C10-C14	%	97			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	100			70-130	Pass	
Toluene	%	108			70-130	Pass	
Ethylbenzene	%	104			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	
o-Xylene	%	101			70-130	Pass	
Xylenes - Total*	%	104			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	105			70-130	Pass	
TRH C6-C10	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	110			70-130	Pass	
LCS - % Recovery							
OCOP in Soil							
Aldrin	%	85			60-120	Pass	
Dieldrin	%	107			60-120	Pass	
p.p-DDT	%	117			60-120	Pass	
Endrin	%	86			60-120	Pass	
Heptachlor	%	83			60-120	Pass	
Lindane	%	99			60-120	Pass	
LCS - % Recovery							
Phosphorus	%	105			80-120	Pass	
LCS - % Recovery							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals									
Arsenic			%	114			80-120	Pass	
Beryllium			%	88			80-120	Pass	
Boron			%	87			80-120	Pass	
Cadmium			%	92			80-120	Pass	
Cobalt			%	90			80-120	Pass	
Copper			%	94			80-120	Pass	
Lead			%	89			80-120	Pass	
Manganese			%	88			80-120	Pass	
Mercury			%	94			80-120	Pass	
Nickel			%	89			80-120	Pass	
Selenium			%	96			80-120	Pass	
Zinc			%	88			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L24-Ma0017035	NCP	%	107			70-130	Pass	
TRH C10-C14	L24-Ma0012765	NCP	%	114			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L24-Ma0017035	NCP	%	102			70-130	Pass	
Toluene	L24-Ma0017035	NCP	%	99			70-130	Pass	
Ethylbenzene	L24-Ma0017035	NCP	%	107			70-130	Pass	
m&p-Xylenes	L24-Ma0017035	NCP	%	103			70-130	Pass	
o-Xylene	L24-Ma0017035	NCP	%	109			70-130	Pass	
Xylenes - Total*	L24-Ma0017035	NCP	%	105			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L24-Ma0017035	NCP	%	104			70-130	Pass	
TRH C6-C10	L24-Ma0017035	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L24-Ma0012765	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Beryllium	L24-Ma0013735	CP	%	85			75-125	Pass	
Boron	L24-Ma0013735	CP	%	79			75-125	Pass	
Cadmium	L24-Ma0013735	CP	%	89			75-125	Pass	
Cobalt	L24-Ma0013735	CP	%	90			75-125	Pass	
Copper	L24-Ma0013735	CP	%	89			75-125	Pass	
Lead	L24-Ma0013735	CP	%	90			75-125	Pass	
Manganese	L24-Ma0013735	CP	%	89			75-125	Pass	
Mercury	L24-Ma0013735	CP	%	91			75-125	Pass	
Nickel	L24-Ma0013735	CP	%	88			75-125	Pass	
Zinc	L24-Ma0013735	CP	%	89			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0017034	NCP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0017034	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0017034	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0017034	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0017034	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0017034	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0013729	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0013729	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0013729	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Diazinon	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0013729	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0013729	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0013729	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0013729	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Kjeldahl Nitrogen	L24-Ma0013729	CP	mg/kg	370	430	14	20%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Selenium	L24-Ma0015257	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0013733	CP	%	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphorus	L24-Ma0013734	CP	mg/kg	45	43	4.6	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0013734	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0013734	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0013734	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0013734	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Lead	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	L24-Ma0013734	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Zinc	L24-Ma0013734	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	L24-Ma0013737	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0013737	CP	mg/kg	180	220	19	30%	Pass	
TRH C29-C36	L24-Ma0013737	CP	mg/kg	190	200	7.9	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0013737	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0013737	CP	mg/kg	310	350	12	30%	Pass	
TRH >C34-C40	L24-Ma0013737	CP	mg/kg	100	120	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0013738	CP	mg/kg	43	44	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0013738	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0013738	CP	mg/kg	3.1	3.4	8.2	20%	Pass	
Nitrite-N	L24-Ma0013738	CP	mg/kg	3.1	3.4	8.2	20%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013753	CP	pH Units	5.2	5.1	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013753	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013763	CP	pH Units	5.9	5.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013763	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013773	CP	pH Units	6.3	6.3	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013773	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013783	CP	pH Units	6.3	6.2	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013783	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013793	CP	pH Units	5.4	5.4	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013793	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013803	CP	pH Units	7.2	7.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013803	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013813	CP	pH Units	5.8	5.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013813	CP	comment	4.0	4.0	pass	30%	Pass	

Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013823	CP	pH Units	4.5	4.4	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013823	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013833	CP	pH Units	5.2	5.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013833	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013843	CP	pH Units	5.2	5.2	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013843	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013855	CP	pH Units	7.2	7.1	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013855	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013865	CP	pH Units	5.6	5.6	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013865	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0013875	CP	pH Units	5.6	5.9	pass	20%	Pass	
Reaction Ratings*	L24-Ma0013875	CP	comment	4.0	4.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q05	The matrix spike concentration is less than five times the background concentration in the sample - therefore the spike recovery cannot be determined
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Elden Garrett	Analytical Services Manager
Douglas Todd	Senior Analyst-Metal
Douglas Todd	Senior Analyst-Sample Properties
John Horwood	Senior Analyst-Volatile
Kim Rodgers	Senior Analyst-Sample Properties
Lauren Killin	Senior Analyst-Inorganic
Patrick Patfield	Senior Analyst-Organic
Patrick Patfield	Senior Analyst-Volatile
Paul Nottle	Senior Analyst-Organic
Rhys Thomas	Senior Analyst-Asbestos
Sam Becker	Senior Analyst-Inorganic
Sean Sangster	Senior Analyst-Metal



Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
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Perth
WA 6000

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Brenton Petracca**

Report **1080155-S**
Project name BEENUP WIND FARM
Received Date Mar 19, 2024

Client Sample ID			**TP01 - 0.0**	**TP01 - 0.25**	**TP01 - 0.75**	**TP01 - 1.0**
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049669**	**L24-Ma0049670**	**L24-Ma0049672**	**L24-Ma0049673**
Date Sampled			**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	67	-	-	< 20
TRH C15-C28	50	mg/kg	870	-	-	< 50
TRH C29-C36	50	mg/kg	1000	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	1937	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	103	-	-	112
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	150	-	-	< 50
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	150	-	-	< 50
TRH >C16-C34	100	mg/kg	1600	-	-	< 100
TRH >C34-C40	100	mg/kg	380	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	2130	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	< 0.05
Chlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	-	-	< 0.01

Client Sample ID			TP01 - 0.0	TP01 - 0.25	TP01 - 0.75	TP01 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049669	L24-Ma0049670	L24-Ma0049672	L24-Ma0049673
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
p.p-DDE	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	< 0.01
Lindane	0.01	mg/kg	< 0.01	-	-	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	-	-	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.05	mg/kg	< 0.05	-	-	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	-	-	< 0.1
Malathion	0.1	mg/kg	< 0.1	-	-	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	-	-	< 0.2
Ammonia-N	10	mg/kg	50	-	-	35
Chromium (VI)	1	mg/kg	< 1	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	3.6	-	-	< 1
Nitrate-N	1	mg/kg	< 1	-	-	< 1
Nitrite-N	1	mg/kg	< 1	-	-	< 1
NOx-N	1	mg/kg	< 1	-	-	< 1
Total Kjeldahl Nitrogen	10	mg/kg	3200	-	-	200
Total Nitrogen	10	mg/kg	3200	-	-	200
Phosphorus	1	mg/kg	34	-	-	1.7
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	< 2
Beryllium	2	mg/kg	< 2	-	-	< 2
Boron	10	mg/kg	< 10	-	-	< 10
Cadmium	0.1	mg/kg	< 0.1	-	-	< 0.1
Cobalt	5	mg/kg	< 5	-	-	< 5
Copper	1	mg/kg	2.4	-	-	< 1
Lead	1	mg/kg	1.3	-	-	< 1
Manganese	5	mg/kg	< 5	-	-	< 5
Mercury	0.02	mg/kg	< 0.02	-	-	< 0.02
Nickel	1	mg/kg	< 1	-	-	< 1
Selenium	2	mg/kg	< 2	-	-	< 2
Zinc	5	mg/kg	< 5	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.6	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.2	3.7	3.8
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	2.2	-	-	1.4

Client Sample ID			TP01 - 1.25	TP01 - 1.50	TP01 - 1.75	TP01 - 2.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049674	L24-Ma0049675	L24-Ma0049676	L24-Ma0049677
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.5	4.7	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.8	3.6	3.5
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			TP02 - 0.0	TP02 - 0.25	TP02 - 0.50	TP02 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049678	L24-Ma0049679	L24-Ma0049680	L24-Ma0049681
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	< 50	-	-	-
TRH C29-C36	50	mg/kg	76	-	-	-
TRH C10-C36 (Total)	50	mg/kg	76	-	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	-
Toluene	0.1	mg/kg	< 0.1	-	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	-
o-Xylene	0.1	mg/kg	< 0.1	-	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	98	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	-
TRH C6-C10	20	mg/kg	< 20	-	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	< 100	-	-	-
TRH >C34-C40	100	mg/kg	< 100	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
Bifenthrin	0.2	mg/kg	< 0.2	-	-	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	-
Chlordane	0.01	mg/kg	< 0.01	-	-	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
p.p-DDD	0.01	mg/kg	< 0.01	-	-	-
p.p-DDE	0.01	mg/kg	< 0.01	-	-	-

Client Sample ID			TP02 - 0.0	TP02 - 0.25	TP02 - 0.50	TP02 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049678	L24-Ma0049679	L24-Ma0049680	L24-Ma0049681
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
p.p-DDT	0.01	mg/kg	< 0.01	-	-	-
o.p-DDT	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	-
Lindane	0.01	mg/kg	< 0.01	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Oxychlordane	0.01	mg/kg	< 0.01	-	-	-
Diazinon	0.2	mg/kg	< 0.2	-	-	-
Ethion	0.05	mg/kg	< 0.05	-	-	-
Fenitrothion	0.1	mg/kg	< 0.1	-	-	-
Malathion	0.1	mg/kg	< 0.1	-	-	-
Trifluralin	0.2	mg/kg	< 0.2	-	-	-
Ammonia-N	10	mg/kg	41	-	-	-
Chromium (VI)	1	mg/kg	< 1	-	-	-
Filterable Reactive Phosphorus	1	mg/kg	6.5	-	-	-
Nitrate-N	1	mg/kg	4.8	-	-	-
Nitrite-N	1	mg/kg	< 1	-	-	-
NOx-N	1	mg/kg	5.0	-	-	-
Total Kjeldahl Nitrogen	10	mg/kg	1700	-	-	-
Total Nitrogen	10	mg/kg	1700	-	-	-
Phosphorus	1	mg/kg	32	-	-	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	-
Beryllium	2	mg/kg	< 2	-	-	-
Boron	10	mg/kg	< 10	-	-	-
Cadmium	0.1	mg/kg	< 0.1	-	-	-
Cobalt	5	mg/kg	< 5	-	-	-
Copper	1	mg/kg	< 1	-	-	-
Lead	1	mg/kg	1.2	-	-	-
Manganese	5	mg/kg	< 5	-	-	-
Mercury	0.02	mg/kg	< 0.02	-	-	-
Nickel	1	mg/kg	< 1	-	-	-
Selenium	2	mg/kg	< 2	-	-	-
Zinc	5	mg/kg	< 5	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.8	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.9	3.9	3.9
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	1.7	-	-	-

Client Sample ID			TP02 - 0.0	TP02 - 0.25	TP02 - 0.50	TP02 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049678	L24-Ma0049679	L24-Ma0049680	L24-Ma0049681
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	-	-	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	-	-	-
13C4-PFBA (surr.)	1	%	62	-	-	-
13C5-PFPeA (surr.)	1	%	102	-	-	-
13C5-PFHxA (surr.)	1	%	113	-	-	-
13C4-PFHpA (surr.)	1	%	108	-	-	-
13C8-PFOA (surr.)	1	%	150	-	-	-
13C5-PFNA (surr.)	1	%	143	-	-	-
13C6-PFDA (surr.)	1	%	125	-	-	-
13C2-PFUnDA (surr.)	1	%	125	-	-	-
13C2-PFDoDA (surr.)	1	%	150	-	-	-
13C2-PFTeDA (surr.)	1	%	147	-	-	-
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	-	-	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	-	-	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	-	-	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	-	-	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	-	-	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	-	-	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	-	-	-
13C8-FOSA (surr.)	1	%	108	-	-	-
D3-N-MeFOSA (surr.)	1	%	136	-	-	-
D5-N-EtFOSA (surr.)	1	%	158	-	-	-
D7-N-MeFOSE (surr.)	1	%	110	-	-	-
D9-N-EtFOSE (surr.)	1	%	119	-	-	-
D5-N-EtFOSAA (surr.)	1	%	137	-	-	-
D3-N-MeFOSAA (surr.)	1	%	127	-	-	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
13C2-4:2 FTSA (surr.)	1	%	112	-	-	-
13C2-6:2 FTSA (surr.)	1	%	140	-	-	-

Client Sample ID			TP02 - 0.0	TP02 - 0.25	TP02 - 0.50	TP02 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049678	L24-Ma0049679	L24-Ma0049680	L24-Ma0049681
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
13C2-8:2 FTSA (surr.)	1	%	198	-	-	-
13C2-10:2 FTSA (surr.)	1	%	INT	-	-	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	< 5	-	-	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	< 5	-	-	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	-	-	-
13C3-PFBS (surr.)	1	%	104	-	-	-
18O2-PFHxS (surr.)	1	%	128	-	-	-
13C8-PFOS (surr.)	1	%	136	-	-	-
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	-
Sum of PFASs (n=30)*	50	ug/kg	< 50	-	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	-	-	-

Client Sample ID			TP02 - 1.0	TP03 - 0.0	TP03 - 0.25	TP03 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049682	L24-Ma0049683	L24-Ma0049684	L24-Ma0049687
Date Sampled			Mar 14, 2024	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	-	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	-	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	66	114	-	103
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	< 20

Client Sample ID			TP02 - 1.0	TP03 - 0.0	TP03 - 0.25	TP03 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049682	L24-Ma0049683	L24-Ma0049684	L24-Ma0049687
Date Sampled			Mar 14, 2024	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	-	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	-	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
Ammonia-N	10	mg/kg	38	41	-	35
Chromium (VI)	1	mg/kg	< 1	< 1	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1	15	-	< 1
Nitrate-N	1	mg/kg	2.9	2.3	-	< 1
Nitrite-N	1	mg/kg	< 1	< 1	-	< 1
NOx-N	1	mg/kg	3.0	2.4	-	< 1
Total Kjeldahl Nitrogen	10	mg/kg	620	1100	-	180
Total Nitrogen	10	mg/kg	620	1100	-	180
Phosphorus	1	mg/kg	8.5	1300	-	5.1
Heavy Metals						
Arsenic	2	mg/kg	< 2	2.4	-	< 2
Beryllium	2	mg/kg	< 2	< 2	-	< 2
Boron	10	mg/kg	< 10	< 10	-	< 10
Cadmium	0.1	mg/kg	< 0.1	0.8	-	< 0.1
Cobalt	5	mg/kg	< 5	< 5	-	< 5

Client Sample ID			TP02 - 1.0	TP03 - 0.0	TP03 - 0.25	TP03 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049682	L24-Ma0049683	L24-Ma0049684	L24-Ma0049687
Date Sampled			Mar 14, 2024	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Heavy Metals						
Copper	1	mg/kg	< 1	12	-	< 1
Lead	1	mg/kg	1.7	4.2	-	< 1
Manganese	5	mg/kg	< 5	14	-	< 5
Mercury	0.02	mg/kg	< 0.02	0.03	-	< 0.02
Nickel	1	mg/kg	< 1	< 1	-	< 1
Selenium	2	mg/kg	< 2	< 2	-	< 2
Zinc	5	mg/kg	< 5	15	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	6.4	6.5	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	5.1	5.1	3.5
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	9.2	1.1	-	1.1

Client Sample ID			TP04 - 0.0	TP04 - 0.50	TP04 - 1.0	TP04 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049688	L24-Ma0049689	L24-Ma0049690	L24-Ma0049691
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
TRH C10-C14	20	mg/kg	< 20	-	< 20	-
TRH C15-C28	50	mg/kg	280	-	< 50	-
TRH C29-C36	50	mg/kg	380	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	660	-	< 50	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	< 0.3	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	105	-	122	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	< 50	-
TRH >C16-C34	100	mg/kg	550	-	< 100	-
TRH >C34-C40	100	mg/kg	160	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	710	-	< 100	-

Client Sample ID			TP04 - 0.0	TP04 - 0.50	TP04 - 1.0	TP04 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049688	L24-Ma0049689	L24-Ma0049690	L24-Ma0049691
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
Bifenthrin	0.2	mg/kg	< 0.2	-	< 0.2	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	< 0.05	-
Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	< 0.02	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
o.p-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	< 0.01	-
Lindane	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Oxychlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.05	mg/kg	< 0.05	-	< 0.05	-
Fenitrothion	0.1	mg/kg	< 0.1	-	< 0.1	-
Malathion	0.1	mg/kg	< 0.1	-	< 0.1	-
Trifluralin	0.2	mg/kg	< 0.2	-	< 0.2	-
Ammonia-N	10	mg/kg	49	-	35	-
Chromium (VI)	1	mg/kg	< 1	-	< 1	-
Filterable Reactive Phosphorus	1	mg/kg	1.7	-	< 1	-
Nitrate-N	1	mg/kg	3.3	-	< 1	-
Nitrite-N	1	mg/kg	< 1	-	< 1	-
NOx-N	1	mg/kg	3.9	-	< 1	-
Total Kjeldahl Nitrogen	10	mg/kg	3000	-	80	-
Total Nitrogen	10	mg/kg	3000	-	80	-
Phosphorus	1	mg/kg	170	-	2.8	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	< 2	-
Beryllium	2	mg/kg	< 2	-	< 2	-
Boron	10	mg/kg	< 10	-	< 10	-
Cadmium	0.1	mg/kg	0.1	-	< 0.1	-
Cobalt	5	mg/kg	< 5	-	< 5	-
Copper	1	mg/kg	7.8	-	< 1	-
Lead	1	mg/kg	2.4	-	< 1	-
Manganese	5	mg/kg	27	-	< 5	-
Mercury	0.02	mg/kg	< 0.02	-	< 0.02	-
Nickel	1	mg/kg	< 1	-	< 1	-

Client Sample ID			TP04 - 0.0	TP04 - 0.50	TP04 - 1.0	TP04 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049688	L24-Ma0049689	L24-Ma0049690	L24-Ma0049691
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Heavy Metals						
Selenium	2	mg/kg	< 2	-	< 2	-
Zinc	5	mg/kg	32	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	6.1	6.1	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.9	4.2	4.6
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	1.6	-	< 1	-
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	-	-	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	-	-	-
13C4-PFBA (surr.)	1	%	51	-	-	-
13C5-PFPeA (surr.)	1	%	95	-	-	-
13C5-PFHxA (surr.)	1	%	101	-	-	-
13C4-PFHpA (surr.)	1	%	95	-	-	-
13C8-PFOA (surr.)	1	%	120	-	-	-
13C5-PFNA (surr.)	1	%	104	-	-	-
13C6-PFDA (surr.)	1	%	102	-	-	-
13C2-PFUnDA (surr.)	1	%	47	-	-	-
13C2-PFDoDA (surr.)	1	%	66	-	-	-
13C2-PFTeDA (surr.)	1	%	80	-	-	-
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	-	-	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	-	-	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	-	-	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	-	-	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	-	-	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	-	-	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	-	-	-
13C8-FOSA (surr.)	1	%	63	-	-	-
D3-N-MeFOSA (surr.)	1	%	93	-	-	-
D5-N-EtFOSA (surr.)	1	%	113	-	-	-
D7-N-MeFOSE (surr.)	1	%	97	-	-	-
D9-N-EtFOSE (surr.)	1	%	100	-	-	-
D5-N-EtFOSAA (surr.)	1	%	72	-	-	-
D3-N-MeFOSAA (surr.)	1	%	76	-	-	-

Client Sample ID			TP04 - 0.0	TP04 - 0.50	TP04 - 1.0	TP04 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049688	L24-Ma0049689	L24-Ma0049690	L24-Ma0049691
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
13C2-4:2 FTSA (surr.)	1	%	105	-	-	-
13C2-6:2 FTSA (surr.)	1	%	86	-	-	-
13C2-8:2 FTSA (surr.)	1	%	122	-	-	-
13C2-10:2 FTSA (surr.)	1	%	67	-	-	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	< 5	-	-	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	< 5	-	-	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	-	-	-
13C3-PFBS (surr.)	1	%	103	-	-	-
18O2-PFHxS (surr.)	1	%	110	-	-	-
13C8-PFOS (surr.)	1	%	111	-	-	-
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	-
Sum of PFASs (n=30)*	50	ug/kg	< 50	-	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	-	-	-

Client Sample ID			TP04 - 1.75	TP05 - 0.0	TP05 - 0.25	TP05 - 0.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049692	L24-Ma0049693	L24-Ma0049694	L24-Ma0049695
Date Sampled			Not Provided[I12]	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	-	-
TRH C10-C14	20	mg/kg	-	< 20	-	-
TRH C15-C28	50	mg/kg	-	< 50	-	-
TRH C29-C36	50	mg/kg	-	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-	-
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-	-

Client Sample ID			TP04 - 1.75	TP05 - 0.0	TP05 - 0.25	TP05 - 0.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049692	L24-Ma0049693	L24-Ma0049694	L24-Ma0049695
Date Sampled			Not Provided[I12]	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	111	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	-	-
TRH C6-C10	20	mg/kg	-	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	< 50	-	-
TRH >C16-C34	100	mg/kg	-	< 100	-	-
TRH >C34-C40	100	mg/kg	-	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	-	< 0.01	-	-
alpha-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
beta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
delta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
Bifenthrin	0.2	mg/kg	-	< 0.2	-	-
Bromophos Ethyl	0.05	mg/kg	-	< 0.05	-	-
Chlordane	0.01	mg/kg	-	< 0.01	-	-
Chlorpyrifos	0.02	mg/kg	-	< 0.02	-	-
Dieldrin	0.01	mg/kg	-	< 0.01	-	-
p.p-DDD	0.01	mg/kg	-	< 0.01	-	-
p.p-DDE	0.01	mg/kg	-	< 0.01	-	-
p.p-DDT	0.01	mg/kg	-	< 0.01	-	-
o.p-DDT	0.01	mg/kg	-	< 0.01	-	-
Endosulfan I	0.01	mg/kg	-	< 0.01	-	-
Endosulfan II	0.01	mg/kg	-	< 0.01	-	-
Endosulfan Sulfate	0.01	mg/kg	-	< 0.01	-	-
Endrin	0.01	mg/kg	-	< 0.01	-	-
Heptachlor	0.01	mg/kg	-	< 0.01	-	-
Heptachlor Epoxide	0.01	mg/kg	-	< 0.01	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	-	< 0.01	-	-
Lindane	0.01	mg/kg	-	< 0.01	-	-
Methoxychlor	0.2	mg/kg	-	< 0.2	-	-
Oxychlordane	0.01	mg/kg	-	< 0.01	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Ethion	0.05	mg/kg	-	< 0.05	-	-
Fenitrothion	0.1	mg/kg	-	< 0.1	-	-
Malathion	0.1	mg/kg	-	< 0.1	-	-
Trifluralin	0.2	mg/kg	-	< 0.2	-	-
Ammonia-N	10	mg/kg	-	36	-	-
Chromium (VI)	1	mg/kg	-	< 1	-	-
Filterable Reactive Phosphorus	1	mg/kg	-	< 1	-	-
Nitrate-N	1	mg/kg	-	4.7	-	-
Nitrite-N	1	mg/kg	-	< 1	-	-
NOx-N	1	mg/kg	-	4.9	-	-
Total Kjeldahl Nitrogen	10	mg/kg	-	540	-	-

Client Sample ID			TP04 - 1.75	TP05 - 0.0	TP05 - 0.25	TP05 - 0.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049692	L24-Ma0049693	L24-Ma0049694	L24-Ma0049695
Date Sampled			Not Provided[I12]	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Nitrogen	10	mg/kg	-	540	-	-
Phosphorus	1	mg/kg	-	45	-	-
Heavy Metals						
Arsenic	2	mg/kg	-	2.4	-	-
Beryllium	2	mg/kg	-	< 2	-	-
Boron	10	mg/kg	-	< 10	-	-
Cadmium	0.1	mg/kg	-	< 0.1	-	-
Cobalt	5	mg/kg	-	< 5	-	-
Copper	1	mg/kg	-	1.6	-	-
Lead	1	mg/kg	-	1.2	-	-
Manganese	5	mg/kg	-	< 5	-	-
Mercury	0.02	mg/kg	-	< 0.02	-	-
Nickel	1	mg/kg	-	< 1	-	-
Selenium	2	mg/kg	-	< 2	-	-
Zinc	5	mg/kg	-	< 5	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.6	6.0	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	2.7	3.1	3.9
Reaction Ratings*[S05]	0	comment	2.0	3.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	1.5	-	-

Client Sample ID			TP06 - 0.0	TP06 - 0.25	TP06 - 0.50	TP07 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049696	L24-Ma0049697	L24-Ma0049698	L24-Ma0049699
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	98	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	98	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	104	-	-	64
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	< 50
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 20

Client Sample ID			TP06 - 0.0	TP06 - 0.25	TP06 - 0.50	TP07 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049696	L24-Ma0049697	L24-Ma0049698	L24-Ma0049699
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	120	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	120	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	< 0.05
Chlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	< 0.01
Lindane	0.01	mg/kg	< 0.01	-	-	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	-	-	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.05	mg/kg	< 0.05	-	-	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	-	-	< 0.1
Malathion	0.1	mg/kg	< 0.1	-	-	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	-	-	< 0.2
Ammonia-N	10	mg/kg	46	-	-	37
Chromium (VI)	1	mg/kg	< 1	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	2.1	-	-	3.3
Nitrate-N	1	mg/kg	< 1	-	-	< 1
Nitrite-N	1	mg/kg	< 1	-	-	< 1
NOx-N	1	mg/kg	< 1	-	-	< 1
Total Kjeldahl Nitrogen	10	mg/kg	2500	-	-	2200
Total Nitrogen	10	mg/kg	2500	-	-	2200
Phosphorus	1	mg/kg	29	-	-	36
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	< 2
Beryllium	2	mg/kg	< 2	-	-	< 2
Boron	10	mg/kg	< 10	-	-	< 10
Cadmium	0.1	mg/kg	< 0.1	-	-	< 0.1
Cobalt	5	mg/kg	< 5	-	-	< 5

Client Sample ID			TP06 - 0.0	TP06 - 0.25	TP06 - 0.50	TP07 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049696	L24-Ma0049697	L24-Ma0049698	L24-Ma0049699
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Copper	1	mg/kg	< 1	-	-	1.7
Lead	1	mg/kg	< 1	-	-	< 1
Manganese	5	mg/kg	< 5	-	-	< 5
Mercury	0.02	mg/kg	< 0.02	-	-	< 0.02
Nickel	1	mg/kg	< 1	-	-	< 1
Selenium	2	mg/kg	< 2	-	-	< 2
Zinc	5	mg/kg	< 5	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.9	4.9	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.1	4.4	5.0
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	3.2	-	-	5.5
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	-	-	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	-	-	-
13C4-PFBA (surr.)	1	%	81	-	-	-
13C5-PFPeA (surr.)	1	%	67	-	-	-
13C5-PFHxA (surr.)	1	%	75	-	-	-
13C4-PFHpA (surr.)	1	%	69	-	-	-
13C8-PFOA (surr.)	1	%	90	-	-	-
13C5-PFNA (surr.)	1	%	106	-	-	-
13C6-PFDA (surr.)	1	%	78	-	-	-
13C2-PFUnDA (surr.)	1	%	83	-	-	-
13C2-PFDoDA (surr.)	1	%	114	-	-	-
13C2-PFTeDA (surr.)	1	%	103	-	-	-
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	-	-	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	-	-	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	-	-	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	-	-	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	-	-	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	-	-	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	-	-	-
13C8-FOSA (surr.)	1	%	86	-	-	-
D3-N-MeFOSA (surr.)	1	%	109	-	-	-

Client Sample ID			TP06 - 0.0	TP06 - 0.25	TP06 - 0.50	TP07 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049696	L24-Ma0049697	L24-Ma0049698	L24-Ma0049699
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	120	-	-	-
D7-N-MeFOSE (surr.)	1	%	83	-	-	-
D9-N-EtFOSE (surr.)	1	%	89	-	-	-
D5-N-EtFOSAA (surr.)	1	%	90	-	-	-
D3-N-MeFOSAA (surr.)	1	%	82	-	-	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
13C2-4:2 FTSA (surr.)	1	%	91	-	-	-
13C2-6:2 FTSA (surr.)	1	%	104	-	-	-
13C2-8:2 FTSA (surr.)	1	%	118	-	-	-
13C2-10:2 FTSA (surr.)	1	%	156	-	-	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	< 5	-	-	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	< 5	-	-	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	-	-	-
13C3-PFBS (surr.)	1	%	74	-	-	-
18O2-PFHxS (surr.)	1	%	84	-	-	-
13C8-PFOS (surr.)	1	%	84	-	-	-
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	-
Sum of PFASs (n=30)*	50	ug/kg	< 50	-	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	-	-	-

Client Sample ID			TP07 - 0.25	TP07 - 0.50	TP07 - 0.75	TP07 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049700	L24-Ma0049701	L24-Ma0049702	L24-Ma0049703
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	-	< 50

Client Sample ID			TP07 - 0.25	TP07 - 0.50	TP07 - 0.75	TP07 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049700	L24-Ma0049701	L24-Ma0049702	L24-Ma0049703
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	-	114
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	-	< 50
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
Bifenthrin	0.2	mg/kg	-	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	-	-	< 0.05
Chlordane	0.01	mg/kg	-	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	-	-	-	< 0.02
Dieldrin	0.01	mg/kg	-	-	-	< 0.01
p.p-DDD	0.01	mg/kg	-	-	-	< 0.01
p.p-DDE	0.01	mg/kg	-	-	-	< 0.01
p.p-DDT	0.01	mg/kg	-	-	-	< 0.01
o.p-DDT	0.01	mg/kg	-	-	-	< 0.01
Endosulfan I	0.01	mg/kg	-	-	-	< 0.01
Endosulfan II	0.01	mg/kg	-	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	-	-	< 0.01
Endrin	0.01	mg/kg	-	-	-	< 0.01
Heptachlor	0.01	mg/kg	-	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	-	< 0.01
Lindane	0.01	mg/kg	-	-	-	< 0.01
Methoxychlor	0.2	mg/kg	-	-	-	< 0.2
Oxychlordane	0.01	mg/kg	-	-	-	< 0.01
Diazinon	0.2	mg/kg	-	-	-	< 0.2
Ethion	0.05	mg/kg	-	-	-	< 0.05
Fenitrothion	0.1	mg/kg	-	-	-	< 0.1
Malathion	0.1	mg/kg	-	-	-	< 0.1
Trifluralin	0.2	mg/kg	-	-	-	< 0.2

Client Sample ID			TP07 - 0.25	TP07 - 0.50	TP07 - 0.75	TP07 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049700	L24-Ma0049701	L24-Ma0049702	L24-Ma0049703
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Ammonia-N	10	mg/kg	-	-	-	37
Chromium (VI)	1	mg/kg	-	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	-	-	< 1
Nitrate-N	1	mg/kg	-	-	-	1.4
Nitrite-N	1	mg/kg	-	-	-	< 1
NOx-N	1	mg/kg	-	-	-	1.5
Total Kjeldahl Nitrogen	10	mg/kg	-	-	-	88
Total Nitrogen	10	mg/kg	-	-	-	90
Phosphorus	1	mg/kg	-	-	-	2.7
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	< 2
Beryllium	2	mg/kg	-	-	-	< 2
Boron	10	mg/kg	-	-	-	< 10
Cadmium	0.1	mg/kg	-	-	-	< 0.1
Cobalt	5	mg/kg	-	-	-	< 5
Copper	1	mg/kg	-	-	-	< 1
Lead	1	mg/kg	-	-	-	< 1
Manganese	5	mg/kg	-	-	-	< 5
Mercury	0.02	mg/kg	-	-	-	< 0.02
Nickel	1	mg/kg	-	-	-	< 1
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.2	6.3	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.1	5.2	5.4	5.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	-	7.9

Client Sample ID			TP07 - 1.25	TP07 - 1.50	TP08 - 0.0	TP08 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049704	L24-Ma0049705	L24-Ma0049706	L24-Ma0049707
Date Sampled			Mar 14, 2024	Mar 14, 2024	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	-
TRH C10-C14	20	mg/kg	-	-	< 20	-
TRH C15-C28	50	mg/kg	-	-	59	-
TRH C29-C36	50	mg/kg	-	-	70	-
TRH C10-C36 (Total)	50	mg/kg	-	-	129	-
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	-
Toluene	0.1	mg/kg	-	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	-
o-Xylene	0.1	mg/kg	-	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3	-

Client Sample ID			TP07 - 1.25	TP07 - 1.50	TP08 - 0.0	TP08 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049704	L24-Ma0049705	L24-Ma0049706	L24-Ma0049707
Date Sampled			Mar 14, 2024	Mar 14, 2024	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	92	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	-
TRH C6-C10	20	mg/kg	-	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	-
TRH >C16-C34	100	mg/kg	-	-	110	-
TRH >C34-C40	100	mg/kg	-	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	-	-	110	-
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	< 0.01	-
alpha-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
beta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
delta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
Bifenthrin	0.2	mg/kg	-	-	< 0.2	-
Bromophos Ethyl	0.05	mg/kg	-	-	< 0.05	-
Chlordane	0.01	mg/kg	-	-	< 0.01	-
Chlorpyrifos	0.02	mg/kg	-	-	< 0.02	-
Dieldrin	0.01	mg/kg	-	-	< 0.01	-
p.p-DDD	0.01	mg/kg	-	-	< 0.01	-
p.p-DDE	0.01	mg/kg	-	-	< 0.01	-
p.p-DDT	0.01	mg/kg	-	-	< 0.01	-
o.p-DDT	0.01	mg/kg	-	-	< 0.01	-
Endosulfan I	0.01	mg/kg	-	-	< 0.01	-
Endosulfan II	0.01	mg/kg	-	-	< 0.01	-
Endosulfan Sulfate	0.01	mg/kg	-	-	< 0.01	-
Endrin	0.01	mg/kg	-	-	< 0.01	-
Heptachlor	0.01	mg/kg	-	-	< 0.01	-
Heptachlor Epoxide	0.01	mg/kg	-	-	< 0.01	-
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	< 0.01	-
Lindane	0.01	mg/kg	-	-	< 0.01	-
Methoxychlor	0.2	mg/kg	-	-	< 0.2	-
Oxychlordane	0.01	mg/kg	-	-	< 0.01	-
Diazinon	0.2	mg/kg	-	-	< 0.2	-
Ethion	0.05	mg/kg	-	-	< 0.05	-
Fenitrothion	0.1	mg/kg	-	-	< 0.1	-
Malathion	0.1	mg/kg	-	-	< 0.1	-
Trifluralin	0.2	mg/kg	-	-	< 0.2	-
Ammonia-N	10	mg/kg	-	-	50	-
Chromium (VI)	1	mg/kg	-	-	< 1	-
Filterable Reactive Phosphorus	1	mg/kg	-	-	1.2	-
Nitrate-N	1	mg/kg	-	-	1.8	-
Nitrite-N	1	mg/kg	-	-	< 1	-
NOx-N	1	mg/kg	-	-	2.2	-
Total Kjeldahl Nitrogen	10	mg/kg	-	-	910	-

Client Sample ID			TP07 - 1.25	TP07 - 1.50	TP08 - 0.0	TP08 - 0.25
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049704**	**L24-Ma0049705**	**L24-Ma0049706**	**L24-Ma0049707**
Date Sampled			**Mar 14, 2024**	**Mar 14, 2024**	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Total Nitrogen	10	mg/kg	-	-	910	-
Phosphorus	1	mg/kg	-	-	41	-
Heavy Metals						
Arsenic	2	mg/kg	-	-	< 2	-
Beryllium	2	mg/kg	-	-	< 2	-
Boron	10	mg/kg	-	-	< 10	-
Cadmium	0.1	mg/kg	-	-	< 0.1	-
Cobalt	5	mg/kg	-	-	< 5	-
Copper	1	mg/kg	-	-	< 1	-
Lead	1	mg/kg	-	-	1.1	-
Manganese	5	mg/kg	-	-	< 5	-
Mercury	0.02	mg/kg	-	-	< 0.02	-
Nickel	1	mg/kg	-	-	< 1	-
Selenium	2	mg/kg	-	-	< 2	-
Zinc	5	mg/kg	-	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.7	6.0	5.0	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.6	2.2	3.8	4.6
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	7.3	-
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	-	-	< 5	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	-	-	< 5	-
13C4-PFBA (surr.)	1	%	-	-	55	-
13C5-PFPeA (surr.)	1	%	-	-	97	-
13C5-PFHxA (surr.)	1	%	-	-	92	-
13C4-PFHpA (surr.)	1	%	-	-	104	-
13C8-PFOA (surr.)	1	%	-	-	131	-
13C5-PFNA (surr.)	1	%	-	-	117	-
13C6-PFDA (surr.)	1	%	-	-	115	-
13C2-PFUnDA (surr.)	1	%	-	-	115	-
13C2-PFDoDA (surr.)	1	%	-	-	142	-
13C2-PFTeDA (surr.)	1	%	-	-	115	-

Client Sample ID			TP07 - 1.25	TP07 - 1.50	TP08 - 0.0	TP08 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049704	L24-Ma0049705	L24-Ma0049706	L24-Ma0049707
Date Sampled			Mar 14, 2024	Mar 14, 2024	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	-	-	< 5	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	-	-	< 5	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	-	-	< 5	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	-	-	< 5	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	-	-	< 5	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	-	-	< 10	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	-	-	< 10	-
13C8-FOSA (surr.)	1	%	-	-	104	-
D3-N-MeFOSA (surr.)	1	%	-	-	124	-
D5-N-EtFOSA (surr.)	1	%	-	-	141	-
D7-N-MeFOSE (surr.)	1	%	-	-	104	-
D9-N-EtFOSE (surr.)	1	%	-	-	104	-
D5-N-EtFOSAA (surr.)	1	%	-	-	125	-
D3-N-MeFOSAA (surr.)	1	%	-	-	125	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	< 10	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
13C2-4:2 FTSA (surr.)	1	%	-	-	83	-
13C2-6:2 FTSA (surr.)	1	%	-	-	91	-
13C2-8:2 FTSA (surr.)	1	%	-	-	187	-
13C2-10:2 FTSA (surr.)	1	%	-	-	INT	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	-	-	< 5	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	-	-	< 5	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	-	-	< 5	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	-	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	-	-	< 5	-
13C3-PFBS (surr.)	1	%	-	-	95	-
18O2-PFHxS (surr.)	1	%	-	-	119	-
13C8-PFOS (surr.)	1	%	-	-	120	-
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	< 5	-
Sum of PFASs (n=30)*	50	ug/kg	-	-	< 50	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	-	-	< 10	-

Client Sample ID			TP08 - 0.50	TP08 - 0.75	TP08 - 1.0	TP08 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049708	L24-Ma0049709	L24-Ma0049710	L24-Ma0049711
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	[G02]< 40	-
TRH C10-C14	20	mg/kg	-	-	< 20	-
TRH C15-C28	50	mg/kg	-	-	< 50	-
TRH C29-C36	50	mg/kg	-	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	-	-	< 50	-
BTEX						
Benzene	0.1	mg/kg	-	-	[G02]< 0.1	-
Toluene	0.1	mg/kg	-	-	[G02]< 0.1	-
Ethylbenzene	0.1	mg/kg	-	-	[G02]< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	-	[G02]< 0.2	-
o-Xylene	0.1	mg/kg	-	-	[G02]< 0.1	-
Xylenes - Total*	0.3	mg/kg	-	-	[G02]< 0.3	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	96	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	[G02]< 1	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	-
TRH C6-C10	20	mg/kg	-	-	[G02]< 40	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 40	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	-
TRH >C16-C34	100	mg/kg	-	-	< 100	-
TRH >C34-C40	100	mg/kg	-	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	-
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	< 0.01	-
alpha-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
beta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
delta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	-
Bifenthrin	0.2	mg/kg	-	-	< 0.2	-
Bromophos Ethyl	0.05	mg/kg	-	-	< 0.05	-
Chlordane	0.01	mg/kg	-	-	< 0.01	-
Chlorpyrifos	0.02	mg/kg	-	-	< 0.02	-
Dieldrin	0.01	mg/kg	-	-	< 0.01	-
p.p-DDD	0.01	mg/kg	-	-	< 0.01	-
p.p-DDE	0.01	mg/kg	-	-	< 0.01	-
p.p-DDT	0.01	mg/kg	-	-	< 0.01	-
o.p-DDT	0.01	mg/kg	-	-	< 0.01	-
Endosulfan I	0.01	mg/kg	-	-	< 0.01	-
Endosulfan II	0.01	mg/kg	-	-	< 0.01	-
Endosulfan Sulfate	0.01	mg/kg	-	-	< 0.01	-
Endrin	0.01	mg/kg	-	-	< 0.01	-
Heptachlor	0.01	mg/kg	-	-	< 0.01	-
Heptachlor Epoxide	0.01	mg/kg	-	-	< 0.01	-
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	< 0.01	-
Lindane	0.01	mg/kg	-	-	< 0.01	-
Methoxychlor	0.2	mg/kg	-	-	< 0.2	-
Oxychlordane	0.01	mg/kg	-	-	< 0.01	-

Client Sample ID			TP08 - 0.50	TP08 - 0.75	TP08 - 1.0	TP08 - 1.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049708	L24-Ma0049709	L24-Ma0049710	L24-Ma0049711
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	-	-	< 0.2	-
Ethion	0.05	mg/kg	-	-	< 0.05	-
Fenitrothion	0.1	mg/kg	-	-	< 0.1	-
Malathion	0.1	mg/kg	-	-	< 0.1	-
Trifluralin	0.2	mg/kg	-	-	< 0.2	-
Ammonia-N	10	mg/kg	-	-	42	-
Chromium (VI)	1	mg/kg	-	-	< 1	-
Filterable Reactive Phosphorus	1	mg/kg	-	-	< 1	-
Nitrate-N	1	mg/kg	-	-	< 1	-
Nitrite-N	1	mg/kg	-	-	< 1	-
NOx-N	1	mg/kg	-	-	< 1	-
Total Kjeldahl Nitrogen	10	mg/kg	-	-	260	-
Total Nitrogen	10	mg/kg	-	-	260	-
Phosphorus	1	mg/kg	-	-	6.1	-
Heavy Metals						
Arsenic	2	mg/kg	-	-	< 2	-
Beryllium	2	mg/kg	-	-	< 2	-
Boron	10	mg/kg	-	-	< 10	-
Cadmium	0.1	mg/kg	-	-	< 0.1	-
Cobalt	5	mg/kg	-	-	< 5	-
Copper	1	mg/kg	-	-	< 1	-
Lead	1	mg/kg	-	-	< 1	-
Manganese	5	mg/kg	-	-	< 5	-
Mercury	0.02	mg/kg	-	-	< 0.02	-
Nickel	1	mg/kg	-	-	< 1	-
Selenium	2	mg/kg	-	-	< 2	-
Zinc	5	mg/kg	-	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.3	6.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.4	4.6	4.8
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	14	-

Client Sample ID			TP08 - 1.50	TP08 - 1.75	TP08 - 2.0	TP09 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049712	L24-Ma0049713	L24-Ma0049714	L24-Ma0049715
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	-	< 50

Client Sample ID			TP08 - 1.50	TP08 - 1.75	TP08 - 2.0	TP09 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049712	L24-Ma0049713	L24-Ma0049714	L24-Ma0049715
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	-	88
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	-	< 50
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
Bifenthrin	0.2	mg/kg	-	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	-	-	< 0.05
Chlordane	0.01	mg/kg	-	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	-	-	-	< 0.02
Dieldrin	0.01	mg/kg	-	-	-	< 0.01
p.p-DDD	0.01	mg/kg	-	-	-	< 0.01
p.p-DDE	0.01	mg/kg	-	-	-	< 0.01
p.p-DDT	0.01	mg/kg	-	-	-	< 0.01
o.p-DDT	0.01	mg/kg	-	-	-	< 0.01
Endosulfan I	0.01	mg/kg	-	-	-	< 0.01
Endosulfan II	0.01	mg/kg	-	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	-	-	< 0.01
Endrin	0.01	mg/kg	-	-	-	< 0.01
Heptachlor	0.01	mg/kg	-	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	-	< 0.01
Lindane	0.01	mg/kg	-	-	-	< 0.01
Methoxychlor	0.2	mg/kg	-	-	-	< 0.2
Oxychlordane	0.01	mg/kg	-	-	-	< 0.01
Diazinon	0.2	mg/kg	-	-	-	< 0.2
Ethion	0.05	mg/kg	-	-	-	< 0.05
Fenitrothion	0.1	mg/kg	-	-	-	< 0.1
Malathion	0.1	mg/kg	-	-	-	< 0.1
Trifluralin	0.2	mg/kg	-	-	-	< 0.2

Client Sample ID			TP08 - 1.50	TP08 - 1.75	TP08 - 2.0	TP09 - 0.0
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049712**	**L24-Ma0049713**	**L24-Ma0049714**	**L24-Ma0049715**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Ammonia-N	10	mg/kg	-	-	-	46
Chromium (VI)	1	mg/kg	-	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	-	-	9.5
Nitrate-N	1	mg/kg	-	-	-	7.0
Nitrite-N	1	mg/kg	-	-	-	< 1
NOx-N	1	mg/kg	-	-	-	7.1
Total Kjeldahl Nitrogen	10	mg/kg	-	-	-	2700
Total Nitrogen	10	mg/kg	-	-	-	2700
Phosphorus	1	mg/kg	-	-	-	74
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	< 2
Beryllium	2	mg/kg	-	-	-	< 2
Boron	10	mg/kg	-	-	-	< 10
Cadmium	0.1	mg/kg	-	-	-	< 0.1
Cobalt	5	mg/kg	-	-	-	< 5
Copper	1	mg/kg	-	-	-	1.9
Lead	1	mg/kg	-	-	-	< 1
Manganese	5	mg/kg	-	-	-	< 5
Mercury	0.02	mg/kg	-	-	-	< 0.02
Nickel	1	mg/kg	-	-	-	< 1
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.9	5.0	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.4	2.8	4.2
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	-	2.2

Client Sample ID			TP09 - 0.25	TP09 - 1.0	TP09 - 1.50	TP10 - 0.0
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049716**	**L24-Ma0049717**	**L24-Ma0049718**	**L24-Ma0049719**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	-	< 20
TRH C10-C14	20	mg/kg	-	< 20	-	< 20
TRH C15-C28	50	mg/kg	-	< 50	-	55
TRH C29-C36	50	mg/kg	-	< 50	-	88
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-	143
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	-	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	-	< 0.1	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-	< 0.3

Client Sample ID			TP09 - 0.25	TP09 - 1.0	TP09 - 1.50	TP10 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049716	L24-Ma0049717	L24-Ma0049718	L24-Ma0049719
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	76	-	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	-	< 50
TRH C6-C10	20	mg/kg	-	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	< 50	-	< 50
TRH >C16-C34	100	mg/kg	-	< 100	-	120
TRH >C34-C40	100	mg/kg	-	< 100	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-	120
OCOP in Soil						
Aldrin	0.01	mg/kg	-	< 0.01	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	< 0.01
Bifenthrin	0.2	mg/kg	-	< 0.2	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	< 0.05	-	< 0.05
Chlordane	0.01	mg/kg	-	< 0.01	-	< 0.01
Chlorpyrifos	0.02	mg/kg	-	< 0.02	-	< 0.02
Dieldrin	0.01	mg/kg	-	< 0.01	-	< 0.01
p.p-DDD	0.01	mg/kg	-	< 0.01	-	< 0.01
p.p-DDE	0.01	mg/kg	-	< 0.01	-	< 0.01
p.p-DDT	0.01	mg/kg	-	< 0.01	-	< 0.01
o.p-DDT	0.01	mg/kg	-	< 0.01	-	< 0.01
Endosulfan I	0.01	mg/kg	-	< 0.01	-	< 0.01
Endosulfan II	0.01	mg/kg	-	< 0.01	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	< 0.01	-	< 0.01
Endrin	0.01	mg/kg	-	< 0.01	-	< 0.01
Heptachlor	0.01	mg/kg	-	< 0.01	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	< 0.01	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	< 0.01	-	< 0.01
Lindane	0.01	mg/kg	-	< 0.01	-	< 0.01
Methoxychlor	0.2	mg/kg	-	< 0.2	-	< 0.2
Oxychlordane	0.01	mg/kg	-	< 0.01	-	< 0.01
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.05	mg/kg	-	< 0.05	-	< 0.05
Fenitrothion	0.1	mg/kg	-	< 0.1	-	< 0.1
Malathion	0.1	mg/kg	-	< 0.1	-	< 0.1
Trifluralin	0.2	mg/kg	-	< 0.2	-	< 0.2
Ammonia-N	10	mg/kg	-	41	-	44
Chromium (VI)	1	mg/kg	-	< 1	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	< 1	-	5.1
Nitrate-N	1	mg/kg	-	2.8	-	< 1
Nitrite-N	1	mg/kg	-	< 1	-	< 1
NOx-N	1	mg/kg	-	3.0	-	1.5
Total Kjeldahl Nitrogen	10	mg/kg	-	230	-	3100

Client Sample ID			TP09 - 0.25	TP09 - 1.0	TP09 - 1.50	TP10 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049716	L24-Ma0049717	L24-Ma0049718	L24-Ma0049719
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Total Nitrogen	10	mg/kg	-	230	-	3100
Phosphorus	1	mg/kg	-	4.4	-	42
Heavy Metals						
Arsenic	2	mg/kg	-	< 2	-	< 2
Beryllium	2	mg/kg	-	< 2	-	< 2
Boron	10	mg/kg	-	< 10	-	< 10
Cadmium	0.1	mg/kg	-	< 0.1	-	< 0.1
Cobalt	5	mg/kg	-	< 5	-	< 5
Copper	1	mg/kg	-	< 1	-	3.1
Lead	1	mg/kg	-	< 1	-	< 1
Manganese	5	mg/kg	-	< 5	-	< 5
Mercury	0.02	mg/kg	-	< 0.02	-	< 0.02
Nickel	1	mg/kg	-	2.6	-	< 1
Selenium	2	mg/kg	-	< 2	-	< 2
Zinc	5	mg/kg	-	< 5	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.6	6.0	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.9	5.2	4.0
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	13	-	1.7
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	-	-	-	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	-	-	-	< 5
13C4-PFBA (surr.)	1	%	-	-	-	69
13C5-PFPeA (surr.)	1	%	-	-	-	101
13C5-PFHxA (surr.)	1	%	-	-	-	94
13C4-PFHpA (surr.)	1	%	-	-	-	99
13C8-PFOA (surr.)	1	%	-	-	-	125
13C5-PFNA (surr.)	1	%	-	-	-	130
13C6-PFDA (surr.)	1	%	-	-	-	118
13C2-PFUnDA (surr.)	1	%	-	-	-	122
13C2-PFDoDA (surr.)	1	%	-	-	-	149
13C2-PFTeDA (surr.)	1	%	-	-	-	138

Client Sample ID			TP09 - 0.25	TP09 - 1.0	TP09 - 1.50	TP10 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049716	L24-Ma0049717	L24-Ma0049718	L24-Ma0049719
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	-	-	-	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	-	-	-	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	-	-	-	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	-	-	-	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	-	-	-	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	-	-	-	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	-	-	-	< 10
13C8-FOSA (surr.)	1	%	-	-	-	100
D3-N-MeFOSA (surr.)	1	%	-	-	-	124
D5-N-EtFOSA (surr.)	1	%	-	-	-	143
D7-N-MeFOSE (surr.)	1	%	-	-	-	100
D9-N-EtFOSE (surr.)	1	%	-	-	-	111
D5-N-EtFOSAA (surr.)	1	%	-	-	-	122
D3-N-MeFOSAA (surr.)	1	%	-	-	-	111
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
13C2-4:2 FTSA (surr.)	1	%	-	-	-	98
13C2-6:2 FTSA (surr.)	1	%	-	-	-	122
13C2-8:2 FTSA (surr.)	1	%	-	-	-	152
13C2-10:2 FTSA (surr.)	1	%	-	-	-	INT
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	-	-	-	< 5
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	-	-	-	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	-	-	-	< 5
13C3-PFBS (surr.)	1	%	-	-	-	99
18O2-PFHxS (surr.)	1	%	-	-	-	106
13C8-PFOS (surr.)	1	%	-	-	-	129
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	< 5
Sum of PFASs (n=30)*	50	ug/kg	-	-	-	< 50
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	-	-	-	< 10

Client Sample ID			TP10 - 1.0	TP11 - 0.0	TP11 - 0.25	TP11 - 0.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049723	L24-Ma0049724	L24-Ma0049725	L24-Ma0049726
Date Sampled			Not Provided[I12]	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	-	-
TRH C10-C14	20	mg/kg	< 20	< 20	-	-
TRH C15-C28	50	mg/kg	< 50	< 50	-	-
TRH C29-C36	50	mg/kg	< 50	66	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	66	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	97	96	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	-
TRH C6-C10	20	mg/kg	< 20	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	-	-
TRH >C16-C34	100	mg/kg	< 100	< 100	-	-
TRH >C34-C40	100	mg/kg	< 100	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	-	-
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	-	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	-	-
Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	-
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	-	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	-	-
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	-	-
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	-	-
Lindane	0.01	mg/kg	< 0.01	< 0.01	-	-
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	-	-
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	-	-

Client Sample ID			TP10 - 1.0	TP11 - 0.0	TP11 - 0.25	TP11 - 0.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049723	L24-Ma0049724	L24-Ma0049725	L24-Ma0049726
Date Sampled			Not Provided[I12]	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-	-
Ethion	0.05	mg/kg	< 0.05	< 0.05	-	-
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	-	-
Malathion	0.1	mg/kg	< 0.1	< 0.1	-	-
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	-	-
Ammonia-N	10	mg/kg	36	43	-	-
Chromium (VI)	1	mg/kg	< 1	< 1	-	-
Filterable Reactive Phosphorus	1	mg/kg	< 1	< 1	-	-
Nitrate-N	1	mg/kg	< 1	11	-	-
Nitrite-N	1	mg/kg	< 1	< 1	-	-
NOx-N	1	mg/kg	< 1	11	-	-
Total Kjeldahl Nitrogen	10	mg/kg	140	1700	-	-
Total Nitrogen	10	mg/kg	140	1700	-	-
Phosphorus	1	mg/kg	2.0	70	-	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	-	-
Beryllium	2	mg/kg	< 2	< 2	-	-
Boron	10	mg/kg	< 10	< 10	-	-
Cadmium	0.1	mg/kg	< 0.1	< 0.1	-	-
Cobalt	5	mg/kg	< 5	< 5	-	-
Copper	1	mg/kg	< 1	< 1	-	-
Lead	1	mg/kg	< 1	< 1	-	-
Manganese	5	mg/kg	< 5	< 5	-	-
Mercury	0.02	mg/kg	< 0.02	< 0.02	-	-
Nickel	1	mg/kg	< 1	< 1	-	-
Selenium	2	mg/kg	< 2	< 2	-	-
Zinc	5	mg/kg	< 5	< 5	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.9	6.1	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	3.8	4.0	3.7
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	4.5	14	-	-

Client Sample ID			TP11 - 0.75	TP11 - 1.0	TP11 - 1.25	TP11 - 1.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049727	L24-Ma0049728	L24-Ma0049729	L24-Ma0049730
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	< 20	-	-
TRH C10-C14	20	mg/kg	-	< 20	-	-
TRH C15-C28	50	mg/kg	-	< 50	-	-
TRH C29-C36	50	mg/kg	-	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-	-

Client Sample ID			TP11 - 0.75	TP11 - 1.0	TP11 - 1.25	TP11 - 1.50
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049727**	**L24-Ma0049728**	**L24-Ma0049729**	**L24-Ma0049730**
Date Sampled			**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	107	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	-	-
TRH C6-C10	20	mg/kg	-	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	< 50	-	-
TRH >C16-C34	100	mg/kg	-	< 100	-	-
TRH >C34-C40	100	mg/kg	-	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	-	< 0.01	-	-
alpha-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
beta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
delta-BHC (HCH)	0.01	mg/kg	-	< 0.01	-	-
Bifenthrin	0.2	mg/kg	-	< 0.2	-	-
Bromophos Ethyl	0.05	mg/kg	-	< 0.05	-	-
Chlordane	0.01	mg/kg	-	< 0.01	-	-
Chlorpyrifos	0.02	mg/kg	-	< 0.02	-	-
Dieldrin	0.01	mg/kg	-	< 0.01	-	-
p.p-DDD	0.01	mg/kg	-	< 0.01	-	-
p.p-DDE	0.01	mg/kg	-	< 0.01	-	-
p.p-DDT	0.01	mg/kg	-	< 0.01	-	-
o.p-DDT	0.01	mg/kg	-	< 0.01	-	-
Endosulfan I	0.01	mg/kg	-	< 0.01	-	-
Endosulfan II	0.01	mg/kg	-	< 0.01	-	-
Endosulfan Sulfate	0.01	mg/kg	-	< 0.01	-	-
Endrin	0.01	mg/kg	-	< 0.01	-	-
Heptachlor	0.01	mg/kg	-	< 0.01	-	-
Heptachlor Epoxide	0.01	mg/kg	-	< 0.01	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	-	< 0.01	-	-
Lindane	0.01	mg/kg	-	< 0.01	-	-
Methoxychlor	0.2	mg/kg	-	< 0.2	-	-
Oxychlordane	0.01	mg/kg	-	< 0.01	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Ethion	0.05	mg/kg	-	< 0.05	-	-
Fenitrothion	0.1	mg/kg	-	< 0.1	-	-
Malathion	0.1	mg/kg	-	< 0.1	-	-
Trifluralin	0.2	mg/kg	-	< 0.2	-	-

Client Sample ID			TP11 - 0.75	TP11 - 1.0	TP11 - 1.25	TP11 - 1.50
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049727	L24-Ma0049728	L24-Ma0049729	L24-Ma0049730
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Ammonia-N	10	mg/kg	-	39	-	-
Chromium (VI)	1	mg/kg	-	< 1	-	-
Filterable Reactive Phosphorus	1	mg/kg	-	< 1	-	-
Nitrate-N	1	mg/kg	-	1.8	-	-
Nitrite-N	1	mg/kg	-	< 1	-	-
NOx-N	1	mg/kg	-	1.9	-	-
Total Kjeldahl Nitrogen	10	mg/kg	-	210	-	-
Total Nitrogen	10	mg/kg	-	210	-	-
Phosphorus	1	mg/kg	-	9.6	-	-
Heavy Metals						
Arsenic	2	mg/kg	-	< 2	-	-
Beryllium	2	mg/kg	-	< 2	-	-
Boron	10	mg/kg	-	< 10	-	-
Cadmium	0.1	mg/kg	-	< 0.1	-	-
Cobalt	5	mg/kg	-	< 5	-	-
Copper	1	mg/kg	-	< 1	-	-
Lead	1	mg/kg	-	< 1	-	-
Manganese	5	mg/kg	-	< 5	-	-
Mercury	0.02	mg/kg	-	< 0.02	-	-
Nickel	1	mg/kg	-	< 1	-	-
Selenium	2	mg/kg	-	< 2	-	-
Zinc	5	mg/kg	-	< 5	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	6.6	6.2	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.1	5.2	4.3	4.3
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	11	-	-

Client Sample ID			TP11 - 1.75	TP11 - 2.0	TP12 - 0.0	TP13 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049731	L24-Ma0049732	L24-Ma0049733	L24-Ma0049734
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	< 50	68
TRH C29-C36	50	mg/kg	-	-	< 50	120
TRH C10-C36 (Total)	50	mg/kg	-	-	< 50	188
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3	< 0.3

Client Sample ID			TP11 - 1.75	TP11 - 2.0	TP12 - 0.0	TP13 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049731	L24-Ma0049732	L24-Ma0049733	L24-Ma0049734
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	98	123
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	< 50
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	< 100	150
TRH >C34-C40	100	mg/kg	-	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	150
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	-	-	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	-	< 0.05	< 0.05
Chlordane	0.01	mg/kg	-	-	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	-	-	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	-	-	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	-	-	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	-	-	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	-	-	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	-	< 0.01	< 0.01
Endrin	0.01	mg/kg	-	-	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	-	-	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	-	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	< 0.01	< 0.01
Lindane	0.01	mg/kg	-	-	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	-	-	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	-	-	< 0.01	< 0.01
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.05	mg/kg	-	-	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	-	-	< 0.1	< 0.1
Malathion	0.1	mg/kg	-	-	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	-	-	< 0.2	< 0.2
Ammonia-N	10	mg/kg	-	-	44	46
Chromium (VI)	1	mg/kg	-	-	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	-	< 1	8.2
Nitrate-N	1	mg/kg	-	-	< 1	4.2
Nitrite-N	1	mg/kg	-	-	< 1	< 1
NOx-N	1	mg/kg	-	-	< 1	4.3
Total Kjeldahl Nitrogen	10	mg/kg	-	-	2900	3700

Client Sample ID			TP11 - 1.75	TP11 - 2.0	TP12 - 0.0	TP13 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049731	L24-Ma0049732	L24-Ma0049733	L24-Ma0049734
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Nitrogen	10	mg/kg	-	-	2900	3700
Phosphorus	1	mg/kg	-	-	100	100
Heavy Metals						
Arsenic	2	mg/kg	-	-	< 2	< 2
Beryllium	2	mg/kg	-	-	< 2	< 2
Boron	10	mg/kg	-	-	< 10	< 10
Cadmium	0.1	mg/kg	-	-	< 0.1	< 0.1
Cobalt	5	mg/kg	-	-	< 5	< 5
Copper	1	mg/kg	-	-	2.1	2.4
Lead	1	mg/kg	-	-	< 1	< 1
Manganese	5	mg/kg	-	-	< 5	< 5
Mercury	0.02	mg/kg	-	-	< 0.02	< 0.02
Nickel	1	mg/kg	-	-	< 1	1.4
Selenium	2	mg/kg	-	-	< 2	< 2
Zinc	5	mg/kg	-	-	< 5	6.0
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.3	6.0	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.4	4.1	5.0
Reaction Ratings*[S05]	0	comment	2.0	4.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	1.0	5.4
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	-	-	< 5	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	-	-	< 5	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	-	-	< 5	-
13C4-PFBA (surr.)	1	%	-	-	89	-
13C5-PFPeA (surr.)	1	%	-	-	87	-
13C5-PFHxA (surr.)	1	%	-	-	86	-
13C4-PFHpA (surr.)	1	%	-	-	84	-
13C8-PFOA (surr.)	1	%	-	-	122	-
13C5-PFNA (surr.)	1	%	-	-	120	-
13C6-PFDA (surr.)	1	%	-	-	105	-
13C2-PFUnDA (surr.)	1	%	-	-	102	-
13C2-PFDoDA (surr.)	1	%	-	-	129	-
13C2-PFTeDA (surr.)	1	%	-	-	119	-

Client Sample ID			TP11 - 1.75	TP11 - 2.0	TP12 - 0.0	TP13 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049731	L24-Ma0049732	L24-Ma0049733	L24-Ma0049734
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	-	-	< 5	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	-	-	< 5	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	-	-	< 5	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	-	-	< 5	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	-	-	< 5	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	-	-	< 10	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	-	-	< 10	-
13C8-FOSA (surr.)	1	%	-	-	93	-
D3-N-MeFOSA (surr.)	1	%	-	-	124	-
D5-N-EtFOSA (surr.)	1	%	-	-	137	-
D7-N-MeFOSE (surr.)	1	%	-	-	98	-
D9-N-EtFOSE (surr.)	1	%	-	-	103	-
D5-N-EtFOSAA (surr.)	1	%	-	-	92	-
D3-N-MeFOSAA (surr.)	1	%	-	-	100	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	< 10	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	-	-	< 5	-
13C2-4:2 FTSA (surr.)	1	%	-	-	95	-
13C2-6:2 FTSA (surr.)	1	%	-	-	111	-
13C2-8:2 FTSA (surr.)	1	%	-	-	124	-
13C2-10:2 FTSA (surr.)	1	%	-	-	179	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	-	-	< 5	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	-	-	< 5	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	-	-	< 5	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	< 5	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	-	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	-	-	< 5	-
13C3-PFBS (surr.)	1	%	-	-	118	-
18O2-PFHxS (surr.)	1	%	-	-	102	-
13C8-PFOS (surr.)	1	%	-	-	111	-
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	< 5	-
Sum of PFASs (n=30)*	50	ug/kg	-	-	< 50	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	-	-	< 10	-

Client Sample ID			TP13 - 0.25	TP13 - 0.50	TP13 - 0.75	TP13 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049735	L24-Ma0049736	L24-Ma0049737	L24-Ma0049738
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	-	96
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	-	< 50
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	-	-	< 0.01
Bifenthrin	0.2	mg/kg	-	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	-	-	< 0.05
Chlordane	0.01	mg/kg	-	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	-	-	-	< 0.02
Dieldrin	0.01	mg/kg	-	-	-	< 0.01
p.p-DDD	0.01	mg/kg	-	-	-	< 0.01
p.p-DDE	0.01	mg/kg	-	-	-	< 0.01
p.p-DDT	0.01	mg/kg	-	-	-	< 0.01
o.p-DDT	0.01	mg/kg	-	-	-	< 0.01
Endosulfan I	0.01	mg/kg	-	-	-	< 0.01
Endosulfan II	0.01	mg/kg	-	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	-	-	< 0.01
Endrin	0.01	mg/kg	-	-	-	< 0.01
Heptachlor	0.01	mg/kg	-	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	-	< 0.01
Lindane	0.01	mg/kg	-	-	-	< 0.01
Methoxychlor	0.2	mg/kg	-	-	-	< 0.2
Oxychlordane	0.01	mg/kg	-	-	-	< 0.01

Client Sample ID			TP13 - 0.25	TP13 - 0.50	TP13 - 0.75	TP13 - 1.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049735	L24-Ma0049736	L24-Ma0049737	L24-Ma0049738
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	-	-	-	< 0.2
Ethion	0.05	mg/kg	-	-	-	< 0.05
Fenitrothion	0.1	mg/kg	-	-	-	< 0.1
Malathion	0.1	mg/kg	-	-	-	< 0.1
Trifluralin	0.2	mg/kg	-	-	-	< 0.2
Ammonia-N	10	mg/kg	-	-	-	37
Chromium (VI)	1	mg/kg	-	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	-	-	< 1
Nitrate-N	1	mg/kg	-	-	-	1.6
Nitrite-N	1	mg/kg	-	-	-	< 1
NOx-N	1	mg/kg	-	-	-	1.7
Total Kjeldahl Nitrogen	10	mg/kg	-	-	-	160
Total Nitrogen	10	mg/kg	-	-	-	160
Phosphorus	1	mg/kg	-	-	-	2.5
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	< 2
Beryllium	2	mg/kg	-	-	-	< 2
Boron	10	mg/kg	-	-	-	< 10
Cadmium	0.1	mg/kg	-	-	-	< 0.1
Cobalt	5	mg/kg	-	-	-	< 5
Copper	1	mg/kg	-	-	-	< 1
Lead	1	mg/kg	-	-	-	< 1
Manganese	5	mg/kg	-	-	-	< 5
Mercury	0.02	mg/kg	-	-	-	< 0.02
Nickel	1	mg/kg	-	-	-	< 1
Selenium	2	mg/kg	-	-	-	< 2
Zinc	5	mg/kg	-	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.6	4.7	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.3	4.2	4.2
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	-	6.7

Client Sample ID			TP13 - 1.25	TP13 - 1.50	TP13 - 1.75	TP13 - 2.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049739	L24-Ma0049740	L24-Ma0049741	L24-Ma0049742
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.2	3.9	3.6
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			TP14 - 0.0	TP14 - 0.25	TP15 - 0.0	TP15 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049743	L24-Ma0049744	L24-Ma0049745	L24-Ma0049746
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
TRH C10-C14	20	mg/kg	< 20	-	< 20	-
TRH C15-C28	50	mg/kg	61	-	< 50	-
TRH C29-C36	50	mg/kg	78	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	139	-	< 50	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	< 0.3	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	96	-	92	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	< 50	-
TRH >C16-C34	100	mg/kg	110	-	< 100	-
TRH >C34-C40	100	mg/kg	< 100	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	110	-	< 100	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	< 0.01	-
Bifenthrin	0.2	mg/kg	< 0.2	-	< 0.2	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	< 0.05	-
Chlordane	0.01	mg/kg	< 0.01	-	< 0.01	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	< 0.02	-
Dieldrin	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDD	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDE	0.01	mg/kg	< 0.01	-	< 0.01	-
p.p-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
o.p-DDT	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan I	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-	< 0.01	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	< 0.01	-
Endrin	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-	< 0.01	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	< 0.01	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	< 0.01	-
Lindane	0.01	mg/kg	< 0.01	-	< 0.01	-
Methoxychlor	0.2	mg/kg	< 0.2	-	< 0.2	-
Oxychlordane	0.01	mg/kg	< 0.01	-	< 0.01	-

Client Sample ID			TP14 - 0.0	TP14 - 0.25	TP15 - 0.0	TP15 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049743	L24-Ma0049744	L24-Ma0049745	L24-Ma0049746
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.05	mg/kg	< 0.05	-	< 0.05	-
Fenitrothion	0.1	mg/kg	< 0.1	-	< 0.1	-
Malathion	0.1	mg/kg	< 0.1	-	< 0.1	-
Trifluralin	0.2	mg/kg	< 0.2	-	< 0.2	-
Ammonia-N	10	mg/kg	40	-	47	-
Chromium (VI)	1	mg/kg	< 1	-	< 1	-
Filterable Reactive Phosphorus	1	mg/kg	2.2	-	< 1	-
Nitrate-N	1	mg/kg	< 1	-	< 1	-
Nitrite-N	1	mg/kg	< 1	-	< 1	-
NOx-N	1	mg/kg	1.0	-	1.1	-
Total Kjeldahl Nitrogen	10	mg/kg	1300	-	2100	-
Total Nitrogen	10	mg/kg	1300	-	2100	-
Phosphorus	1	mg/kg	140	-	80	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	< 2	-
Beryllium	2	mg/kg	< 2	-	< 2	-
Boron	10	mg/kg	< 10	-	< 10	-
Cadmium	0.1	mg/kg	< 0.1	-	< 0.1	-
Cobalt	5	mg/kg	< 5	-	< 5	-
Copper	1	mg/kg	1.2	-	< 1	-
Lead	1	mg/kg	2.0	-	< 1	-
Manganese	5	mg/kg	< 5	-	< 5	-
Mercury	0.02	mg/kg	< 0.02	-	< 0.02	-
Nickel	1	mg/kg	< 1	-	< 1	-
Selenium	2	mg/kg	< 2	-	< 2	-
Zinc	5	mg/kg	< 5	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.8	5.3	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.7	3.5	4.1
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	1.0	-	2.0	-
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	-	-	-
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	-	-	-
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	-	-	-
13C4-PFBA (surr.)	1	%	84	-	-	-
13C5-PFPeA (surr.)	1	%	111	-	-	-

Client Sample ID			TP14 - 0.0	TP14 - 0.25	TP15 - 0.0	TP15 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049743	L24-Ma0049744	L24-Ma0049745	L24-Ma0049746
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C5-PFHxA (surr.)	1	%	109	-	-	-
13C4-PFHpA (surr.)	1	%	165	-	-	-
13C8-PFOA (surr.)	1	%	105	-	-	-
13C5-PFNA (surr.)	1	%	89	-	-	-
13C6-PFDA (surr.)	1	%	120	-	-	-
13C2-PFUnDA (surr.)	1	%	160	-	-	-
13C2-PFDoDA (surr.)	1	%	115	-	-	-
13C2-PFTeDA (surr.)	1	%	103	-	-	-
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	-	-	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	-	-	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	-	-	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	-	-	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	-	-	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	-	-	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	-	-	-
13C8-FOSA (surr.)	1	%	123	-	-	-
D3-N-MeFOSA (surr.)	1	%	182	-	-	-
D5-N-EtFOSA (surr.)	1	%	INT	-	-	-
D7-N-MeFOSE (surr.)	1	%	171	-	-	-
D9-N-EtFOSE (surr.)	1	%	139	-	-	-
D5-N-EtFOSAA (surr.)	1	%	92	-	-	-
D3-N-MeFOSAA (surr.)	1	%	99	-	-	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	-	-	-
13C2-4:2 FTSA (surr.)	1	%	113	-	-	-
13C2-6:2 FTSA (surr.)	1	%	81	-	-	-
13C2-8:2 FTSA (surr.)	1	%	93	-	-	-
13C2-10:2 FTSA (surr.)	1	%	114	-	-	-
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	< 5	-	-	-
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	< 5	-	-	-
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	-
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	-	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	-	-	-
13C3-PFBS (surr.)	1	%	149	-	-	-
18O2-PFHxS (surr.)	1	%	87	-	-	-
13C8-PFOS (surr.)	1	%	111	-	-	-

Client Sample ID			TP14 - 0.0	TP14 - 0.25	TP15 - 0.0	TP15 - 0.25
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049743	L24-Ma0049744	L24-Ma0049745	L24-Ma0049746
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	-
Sum of PFASs (n=30)*	50	ug/kg	< 50	-	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	-	-	-

Client Sample ID			TP15 - 0.50	TP15 - 0.75	TP15 - 1.0	TP16 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049747	L24-Ma0049748	L24-Ma0049749	L24-Ma0049750
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	< 50	< 50
TRH C29-C36	50	mg/kg	-	-	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	89	100
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	< 50
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	< 100	< 100
TRH >C34-C40	100	mg/kg	-	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	-	-	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	-	-	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	-	-	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	-	-	< 0.05	< 0.05
Chlordane	0.01	mg/kg	-	-	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	-	-	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	-	-	< 0.01	< 0.01

Client Sample ID			TP15 - 0.50	TP15 - 0.75	TP15 - 1.0	TP16 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049747	L24-Ma0049748	L24-Ma0049749	L24-Ma0049750
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
p.p-DDD	0.01	mg/kg	-	-	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	-	-	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	-	-	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	-	-	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	-	-	< 0.01	< 0.01
Endrin	0.01	mg/kg	-	-	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	-	-	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	-	-	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	-	-	< 0.01	< 0.01
Lindane	0.01	mg/kg	-	-	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	-	-	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	-	-	< 0.01	< 0.01
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.05	mg/kg	-	-	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	-	-	< 0.1	< 0.1
Malathion	0.1	mg/kg	-	-	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	-	-	< 0.2	< 0.2
Ammonia-N	10	mg/kg	-	-	42	44
Chromium (VI)	1	mg/kg	-	-	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	-	-	< 1	< 1
Nitrate-N	1	mg/kg	-	-	< 1	2.7
Nitrite-N	1	mg/kg	-	-	< 1	< 1
NOx-N	1	mg/kg	-	-	< 1	3.5
Total Kjeldahl Nitrogen	10	mg/kg	-	-	160	1300
Total Nitrogen	10	mg/kg	-	-	160	1300
Phosphorus	1	mg/kg	-	-	14	160
Heavy Metals						
Arsenic	2	mg/kg	-	-	< 2	< 2
Beryllium	2	mg/kg	-	-	< 2	< 2
Boron	10	mg/kg	-	-	< 10	< 10
Cadmium	0.1	mg/kg	-	-	< 0.1	< 0.1
Cobalt	5	mg/kg	-	-	< 5	< 5
Copper	1	mg/kg	-	-	< 1	1.8
Lead	1	mg/kg	-	-	< 1	< 1
Manganese	5	mg/kg	-	-	< 5	15
Mercury	0.02	mg/kg	-	-	< 0.02	< 0.02
Nickel	1	mg/kg	-	-	< 1	< 1
Selenium	2	mg/kg	-	-	< 2	< 2
Zinc	5	mg/kg	-	-	< 5	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	6.2	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	5.0	5.1	3.0
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	-	-	9.0	1.2

Client Sample ID			TP15 - 0.50	TP15 - 0.75	TP15 - 1.0	TP16 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049747	L24-Ma0049748	L24-Ma0049749	L24-Ma0049750
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	-	-	-	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	-	-	-	< 5
13C4-PFBA (surr.)	1	%	-	-	-	46
13C5-PFPeA (surr.)	1	%	-	-	-	80
13C5-PFHxA (surr.)	1	%	-	-	-	72
13C4-PFHpA (surr.)	1	%	-	-	-	75
13C8-PFOA (surr.)	1	%	-	-	-	92
13C5-PFNA (surr.)	1	%	-	-	-	85
13C6-PFDA (surr.)	1	%	-	-	-	86
13C2-PFUnDA (surr.)	1	%	-	-	-	83
13C2-PFDoDA (surr.)	1	%	-	-	-	100
13C2-PFTeDA (surr.)	1	%	-	-	-	89
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	-	-	-	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	-	-	-	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	-	-	-	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	-	-	-	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	-	-	-	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	-	-	-	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	-	-	-	< 10
13C8-FOSA (surr.)	1	%	-	-	-	74
D3-N-MeFOSA (surr.)	1	%	-	-	-	93
D5-N-EtFOSA (surr.)	1	%	-	-	-	105
D7-N-MeFOSE (surr.)	1	%	-	-	-	74
D9-N-EtFOSE (surr.)	1	%	-	-	-	76
D5-N-EtFOSAA (surr.)	1	%	-	-	-	82
D3-N-MeFOSAA (surr.)	1	%	-	-	-	79
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
13C2-4:2 FTSA (surr.)	1	%	-	-	-	72
13C2-6:2 FTSA (surr.)	1	%	-	-	-	92

Client Sample ID			TP15 - 0.50	TP15 - 0.75	TP15 - 1.0	TP16 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049747	L24-Ma0049748	L24-Ma0049749	L24-Ma0049750
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
13C2-8:2 FTSA (surr.)	1	%	-	-	-	136
13C2-10:2 FTSA (surr.)	1	%	-	-	-	157
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	-	-	-	< 5
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	-	-	-	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	-	-	-	< 5
13C3-PFBS (surr.)	1	%	-	-	-	70
18O2-PFHxS (surr.)	1	%	-	-	-	86
13C8-PFOS (surr.)	1	%	-	-	-	90
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	< 5
Sum of PFASs (n=30)*	50	ug/kg	-	-	-	< 50
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	-	-	-	< 10

Client Sample ID			TP17 - 0.0	TP17 - 0.25	TP17 - 0.50	TP18 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049751	L24-Ma0049752	L24-Ma0049753	L24-Ma0049754
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	< 50	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	108	-	-	90
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	< 50
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 20

Client Sample ID			TP17 - 0.0	TP17 - 0.25	TP17 - 0.50	TP18 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049751	L24-Ma0049752	L24-Ma0049753	L24-Ma0049754
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	< 100	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	< 0.05
Chlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	< 0.01
Lindane	0.01	mg/kg	< 0.01	-	-	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	-	-	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.05	mg/kg	< 0.05	-	-	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	-	-	< 0.1
Malathion	0.1	mg/kg	< 0.1	-	-	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	-	-	< 0.2
Ammonia-N	10	mg/kg	40	-	-	38
Chromium (VI)	1	mg/kg	< 1	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1	-	-	< 1
Nitrate-N	1	mg/kg	3.4	-	-	3.8
Nitrite-N	1	mg/kg	< 1	-	-	< 1
NOx-N	1	mg/kg	3.7	-	-	4.8
Total Kjeldahl Nitrogen	10	mg/kg	1600	-	-	980
Total Nitrogen	10	mg/kg	1600	-	-	980
Phosphorus	1	mg/kg	48	-	-	36
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	< 2
Beryllium	2	mg/kg	< 2	-	-	< 2
Boron	10	mg/kg	< 10	-	-	< 10
Cadmium	0.1	mg/kg	< 0.1	-	-	< 0.1
Cobalt	5	mg/kg	< 5	-	-	< 5

Client Sample ID			TP17 - 0.0	TP17 - 0.25	TP17 - 0.50	TP18 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049751	L24-Ma0049752	L24-Ma0049753	L24-Ma0049754
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Heavy Metals						
Copper	1	mg/kg	1.2	-	-	< 1
Lead	1	mg/kg	< 1	-	-	1.2
Manganese	5	mg/kg	< 5	-	-	6.3
Mercury	0.02	mg/kg	< 0.02	-	-	< 0.02
Nickel	1	mg/kg	< 1	-	-	< 1
Selenium	2	mg/kg	< 2	-	-	< 2
Zinc	5	mg/kg	< 5	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.3	5.3	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.1	3.1	3.8
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	2.0
Sample Properties						
% Moisture	1	%	< 1	-	-	4.4
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	-	-	-	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	-	-	-	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	-	-	-	< 5
13C4-PFBA (surr.)	1	%	-	-	-	17
13C5-PFPeA (surr.)	1	%	-	-	-	12
13C5-PFHxA (surr.)	1	%	-	-	-	19
13C4-PFHpA (surr.)	1	%	-	-	-	17
13C8-PFOA (surr.)	1	%	-	-	-	18
13C5-PFNA (surr.)	1	%	-	-	-	13
13C6-PFDA (surr.)	1	%	-	-	-	19
13C2-PFUnDA (surr.)	1	%	-	-	-	17
13C2-PFDoDA (surr.)	1	%	-	-	-	19
13C2-PFTeDA (surr.)	1	%	-	-	-	19
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	-	-	-	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	-	-	-	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	-	-	-	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	-	-	-	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	-	-	-	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	-	-	-	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	-	-	-	< 10
13C8-FOSA (surr.)	1	%	-	-	-	18
D3-N-MeFOSA (surr.)	1	%	-	-	-	20

Client Sample ID			TP17 - 0.0	TP17 - 0.25	TP17 - 0.50	TP18 - 0.0
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049751	L24-Ma0049752	L24-Ma0049753	L24-Ma0049754
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	-	-	-	25
D7-N-MeFOSE (surr.)	1	%	-	-	-	19
D9-N-EtFOSE (surr.)	1	%	-	-	-	20
D5-N-EtFOSAA (surr.)	1	%	-	-	-	17
D3-N-MeFOSAA (surr.)	1	%	-	-	-	18
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	-	-	-	< 5
13C2-4:2 FTSA (surr.)	1	%	-	-	-	13
13C2-6:2 FTSA (surr.)	1	%	-	-	-	15
13C2-8:2 FTSA (surr.)	1	%	-	-	-	19
13C2-10:2 FTSA (surr.)	1	%	-	-	-	17
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	-	-	-	< 5
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	-	-	-	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	-	-	-	< 5
13C3-PFBS (surr.)	1	%	-	-	-	17
18O2-PFHxS (surr.)	1	%	-	-	-	16
13C8-PFOS (surr.)	1	%	-	-	-	12
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	< 5
Sum of PFASs (n=30)*	50	ug/kg	-	-	-	< 50
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	-	-	-	< 10

Client Sample ID			TP19 - 0.0	TP19 - 0.25	TP19 - 0.50	TP01 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049755	L24-Ma0049756	L24-Ma0049757	L24-Ma0049763
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	< 50	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 50

Client Sample ID			TP19 - 0.0	TP19 - 0.25	TP19 - 0.50	TP01 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049755	L24-Ma0049756	L24-Ma0049757	L24-Ma0049763
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	97	-	-	91
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	< 50
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	< 100	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	-	-	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	< 0.05
Chlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	-	-	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	-	-	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	-	-	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	< 0.01
Lindane	0.01	mg/kg	< 0.01	-	-	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	-	-	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	-	-	< 0.01
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.05	mg/kg	< 0.05	-	-	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	-	-	< 0.1
Malathion	0.1	mg/kg	< 0.1	-	-	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	-	-	< 0.2

Client Sample ID			TP19 - 0.0	TP19 - 0.25	TP19 - 0.50	TP01 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049755	L24-Ma0049756	L24-Ma0049757	L24-Ma0049763
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Ammonia-N	10	mg/kg	46	-	-	43
Chromium (VI)	1	mg/kg	< 1	-	-	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1	-	-	< 1
Nitrate-N	1	mg/kg	2.5	-	-	< 1
Nitrite-N	1	mg/kg	< 1	-	-	< 1
NOx-N	1	mg/kg	2.9	-	-	< 1
Total Kjeldahl Nitrogen	10	mg/kg	3000	-	-	1600
Total Nitrogen	10	mg/kg	3000	-	-	1600
Phosphorus	1	mg/kg	15	-	-	14
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	< 2
Beryllium	2	mg/kg	< 2	-	-	< 2
Boron	10	mg/kg	< 10	-	-	< 10
Cadmium	0.1	mg/kg	< 0.1	-	-	< 0.1
Cobalt	5	mg/kg	< 5	-	-	< 5
Copper	1	mg/kg	< 1	-	-	2.0
Lead	1	mg/kg	< 1	-	-	< 1
Manganese	5	mg/kg	< 5	-	-	< 5
Mercury	0.02	mg/kg	< 0.02	-	-	< 0.02
Nickel	1	mg/kg	< 1	-	-	< 1
Selenium	2	mg/kg	< 2	-	-	< 2
Zinc	5	mg/kg	< 5	-	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	5.2	5.2	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	4.3	4.7	-
Reaction Ratings*[S05]	0	comment	2.0	2.0	2.0	-
Sample Properties						
% Moisture	1	%	7.9	-	-	5.0

Client Sample ID			TP06 - QC2	TP11 - QC2	TP16 - QC2	TP20 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049764	L24-Ma0049765	L24-Ma0049766	L24-Ma0049767
Date Sampled			Mar 13, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	76	< 50	< 50	56
TRH C29-C36	50	mg/kg	130	58	< 50	59
TRH C10-C36 (Total)	50	mg/kg	206	58	< 50	115
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

Client Sample ID			TP06 - QC2	TP11 - QC2	TP16 - QC2	TP20 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049764	L24-Ma0049765	L24-Ma0049766	L24-Ma0049767
Date Sampled			Mar 13, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
BTEX						
4-Bromofluorobenzene (surr.)	1	%	64	101	101	76
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	180	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	180	< 100	< 100	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	45	49	43	49
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	1.4	< 1	< 1	< 1
Nitrate-N	1	mg/kg	< 1	14	< 1	1.3
Nitrite-N	1	mg/kg	< 1	< 1	< 1	1.6
NOx-N	1	mg/kg	1.8	15	1.2	2.9
Total Kjeldahl Nitrogen	10	mg/kg	1800	1800	730	3300

Client Sample ID			TP06 - QC2	TP11 - QC2	TP16 - QC2	TP20 - QC2
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049764	L24-Ma0049765	L24-Ma0049766	L24-Ma0049767
Date Sampled			Mar 13, 2024	Mar 14, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Nitrogen	10	mg/kg	1800	1800	730	3300
Phosphorus	1	mg/kg	29	120	110	120
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	< 1	1.4	1.3	1.2
Lead	1	mg/kg	< 1	< 1	< 1	< 1
Manganese	5	mg/kg	< 5	11	15	< 5
Mercury	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	16	< 5	< 5	< 5
Sample Properties						
% Moisture	1	%	2.7	8.6	3.0	2.7
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	-	-	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	-	-	< 5
13C4-PFBA (surr.)	1	%	47	-	-	11
13C5-PFPeA (surr.)	1	%	93	-	-	11
13C5-PFHxA (surr.)	1	%	92	-	-	13
13C4-PFHpA (surr.)	1	%	100	-	-	12
13C8-PFOA (surr.)	1	%	119	-	-	13
13C5-PFNA (surr.)	1	%	112	-	-	10
13C6-PFDA (surr.)	1	%	110	-	-	INT
13C2-PFUnDA (surr.)	1	%	113	-	-	12
13C2-PFDoDA (surr.)	1	%	126	-	-	12
13C2-PFTeDA (surr.)	1	%	113	-	-	13
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	-	-	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	-	-	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	-	-	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	5	ug/kg	< 5	-	-	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	5	ug/kg	< 5	-	-	< 5

Client Sample ID			TP06 - QC2	TP11 - QC2	TP16 - QC2	TP20 - QC2
Sample Matrix			**Solid**	**Solid**	**Solid**	**Solid**
Eurofins Sample No.			**L24-Ma0049764**	**L24-Ma0049765**	**L24-Ma0049766**	**L24-Ma0049767**
Date Sampled			**Mar 13, 2024**	**Mar 14, 2024**	**Mar 13, 2024**	**Mar 13, 2024**
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	-	-	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	-	-	< 10
13C8-FOSA (surr.)	1	%	92	-	-	12
D3-N-MeFOSA (surr.)	1	%	117	-	-	12
D5-N-EtFOSA (surr.)	1	%	129	-	-	16
D7-N-MeFOSE (surr.)	1	%	94	-	-	13
D9-N-EtFOSE (surr.)	1	%	98	-	-	13
D5-N-EtFOSAA (surr.)	1	%	117	-	-	14
D3-N-MeFOSAA (surr.)	1	%	129	-	-	12
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	-	-	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	-	-	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	-	-	< 5
13C2-4:2 FTSA (surr.)	1	%	106	-	-	INT
13C2-6:2 FTSA (surr.)	1	%	122	-	-	10
13C2-8:2 FTSA (surr.)	1	%	182	-	-	INT
13C2-10:2 FTSA (surr.)	1	%	INT	-	-	14
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorononanesulfonic acid (PFNS)*[N15]	5	ug	< 5	-	-	< 5
Perfluoropropanesulfonic acid (PFPrS)*[N15]	5	ug/kg	< 5	-	-	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	-	-	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	-	-	< 5
13C3-PFBS (surr.)	1	%	96	-	-	10
18O2-PFHxS (surr.)	1	%	115	-	-	INT
13C8-PFOS (surr.)	1	%	114	-	-	10
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	< 5
Sum of PFASs (n=30)*	50	ug/kg	< 50	-	-	< 50
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	-	-	< 10

Client Sample ID			TP01 - QC3	TP06 - QC3	TP11 - QC3	TP16 - QC3
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049768	L24-Ma0049769	L24-Ma0049770	L24-Ma0049771
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 14, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	43	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	470	62	< 50	< 50
TRH C29-C36	50	mg/kg	610	110	50	< 50
TRH C10-C36 (Total)	50	mg/kg	1123	172	50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	83	103	90	90
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	120	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	120	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	880	140	< 100	< 100
TRH >C34-C40	100	mg/kg	280	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	1280	140	< 100	< 100
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Lindane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			TP01 - QC3	TP06 - QC3	TP11 - QC3	TP16 - QC3
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049768	L24-Ma0049769	L24-Ma0049770	L24-Ma0049771
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 14, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
OCOP in Soil						
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Malathion	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Trifluralin	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ammonia-N	10	mg/kg	53	45	65	41
Chromium (VI)	1	mg/kg	< 1	< 1	< 1	< 1
Filterable Reactive Phosphorus	1	mg/kg	1.7	2.1	< 1	< 1
Nitrate-N	1	mg/kg	< 1	< 1	37	6.3
Nitrite-N	1	mg/kg	< 1	< 1	1.0	< 1
NOx-N	1	mg/kg	< 1	< 1	38	7.0
Total Kjeldahl Nitrogen	10	mg/kg	2600	2200	3300	730
Total Nitrogen	10	mg/kg	2600	2200	3300	740
Phosphorus	1	mg/kg	32	26	170	140
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Beryllium	2	mg/kg	< 2	< 2	< 2	< 2
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Cadmium	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Cobalt	5	mg/kg	< 5	< 5	< 5	< 5
Copper	1	mg/kg	2.1	1.7	1.9	< 1
Lead	1	mg/kg	1.2	< 1	< 1	< 1
Manganese	5	mg/kg	< 5	< 5	14	11
Mercury	0.02	mg/kg	< 0.02	< 0.02	< 0.02	< 0.02
Nickel	1	mg/kg	< 1	< 1	< 1	< 1
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Zinc	5	mg/kg	< 5	< 5	< 5	< 5
Sample Properties						
% Moisture	1	%	3.5	2.5	7.2	3.1

Client Sample ID			TP20 - QC3	QC4	QC4	TP05 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049772	L24-Ma0049773	L24-Ma0049774	L24-Ma0049927
Date Sampled			Mar 13, 2024	Not Provided[I12]	Not Provided[I12]	Mar 13, 2024
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	[G02]< 40	< 20	< 20	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	< 50	-	-	-
TRH C29-C36	50	mg/kg	65	-	-	-
TRH C10-C36 (Total)	50	mg/kg	65	-	-	-
BTEX						
Benzene	0.1	mg/kg	[G02]< 0.1	< 0.1	< 0.1	-
Toluene	0.1	mg/kg	[G02]< 0.1	< 0.1	< 0.1	-
Ethylbenzene	0.1	mg/kg	[G02]< 0.1	< 0.1	< 0.1	-
m&p-Xylenes	0.2	mg/kg	[G02]< 0.2	< 0.2	< 0.2	-

Client Sample ID			TP20 - QC3	QC4	QC4	TP05 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049772	L24-Ma0049773	L24-Ma0049774	L24-Ma0049927
Date Sampled			Mar 13, 2024	Not Provided[I12]	Not Provided[I12]	Mar 13, 2024
Test/Reference	LOR	Unit				
BTEX						
o-Xylene	0.1	mg/kg	[G02]< 0.1	< 0.1	< 0.1	-
Xylenes - Total*	0.3	mg/kg	[G02]< 0.3	< 0.3	< 0.3	-
BTEX						
4-Bromofluorobenzene (surr.)	1	%	89	86	89	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	[G02]< 1	-	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	-
TRH C6-C10	20	mg/kg	[G02]< 40	-	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 40	-	-	-
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	< 100	-	-	-
TRH >C34-C40	100	mg/kg	< 100	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	-
OCOP in Soil						
Aldrin	0.01	mg/kg	< 0.01	-	-	-
alpha-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
beta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
delta-BHC (HCH)	0.01	mg/kg	< 0.01	-	-	-
Bifenthrin	0.2	mg/kg	< 0.2	-	-	-
Bromophos Ethyl	0.05	mg/kg	< 0.05	-	-	-
Chlordane	0.01	mg/kg	< 0.01	-	-	-
Chlorpyrifos	0.02	mg/kg	< 0.02	-	-	-
Dieldrin	0.01	mg/kg	< 0.01	-	-	-
p.p-DDD	0.01	mg/kg	< 0.01	-	-	-
p.p-DDE	0.01	mg/kg	< 0.01	-	-	-
p.p-DDT	0.01	mg/kg	< 0.01	-	-	-
o.p-DDT	0.01	mg/kg	< 0.01	-	-	-
Endosulfan I	0.01	mg/kg	< 0.01	-	-	-
Endosulfan II	0.01	mg/kg	< 0.01	-	-	-
Endosulfan Sulfate	0.01	mg/kg	< 0.01	-	-	-
Endrin	0.01	mg/kg	< 0.01	-	-	-
Heptachlor	0.01	mg/kg	< 0.01	-	-	-
Heptachlor Epoxide	0.01	mg/kg	< 0.01	-	-	-
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01	-	-	-
Lindane	0.01	mg/kg	< 0.01	-	-	-
Methoxychlor	0.2	mg/kg	< 0.2	-	-	-
Oxychlordane	0.01	mg/kg	< 0.01	-	-	-
Diazinon	0.2	mg/kg	< 0.2	-	-	-
Ethion	0.05	mg/kg	< 0.05	-	-	-
Fenitrothion	0.1	mg/kg	< 0.1	-	-	-
Malathion	0.1	mg/kg	< 0.1	-	-	-
Trifluralin	0.2	mg/kg	< 0.2	-	-	-
Ammonia-N	10	mg/kg	51	-	-	-
Chromium (VI)	1	mg/kg	< 1	-	-	-
Filterable Reactive Phosphorus	1	mg/kg	< 1	-	-	-
Nitrate-N	1	mg/kg	1.1	-	-	-

Client Sample ID			TP20 - QC3	QC4	QC4	TP05 - 0.75
Sample Matrix			Solid	Solid	Solid	Solid
Eurofins Sample No.			L24-Ma0049772	L24-Ma0049773	L24-Ma0049774	L24-Ma0049927
Date Sampled			Mar 13, 2024	Not Provided[I12]	Not Provided[I12]	Mar 13, 2024
Test/Reference	LOR	Unit				
Nitrite-N	1	mg/kg	< 1	-	-	-
NOx-N	1	mg/kg	1.6	-	-	-
Total Kjeldahl Nitrogen	10	mg/kg	2700	-	-	-
Total Nitrogen	10	mg/kg	2700	-	-	-
Phosphorus	1	mg/kg	100	-	-	-
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	< 0.5	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	-	-
Beryllium	2	mg/kg	< 2	-	-	-
Boron	10	mg/kg	< 10	-	-	-
Cadmium	0.1	mg/kg	< 0.1	-	-	-
Cobalt	5	mg/kg	< 5	-	-	-
Copper	1	mg/kg	< 1	-	-	-
Lead	1	mg/kg	< 1	-	-	-
Manganese	5	mg/kg	< 5	-	-	-
Mercury	0.02	mg/kg	< 0.02	-	-	-
Nickel	1	mg/kg	< 1	-	-	-
Selenium	2	mg/kg	< 2	-	-	-
Zinc	5	mg/kg	< 5	-	-	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	-	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	-	4.2
Reaction Ratings*[S05]	0	comment	-	-	-	2.0
Sample Properties						
% Moisture	1	%	3.1	-	-	-
Total Recoverable Hydrocarbons						
TRH C6-C10	20	mg/kg	-	< 20	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	< 20	-

Client Sample ID			TP20 - 0.0
Sample Matrix			Solid
Eurofins Sample No.			L24-Ma0050128
Date Sampled			Mar 14, 2024
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3

Client Sample ID			TP20 - 0.0
Sample Matrix			Solid
Eurofins Sample No.			L24-Ma0050128
Date Sampled			Mar 14, 2024
Test/Reference	LOR	Unit	
BTEX			
4-Bromofluorobenzene (surr.)	1	%	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
OCOP in Soil			
Aldrin	0.01	mg/kg	< 0.01
alpha-BHC (HCH)	0.01	mg/kg	< 0.01
beta-BHC (HCH)	0.01	mg/kg	< 0.01
delta-BHC (HCH)	0.01	mg/kg	< 0.01
Bifenthrin	0.2	mg/kg	< 0.2
Bromophos Ethyl	0.05	mg/kg	< 0.05
Chlordane	0.01	mg/kg	< 0.01
Chlorpyrifos	0.02	mg/kg	< 0.02
Dieldrin	0.01	mg/kg	< 0.01
p.p-DDD	0.01	mg/kg	< 0.01
p.p-DDE	0.01	mg/kg	< 0.01
p.p-DDT	0.01	mg/kg	< 0.01
o.p-DDT	0.01	mg/kg	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01
Endosulfan Sulfate	0.01	mg/kg	< 0.01
Endrin	0.01	mg/kg	< 0.01
Heptachlor	0.01	mg/kg	< 0.01
Heptachlor Epoxide	0.01	mg/kg	< 0.01
Hexachlorobenzene (HCB)	0.01	mg/kg	< 0.01
Lindane	0.01	mg/kg	< 0.01
Methoxychlor	0.2	mg/kg	< 0.2
Oxychlordane	0.01	mg/kg	< 0.01
Diazinon	0.2	mg/kg	< 0.2
Ethion	0.05	mg/kg	< 0.05
Fenitrothion	0.1	mg/kg	< 0.1
Malathion	0.1	mg/kg	< 0.1
Trifluralin	0.2	mg/kg	< 0.2
Ammonia-N	10	mg/kg	50
Chromium (VI)	1	mg/kg	< 1
Filterable Reactive Phosphorus	1	mg/kg	< 1
Nitrate-N	1	mg/kg	< 1
Nitrite-N	1	mg/kg	< 1
NOx-N	1	mg/kg	< 1
Total Kjeldahl Nitrogen	10	mg/kg	2400

Client Sample ID			TP20 - 0.0
Sample Matrix			**Solid**
Eurofins Sample No.			**L24-Ma0050128**
Date Sampled			**Mar 14, 2024**
Test/Reference	LOR	Unit	
Total Nitrogen	10	mg/kg	2400
Phosphorus	1	mg/kg	120
Heavy Metals			
Arsenic	2	mg/kg	< 2
Beryllium	2	mg/kg	< 2
Boron	10	mg/kg	< 10
Cadmium	0.1	mg/kg	< 0.1
Cobalt	5	mg/kg	< 5
Copper	1	mg/kg	< 1
Lead	1	mg/kg	< 1
Manganese	5	mg/kg	< 5
Mercury	0.02	mg/kg	< 0.02
Nickel	1	mg/kg	< 1
Selenium	2	mg/kg	< 2
Zinc	5	mg/kg	< 5
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6
Reaction Ratings*[S05]	0	comment	2.0
Sample Properties			
% Moisture	1	%	2.6

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Mar 27, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Mar 27, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 27, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Mar 27, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
NEPM 2013 Metals : Metals M12	Welshpool	Mar 27, 2024	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
OCOP in Soil	Welshpool	Mar 27, 2024	14 Days
- Method: ARL003 - OCOP and PCB in Soil			
Ammonia-N	Welshpool	Mar 27, 2024	7 Days
- Method: ARL304 - Ammonia in Soil and Sediment by Discrete Analyser			
Chromium (VI)	Welshpool	Mar 27, 2024	28 Days
- Method: ARL051 - Hexavalent Chromium in Soil			
Filterable Reactive Phosphorus	Welshpool	Mar 27, 2024	7 Day
- Method: ARL120 - Filterable Reactive Phosphorus in Soil			
Nitrate-N	Welshpool	Mar 27, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Nitrite-N	Welshpool	Mar 27, 2024	7 Days
- Method: ARL312 - Nitrite in Soil and Sediment by Discrete Analyser			
Phosphorus	Welshpool	Mar 27, 2024	7 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Acid Sulfate Soils Field pH Test	Welshpool	Mar 27, 2024	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
NOx-N	Welshpool	Mar 27, 2024	7 Days
- Method: ARL314 - NOx in Soil and Sediment by Discrete Analyser			
Total Kjeldahl Nitrogen	Welshpool	Mar 27, 2024	7 Days
- Method: ARL118 - Total Phosphorus and TKN in Soil and Biosolids			
Total Nitrogen	Welshpool	Mar 27, 2024	7 Days
- Method: ARL No. 330 - Persulfate Method for Simultaneous Determination of TN & TP			
Naphthalene	Welshpool	Mar 27, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Welshpool	Mar 21, 2024	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
% Moisture	Welshpool	Mar 27, 2024	14 Days
- Method: ARL135 Moisture in Solids			
Perfluoroalkyl carboxylic acids (PFCAs)	Welshpool	Mar 25, 2024	28 Days
- Method: Method ARL0510_ARL0511 PFAS in aqueous & solid samples by LC-MS/MS			
Perfluoroalkyl sulfonamido substances	Welshpool	Mar 25, 2024	28 Days
- Method: Method ARL0510_ARL0511 PFAS in aqueous & solid samples by LC-MS/MS			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Welshpool	Mar 25, 2024	28 Days
- Method: Method ARL0510_ARL0511 PFAS in aqueous & solid samples by LC-MS/MS			
Perfluoroalkyl sulfonic acids (PFSAs)	Welshpool	Mar 25, 2024	28 Days
- Method: Method ARL0510_ARL0511 PFAS in aqueous & solid samples by LC-MS/MS			
PFASs Summations	Welshpool	Mar 23, 2024	
- Method: Method ARL0510_ARL0511 PFAS in aqueous & solid samples by LC-MS/MS			

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1080155
Phone: 0458 839 200
Fax:

Received: Mar 19, 2024 1:06 PM
Due: Mar 26, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	Asbestos in Soils (AS 4964-2004)	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																		
1	TP01 - 0.0	Mar 14, 2024		Solid	L24-Ma0049669	X			X	X	X	X	X	X	X		X	X	X		X		
2	TP01 - 0.25	Mar 14, 2024		Solid	L24-Ma0049670									X									
3	TP01 - 0.50	Mar 14, 2024		Solid	L24-Ma0049671													X					
4	TP01 - 0.75	Mar 14, 2024		Solid	L24-Ma0049672									X									
5	TP01 - 1.0	Mar 14, 2024		Solid	L24-Ma0049673	X			X	X	X	X	X	X	X		X	X	X		X		
6	TP01 - 1.25	Mar 14, 2024		Solid	L24-Ma0049674									X									
7	TP01 - 1.50	Mar 14, 2024		Solid	L24-Ma0049675									X									
8	TP01 - 1.75	Mar 14, 2024		Solid	L24-Ma0049676									X									
9	TP01 - 2.0	Mar 14, 2024		Solid	L24-Ma0049677									X									
10	TP02 - 0.0	Mar 14, 2024		Solid	L24-Ma0049678	X			X	X	X	X	X	X	X		X	X	X		X		X
11	TP02 - 0.25	Mar 14, 2024		Solid	L24-Ma0049679									X									
12	TP02 - 0.50	Mar 14, 2024		Solid	L24-Ma0049680									X				X					
13	TP02 - 0.75	Mar 14, 2024		Solid	L24-Ma0049681									X									
14	TP02 - 1.0	Mar 14, 2024		Solid	L24-Ma0049682	X			X	X	X	X	X	X	X		X	X	X		X		

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
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Project Name: BEENUP WIND FARM

Order No.:
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Sample Detail						Ammonia-N	Asbestos in Soils (AS 4964-2004)	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
15	TP03 - 0.0	Not Provided		Solid	L24-Ma0049683	X			X	X	X	X	X	X	X		X	X	X		X		
16	TP03 - 0.25	Not Provided		Solid	L24-Ma0049684									X									
17	TP03 - 0.50	Not Provided		Solid	L24-Ma0049685													X					
18	TP03 - 1.0	Not Provided		Solid	L24-Ma0049687	X			X	X	X	X	X	X	X		X	X	X		X		
19	TP04 - 0.0	Not Provided		Solid	L24-Ma0049688	X			X	X	X	X	X	X	X		X	X	X		X		X
20	TP04 - 0.50	Not Provided		Solid	L24-Ma0049689									X									
21	TP04 - 1.0	Not Provided		Solid	L24-Ma0049690	X	X		X	X	X	X	X	X	X		X		X		X		
22	TP04 - 1.25	Not Provided		Solid	L24-Ma0049691									X									
23	TP04 - 1.75	Not Provided		Solid	L24-Ma0049692									X									
24	TP05 - 0.0	Mar 13, 2024		Solid	L24-Ma0049693	X			X	X	X	X	X	X	X		X	X	X		X		
25	TP05 - 0.25	Mar 13, 2024		Solid	L24-Ma0049694									X									
26	TP05 - 0.50	Mar 13, 2024		Solid	L24-Ma0049695									X				X					
27	TP06 - 0.0	Mar 13, 2024		Solid	L24-Ma0049696	X	X		X	X	X	X	X	X	X		X		X		X		X
28	TP06 - 0.25	Mar 13, 2024		Solid	L24-Ma0049697									X									
29	TP06 - 0.50	Mar 13, 2024		Solid	L24-Ma0049698									X				X					

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Company Name: Stantec Australia Pty Ltd (WA)
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Perth
WA 6000

Project Name: BEENUP WIND FARM

Order No.:
Report #: 1080155
Phone: 0458 839 200
Fax:

Received: Mar 19, 2024 1:06 PM
Due: Mar 26, 2024
Priority: 5 Day
Contact Name: Brenton Petracca

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						Ammonia-N	Asbestos in Soils (AS 4964-2004)	Chromium (VI)	Chromium (VI)	Filterable Reactive Phosphorus	Nitrate-N	Nitrite-N	Phosphorus	Acid Sulfate Soils Field pH Test	Moisture Set	BTEXN and Volatile TRH	Eurofins Suite B6A	Asbestos in Soils (ASC NEPM 2013)	OCOP in Soil	OCOP in Water	Total Nitrogen	Eurofins Suite B19E	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
30	TP07 - 0.0	Mar 14, 2024		Solid	L24-Ma0049699	X			X	X	X	X	X	X	X		X	X	X		X		
31	TP07 - 0.25	Mar 14, 2024		Solid	L24-Ma0049700									X									
32	TP07 - 0.50	Mar 14, 2024		Solid	L24-Ma0049701									X				X					
33	TP07 - 0.75	Mar 14, 2024		Solid	L24-Ma0049702									X									
34	TP07 - 1.0	Mar 14, 2024		Solid	L24-Ma0049703	X			X	X	X	X	X	X	X		X	X	X		X		
35	TP07 - 1.25	Mar 14, 2024		Solid	L24-Ma0049704									X									
36	TP07 - 1.50	Mar 14, 2024		Solid	L24-Ma0049705									X									
37	TP08 - 0.0	Not Provided		Solid	L24-Ma0049706	X			X	X	X	X	X	X	X		X	X	X		X		X
38	TP08 - 0.25	Not Provided		Solid	L24-Ma0049707									X									
39	TP08 - 0.50	Not Provided		Solid	L24-Ma0049708									X				X					
40	TP08 - 0.75	Not Provided		Solid	L24-Ma0049709									X									
41	TP08 - 1.0	Not Provided		Solid	L24-Ma0049710	X			X	X	X	X	X	X	X		X	X	X		X		
42	TP08 - 1.25	Not Provided		Solid	L24-Ma0049711									X									
43	TP08 - 1.50	Not Provided		Solid	L24-Ma0049712									X									
44	TP08 - 1.75	Not Provided		Solid	L24-Ma0049713									X									

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
45	TP08 - 2.0	Not Provided		Solid	L24-Ma0049714									X									
46	TP09 - 0.0	Not Provided		Solid	L24-Ma0049715	X	X		X	X	X	X	X	X	X		X		X		X		
47	TP09 - 0.25	Not Provided		Solid	L24-Ma0049716									X									
48	TP09 - 1.0	Not Provided		Solid	L24-Ma0049717	X	X		X	X	X	X	X	X	X		X		X		X		
49	TP09 - 1.50	Not Provided		Solid	L24-Ma0049718									X									
50	TP10 - 0.0	Not Provided		Solid	L24-Ma0049719	X	X		X	X	X	X	X	X	X		X		X		X		X
51	TP10 - 1.0	Not Provided		Solid	L24-Ma0049723	X	X		X	X	X	X	X	X	X		X		X		X		
52	TP11 - 0.0	Mar 14, 2024		Solid	L24-Ma0049724	X			X	X	X	X	X	X	X		X	X	X		X		
53	TP11 - 0.25	Mar 14, 2024		Solid	L24-Ma0049725									X									
54	TP11 - 0.50	Mar 14, 2024		Solid	L24-Ma0049726									X				X					
55	TP11 - 0.75	Mar 14, 2024		Solid	L24-Ma0049727									X									
56	TP11 - 1.0	Mar 14, 2024		Solid	L24-Ma0049728	X			X	X	X	X	X	X	X		X	X	X		X		
57	TP11 - 1.25	Mar 14, 2024		Solid	L24-Ma0049729									X									
58	TP11 - 1.50	Mar 14, 2024		Solid	L24-Ma0049730									X									
59	TP11 - 1.75	Mar 14, 2024		Solid	L24-Ma0049731									X									

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
60	TP11 - 2.0	Mar 14, 2024		Solid	L24-Ma0049732									X									
61	TP12 - 0.0	Mar 13, 2024		Solid	L24-Ma0049733	X	X		X	X	X	X	X	X	X		X		X		X		X
62	TP13 - 0.0	Mar 13, 2024		Solid	L24-Ma0049734	X			X	X	X	X	X	X	X		X	X	X		X		
63	TP13 - 0.25	Mar 13, 2024		Solid	L24-Ma0049735									X									
64	TP13 - 0.50	Mar 13, 2024		Solid	L24-Ma0049736									X				X					
65	TP13 - 0.75	Mar 13, 2024		Solid	L24-Ma0049737									X									
66	TP13 - 1.0	Mar 13, 2024		Solid	L24-Ma0049738	X			X	X	X	X	X	X	X		X	X	X		X		
67	TP13 - 1.25	Mar 13, 2024		Solid	L24-Ma0049739									X									
68	TP13 - 1.50	Mar 13, 2024		Solid	L24-Ma0049740									X									
69	TP13 - 1.75	Mar 13, 2024		Solid	L24-Ma0049741									X									
70	TP13 - 2.0	Mar 13, 2024		Solid	L24-Ma0049742									X									
71	TP14 - 0.0	Mar 13, 2024		Solid	L24-Ma0049743	X			X	X	X	X	X	X	X		X	X	X		X		X
72	TP14 - 0.25	Mar 13, 2024		Solid	L24-Ma0049744									X									
73	TP15 - 0.0	Mar 13, 2024		Solid	L24-Ma0049745	X			X	X	X	X	X	X	X		X	X	X		X		
74	TP15 - 0.25	Mar 13, 2024		Solid	L24-Ma0049746									X									

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
75	TP15 - 0.50	Mar 13, 2024		Solid	L24-Ma0049747									X				X					
76	TP15 - 0.75	Mar 13, 2024		Solid	L24-Ma0049748									X									
77	TP15 - 1.0	Mar 13, 2024		Solid	L24-Ma0049749	X			X	X	X	X	X	X	X		X	X	X		X		
78	TP16 - 0.0	Mar 13, 2024		Solid	L24-Ma0049750	X	X		X	X	X	X	X	X	X		X		X		X		X
79	TP17 - 0.0	Mar 13, 2024		Solid	L24-Ma0049751	X			X	X	X	X	X	X	X		X	X	X		X		
80	TP17 - 0.25	Mar 13, 2024		Solid	L24-Ma0049752									X									
81	TP17 - 0.50	Mar 13, 2024		Solid	L24-Ma0049753									X				X					
82	TP18 - 0.0	Mar 14, 2024		Solid	L24-Ma0049754	X			X	X	X	X	X	X	X		X	X	X		X		X
83	TP19 - 0.0	Mar 14, 2024		Solid	L24-Ma0049755	X			X	X	X	X	X	X	X		X	X	X		X		
84	TP19 - 0.25	Mar 14, 2024		Solid	L24-Ma0049756									X									
85	TP19 - 0.50	Mar 14, 2024		Solid	L24-Ma0049757									X				X					
86	TP10 - QC1	Mar 12, 2024		Water	L24-Ma0049760			X									X			X		X	X
87	TP15 - QC1	Mar 13, 2024		Water	L24-Ma0049761			X									X			X		X	X
88	TP01 - QC1	Mar 14, 2024		Water	L24-Ma0049762			X									X			X		X	X
89	TP01 - QC2	Mar 14, 2024		Solid	L24-Ma0049763	X			X	X	X	X	X		X		X	X	X		X		

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Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
External Laboratory																							
90	TP06 - QC2	Mar 13, 2024		Solid	L24-Ma0049764	X			X	X	X	X	X		X		X	X	X		X		X
91	TP11 - QC2	Mar 14, 2024		Solid	L24-Ma0049765	X			X	X	X	X	X		X		X	X	X		X		
92	TP16 - QC2	Mar 13, 2024		Solid	L24-Ma0049766	X	X		X	X	X	X	X		X		X		X		X		
93	TP20 - QC2	Mar 13, 2024		Solid	L24-Ma0049767	X	X		X	X	X	X	X		X		X		X		X		X
94	TP01 - QC3	Mar 14, 2024		Solid	L24-Ma0049768	X			X	X	X	X	X		X		X	X	X		X		
95	TP06 - QC3	Mar 13, 2024		Solid	L24-Ma0049769	X			X	X	X	X	X		X		X	X	X		X		
96	TP11 - QC3	Mar 14, 2024		Solid	L24-Ma0049770	X			X	X	X	X	X		X		X	X	X		X		
97	TP16 - QC3	Mar 13, 2024		Solid	L24-Ma0049771	X	X		X	X	X	X	X		X		X		X		X		
98	TP20 - QC3	Mar 13, 2024		Solid	L24-Ma0049772	X	X		X	X	X	X	X		X		X		X		X		
99	QC4	Not Provided		Solid	L24-Ma0049773											X							
100	QC4	Not Provided		Solid	L24-Ma0049774											X							
101	TP05 - 0.75	Mar 13, 2024		Solid	L24-Ma0049927									X									
102	TP20 - 0.0	Mar 14, 2024		Solid	L24-Ma0050128	X	X		X	X	X	X	X	X	X		X		X		X		
Test Counts						41	13	3	42	41	41	41	41	85	41	2	44	40	41	3	41	3	14

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
ppm: parts per million
µg/L: micrograms per litre
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit
Colour: Pt-Co Units (CU)

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Total Kjeldahl Nitrogen	mg/kg	< 10			10	Pass	
Method Blank							
OCOP in Soil							
Aldrin	mg/kg	< 0.01			0.01	Pass	
alpha-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
beta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
delta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
Bifenthrin	mg/kg	< 0.2			0.2	Pass	
Bromophos Ethyl	mg/kg	< 0.05			0.05	Pass	
Chlordane	mg/kg	< 0.01			0.01	Pass	
Chlorpyrifos	mg/kg	< 0.02			0.02	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
p.p-DDD	mg/kg	< 0.01			0.01	Pass	
p.p-DDE	mg/kg	< 0.01			0.01	Pass	
p.p-DDT	mg/kg	< 0.01			0.01	Pass	
o.p-DDT	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan Sulfate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor Epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene (HCB)	mg/kg	< 0.01			0.01	Pass	
Lindane	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Oxychlordane	mg/kg	< 0.01			0.01	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.05			0.05	Pass	
Fenitrothion	mg/kg	< 0.1			0.1	Pass	
Malathion	mg/kg	< 0.1			0.1	Pass	
Trifluralin	mg/kg	< 0.2			0.2	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ammonia-N	mg/kg	< 10			10	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Phosphorus	mg/kg	< 1			1	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)*	ug	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)*	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
OCOP in Soil							
Aldrin	mg/kg	< 0.01			0.01	Pass	
alpha-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
beta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
delta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
Bifenthrin	mg/kg	< 0.2			0.2	Pass	
Bromophos Ethyl	mg/kg	< 0.05			0.05	Pass	
Chlordane	mg/kg	< 0.01			0.01	Pass	
Chlorpyrifos	mg/kg	< 0.02			0.02	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin	mg/kg	< 0.01			0.01	Pass	
p.p-DDD	mg/kg	< 0.01			0.01	Pass	
p.p-DDE	mg/kg	< 0.01			0.01	Pass	
p.p-DDT	mg/kg	< 0.01			0.01	Pass	
o.p-DDT	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan Sulfate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor Epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene (HCB)	mg/kg	< 0.01			0.01	Pass	
Lindane	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Oxychlordane	mg/kg	< 0.01			0.01	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.05			0.05	Pass	
Fenitrothion	mg/kg	< 0.1			0.1	Pass	
Malathion	mg/kg	< 0.1			0.1	Pass	
Trifluralin	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Total Kjeldahl Nitrogen	mg/kg	< 10			10	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Method Blank							
Phosphorus	mg/kg	< 1			1	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Phosphorus	mg/kg	< 1			1	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 1			1	Pass	
Lead	mg/kg	< 1			1	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.02			0.02	Pass	
Nickel	mg/kg	< 1			1	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
OCOP in Soil							
Aldrin	mg/kg	< 0.01			0.01	Pass	
alpha-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
beta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
delta-BHC (HCH)	mg/kg	< 0.01			0.01	Pass	
Bifenthrin	mg/kg	< 0.2			0.2	Pass	
Bromophos Ethyl	mg/kg	< 0.05			0.05	Pass	
Chlordane	mg/kg	< 0.01			0.01	Pass	
Chlorpyrifos	mg/kg	< 0.02			0.02	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
p.p-DDD	mg/kg	< 0.01			0.01	Pass	
p.p-DDE	mg/kg	< 0.01			0.01	Pass	
p.p-DDT	mg/kg	< 0.01			0.01	Pass	
o.p-DDT	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan Sulfate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor Epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene (HCB)	mg/kg	< 0.01			0.01	Pass	
Lindane	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Oxychlordane	mg/kg	< 0.01			0.01	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.05			0.05	Pass	
Fenitrothion	mg/kg	< 0.1			0.1	Pass	
Malathion	mg/kg	< 0.1			0.1	Pass	
Trifluralin	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 1			1	Pass	
Lead	mg/kg	< 1			1	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.02			0.02	Pass	
Nickel	mg/kg	< 1			1	Pass	
Selenium	mg/kg	< 2			2	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Ammonia-N	mg/kg	< 10			10	Pass	
Chromium (VI)	mg/kg	< 1			1	Pass	
Filterable Reactive Phosphorus	mg/kg	< 1			1	Pass	
Nitrate-N	mg/kg	< 1			1	Pass	
Nitrite-N	mg/kg	< 1			1	Pass	
NOx-N	mg/kg	< 1			1	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	119			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	101			70-130	Pass	
Toluene	%	100			70-130	Pass	
Ethylbenzene	%	104			70-130	Pass	
m&p-Xylenes	%	107			70-130	Pass	
o-Xylene	%	100			70-130	Pass	
Xylenes - Total*	%	105			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	104			70-130	Pass	
TRH C6-C10	%	99			70-130	Pass	
LCS - % Recovery							
OCOP in Soil							
Aldrin	%	81			60-120	Pass	
Dieldrin	%	116			60-120	Pass	
p.p-DDT	%	96			60-120	Pass	
Endrin	%	90			60-120	Pass	
Heptachlor	%	88			60-120	Pass	
Lindane	%	88			60-120	Pass	
LCS - % Recovery							
Phosphorus	%	111			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	51			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	74			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	97			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	68			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	72			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	66			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	62			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	61			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	68			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	60			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	71			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	65			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	63			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	63			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	64			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	68			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	63			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	64			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	64			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	61			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	63			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanesulfonic acid (PFBS)	%	56			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)*	%	63			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	55			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	63			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	65			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	63			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	66			50-150	Pass	
LCS - % Recovery							
Phosphorus	%	114			80-120	Pass	
LCS - % Recovery							
OCOP in Soil							
Aldrin	%	82			60-120	Pass	
Dieldrin	%	97			60-120	Pass	
p.p-DDT	%	99			60-120	Pass	
Endrin	%	60			60-120	Pass	
Heptachlor	%	85			60-120	Pass	
Lindane	%	83			60-120	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	94			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	95			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C10-C14	%	92			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	98			70-130	Pass	
LCS - % Recovery							
Phosphorus	%	117			80-120	Pass	
LCS - % Recovery							
Phosphorus	%	93			80-120	Pass	
LCS - % Recovery							
Phosphorus	%	120			80-120	Pass	
LCS - % Recovery							
Phosphorus	%	109			80-120	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	100			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	98			70-130	Pass	
Toluene	%	99			70-130	Pass	
Ethylbenzene	%	102			70-130	Pass	
m&p-Xylenes	%	104			70-130	Pass	
o-Xylene	%	101			70-130	Pass	
Xylenes - Total*	%	103			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	101			70-130	Pass	
TRH C6-C10	%	97			70-130	Pass	
LCS - % Recovery							
Phosphorus	%	89			80-120	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phosphorus	%	110			80-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	98			80-120	Pass	
Beryllium	%	106			80-120	Pass	
Boron	%	99			80-120	Pass	
Cadmium	%	100			80-120	Pass	
Cobalt	%	100			80-120	Pass	
Copper	%	96			80-120	Pass	
Lead	%	100			80-120	Pass	
Manganese	%	99			80-120	Pass	
Mercury	%	100			80-120	Pass	
Nickel	%	100			80-120	Pass	
Selenium	%	99			80-120	Pass	
Zinc	%	100			80-120	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	119			70-130	Pass	
TRH C10-C14	%	95			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	100			70-130	Pass	
Toluene	%	102			70-130	Pass	
Ethylbenzene	%	101			70-130	Pass	
m&p-Xylenes	%	103			70-130	Pass	
o-Xylene	%	100			70-130	Pass	
Xylenes - Total*	%	102			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	101			70-130	Pass	
TRH C6-C10	%	108			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	97			70-130	Pass	
LCS - % Recovery							
OCOP in Soil							
Aldrin	%	98			60-120	Pass	
Dieldrin	%	112			60-120	Pass	
p.p-DDT	%	106			60-120	Pass	
Endrin	%	91			60-120	Pass	
Heptachlor	%	92			60-120	Pass	
Lindane	%	89			60-120	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	118			80-120	Pass	
Beryllium	%	97			80-120	Pass	
Boron	%	94			80-120	Pass	
Cadmium	%	98			80-120	Pass	
Cobalt	%	95			80-120	Pass	
Copper	%	91			80-120	Pass	
Lead	%	90			80-120	Pass	
Manganese	%	93			80-120	Pass	
Mercury	%	95			80-120	Pass	
Nickel	%	94			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium			%	97			80-120	Pass	
Zinc			%	92			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	L24-Ma0049669	CP	%	106			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L24-Ma0049669	CP	%	106			70-130	Pass	
Spike - % Recovery									
OCOP in Soil				Result 1					
Aldrin	L24-Ma0049669	CP	%	82			60-120	Pass	
Dieldrin	L24-Ma0049669	CP	%	96			60-120	Pass	
p.p-DDT	L24-Ma0049669	CP	%	86			60-120	Pass	
Endrin	L24-Ma0049669	CP	%	107			60-120	Pass	
Heptachlor	L24-Ma0049669	CP	%	90			60-120	Pass	
Lindane	L24-Ma0049669	CP	%	110			60-120	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	L24-Ma0049719	CP	%	96			75-125	Pass	
Beryllium	L24-Ma0049719	CP	%	96			75-125	Pass	
Boron	L24-Ma0049719	CP	%	88			75-125	Pass	
Cadmium	L24-Ma0049719	CP	%	97			75-125	Pass	
Cobalt	L24-Ma0049719	CP	%	97			75-125	Pass	
Copper	L24-Ma0049719	CP	%	96			75-125	Pass	
Lead	L24-Ma0049719	CP	%	100			75-125	Pass	
Manganese	L24-Ma0049719	CP	%	97			75-125	Pass	
Mercury	L24-Ma0049719	CP	%	98			75-125	Pass	
Nickel	L24-Ma0049719	CP	%	98			75-125	Pass	
Selenium	L24-Ma0049719	CP	%	97			75-125	Pass	
Zinc	L24-Ma0049719	CP	%	96			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L24-Ma0049734	CP	%	117			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L24-Ma0049734	CP	%	97			70-130	Pass	
Toluene	L24-Ma0049734	CP	%	97			70-130	Pass	
Ethylbenzene	L24-Ma0049734	CP	%	98			70-130	Pass	
m&p-Xylenes	L24-Ma0049734	CP	%	101			70-130	Pass	
o-Xylene	L24-Ma0049734	CP	%	96			70-130	Pass	
Xylenes - Total*	L24-Ma0049734	CP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L24-Ma0049734	CP	%	102			70-130	Pass	
TRH C6-C10	L24-Ma0049734	CP	%	91			70-130	Pass	
Spike - % Recovery									
OCOP in Soil				Result 1					
Aldrin	L24-Ma0049734	CP	%	90			60-120	Pass	
Dieldrin	L24-Ma0049734	CP	%	110			60-120	Pass	
p.p-DDT	L24-Ma0049734	CP	%	120			60-120	Pass	
Endrin	L24-Ma0049734	CP	%	103			60-120	Pass	
Heptachlor	L24-Ma0049734	CP	%	99			60-120	Pass	
Lindane	L24-Ma0049734	CP	%	112			60-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	L24-Ma0049743	CP	%	54			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L24-Ma0049743	CP	%	54			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L24-Ma0049743	CP	%	59			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L24-Ma0049743	CP	%	60			50-150	Pass	
Perfluorooctanoic acid (PFOA)	L24-Ma0049743	CP	%	65			50-150	Pass	
Perfluorononanoic acid (PFNA)	L24-Ma0049743	CP	%	61			50-150	Pass	
Perfluorodecanoic acid (PFDA)	L24-Ma0049743	CP	%	67			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L24-Ma0049743	CP	%	64			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L24-Ma0049743	CP	%	72			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L24-Ma0049743	CP	%	59			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L24-Ma0049743	CP	%	69			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	L24-Ma0049743	CP	%	64			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L24-Ma0049743	CP	%	57			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L24-Ma0049743	CP	%	63			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L24-Ma0049743	CP	%	54			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L24-Ma0049743	CP	%	62			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L24-Ma0049743	CP	%	66			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L24-Ma0049743	CP	%	64			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L24-Ma0049743	CP	%	67			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L24-Ma0049743	CP	%	64			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L24-Ma0049743	CP	%	61			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L24-Ma0049743	CP	%	55			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L24-Ma0049743	CP	%	52			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)*	L24-Ma0049743	CP	%	63			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)*	L24-Ma0049743	CP	%	59			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L24-Ma0049743	CP	%	68			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L24-Ma0049743	CP	%	52			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L24-Ma0049743	CP	%	68			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)	L24-Ma0049743	CP	%	63			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L24-Ma0049743	CP	%	64			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	L24-Ma0049769	CP	%	87			75-125	Pass	
Beryllium	L24-Ma0049769	CP	%	98			75-125	Pass	
Boron	L24-Ma0049769	CP	%	84			75-125	Pass	
Cadmium	L24-Ma0049769	CP	%	91			75-125	Pass	
Cobalt	L24-Ma0049769	CP	%	90			75-125	Pass	
Copper	L24-Ma0049769	CP	%	87			75-125	Pass	
Lead	L24-Ma0049769	CP	%	91			75-125	Pass	
Manganese	L24-Ma0049769	CP	%	90			75-125	Pass	
Mercury	L24-Ma0049769	CP	%	92			75-125	Pass	
Nickel	L24-Ma0049769	CP	%	90			75-125	Pass	
Selenium	L24-Ma0049769	CP	%	86			75-125	Pass	
Zinc	L24-Ma0049769	CP	%	91			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L24-Ma0050128	CP	%	120			70-130	Pass	
TRH C10-C14	L24-Ma0050128	CP	%	92			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L24-Ma0050128	CP	%	99			70-130	Pass	
Toluene	L24-Ma0050128	CP	%	100			70-130	Pass	
Ethylbenzene	L24-Ma0050128	CP	%	101			70-130	Pass	
m&p-Xylenes	L24-Ma0050128	CP	%	101			70-130	Pass	
o-Xylene	L24-Ma0050128	CP	%	99			70-130	Pass	
Xylenes - Total*	L24-Ma0050128	CP	%	100			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L24-Ma0050128	CP	%	99			70-130	Pass	
TRH C6-C10	L24-Ma0050128	CP	%	112			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L24-Ma0050128	CP	%	92			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049669	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049669	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049669	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049669	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049669	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049669	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049669	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049669	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049669	CP	mg/kg	< 20	< 20	<1	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0049669	CP	mg/kg	50	50	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0049669	CP	mg/kg	3.6	4.1	13	20%	Pass	
Nitrate-N	L24-Ma0049669	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0049669	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0049669	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049669	CP	pH Units	4.6	4.3	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049669	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049680	CP	pH Units	4.8	4.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049680	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphorus	L24-Ma0049683	CP	mg/kg	1300	1300	1.1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0049683	CP	mg/kg	2.4	2.4	1.1	30%	Pass	
Beryllium	L24-Ma0049683	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0049683	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0049683	CP	mg/kg	0.8	0.8	2.0	30%	Pass	
Cobalt	L24-Ma0049683	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0049683	CP	mg/kg	12	12	5.7	30%	Pass	
Lead	L24-Ma0049683	CP	mg/kg	4.2	4.4	4.6	30%	Pass	
Manganese	L24-Ma0049683	CP	mg/kg	14	15	6.1	30%	Pass	
Mercury	L24-Ma0049683	CP	mg/kg	0.03	0.03	1.7	30%	Pass	
Nickel	L24-Ma0049683	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0049683	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0049683	CP	mg/kg	15	17	13	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049687	CP	pH Units	5.8	5.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049687	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0049690	CP	%	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049694	CP	pH Units	6.0	6.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049694	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049696	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	L24-Ma0049696	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0049696	CP	mg/kg	< 50	59	20	30%	Pass	
TRH C29-C36	L24-Ma0049696	CP	mg/kg	98	120	16	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049696	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049696	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049696	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049696	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0049696	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0049696	CP	mg/kg	120	140	17	30%	Pass	
TRH >C34-C40	L24-Ma0049696	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0049696	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0049696	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0049696	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0049696	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0049696	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Diazinon	L24-Ma0049696	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0049696	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0049696	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0049696	CP	mg/kg	46	47	1.5	20%	Pass	
Chromium (VI)	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0049696	CP	mg/kg	2.1	2.1	2.3	20%	Pass	
Nitrate-N	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Total Kjeldahl Nitrogen	L24-Ma0049696	CP	mg/kg	2500	2900	15	20%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0049696	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0049696	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0049696	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0049696	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0049696	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0049696	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	L24-Ma0049696	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L24-Ma0049696	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0049696	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0049696	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049699	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	L24-Ma0049699	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0049699	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	L24-Ma0049699	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049699	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049699	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049699	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049699	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0049699	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0049699	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	L24-Ma0049699	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0049699	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0049699	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0049699	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0049699	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0049699	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Diazinon	L24-Ma0049699	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0049699	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0049699	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0049699	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049704	CP	pH Units	6.7	6.7	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049704	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0049710	CP	mg/kg	42	42	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0049710	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0049710	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0049710	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0049710	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049714	CP	pH Units	5.0	5.0	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049714	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0049724	CP	%	14	18	26	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049730	CP	pH Units	6.3	6.3	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049730	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049733	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049733	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049733	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049733	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049733	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049733	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049733	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049733	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049733	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0049733	CP	mg/kg	44	44	<1	20%	Pass	
Chromium (VI)	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Total Kjeldahl Nitrogen	L24-Ma0049733	CP	mg/kg	2900	2500	15	20%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0049733	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0049733	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0049733	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0049733	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0049733	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0049733	CP	mg/kg	2.1	2.1	2.6	30%	Pass	
Lead	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0049733	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	L24-Ma0049733	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L24-Ma0049733	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0049733	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0049733	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	L24-Ma0049734	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0049734	CP	mg/kg	68	79	<1	30%	Pass	
TRH C29-C36	L24-Ma0049734	CP	mg/kg	120	130	10	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0049734	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0049734	CP	mg/kg	150	170	13	30%	Pass	
TRH >C34-C40	L24-Ma0049734	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049741	CP	pH Units	4.8	4.8	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049741	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0049749	CP	mg/kg	42	37	12	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0049749	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0049749	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0049749	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0049749	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C10-C14	L24-Ma0049751	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0049751	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	L24-Ma0049751	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0049751	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0049751	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	L24-Ma0049751	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	L24-Ma0049752	CP	pH Units	5.3	5.3	pass	20%	Pass	
Reaction Ratings*	L24-Ma0049752	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0049754	CP	%	4.4	3.4	27	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L24-Ma0049754	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L24-Ma0049754	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L24-Ma0049754	CP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)*	L24-Ma0049754	CP	ug	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)*	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L24-Ma0049754	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0049763	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0049763	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0049763	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0049763	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0049763	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Diazinon	L24-Ma0049763	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0049763	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0049763	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0049763	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0049763	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0049763	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0049763	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0049763	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0049763	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0049763	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0049763	CP	mg/kg	2.0	1.9	5.2	30%	Pass	
Lead	L24-Ma0049763	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0049763	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	L24-Ma0049763	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L24-Ma0049763	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0049763	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0049763	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorotridecanoic acid (PFTrDA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L24-Ma0049764	CP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L24-Ma0049764	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L24-Ma0049764	CP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)*	L24-Ma0049764	CP	ug	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)*	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L24-Ma0049764	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049770	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	L24-Ma0049770	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L24-Ma0049770	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	L24-Ma0049770	CP	mg/kg	50	56	11	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049770	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049770	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049770	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049770	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L24-Ma0049770	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L24-Ma0049770	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	L24-Ma0049770	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
OCOP in Soil				Result 1	Result 2	RPD			
Aldrin	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
alpha-BHC (HCH)	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
beta-BHC (HCH)	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
delta-BHC (HCH)	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Bifenthrin	L24-Ma0049770	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bromophos Ethyl	L24-Ma0049770	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Chlordane	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlorpyrifos	L24-Ma0049770	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Dieldrin	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDD	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDE	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
p.p-DDT	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
o.p-DDT	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan Sulfate	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor Epoxide	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene (HCB)	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Lindane	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	L24-Ma0049770	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Oxychlordane	L24-Ma0049770	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Diazinon	L24-Ma0049770	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	L24-Ma0049770	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Fenitrothion	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Malathion	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Trifluralin	L24-Ma0049770	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (VI)	L24-Ma0049770	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Total Kjeldahl Nitrogen	L24-Ma0049770	CP	mg/kg	3300	3400	3.2	20%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0049770	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0049770	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0049770	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0049770	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0049770	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0049770	CP	mg/kg	1.9	2.1	11	30%	Pass	
Lead	L24-Ma0049770	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0049770	CP	mg/kg	14	16	9.9	30%	Pass	
Mercury	L24-Ma0049770	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L24-Ma0049770	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0049770	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0049770	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L24-Ma0049772	CP	%	3.1	2.4	25	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L24-Ma0049774	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L24-Ma0049774	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L24-Ma0049774	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L24-Ma0049774	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L24-Ma0049774	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L24-Ma0049774	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L24-Ma0049774	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L24-Ma0049774	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L24-Ma0049774	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia-N	L24-Ma0050128	CP	mg/kg	50	50	1.0	20%	Pass	
Filterable Reactive Phosphorus	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrate-N	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Nitrite-N	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	20%	Pass	
NOx-N	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	20%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L24-Ma0050128	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Beryllium	L24-Ma0050128	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	L24-Ma0050128	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Cadmium	L24-Ma0050128	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Cobalt	L24-Ma0050128	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Lead	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Manganese	L24-Ma0050128	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	L24-Ma0050128	CP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L24-Ma0050128	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Selenium	L24-Ma0050128	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Zinc	L24-Ma0050128	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Comments

NOTE: Acid sulphate sample bag not provided for Ma0049687, Ma0049690, Ma0049717, Ma0049719, Ma0049723, Ma0049733, Ma0049750, Ma0050218.

Glass jar has been used in place.

B14, B19E, and B6A added to Ma0049703 at client request

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G02	The LORs have been raised as there was insufficient sample provided for analysis
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Elden Garrett	Analytical Services Manager
Douglas Todd	Senior Analyst-Metal
Douglas Todd	Senior Analyst-Sample Properties
Kim Rodgers	Senior Analyst-Sample Properties
Patrick Patfield	Senior Analyst-Organic
Patrick Patfield	Senior Analyst-Volatile
Paul Nottle	Senior Analyst-Organic
Paul Nottle	Senior Analyst-PFAS
Rhys Thomas	Senior Analyst-Asbestos
Sam Becker	Senior Analyst-Inorganic
Sean Sangster	Senior Analyst-Metal



Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
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WA 6000

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: **Edvinder Singh**

Report **1084676-S**
Project name BEENYUP WIND FARM
Received Date Apr 03, 2024

Client Sample ID			**WM01 - 0.0**	**WM01 - 1.0**	**WM01 - 10.0**	**WM01 - 2.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ap0011899**	**L24-Ap0011900**	**L24-Ap0011901**	**L24-Ap0011902**
Date Sampled			**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**	**Feb 26, 2024**
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.4	5.2	5.2	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	10	10	8.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.018	0.017	0.016	0.014
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.8	1.2	26	2.4
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	23	16	340	32
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.038	0.026	0.55	0.051
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.0	3.4	2.4	3.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	0.53	0.05
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	330	32
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	320	23
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	0.52	0.04
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	0.014	0.006
Peroxide Extractable Sulfur	0.005	% S	0.019	0.009	0.54	0.043
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.019	0.009	0.53	0.037
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	12	5.6	330	23
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.030	0.010	< 0.005	< 0.005
Calcium - Peroxide	0.005	% Ca	0.033	0.012	0.007	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.007	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.006	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	3.4	< 0.005

Client Sample ID			WM01 - 0.0	WM01 - 1.0	WM01 - 10.0	WM01 - 2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011899	L24-Ap0011900	L24-Ap0011901	L24-Ap0011902
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.006	0.010
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.009	0.011
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	23	16	340	32
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	0.03	0.55	0.05
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.8	1.2	26	2.4
Extraneous Material						
<2mm Fraction	0.005	g	68	54	15	83
>2mm Fraction	0.005	g	0.72	0.48	0.63	1.5
Analysed Material	0.1	%	99	99	96	98
Extraneous Material	0.1	%	1.1	0.9	3.9	1.7

Client Sample ID			WM01 - 3.0	WM01 - 4.0	WM01 - 5.0	WM01 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011903	L24-Ap0011904	L24-Ap0011905	L24-Ap0011906
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	5.2	4.9	5.2
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	8.5	6.8	17	6.2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.014	0.011	0.027	0.010
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.0	4.6	10	10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	14	61	140	130
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.022	0.098	0.22	0.22
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.3	3.2	2.9	2.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	0.11	0.27	0.25
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	19	66	170	160
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	10	60	150	150
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	0.10	0.24	0.24
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.006	< 0.005	0.021	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.014	0.087	0.22	0.21
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.008	0.087	0.20	0.21
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	5.0	54	120	130

Client Sample ID			WM01 - 3.0	WM01 - 4.0	WM01 - 5.0	WM01 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011903	L24-Ap0011904	L24-Ap0011905	L24-Ap0011906
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 26, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Peroxide	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.018	0.010	0.010	0.008
Magnesium - Peroxide	0.005	% Mg	0.018	0.011	0.012	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	14	61	140	130
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.02	0.10	0.22	0.22
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.0	4.6	10	10
Extraneous Material						
<2mm Fraction	0.005	g	69	73	22	61
>2mm Fraction	0.005	g	6.5	4.3	< 0.005	3.9
Analysed Material	0.1	%	91	94	100	94
Extraneous Material	0.1	%	8.6	5.6	< 0.1	6.0

Client Sample ID			WM01 - 7.0	WM01 - 8.0	WM01 - 9.0	WM02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011907	L24-Ap0011908	L24-Ap0011909	L24-Ap0011910
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.2	5.1	5.0	7.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	6.6	9.8	20	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.011	0.016	0.033	< 0.003
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	7.7	7.0	8.3	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	100	94	110	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.17	0.15	0.18	< 0.02

Client Sample ID			WM01 - 7.0	WM01 - 8.0	WM01 - 9.0	WM02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011907	L24-Ap0011908	L24-Ap0011909	L24-Ap0011910
Date Sampled			Feb 26, 2024	Feb 26, 2024	Feb 26, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	3.2	3.2	3.4
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.20	0.18	0.29	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	130	110	180	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	120	100	160	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.19	0.16	0.26	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	0.007
Peroxide Extractable Sulfur	0.005	% S	0.15	0.13	0.14	0.032
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.15	0.13	0.14	0.025
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	97	84	90	16
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	< 0.005	< 0.005	0.010	0.12
Calcium - Peroxide	0.005	% Ca	< 0.005	< 0.005	0.011	0.14
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	0.018
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	0.014
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	8.9
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.009	0.012	0.029	0.008
Magnesium - Peroxide	0.005	% Mg	0.011	0.014	0.031	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	100	94	110	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.17	0.15	0.18	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	7.7	7.0	8.3	< 1
Extraneous Material						
<2mm Fraction	0.005	g	48	25	26	76
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	5.9
Analysed Material	0.1	%	100	100	100	93
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	7.2

Client Sample ID			WM02 - 1.0	WM02 - 10.0	WM02 - 2.0	WM02 - 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011911	L24-Ap0011912	L24-Ap0011913	L24-Ap0011914
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.3	4.6	6.1	5.1
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	7.0	76	5.8	6.5
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.011	0.12	0.009	0.010
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.0	67	1.0	5.1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	13	900	13	0.11
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.021	1.4	0.022	68
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.2	2.2	6.3	2.8
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	1.4	< 0.02	0.15
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	18	900	7.0	94
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	11	820	< 2	87
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	1.3	< 0.02	0.14
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.008	0.093	0.024	0.017
Peroxide Extractable Sulfur	0.005	% S	0.018	1.4	0.037	0.12
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.010	1.3	0.012	0.099
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	6.3	820	7.7	62
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.007	0.027	0.007	0.016
Calcium - Peroxide	0.005	% Ca	0.008	0.11	0.008	0.019
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.083	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.066	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	41	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.026	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.033	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	0.007	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.009	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	5.5	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	13	900	13	68
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.02	1.4	0.02	0.11
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	< 1	67	1.0	5.1

Client Sample ID			WM02 - 1.0	WM02 - 10.0	WM02 - 2.0	WM02 - 2.75
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011911	L24-Ap0011912	L24-Ap0011913	L24-Ap0011914
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	15	10	22	67
>2mm Fraction	0.005	g	< 0.005	< 0.005	1.8	< 0.005
Analysed Material	0.1	%	100	100	92	100
Extraneous Material	0.1	%	< 0.1	< 0.1	7.5	< 0.1

Client Sample ID			WM02 - 3.0	WM02 - 4.0	WM02 - 5.0	WM02 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011915	L24-Ap0011916	L24-Ap0011917	L24-Ap0011918
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	5.2	4.7	4.9
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	12	13	33	19
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.019	0.021	0.054	0.030
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	6.5	14	33	28
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	87	180	440	370
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.14	0.29	0.70	0.60
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	2.6	2.3	2.2
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.20	0.39	0.81	0.64
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	120	240	510	400
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	110	230	470	380
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.18	0.37	0.76	0.61
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	0.006	0.030	0.019
Peroxide Extractable Sulfur	0.005	% S	0.13	0.28	0.68	0.59
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.12	0.27	0.65	0.57
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	75	170	410	360
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.006	0.018	0.006	0.012
Calcium - Peroxide	0.005	% Ca	0.008	0.020	0.007	0.013
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			WM02 - 3.0	WM02 - 4.0	WM02 - 5.0	WM02 - 6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011915	L24-Ap0011916	L24-Ap0011917	L24-Ap0011918
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.006	0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.4	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	87	180	440	370
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.14	0.29	0.70	0.60
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	6.5	14	33	28
Extraneous Material						
<2mm Fraction	0.005	g	16	28	22	11
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			WM02 - 7.0	WM02 - 8.0	WM02 - 9.0	WM03 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011919	L24-Ap0011920	L24-Ap0011921	L24-Ap0011922
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	4.6	4.4	5.2
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	26	110	30
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.017	0.041	0.18	0.048
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	13	23	98	6.3
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	180	300	1300	84
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.29	0.48	2.1	0.13
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.4	2.1	1.9	2.5
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.32	0.54	2.2	1.2
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	200	340	1400	720
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	190	310	1300	690
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.30	0.50	2.0	1.1
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.011	0.031	0.13	0.006
Peroxide Extractable Sulfur	0.005	% S	0.28	0.47	2.0	0.092
HCl Extractable Sulfur	0.005	% S	N/A	N/A	0.14	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.27	0.44	1.9	0.086
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	170	270	1200	54

Client Sample ID			WM02 - 7.0	WM02 - 8.0	WM02 - 9.0	WM03 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011919	L24-Ap0011920	L24-Ap0011921	L24-Ap0011922
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	0.023	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	0.017	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	11	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.011	0.007	0.021	0.19
Calcium - Peroxide	0.005	% Ca	0.012	0.008	0.030	0.21
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.009	0.027
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	0.021
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.5	13
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.007	0.030	0.021
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.008	0.033	0.023
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	180	300	1300	84
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.29	0.48	2.1	0.13
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	13	23	98	6.3
Extraneous Material						
<2mm Fraction	0.005	g	12	13	15	110
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	2.0
Analysed Material	0.1	%	100	100	100	98
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	1.7

Client Sample ID			WM03 - 0.25	WM03 - 1.0	WM03 - 10.0	WM03 - 3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011923	L24-Ap0011924	L24-Ap0011925	L24-Ap0011926
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.1	5.7	4.7	5.8
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	31	16	37	11
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.050	0.026	0.060	0.018
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	9.6	1.8	26	3.0
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	130	24	350	40
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.20	0.039	0.56	0.064

Client Sample ID			WM03 - 0.25	WM03 - 1.0	WM03 - 10.0	WM03 - 3.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011923	L24-Ap0011924	L24-Ap0011925	L24-Ap0011926
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.7	4.8	2.7	4.1
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.32	0.06	0.69	0.09
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	200	35	430	55
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	170	18	390	44
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.27	0.03	0.63	0.07
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.016	0.071	0.021	0.024
Peroxide Extractable Sulfur	0.005	% S	0.17	0.083	0.52	0.070
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.15	0.012	0.50	0.046
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	96	7.7	310	29
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.072	0.012	0.007	< 0.005
Calcium - Peroxide	0.005	% Ca	0.076	0.014	0.009	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.011	< 0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.012	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.2	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	130	24	350	40
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.20	0.04	0.56	0.06
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	9.6	1.8	26	3.0
Extraneous Material						
<2mm Fraction	0.005	g	10	36	33	31
>2mm Fraction	0.005	g	< 0.005	12	< 0.005	2.0
Analysed Material	0.1	%	100	75	100	94
Extraneous Material	0.1	%	< 0.1	25	< 0.1	6.1

Client Sample ID			WM03 - 3.50	WM03 - 5.0	WM03 - 6.0	WM03 - 7.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011927	L24-Ap0011928	L24-Ap0011929	L24-Ap0011930
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	5.6	5.0	4.7
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	20	8.9	9.8	100
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.033	0.014	0.016	0.16
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	12	6.0	9.2	48
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	160	80	120	640
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.26	0.13	0.20	1.0
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.7	3.8	2.6	3.0
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.33	0.16	0.24	1.4
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	210	100	150	860
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	190	92	140	760
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.30	0.15	0.22	1.2
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	0.011	0.008	0.037
Peroxide Extractable Sulfur	0.005	% S	0.24	0.13	0.19	0.90
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.23	0.11	0.18	0.86
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	140	71	110	540
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.007	0.016	0.010	0.013
Calcium - Peroxide	0.005	% Ca	0.008	0.018	0.011	0.014
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	< 0.005	0.009
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	< 0.005	0.009
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	160	80	120	640
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.26	0.13	0.20	1.0
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	12	6.0	9.2	48

Client Sample ID			WM03 - 3.50	WM03 - 5.0	WM03 - 6.0	WM03 - 7.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011927	L24-Ap0011928	L24-Ap0011929	L24-Ap0011930
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	71	12	15	38
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			WM03 - 8.0	WM03 - 9.0	WM03 - 4.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011931	L24-Ap0011932	L24-Ap0011933
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Actual Acidity (NLM-3.2)					
pH-KCL (NLM-3.1)	0.1	pH Units	4.5	4.7	4.7
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	89	35	26
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.14	0.055	0.041
SPOCAS Suite - WA (Excluding ANC)					
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	42	23	18
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	560	310	240
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.90	0.50	0.39
Potential Acidity - Titratable Peroxide					
pH-OX	0.1	pH Units	2.6	2.7	2.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	1.1	0.61	0.45
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	680	380	280
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	590	350	260
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.95	0.55	0.41
Extractable Sulfur					
Sulfur - KCl Extractable	0.005	% S	0.073	0.028	0.017
Peroxide Extractable Sulfur	0.005	% S	0.83	0.47	0.37
HCl Extractable Sulfur	0.005	% S	0.071	N/A	N/A
Potential Acidity (SPOS)					
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.76	0.44	0.35
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	470	280	220
Retained Acidity (S-NAS)					
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	< 0.005	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	< 0.005	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	< 2	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
Extractable Calcium					
Calcium - KCl Extractable	0.005	% Ca	< 0.005	0.007	0.006
Calcium - Peroxide	0.005	% Ca	0.006	0.008	0.008
Calcium - Acid Reacted	0.005	% Ca	0.006	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	2.9	< 0.005	< 0.005

Client Sample ID			WM03 - 8.0	WM03 - 9.0	WM03 - 4.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011931	L24-Ap0011932	L24-Ap0011933
Date Sampled			Feb 29, 2024	Feb 29, 2024	Feb 29, 2024
Test/Reference	LOR	Unit			
Extractable Magnesium					
Magnesium - KCl Extractable	0.005	% Mg	0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.005	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)					
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)					
ANC Fineness Factor		factor	1.5	1.5	1.5
Net Acidity (Including ANC)					
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	560	310	240
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.90	0.50	0.39
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	42	23	18
Extraneous Material					
<2mm Fraction	0.005	g	55	40	16
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite - WA (Excluding ANC)			
SPOCAS Suite - WA (Excluding ANC)	Brisbane	Apr 10, 2024	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Apr 10, 2024	6 Week
- Method: LTM-GEN-7050/7070			

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Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084676
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	WM01 - 0.0	Feb 26, 2024		Soil	L24-Ap0011899	X	X
2	WM01 - 1.0	Feb 26, 2024		Soil	L24-Ap0011900	X	X
3	WM01 - 10.0	Feb 26, 2024		Soil	L24-Ap0011901	X	X
4	WM01 - 2.0	Feb 26, 2024		Soil	L24-Ap0011902	X	X
5	WM01 - 3.0	Feb 26, 2024		Soil	L24-Ap0011903	X	X
6	WM01 - 4.0	Feb 26, 2024		Soil	L24-Ap0011904	X	X
7	WM01 - 5.0	Feb 26, 2024		Soil	L24-Ap0011905	X	X
8	WM01 - 6.0	Feb 26, 2024		Soil	L24-Ap0011906	X	X
9	WM01 - 7.0	Feb 26, 2024		Soil	L24-Ap0011907	X	X
10	WM01 - 8.0	Feb 26, 2024		Soil	L24-Ap0011908	X	X
11	WM01 - 9.0	Feb 26, 2024		Soil	L24-Ap0011909	X	X
12	WM02 - 0.0	Feb 28, 2024		Soil	L24-Ap0011910	X	X
13	WM02 - 1.0	Feb 28, 2024		Soil	L24-Ap0011911	X	X
14	WM02 - 10.0	Feb 28, 2024		Soil	L24-Ap0011912	X	X

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Company Name: Stantec Australia Pty Ltd (WA)
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Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084676
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
15	WM02 - 2.0	Feb 28, 2024		Soil	L24-Ap0011913	X	X
16	WM02 - 2.75	Feb 28, 2024		Soil	L24-Ap0011914	X	X
17	WM02 - 3.0	Feb 28, 2024		Soil	L24-Ap0011915	X	X
18	WM02 - 4.0	Feb 28, 2024		Soil	L24-Ap0011916	X	X
19	WM02 - 5.0	Feb 28, 2024		Soil	L24-Ap0011917	X	X
20	WM02 - 6.0	Feb 28, 2024		Soil	L24-Ap0011918	X	X
21	WM02 - 7.0	Feb 28, 2024		Soil	L24-Ap0011919	X	X
22	WM02 - 8.0	Feb 28, 2024		Soil	L24-Ap0011920	X	X
23	WM02 - 9.0	Feb 28, 2024		Soil	L24-Ap0011921	X	X
24	WM03 - 0.0	Feb 29, 2024		Soil	L24-Ap0011922	X	X
25	WM03 - 0.25	Feb 29, 2024		Soil	L24-Ap0011923	X	X
26	WM03 - 1.0	Feb 29, 2024		Soil	L24-Ap0011924	X	X
27	WM03 - 10.0	Feb 29, 2024		Soil	L24-Ap0011925	X	X
28	WM03 - 3.0	Feb 29, 2024		Soil	L24-Ap0011926	X	X
29	WM03 - 3.50	Feb 29, 2024		Soil	L24-Ap0011927	X	X
30	WM03 - 5.0	Feb 29, 2024		Soil	L24-Ap0011928	X	X

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Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
31	WM03 - 6.0	Feb 29, 2024		Soil	L24-Ap0011929	X	X
32	WM03 - 7.0	Feb 29, 2024		Soil	L24-Ap0011930	X	X
33	WM03 - 8.0	Feb 29, 2024		Soil	L24-Ap0011931	X	X
34	WM03 - 9.0	Feb 29, 2024		Soil	L24-Ap0011932	X	X
35	WM03 - 4.0	Feb 29, 2024		Soil	L24-Ap0011933	X	X
Test Counts						35	35

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	95			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	108			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	95			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	108			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011903	CP	pH Units	5.0	5.1	2.1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011903	CP	mol H+/t	8.5	7.0	19	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011903	CP	% pyrite S	0.014	0.011	19	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011903	CP	pH Units	4.3	4.3	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011903	CP	% pyrite S	0.03	0.03	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011903	CP	mol H+/t	19	19	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011903	CP	% S	0.006	0.005	14	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011903	CP	% S	0.014	0.013	7.7	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011903	CP	% S	0.008	0.008	3.6	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011903	CP	mol H+/t	5.0	4.9	3.6	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011903	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011903	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011903	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011903	CP	% Mg	0.018	0.018	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011903	CP	% Mg	0.018	0.018	2.8	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011903	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011903	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011903	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011903	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011913	CP	pH Units	6.1	6.1	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011913	CP	mol H+/t	5.8	5.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011913	CP	% pyrite S	0.009	0.009	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011913	CP	pH Units	6.3	6.3	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011913	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011913	CP	mol H+/t	7.0	6.8	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011913	CP	% S	0.024	0.025	2.0	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011913	CP	% S	0.037	0.036	2.8	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011913	CP	% S	0.012	0.011	13	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011913	CP	mol H+/t	7.7	6.8	13	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011913	CP	% Ca	0.007	0.007	3.7	30%	Pass	
Calcium - Peroxide	L24-Ap0011913	CP	% Ca	0.008	0.008	2.0	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011913	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011913	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011913	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011913	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011913	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011913	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011913	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011924	CP	pH Units	5.7	5.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011924	CP	mol H+/t	16	15	10	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011924	CP	% pyrite S	0.026	0.024	10	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011924	CP	pH Units	4.8	4.8	1.2	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011924	CP	% pyrite S	0.06	0.05	4.2	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011924	CP	mol H+/t	35	33	4.2	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011924	CP	% S	0.071	0.070	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011924	CP	% S	0.083	0.082	1.8	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011924	CP	% S	0.012	0.012	6.8	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011924	CP	mol H+/t	7.7	7.2	6.8	30%	Pass	

Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011924	CP	% Ca	0.012	0.012	1.8	30%	Pass	
Calcium - Peroxide	L24-Ap0011924	CP	% Ca	0.014	0.013	5.9	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011924	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011924	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011924	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011924	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011924	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011924	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011924	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011933	CP	pH Units	4.7	4.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011933	CP	mol H+/t	26	25	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011933	CP	% pyrite S	0.041	0.041	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011933	CP	pH Units	2.6	2.6	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011933	CP	% pyrite S	0.45	0.45	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011933	CP	mol H+/t	280	280	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011933	CP	% S	0.017	0.017	1.4	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011933	CP	% S	0.37	0.38	2.5	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011933	CP	% S	0.35	0.36	2.7	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011933	CP	mol H+/t	220	230	2.7	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011933	CP	% Ca	0.006	0.006	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011933	CP	% Ca	0.008	0.009	17	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011933	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011933	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011933	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011933	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011933	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011933	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011933	CP	factor	1.5	1.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Elden Garrett	Analytical Services Manager
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Attention: **Edvinder Singh**

Report **1084649-S**
Project name BEENYUP WIND FARM
Received Date Apr 03, 2024

Client Sample ID			**TP01 - 0.0**	**TP01 - 1.0**	**TP01 - 2.0**	**TP02 - 0.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L24-Ap0011751**	**L24-Ap0011752**	**L24-Ap0011753**	**L24-Ap0011754**
Date Sampled			**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**	**Mar 14, 2024**
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.6	5.1	4.7	5.0
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	47	8.9	38	21
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.075	0.014	0.060	0.034
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	4.6	< 1	4.5	2.7
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	61	< 10	61	36
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.098	< 0.02	0.097	0.058
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.9	3.5	2.6	2.7
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.13	< 0.02	0.10	0.03
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	84	4.8	63	16
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	37	< 2	25	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.06	< 0.02	0.04	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.008	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.031	< 0.005	0.037	0.024
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.024	< 0.005	0.037	0.024
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	15	< 2	23	15
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.021	< 0.005	0.008	0.041
Calcium - Peroxide	0.005	% Ca	0.027	< 0.005	0.011	0.050
Calcium - Acid Reacted	0.005	% Ca	0.006	< 0.005	< 0.005	0.009
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	0.007
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	2.8	< 0.005	< 0.005	4.4

Client Sample ID			TP01 - 0.0	TP01 - 1.0	TP01 - 2.0	TP02 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011751	L24-Ap0011752	L24-Ap0011753	L24-Ap0011754
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.010	< 0.005	0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.011	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	61	< 10	61	36
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.10	< 0.02	0.10	0.06
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	4.6	< 1	4.5	2.7
Extraneous Material						
<2mm Fraction	0.005	g	91	200	160	170
>2mm Fraction	0.005	g	9.6	0.66	2.2	0.44
Analysed Material	0.1	%	91	100	99	100
Extraneous Material	0.1	%	9.5	0.3	1.3	0.3

Client Sample ID			TP02 - 0.75	TP02 - 1.0	TP03 - 0.0	TP03 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011755	L24-Ap0011756	L24-Ap0011757	L24-Ap0011758
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.1	4.8	6.9	5.6
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	22	48	< 2	3.2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.034	0.076	< 0.003	0.005
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	2.0	4.2	< 1	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	27	56	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.043	0.089	< 0.02	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.7	4.2	6.5	4.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.03	0.14	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	20	85	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	38	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	0.06	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.009	0.013	0.024	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.009	0.013	0.018	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	5.5	8.0	12	< 2

Client Sample ID			TP02 - 0.75	TP02 - 1.0	TP03 - 0.0	TP03 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011755	L24-Ap0011756	L24-Ap0011757	L24-Ap0011758
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.005	< 0.005	0.13	0.017
Calcium - Peroxide	0.005	% Ca	0.007	0.006	0.13	0.020
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.006	0.006	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	3.1	2.9	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.009	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	27	56	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	0.09	< 0.02	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	2.0	4.2	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	150	240	150	150
>2mm Fraction	0.005	g	< 0.005	0.47	86	< 0.005
Analysed Material	0.1	%	100	100	64	100
Extraneous Material	0.1	%	< 0.1	0.2	36	< 0.1

Client Sample ID			TP04 - 0.0	TP05 - 0.0	TP06 - 0.0	TP06 - 0.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011759	L24-Ap0011760	L24-Ap0011761	L24-Ap0011762
Date Sampled			Mar 12, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.2	5.3	4.8	5.6
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	18	14	36	3.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.028	0.022	0.058	0.006
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	2.7	3.6	5.0	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	37	48	67	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.059	0.076	0.11	< 0.02

Client Sample ID			TP04 - 0.0	TP05 - 0.0	TP06 - 0.0	TP06 - 0.50
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011759	L24-Ap0011760	L24-Ap0011761	L24-Ap0011762
Date Sampled			Mar 12, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	5.7	6.2	2.5	3.9
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.030	0.054	0.050	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.030	0.054	0.050	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	19	34	31	< 2
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.082	0.10	0.099	0.012
Calcium - Peroxide	0.005	% Ca	0.063	0.046	0.11	0.014
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.007	0.007	0.012	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.007	0.013	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	37	48	67	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.06	0.08	0.11	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	2.7	3.6	5.0	< 1
Extraneous Material						
<2mm Fraction	0.005	g	88	140	98	130
>2mm Fraction	0.005	g	37	3.5	1.1	0.53
Analysed Material	0.1	%	70	98	99	100
Extraneous Material	0.1	%	30	2.4	1.1	0.4

Client Sample ID			TP07 - 0.0	TP07 - 1.0	TP08 - 0.0	TP08 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011763	L24-Ap0011764	L24-Ap0011765	L24-Ap0011766
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	6.3	6.0	5.4	5.5
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	2.4	< 2	7.9	5.7
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.004	< 0.003	0.013	0.009
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	3.2	< 1	1.7	1.1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	43	< 10	22	14
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.069	< 0.02	0.035	0.023
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.0	4.4	2.9	3.6
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.065	< 0.005	0.023	0.014
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.065	< 0.005	0.023	0.014
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	41	< 2	14	8.6
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.22	0.009	0.030	0.011
Calcium - Peroxide	0.005	% Ca	0.25	0.011	0.034	0.013
Calcium - Acid Reacted	0.005	% Ca	0.034	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	0.027	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	17	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.010	< 0.005	0.006	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.010	< 0.005	0.007	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	43	< 10	22	14
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.07	< 0.02	0.04	0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	3.2	< 1	1.7	1.1

Client Sample ID			TP07 - 0.0	TP07 - 1.0	TP08 - 0.0	TP08 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011763	L24-Ap0011764	L24-Ap0011765	L24-Ap0011766
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 12, 2024	Mar 12, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	130	170	140	180
>2mm Fraction	0.005	g	0.62	0.35	0.10	0.42
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	0.5	0.2	< 0.1	0.2

Client Sample ID			TP08 - 2.0	TP09 - 0.0	TP11 - 0.0	TP11 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011767	L24-Ap0011768	L24-Ap0011769	L24-Ap0011770
Date Sampled			Mar 12, 2024	Mar 12, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.5	5.4	5.9	6.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	9.5	20	4.3	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.015	0.032	0.007	< 0.003
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	3.5	4.3	2.3	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	46	57	31	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.074	0.091	0.049	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.8	2.9	3.0	4.8
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.05	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	30	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	20	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.03	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.007	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.066	0.059	0.042	0.006
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.059	0.059	0.042	0.006
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	37	37	26	3.7
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.030	0.16	0.087	0.023
Calcium - Peroxide	0.005	% Ca	0.033	0.16	0.096	0.025
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.008	0.009	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.006	0.007	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	4.0	4.6	< 0.005

Client Sample ID			TP08 - 2.0	TP09 - 0.0	TP11 - 0.0	TP11 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011767	L24-Ap0011768	L24-Ap0011769	L24-Ap0011770
Date Sampled			Mar 12, 2024	Mar 12, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit				
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.007	0.008	0.007	< 0.005
Magnesium - Peroxide	0.005	% Mg	0.008	0.007	0.008	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	46	57	31	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.07	0.09	0.05	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	3.5	4.3	2.3	< 1
Extraneous Material						
<2mm Fraction	0.005	g	190	82	130	140
>2mm Fraction	0.005	g	0.62	< 0.005	0.40	2.3
Analysed Material	0.1	%	100	100	100	98
Extraneous Material	0.1	%	0.3	< 0.1	0.3	1.6

Client Sample ID			TP11 - 2.0	TP12 - 0.0	TP13 - 0.0	TP13 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011771	L24-Ap0011772	L24-Ap0011773	L24-Ap0011774
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.0	6.0	6.7	5.4
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	31	4.6	< 2	4.0
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.049	0.007	< 0.003	0.006
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	12	1.8	1.2	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	160	24	17	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.26	0.039	0.027	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	3.3	6.2	3.2	3.3
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.41	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	260	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	230	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.36	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.006	< 0.005	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.22	0.032	0.080	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.21	0.032	0.080	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	130	20	50	< 2

Client Sample ID			TP11 - 2.0	TP12 - 0.0	TP13 - 0.0	TP13 - 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011771	L24-Ap0011772	L24-Ap0011773	L24-Ap0011774
Date Sampled			Mar 14, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.014	0.11	0.35	0.007
Calcium - Peroxide	0.005	% Ca	0.016	0.060	0.43	0.008
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	0.072	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.058	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	36	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	0.031	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	0.037	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	0.006	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	0.008	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	4.7	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	160	24	17	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.26	0.04	0.03	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	12	1.8	1.2	< 1
Extraneous Material						
<2mm Fraction	0.005	g	240	100	100	150
>2mm Fraction	0.005	g	4.4	< 0.005	1.5	0.70
Analysed Material	0.1	%	98	100	99	100
Extraneous Material	0.1	%	1.8	< 0.1	1.4	0.5

Client Sample ID			TP13 - 2.0	TP14 - 0.0	TP14 - 0.25	TP15 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011775	L24-Ap0011776	L24-Ap0011777	L24-Ap0011778
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.3	5.2	5.4	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	110	14	5.5	14
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.17	0.023	0.009	0.022
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	13	3.4	< 1	3.0
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	180	45	13	40
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.29	0.072	0.021	0.065

Client Sample ID			TP13 - 2.0	TP14 - 0.0	TP14 - 0.25	TP15 - 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011775	L24-Ap0011776	L24-Ap0011777	L24-Ap0011778
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	2.2	2.7	3.1	2.9
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	0.49	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	310	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	200	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	0.32	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	< 0.005	< 0.005	0.012
Peroxide Extractable Sulfur	0.005	% S	0.11	0.049	0.012	0.055
HCl Extractable Sulfur	0.005	% S	< 0.005	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.11	0.049	0.012	0.043
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	69	30	7.5	27
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.006	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	< 0.005	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	2.8	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.021	0.053	0.016	0.065
Calcium - Peroxide	0.005	% Ca	0.031	0.066	0.019	0.072
Calcium - Acid Reacted	0.005	% Ca	0.010	0.013	< 0.005	0.006
Calcium - Acid Reacted (s-aCa)	0.005	% S	0.008	0.011	< 0.005	0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	4.9	6.6	< 0.005	3.1
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	0.009	0.006	< 0.005	0.005
Magnesium - Peroxide	0.005	% Mg	0.010	0.007	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	180	45	13	40
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.29	0.07	0.02	0.07
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	13	3.4	< 1	3.0
Extraneous Material						
<2mm Fraction	0.005	g	160	160	160	150
>2mm Fraction	0.005	g	0.58	2.1	4.3	1.9
Analysed Material	0.1	%	100	99	97	99
Extraneous Material	0.1	%	0.4	1.3	2.6	1.3

Client Sample ID			TP15 - 0.75	TP15 - 1.0	TP17 - 0.0	TP17 - 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011779	L24-Ap0011780	L24-Ap0011781	L24-Ap0011782
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.8	6.1	5.4	5.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	3.6	3.2	11	5.6
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.006	0.005	0.018	0.009
SPOCAS Suite - WA (Excluding ANC)						
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	< 1	< 1	2.5	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	< 10	< 10	33	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	< 0.02	< 0.02	0.053	< 0.02
Potential Acidity - Titratable Peroxide						
pH-OX	0.1	pH Units	4.1	4.3	3.0	3.5
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	3.5	3.6	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.009	0.018	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.013	0.025	0.034	< 0.005
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Potential Acidity (SPOS)						
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	< 0.005	0.007	0.034	< 0.005
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	< 2	4.4	21	< 2
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Extractable Calcium						
Calcium - KCl Extractable	0.005	% Ca	0.006	0.007	0.036	< 0.005
Calcium - Peroxide	0.005	% Ca	0.007	0.008	0.038	< 0.005
Calcium - Acid Reacted	0.005	% Ca	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Extractable Magnesium						
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)						
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	< 10	< 10	33	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	< 0.02	< 0.02	0.05	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	< 1	< 1	2.5	< 1

Client Sample ID			TP15 - 0.75	TP15 - 1.0	TP17 - 0.0	TP17 - 0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011779	L24-Ap0011780	L24-Ap0011781	L24-Ap0011782
Date Sampled			Mar 13, 2024	Mar 13, 2024	Mar 13, 2024	Mar 13, 2024
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	140	150	150	160
>2mm Fraction	0.005	g	9.6	210	1.2	2.0
Analysed Material	0.1	%	94	41	99	99
Extraneous Material	0.1	%	6.3	59	0.8	1.2

Client Sample ID			TP18 - 0.0	TP19 - 0.0	TP19 - 0.50
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011783	L24-Ap0011784	L24-Ap0011785
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit			
Actual Acidity (NLM-3.2)					
pH-KCL (NLM-3.1)	0.1	pH Units	5.4	7.1	5.9
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	11	< 2	2.4
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.018	< 0.003	0.004
SPOCAS Suite - WA (Excluding ANC)					
SPOCAS - Liming rate - ASSMAC (Excluding ANC)		kg CaCO3/t	1.8	< 1	< 1
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		mol H+/t	24	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Excluding ANC)		% S	0.039	< 0.02	< 0.02
Potential Acidity - Titratable Peroxide					
pH-OX	0.1	pH Units	3.9	3.2	3.1
Titratable Peroxide Acidity (s-TPA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02
Titratable Peroxide Acidity (a-TPA)	2	mol H+/t	< 2	< 2	< 2
Titratable Sulfidic Acidity (a-TSA)	2	mol H+/t	< 2	< 2	< 2
Titratable Sulfidic Acidity (s-TSA)	0.02	% pyrite S	< 0.02	< 0.02	< 0.02
Extractable Sulfur					
Sulfur - KCl Extractable	0.005	% S	0.018	< 0.005	< 0.005
Peroxide Extractable Sulfur	0.005	% S	0.039	0.042	0.007
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A
Potential Acidity (SPOS)					
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	0.005	% S	0.021	0.042	0.007
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	2	mol H+/t	13	26	4.2
Retained Acidity (S-NAS)					
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[SO2]	0.005	% S	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
Extractable Calcium					
Calcium - KCl Extractable	0.005	% Ca	0.026	0.26	0.031
Calcium - Peroxide	0.005	% Ca	0.030	0.30	0.034
Calcium - Acid Reacted	0.005	% Ca	< 0.005	0.046	< 0.005
Calcium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	0.037	< 0.005
Calcium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	23	< 0.005

Client Sample ID			TP18 - 0.0	TP19 - 0.0	TP19 - 0.50
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			L24-Ap0011783	L24-Ap0011784	L24-Ap0011785
Date Sampled			Mar 14, 2024	Mar 14, 2024	Mar 14, 2024
Test/Reference	LOR	Unit			
Extractable Magnesium					
Magnesium - KCl Extractable	0.005	% Mg	< 0.005	0.010	< 0.005
Magnesium - Peroxide	0.005	% Mg	< 0.005	0.011	< 0.005
Magnesium - Acid Reacted	0.005	% Mg	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (s-aCa)	0.005	% S	< 0.005	< 0.005	< 0.005
Magnesium - Acid Reacted (a-aCa)	0.005	mol H+/t	< 0.005	< 0.005	< 0.005
Acid Neutralising Capacity (ANCE)					
Acid Neutralising Capacity - (ANCE)	0.02	% CaCO3	N/A	N/A	N/A
Acid Neutralising Capacity - (s-ANCE)	0.02	% S	N/A	N/A	N/A
Acid Neutralising Capacity - (a-ANCE)	10	mol H+/t	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)					
ANC Fineness Factor		factor	1.5	1.5	1.5
Net Acidity (Including ANC)					
SPOCAS - Net Acidity - ASSMAC (Acidity Units)	10	mol H+/t	24	< 10	< 10
SPOCAS - Net Acidity - ASSMAC (Sulfur Units)	0.02	% S	0.04	< 0.02	< 0.02
SPOCAS - Liming rate - ASSMAC	1	kg CaCO3/t	1.8	< 1	< 1
Extraneous Material					
<2mm Fraction	0.005	g	140	110	140
>2mm Fraction	0.005	g	8.5	0.84	0.66
Analysed Material	0.1	%	94	99	100
Extraneous Material	0.1	%	5.8	0.7	0.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite - WA (Excluding ANC)			
SPOCAS Suite - WA (Excluding ANC)	Brisbane	Apr 11, 2024	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Apr 11, 2024	6 Week
- Method: LTM-GEN-7050/7070			

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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
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WA 6000

Project Name: BEENYUP WIND FARM

Order No.:
Report #: 1084649
Phone: 0458 839 200
Fax:

Received: Apr 3, 2024 5:46 PM
Due: Apr 11, 2024
Priority: 5 Day
Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	TP01 - 0.0	Mar 14, 2024		Soil	L24-Ap0011751	X	X
2	TP01 - 1.0	Mar 14, 2024		Soil	L24-Ap0011752	X	X
3	TP01 - 2.0	Mar 14, 2024		Soil	L24-Ap0011753	X	X
4	TP02 - 0.0	Mar 14, 2024		Soil	L24-Ap0011754	X	X
5	TP02 - 0.75	Mar 14, 2024		Soil	L24-Ap0011755	X	X
6	TP02 - 1.0	Mar 14, 2024		Soil	L24-Ap0011756	X	X
7	TP03 - 0.0	Mar 12, 2024		Soil	L24-Ap0011757	X	X
8	TP03 - 1.0	Mar 12, 2024		Soil	L24-Ap0011758	X	X
9	TP04 - 0.0	Mar 12, 2024		Soil	L24-Ap0011759	X	X
10	TP05 - 0.0	Mar 13, 2024		Soil	L24-Ap0011760	X	X
11	TP06 - 0.0	Mar 13, 2024		Soil	L24-Ap0011761	X	X
12	TP06 - 0.50	Mar 13, 2024		Soil	L24-Ap0011762	X	X
13	TP07 - 0.0	Mar 14, 2024		Soil	L24-Ap0011763	X	X
14	TP07 - 1.0	Mar 14, 2024		Soil	L24-Ap0011764	X	X

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Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
15	TP08 - 0.0	Mar 12, 2024		Soil	L24-Ap0011765	X	X
16	TP08 - 1.0	Mar 12, 2024		Soil	L24-Ap0011766	X	X
17	TP08 - 2.0	Mar 12, 2024		Soil	L24-Ap0011767	X	X
18	TP09 - 0.0	Mar 12, 2024		Soil	L24-Ap0011768	X	X
19	TP11 - 0.0	Mar 14, 2024		Soil	L24-Ap0011769	X	X
20	TP11 - 1.0	Mar 14, 2024		Soil	L24-Ap0011770	X	X
21	TP11 - 2.0	Mar 14, 2024		Soil	L24-Ap0011771	X	X
22	TP12 - 0.0	Mar 13, 2024		Soil	L24-Ap0011772	X	X
23	TP13 - 0.0	Mar 13, 2024		Soil	L24-Ap0011773	X	X
24	TP13 - 1.0	Mar 13, 2024		Soil	L24-Ap0011774	X	X
25	TP13 - 2.0	Mar 13, 2024		Soil	L24-Ap0011775	X	X
26	TP14 - 0.0	Mar 13, 2024		Soil	L24-Ap0011776	X	X
27	TP14 - 0.25	Mar 13, 2024		Soil	L24-Ap0011777	X	X
28	TP15 - 0.0	Mar 13, 2024		Soil	L24-Ap0011778	X	X
29	TP15 - 0.75	Mar 13, 2024		Soil	L24-Ap0011779	X	X
30	TP15 - 1.0	Mar 13, 2024		Soil	L24-Ap0011780	X	X

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Contact Name: Edvinder Singh

Eurofins Analytical Services Manager : Elden Garrett

Sample Detail						SPOCAS Suite - WA (Excluding ANC)	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
31	TP17 - 0.0	Mar 13, 2024		Soil	L24-Ap0011781	X	X
32	TP17 - 0.25	Mar 13, 2024		Soil	L24-Ap0011782	X	X
33	TP18 - 0.0	Mar 14, 2024		Soil	L24-Ap0011783	X	X
34	TP19 - 0.0	Mar 14, 2024		Soil	L24-Ap0011784	X	X
35	TP19 - 0.50	Mar 14, 2024		Soil	L24-Ap0011785	X	X
Test Counts						35	35

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds where annotated.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

Please refer to the 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours before sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and despite any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the sampling date; therefore, compliance with these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether, the holding time is seven days; however, for all other VOCs, such as BTEX or C6-10 TRH, the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is ≤30%; however, the following acceptance guidelines are equally applicable:

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown are not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data; thus, it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	101			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	93			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	94			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	105			80-120	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	102			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011751	CP	pH Units	4.6	4.7	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011751	CP	mol H+/t	47	48	4.1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011751	CP	% pyrite S	0.075	0.078	4.1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011751	CP	pH Units	2.9	2.9	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011751	CP	% pyrite S	0.13	0.14	2.4	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011751	CP	mol H+/t	84	86	2.4	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011751	CP	% S	0.008	0.007	7.2	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011751	CP	% S	0.031	0.031	2.6	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011751	CP	% S	0.024	0.024	1.3	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011751	CP	mol H+/t	15	15	1.3	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011751	CP	% Ca	0.021	0.021	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011751	CP	% Ca	0.027	0.026	1.3	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011751	CP	% Ca	0.006	0.005	4.0	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011751	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011751	CP	mol H+/t	2.8	2.6	4.0	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011751	CP	% Mg	0.010	0.010	2.3	30%	Pass	
Magnesium - Peroxide	L24-Ap0011751	CP	% Mg	0.011	0.011	1.8	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011751	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011751	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011751	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011751	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011761	CP	pH Units	4.8	4.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011761	CP	mol H+/t	36	36	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011761	CP	% pyrite S	0.058	0.058	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011761	CP	pH Units	2.5	2.5	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011761	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011761	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011761	CP	% S	0.050	0.050	1.4	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011761	CP	% S	0.050	0.050	1.4	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011761	CP	mol H+/t	31	31	1.4	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011761	CP	% Ca	0.099	0.10	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011761	CP	% Ca	0.11	0.12	4.4	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011761	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011761	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011761	CP	% Mg	0.012	0.012	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011761	CP	% Mg	0.013	0.014	3.2	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011761	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011761	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011761	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011761	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011765	CP	pH Units	5.4	5.3	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011765	CP	mol H+/t	7.9	8.4	6.8	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011765	CP	% pyrite S	0.013	0.013	6.8	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011765	CP	pH Units	2.9	2.9	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011765	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011765	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011765	CP	% S	0.023	0.023	2.4	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011765	CP	% S	0.023	0.023	2.4	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011765	CP	mol H+/t	14	14	2.4	30%	Pass	

Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011765	CP	% Ca	0.030	0.029	3.9	30%	Pass	
Calcium - Peroxide	L24-Ap0011765	CP	% Ca	0.034	0.033	1.3	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011765	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011765	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011765	CP	% Mg	0.006	0.006	5.8	30%	Pass	
Magnesium - Peroxide	L24-Ap0011765	CP	% Mg	0.007	0.006	4.1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011765	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011765	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011765	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011765	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011770	CP	pH Units	6.3	6.3	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011770	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011770	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011770	CP	pH Units	4.8	4.7	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011770	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011770	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011770	CP	% S	0.006	0.005	16	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011770	CP	% S	0.006	0.005	16	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011770	CP	mol H+/t	3.7	3.1	16	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011770	CP	% Ca	0.023	0.023	2.8	30%	Pass	
Calcium - Peroxide	L24-Ap0011770	CP	% Ca	0.025	0.025	2.5	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011770	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011770	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011770	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011770	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011770	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011770	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L24-Ap0011779	CP	pH Units	5.8	5.8	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011779	CP	mol H+/t	3.6	3.7	2.3	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L24-Ap0011779	CP	% pyrite S	0.006	0.006	2.3	30%	Pass	
Duplicate									
Potential Acidity - Titratable Peroxide				Result 1	Result 2	RPD			
pH-OX	L24-Ap0011779	CP	pH Units	4.1	4.2	<1	20%	Pass	
Titratable Peroxide Acidity (s-TPA)	L24-Ap0011779	CP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Titratable Peroxide Acidity (a-TPA)	L24-Ap0011779	CP	mol H+/t	3.5	3.2	<1	20%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L24-Ap0011779	CP	% S	0.009	0.008	5.1	30%	Pass	
Peroxide Extractable Sulfur	L24-Ap0011779	CP	% S	0.013	0.014	6.2	20%	Pass	
Duplicate									
Potential Acidity (SPOS)				Result 1	Result 2	RPD			
Peroxide Oxidisable Sulfur (s-SPOS) (NLM 2.2)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Peroxide Oxidisable Sulfur (a-SPOS) (NLM 2.2)	L24-Ap0011779	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
Duplicate									
Extractable Calcium				Result 1	Result 2	RPD			
Calcium - KCl Extractable	L24-Ap0011779	CP	% Ca	0.006	0.006	<1	30%	Pass	
Calcium - Peroxide	L24-Ap0011779	CP	% Ca	0.007	0.007	2.1	20%	Pass	
Calcium - Acid Reacted	L24-Ap0011779	CP	% Ca	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (s-aCa)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Calcium - Acid Reacted (a-aCa)	L24-Ap0011779	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Extractable Magnesium				Result 1	Result 2	RPD			
Magnesium - KCl Extractable	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Peroxide	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	20%	Pass	
Magnesium - Acid Reacted	L24-Ap0011779	CP	% Mg	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (s-aCa)	L24-Ap0011779	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Magnesium - Acid Reacted (a-aCa)	L24-Ap0011779	CP	mol H+/t	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
ANC Fineness Factor	L24-Ap0011779	CP	factor	1.5	1.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Elden Garrett	Analytical Services Manager
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Appendix D Acid Sulfate Soils Summary Tables

D.1 Field Analyses (pH_F & pH_{FOX}) Summary

Field Tests - pH(F) and pH (FOX) - Borehole Samples

Location	Soil Sample Depth (m)	pH-F (Field pH test)*	pH-FOX (Field pH Peroxide test)*	ΔpH	Reaction Ratings*SO5
WM01	0.00	5.2	3.9	1.3	2
WM01	0.25	5.2	3.9	1.3	2
WM01	0.50	5.5	3.7	1.8	2
WM01	0.75	5.5	3.5	2	2
WM01	1.00	5.4	3.5	1.9	2
WM01	1.25	5.3	3.6	1.7	2
WM01	1.50	5.2	3.9	1.3	2
WM01	1.75	5.3	3	2.3	2
WM01	2.00	5.2	2.9	2.3	2
WM01	2.25	5.4	2.9	2.5	2
WM01	2.50	5.9	3.4	2.5	2
WM01	2.75	5.7	3.3	2.4	2
WM01	3.00	5.9	3	2.9	2
WM01	3.25	5.8	3.1	2.7	2
WM01	3.50	6.2	2.7	3.5	2
WM01	3.75	6.2	2.5	3.7	2
WM01	4.00	6.1	2.6	3.5	2
WM01	4.25	6	2.6	3.4	2
WM01	4.50	6.2	2.5	3.7	2
WM01	4.75	6.3	2.2	4.1	2
WM01	5.00	6.3	2.4	3.9	2
WM01	5.25	6.1	2.4	3.7	4
WM01	5.50	6.3	2.3	4	2
WM01	5.75	6.3	1.9	4.4	4
WM01	6.00	6	2.3	3.7	4
WM01	6.25	6.1	2.3	3.8	4
WM01	6.50	6.1	2.4	3.7	4
WM01	6.75	6.1	2.4	3.7	4
WM01	7.00	6.1	2.3	3.8	4
WM01	7.25	6.7	2.3	4.4	4
WM01	7.50	6.3	2.2	4.1	4
WM01	7.75	6.3	2.4	3.9	4
WM01	8.00	6.4	2.4	4	4
WM01	8.25	6.4	2.3	4.1	4
WM01	8.50	6.3	2.1	4.2	4
WM01	8.75	6.1	2.3	3.8	4
WM01	9.00	6.2	2.5	3.7	4
WM01	9.25	6.4	2.3	4.1	4
WM01	9.50	5.8	2.3	3.5	4
WM01	9.75	6	2.3	3.7	4
WM01	10.00	5.4	2.3	3.1	4
WM02	0.00	5.5	3.6	1.9	2
WM02	0.25	6	3.2	2.8	2
WM02	0.50	6.4	4	2.4	2
WM02	0.75	6.3	4.1	2.2	2
WM02	1.00	6.4	4.5	1.9	2
WM02	1.25	5.7	4.7	1	2
WM02	1.50	6.9	4.4	2.5	2
WM02	1.75	5.7	4.3	1.4	2
WM02	2.00	6.2	5	1.2	2
WM02	2.25	7.2	3.2	4	2
WM02	2.50	6.9	4.4	2.5	2
WM02	2.75	5.7	4.3	1.4	2
WM02	3.00	6.2	5	1.2	2
WM02	3.25	7.2	3.2	4	2
WM02	3.50	6.6	3.2	3.4	3
WM02	3.75	6.1	2.7	3.4	4
WM02	4.00	7.2	2.8	4.4	4
WM02	4.25	5.8	3.1	2.7	4
WM02	4.50	5.7	3.2	2.5	4
WM02	4.75	5.8	2.9	2.9	4

Location	Soil Sample Depth (m)	pH-F (Field pH test)*	pH-FOX (Field pH Peroxide test)*	ΔpH	Reaction Ratings*SO5
WM02	5.00	5.2	2.9	2.3	4
WM02	5.25	5.5	3.1	2.4	4
WM02	5.50	5.4	3.2	2.2	4
WM02	5.75	6.5	2.8	3.7	4
WM02	6.00	6.5	2.7	3.8	4
WM02	6.25	5.7	2.4	3.3	4
WM02	6.50	6	2.9	3.1	4
WM02	6.75	4.6	2.5	2.1	4
WM02	7.00	7.7	2.5	5.2	4
WM02	7.25	4.5	2.3	2.2	4
WM02	7.50	4.8	2.3	2.5	4
WM02	7.75	5	2.7	2.3	4
WM02	8.00	4.8	2.6	2.2	4
WM02	8.25	6.1	2.3	3.8	4
WM02	8.50	5.3	2.7	2.6	4
WM02	8.75	4.9	2.7	2.2	4
WM02	9.00	5	2.8	2.2	4
WM02	9.25	5.2	2.6	2.6	4
WM02	9.50	4.9	3	1.9	4
WM02	9.75	5.2	2.9	2.3	4
WM02	10.00	4.8	2.9	1.9	4
WM03	0.00	5.6	3.1	2.5	3
WM03	0.25	6.8	4	2.8	2
WM03	0.50	6.2	4.3	1.9	2
WM03	0.75	5.5	4.6	0.9	2
WM03	1.00	5.2	4.4	0.8	2
WM03	1.25	5.3	4.7	0.6	2
WM03	2.00	5.2	4.6	0.6	2
WM03	2.25	5.5	4.4	1.1	2
WM03	2.50	5.7	4.6	1.1	2
WM03	2.75	5.5	4.7	0.8	2
WM03	3.00	5.8	4.1	1.7	2
WM03	3.25	6.1	3.3	2.8	4
WM03	3.50	6.7	3	3.7	4
WM03	3.75	6.2	3.1	3.1	4
WM03	4.00	7.3	2.7	4.6	4
WM03	4.25	6.7	3	3.7	4
WM03	4.50	6.6	3.1	3.5	4
WM03	4.75	7.1	3.2	3.9	4
WM03	5.00	7.2	3.2	4	4
WM03	5.25	7.8	2.5	5.3	4
WM03	5.50	7.7	2.5	5.2	4
WM03	5.75	7.7	2.5	5.2	4
WM03	6.00	7.9	2.5	5.4	4
WM03	6.25	7	2.9	4.1	4
WM03	6.50	5.4	3.1	2.3	4
WM03	6.75	4.9	2.8	2.1	4
WM03	7.00	6.4	3.7	2.7	4
WM03	7.25	5.2	3.1	2.1	4
WM03	7.50	5.6	2.9	2.7	4
WM03	7.75	5	2.9	2.1	4
WM03	8.00	4.7	3.4	1.3	4
WM03	8.25	6.6	3.2	3.4	4
WM03	8.50	6.6	3.2	3.4	4
WM03	8.75	6.7	3.2	3.5	4
WM03	9.00	6.2	3.2	3	4
WM03	9.25	5.5	2.9	2.6	4
WM03	9.50	5.5	3	2.5	4
WM03	9.75	6.4	3	3.4	4
WM03	10.00	5.6	3.2	2.4	4

Field Tests - pH(F) and pH (FOX) - Test Pit Samples

Location	Soil Sample Depth (m)	pH-F (Field pH test)*	pH-FOX (Field pH Peroxide test)*	ΔpH	Reaction Ratings*SO5
TP01	0.00	4.6	3.1	1.5	2
TP01	0.25	4.6	3.2	1.4	2
TP01	0.75	4.8	3.7	1.1	2
TP01	1.00	4.8	3.8	1	2
TP01	1.25	4.6	3.8	0.8	2
TP01	1.50	4.5	3.8	0.7	2
TP01	1.75	4.7	3.6	1.1	2
TP01	2.00	4.7	3.5	1.2	2
TP02	0.00	4.8	3.4	1.4	2
TP02	0.25	4.8	3.9	0.9	2
TP02	0.50	4.8	3.9	0.9	2
TP02	0.75	4.8	3.9	0.9	2
TP02	1.00	4.8	3.9	0.9	2
TP03	0.00	6.4	5.1	1.3	2
TP03	0.25	6.5	5.1	1.4	2
TP03	1.00	5.8	3.5	2.3	2
TP04	0.00	5.4	3.2	2.2	2
TP04	0.50	6.1	3.9	2.2	2
TP04	1.00	6.1	4.2	1.9	2
TP04	1.25	6.1	4.6	1.5	2
TP04	1.75	5.7	3.9	1.8	2
TP05	0.00	5.6	2.7	2.9	2
TP05	0.25	6	3.1	2.9	2
TP05	0.50	6	3.9	2.1	2
TP05	0.75	6.2	4.2	2	2
TP06	0.00	5	3.9	1.1	2
TP06	0.25	4.9	4.1	0.8	2
TP06	0.50	4.9	4.4	0.5	2
TP07	0.00	6	5	1	2
TP07	0.25	6	5.1	0.9	2
TP07	0.50	6.2	5.2	1	2
TP07	0.75	6.3	5.4	0.9	2
TP07	1.00	6.7	5.7	1	2
TP07	1.25	6.7	5.6	1.1	2
TP07	1.50	6	2.2	3.8	2
TP08	0.00	5	3.8	1.2	2
TP08	0.25	5.3	4.6	0.7	2
TP08	0.50	5.2	4.3	0.9	2
TP08	0.75	5.3	4.4	0.9	2
TP08	1.00	6.1	4.6	1.5	2
TP08	1.25	6.3	4.8	1.5	2
TP08	1.50	5.2	4.4	0.8	2
TP08	1.75	5.9	4.4	1.5	2
TP08	2.00	5	2.8	2.2	2
TP09	0.00	5.1	4.2	0.9	2
TP09	0.25	5.1	4.4	0.7	2
TP09	1.00	5.6	4.9	0.7	2
TP09	1.50	6	5.2	0.8	2
TP10	0.00	6	4	2	2
TP10	1.00	6.1	4.1	2	2
TP11	0.00	5.9	3.8	2.1	2
TP11	0.25	6.1	4	2.1	2
TP11	0.50	6	3.7	2.3	2
TP11	0.75	6.5	5.1	1.4	2
TP11	1.00	6.6	5.2	1.4	2
TP11	1.25	6.2	4.3	1.9	2
TP11	1.50	6.3	4.3	2	2
TP11	1.75	5.9	3.1	2.8	2
TP11	2.00	5.3	3.4	1.9	4
TP12	0.00	6	4.1	1.9	2
TP13	0.00	5.9	5	0.9	2
TP13	0.25	4.7	4	0.7	2
TP13	0.50	4.6	4.3	0.3	2
TP13	0.75	4.7	4.2	0.5	2
TP13	1.00	4.7	4.2	0.5	2
TP13	1.25	4.7	4.1	0.6	2
TP13	1.50	4.7	4.2	0.5	2
TP13	1.75	4.8	3.9	0.9	2
TP13	2.00	4.8	3.6	1.2	2
TP14	0.00	5.5	3.5	2	2
TP14	0.25	5.8	3.7	2.1	2
TP15	0.00	5.3	3.5	1.8	2
TP15	0.25	5.6	4.1	1.5	2
TP15	0.50	5.7	4.8	0.9	2
TP15	0.75	5.9	5	0.9	2
TP15	1.00	6.2	5.1	1.1	2
TP16	0.00	5.8	3	2.8	2
TP17	0.00	5.3	2.8	2.5	2
TP17	0.25	5.3	3.1	2.2	2
TP17	0.50	5.3	3.1	2.2	2
TP18	0.00	5.9	3.8	2.1	2
TP19	0.00	6.5	5	1.5	2
TP19	0.25	5.2	4.3	0.9	2
TP19	0.50	5.2	4.7	0.5	2
TP20	0.00	5.2	4.6	0.6	2

D.2 SPOCAS Summary

SPOCAS - Borehole Samples

Location	Soil Sample Depth (m bgl)	Titratable Actual Acidity %S	Titratable Peroxide Acidity %S	Titratable Sulfidic Acidity %S	Peroxide Oxidisable Sulfur %S	Net Acidity %S	Net Acidity Excluding Acid Neutralising Capacity %S	Exceeding Net Acidity Action Criteria (0.03 %S)
WM01	0.00	0.018	<0.02	<0.02	0.019	0.04	0.038	Yes
WM01	1.00	0.017	< 0.02	< 0.02	0.009	0.03	0.026	No
WM01	10.00	0.016	0.53	0.52	0.53	0.55	0.55	Yes
WM01	2.00	0.014	0.05	0.04	0.037	0.05	0.051	Yes
WM01	3.00	0.014	0.03	< 0.02	0.008	0.02	0.022	No
WM01	4.00	0.011	0.11	0.1	0.087	0.1	0.098	Yes
WM01	5.00	0.027	0.27	0.24	0.2	0.22	0.22	Yes
WM01	6.00	0.01	0.25	0.24	0.21	0.22	0.22	Yes
WM01	7.00	0.011	0.2	0.19	0.15	0.17	0.17	Yes
WM01	8.00	0.016	0.18	0.16	0.13	0.15	0.15	Yes
WM01	9.00	0.033	0.29	0.26	0.14	0.18	0.18	Yes
WM02	0.00	<0.003	<0.02	<0.02	0.025	<0.02	<0.02	No
WM02	1.00	0.011	0.03	< 0.02	0.01	0.02	0.021	No
WM02	10.00	0.12	1.4	1.3	1.3	1.4	1.4	Yes
WM02	2.00	0.009	< 0.02	< 0.02	0.012	0.02	0.022	No
WM02	2.75	0.01	0.15	0.14	0.099	0.11	68	Yes
WM02	3.00	0.019	0.2	0.18	0.12	0.14	0.14	Yes
WM02	4.00	0.021	0.39	0.37	0.27	0.29	0.29	Yes
WM02	5.00	0.054	0.81	0.76	0.65	0.7	0.7	Yes
WM02	6.00	0.03	0.64	0.61	0.57	0.6	0.6	Yes
WM02	7.00	0.017	0.32	0.27	0.27	0.29	0.29	Yes
WM02	8.00	0.041	0.54	0.44	0.44	0.48	0.48	Yes
WM02	9.00	0.18	2.2	1.9	1.9	2.1	2.1	Yes
WM02	0.00	0.048	1.2	0.086	0.086	0.13	0.13	Yes
WM03	0.25	0.05	0.32	0.27	0.15	0.2	0.2	Yes
WM03	1.00	0.026	0.06	0.03	0.012	0.04	0.039	Yes
WM03	10.00	0.06	0.69	0.63	0.5	0.56	0.56	Yes
WM03	3.00	0.018	0.09	0.07	0.046	0.06	0.064	Yes
WM03	3.50	0.033	0.33	0.3	0.23	0.26	0.26	Yes
WM03	5.00	0.014	0.16	0.15	0.11	0.13	0.13	Yes
WM03	6.00	0.016	0.24	0.22	0.18	0.2	0.2	Yes
WM03	7.00	0.16	1.4	1.2	0.86	1	1	Yes
WM03	8.00	0.14	1.1	0.95	0.76	0.9	0.9	Yes
WM03	9.00	0.055	0.61	0.55	0.44	0.5	0.5	Yes
WM03	4.00	0.041	0.45	0.41	0.35	0.39	0.39	Yes

SPOCAS - Test Pit Samples

Location	Soil Sample Depth (m bgl)	Titratable Actual Acidity %S	Titratable Peroxide Acidity %S	Titratable Sulfidic Acidity %S	Peroxide Oxidisable Sulfur %S	Net Acidity %S	Net Acidity Excluding Acid Neutralising Capacity %S	Exceeding Net Acidity Action Criteria (0.03 %S)
TP01	0.00	0.075	0.13	0.06	0.024	0.1	0.098	Yes
TP01	1.00	0.014	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP01	2.00	0.06	0.1	0.04	0.037	0.1	0.097	Yes
TP02	0.00	0.034	0.03	<0.02	0.024	0.06	0.058	Yes
TP02	0.75	0.034	0.03	< 0.02	0.009	0.04	0.043	Yes
TP02	1.00	0.076	0.14	0.06	0.013	0.09	0.089	Yes
TP03	0.00	<0.003	<0.02	<0.02	0.018	<0.02	<0.02	No
TP03	1.00	0.005	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP04	0.00	0.028	<0.02	<0.02	0.03	0.06	0.059	Yes
TP05	0.00	0.022	<0.02	<0.02	0.054	0.08	0.076	Yes
TP06	0.00	0.058	<0.02	<0.02	0.05	0.11	0.11	Yes
TP06	0.50	0.006	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP07	0.00	0.004	<0.02	<0.02	0.065	0.07	0.069	Yes
TP07	1.00	<0.003	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP08	0.00	0.013	<0.02	<0.02	0.023	0.04	0.035	Yes
TP08	1.00	0.009	<0.02	<0.02	0.014	0.02	0.023	No
TP08	2.00	0.015	0.05	0.03	0.059	0.07	0.074	Yes
TP09	0.00	0.032	<0.02	<0.02	0.059	0.09	0.091	Yes
TP11	0.00	0.007	<0.02	<0.02	0.042	0.05	0.049	Yes
TP11	1.00	<0.003	<0.02	<0.02	0.006	<0.02	<0.02	No
TP11	2.00	0.049	0.41	0.36	0.21	0.26	0.26	Yes
TP12	0.00	0.007	<0.02	<0.02	0.032	0.04	0.039	Yes
TP13	0.00	<0.003	<0.02	<0.02	0.08	0.03	0.027	No
TP13	1.00	0.006	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP13	2.00	0.17	0.49	0.32	0.11	0.29	0.29	Yes
TP14	0.00	0.023	<0.02	<0.02	0.049	0.07	0.072	Yes
TP14	0.25	0.009	<0.02	<0.02	0.012	0.02	0.021	No
TP15	0.00	0.022	<0.02	<0.02	0.043	0.07	0.065	Yes
TP15	0.75	0.006	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP15	1.00	0.005	<0.02	<0.02	0.007	< 0.02	<0.02	No
TP17	0.00	0.018	<0.02	<0.02	0.034	0.05	0.053	Yes
TP17	0.25	0.009	<0.02	<0.02	<0.005	<0.02	<0.02	No
TP18	0.00	0.018	<0.02	<0.02	0.021	0.04	0.039	Yes
TP19	0.00	<0.003	<0.02	<0.02	0.042	<0.02	<0.02	No
TP19	0.50	0.004	<0.02	<0.02	0.007	<0.02	<0.02	No

Appendix E Soil Analytical Results

					BTEX							Asbestos Identification in Soil		Asbestos							CRC Care TPH Fractions				
					Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Asbestos (Trace)	Asbestos Type	AF in Soil (as asbestos)*	Asbestos Detected	FA in Soil (as asbestos)*	Fibres Identified	Filterable Reactive Phosphorus	Total AF	Total Analytical Fraction	Total Dry Mass	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Comment	%	% w/w	Comment	% w/w	Comment	mg/kg	g	g	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.5	0.1	0.1	0.1	0.2	0.1	0.3		0.01	0.001		0.001		0.01	0.0005	0.1	0.1	20	50	100	100	100
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																										
PFAS NEMP 2.0 Table 2 Health Public open space																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP						120	18,000	5,300			15,000											5,100	3,800	5,300	7,400	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind						430	99,000	27,000			81,000											26,000	20,000	27,000	38,000	
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker						1,100	120,000	85,000			130,000											82,000	62,000	85,000	120,000	
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil						75	135	165			180													1,700	3,300	
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand						3 | 3 | 3 | 3					230														
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																						700	1,000	3,500	10,000	
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																						700	1,000	2,500	10,000	
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																						
TP01	**14 Mar 2024**	**TP01 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	3.6	<0.0005	242	242	<20	150	1,600	380	2,130
				1084649																						
		TP01 - 0.25	**Normal**	**1080155**																						
		TP01 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	278	278					
		TP01 - 0.75	**Normal**	**1080155**																						
		TP01 - 1.0	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	336	336	<20	<50	<100	<100	<100
				1084649																						
		TP01 - 1.25	**Normal**	**1080155**																						
		TP01 - 1.50	**Normal**	**1080155**																						
		TP01 - 1.75	**Normal**	**1080155**																						
		TP01 - 2.0	**Normal**	**1080155**																						
				1084649																						
TP02	**14 Mar 2024**	**TP02 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	6.5	<0.0005	453	453	<20	<50	<100	<100	<100
				1084649																						
		TP02 - 0.25	**Normal**	**1080155**																						
		TP02 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	333	333					
		TP02 - 0.75	**Normal**	**1080155**																						
				1084649																						
		TP02 - 1.0	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	585	585	<20	<50	<100	<100	<100
				1084649																						
TP03		**TP03 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	15	<0.0005	360	360	<20	<50	<100	<100	<100
		TP03 - 0.25	**Normal**	**1080155**																						
		TP03 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	314	314					
		TP03 - 1.0	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	333	333	<20	<50	<100	<100	<100
	12 Mar 2024	**TP03 - 0.0**	**Normal**	**1084649**																						
		TP03 - 1.0	**Normal**	**1084649**																						
TP04		**TP04 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	1.7	<0.0005	364	364	<20	<50	550	160	710
		TP04 - 0.50	**Normal**	**1080155**																						
		TP04 - 1.0	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		96	96	<20	<50	<100	<100	<100
		TP04 - 1.25	**Normal**	**1080155**																						
		TP04 - 1.75	**Normal**	**1080155**																						
	12 Mar 2024	**TP04 - 0.0**	**Normal**	**1084649**																						
TP05	**13 Mar 2024**	**TP05 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	431	431	<20	<50	<100	<100	<100
				1084649																						
		TP05 - 0.25	**Normal**	**1080155**																						
		TP05 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	365	365					
		TP05 - 0.75	**Normal**	**1080155**																						
TP06	**13 Mar 2024**	**TP06 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	2.1		72	72	<20	<50	120	<100	120
				1084649																						
		TP06 - 0.25	**Normal**	**1080155**																						
		TP06 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	256	256					
				1084649																						
		TP06 - QC2	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	1.4	<0.0005	309	309	<20	<50	180	<100	180
		TP06 - QC3	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	2.1	<0.0005	205	205	<20	<50	140	<100	140
TP07	**14 Mar 2024**	**TP07 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	3.3	<0.0005	281	281	<20	<50	<100	<100	<100
				1084649																						
		TP07 - 0.25	**Normal**	**1080155**																						
		TP07 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	303	303					
		TP07 - 0.75	**Normal**	**1080155**																						
		TP07 - 1.0	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	268	268	<20	<50	<100	<100	<100
				1084649																						
		TP07 - 1.25	**Normal**	**1080155**																						
		TP07 - 1.50	**Normal**	**1080155**																						
TP08		**TP08 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	1.2	<0.0005	246	246	<20	<50	110	<100	110
		TP08 - 0.25	**Normal**	**1080155**																						
		TP08 - 0.50	**Normal**	**1080155**								1	<0.01	<0.001	1	<0.001	1		<0.0005	271	271					
		TP08 - 0.75	**Normal**	**1080155**																						
		TP08 - 1.0	**Normal**	**1080155**	<1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	260	260	<40	<50	<100	<100	<100
		TP08 - 1.25	**Normal**	**1080155**																						
		TP08 - 1.50	**Normal**	**1080155**																						
		TP08 - 1.75	**Normal**	**1080155**																						
		TP08 - 2.0	**Normal**	**1080155**																						
TP09		**TP09 - 0.0**	**Normal**	**1080155**	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	9.5		83	83	<20	<50	<100	<100	<100
		TP09 - 0.25	**Normal**	**1080155**																						

					BTEX							Asbestos Identification in Soil		Asbestos							CRC Care TPH Fractions				
					Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Asbestos (Trace)	Asbestos Type	AF in Soil (as asbestos)*	Asbestos Detected	FA in Soil (as asbestos)*	Fibres Identified	Filterable Reactive Phosphorus	Total AF	Total Analytical Fraction	Total Dry Mass	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Comment	%	% w/w	Comment	% w/w	Comment	mg/kg	g	g	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.5	0.1	0.1	0.1	0.2	0.1	0.3		0.01	0.001		0.001		0.01	0.0005	0.1	0.1	20	50	100	100	100
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																										
PFAS NEMP 2.0 Table 2 Health Public open space																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP						120	18,000	5,300			15,000											5,100	3,800	5,300	7,400	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind						430	99,000	27,000			81,000											26,000	20,000	27,000	38,000	
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker						1,100	120,000	85,000			130,000											82,000	62,000	85,000	120,000	
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil						75	135	165			180													1,700	3,300	
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand						3 | 3 | 3 | 3					230														
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																						700	1,000	3,500	10,000	
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																						700	1,000	2,500	10,000	
		TP09 - 1.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		86	86	<20	<50	<100	<100	<100
		TP09 - 1.50	Normal	1080155																						
	12 Mar 2024	TP09 - 0.0	Normal	1084649																						
TP10		TP10 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	5.1		58	58	<20	<50	120	<100	120
		TP10 - 1.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		97	97	<20	<50	<100	<100	<100
TP11	14 Mar 2024	TP11 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	171	171	<20	<50	<100	<100	<100
				1084649																						
		TP11 - 0.25	Normal	1080155																						
		TP11 - 0.50	Normal	1080155								1	<0.01	<0.001	1	<0.001	1		<0.0005	348	348					
		TP11 - 0.75	Normal	1080155																						
		TP11 - 1.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	400	400	<20	<50	<100	<100	<100
				1084649																						
		TP11 - 1.25	Normal	1080155																						
		TP11 - 1.50	Normal	1080155																						
		TP11 - 1.75	Normal	1080155																						
		TP11 - 2.0	Normal	1080155																						
				1084649																						
TP12	13 Mar 2024	TP12 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
				1084649																						
TP13	13 Mar 2024	TP13 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	8.2	<0.0005	125	125	<20	<50	150	<100	150
				1084649																						
		TP13 - 0.25	Normal	1080155																						
		TP13 - 0.50	Normal	1080155								1	<0.01	<0.001	1	<0.001	1		<0.0005	355	355					
		TP13 - 0.75	Normal	1080155																						
		TP13 - 1.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	256	256	<20	<50	<100	<100	<100
				1084649																						
		TP13 - 1.25	Normal	1080155																						
		TP13 - 1.50	Normal	1080155																						
		TP13 - 1.75	Normal	1080155																						
		TP13 - 2.0	Normal	1080155																						
				1084649																						
TP14	13 Mar 2024	TP14 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	2.2	<0.0005	321	321	<20	<50	110	<100	110
				1084649																						
		TP14 - 0.25	Normal	1080155																						
				1084649																						
TP15	13 Mar 2024	TP15 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	289	289	<20	<50	<100	<100	<100
				1084649																						
		TP15 - 0.25	Normal	1080155																						
		TP15 - 0.50	Normal	1080155								1	<0.01	<0.001	1	<0.001	1		<0.0005	469	469					
		TP15 - 0.75	Normal	1080155																						
				1084649																						
		TP15 - 1.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	472	472	<20	<50	<100	<100	<100
				1084649																						
		TP15 - QC1	Normal	1080155														<0.01								
TP16	13 Mar 2024	TP16 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		121	121	<20	<50	<100	<100	<100
		TP16 - QC2	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
		TP16 - QC3	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		136	136	<20	<50	<100	<100	<100
TP17	13 Mar 2024	TP17 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	321	321	<20	<50	<100	<100	<100
				1084649																						
		TP17 - 0.25	Normal	1080155																						
				1084649																						
		TP17 - 0.50	Normal	1080155								1	<0.01	<0.001	1	<0.001	1		<0.0005	408	408					
TP18	14 Mar 2024	TP18 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	307	307	<20	<50	<100	<100	<100
				1084649																						
TP19	14 Mar 2024	TP19 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<1	<0.0005	441	441	<20	<50	<100	<100	<100
				1084649																						
		TP19 - 0.25	Normal	1080155																						
		TP19 - 0.50	Normal	1080155								1	<0.01	<0.001	1	<0.001	1		<0.0005	352	352					
				1084649																						
TP20	14 Mar 2024	TP20 - 0.0	Normal	1080155	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01		1		1	<1		63	63	<20	<50	<100	<100	<100
WM01	26 Feb 2024	WM01-0.0	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							7.9				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	50	50					
		WM01 - 0.0	Normal	1084676																						
		WM01-0.5	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	14	14					

					BTEX							Asbestos Identification in Soil		Asbestos							CRC Care TPH Fractions				
					Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Asbestos (Trace)	Asbestos Type	AF in Soil (as asbestos)*	Asbestos Detected	FA in Soil (as asbestos)*	Fibres Identified	Filterable Reactive Phosphorus	Total AF	Total Analytical Fraction	Total Dry Mass	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Comment	%	% w/w	Comment	% w/w	Comment	mg/kg	g	g	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.5	0.1	0.1	0.1	0.2	0.1	0.3		0.01	0.001		0.001		0.01	0.0005	0.1	0.1	20	50	100	100	100
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																										
PFAS NEMP 2.0 Table 2 Health Public open space																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP						120	18,000	5,300			15,000											5,100	3,800	5,300	7,400	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind						430	99,000	27,000			81,000											26,000	20,000	27,000	38,000	
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker						1,100	120,000	85,000			130,000											82,000	62,000	85,000	120,000	
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil						75	135	165			180													1,700	3,300	
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand						3 | 3 | 3 | 3					230														
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																						700	1,000	3,500	10,000	
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																						700	1,000	2,500	10,000	
		WM01-0.25	Normal	1075587																						
		WM01-0.75	Normal	1075587																						
		WM01-1.0	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	26	26					
		WM01 - 1.0	Normal	1084676																						
		WM01-1.5	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	50	50					
WM02	28 Feb 2024	WM02-0.0	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	116	116					
		WM02 - 0.0	Normal	1084676																						
		WM02-0.5	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	110	<100	110
												1	<0.01	<0.001	1	<0.001	1		<0.0005	43	43					
		WM02-1.0	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	79	79					
		WM02 - 1.0	Normal	1084676																						
		WM02-1.5	Normal	1075587								1	<0.01	<0.001	1	<0.001	1		<0.0005	63	63					
WM03	29 Feb 2024	WM03-0.0	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							1.1				<20	<50	310	100	410
												1	<0.01	<0.001	1	<0.001	1		<0.0005	105	105					
		WM03 - 0.0	Normal	1084676																						
		WM03-0.5	Normal	1075587	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3							<1				<20	<50	<100	<100	<100
												1	<0.01	<0.001	1	<0.001	1		<0.0005	98	98					
		WM03 - 0.25	Normal	1084676																						
		WM03-1.0	Normal	1075587								1	<0.01	<0.001	1	<0.001	1		<0.0005	284	284					
		WM03 - 1.0	Normal	1084676																						
		WM03-1.5	Normal	1075587								1	<0.01	<0.001	1	<0.001	1		<0.0005	238	238					

Statistics

Number of Results	53	53	53	53	53	53	53	62	62	52	62	52	62	56	52	62	62	53	50	50	50	50
Number of Detects	0	0	0	0	0	0	0	62	0	0	62	0	62	16	0	62	62	0	2	12	4	12
Minimum Concentration	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	<0.01	<0.0005	14	14	<20	<50	<100	100	<100
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	1	ND	1	1.1	ND	14	14	ND	120	110	100	110
Maximum Concentration	<1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	1	<0.01	<0.001	1	<0.001	1	15	<0.0005	585	585	<40	150	1,600	380	2,130
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	1	ND	1	15	ND	585	585	ND	150	1,600	380	2,130
Average Concentration *	0.26	0.05	0.05	0.05	0.1	0.05	0.15	1	0.005	0.0005	1	0.0005	1	1.6	0.00025	242	242	10	29	126	64	149
Geometric Average *	0.26	0.05	0.05	0.05	0.1	0.05	0.15	1	0.005	0.0005	1	0.0005	1	0.52	0.00025	190	190	10	27	72	56	74
Median Concentration *	0.25	0.05	0.05	0.05	0.1	0.05	0.15	1	0.005	0.0005	1	0.0005	1	0.5	0.00025	269.5	269.5	10	25	50	50	50
Standard Deviation *	0.048	0	0	0	0	0	0	0	0	0	0	0	0	2.8	0	137	137	1.9	22	255	58	349
Geometric Standard Deviation *	1.1	1	1	1	1	1	1	1	1	1	1	1	1	6.5	1	2.3	2.3	1.1	1.4	2.2	1.5	2.4
95% UCL (Student's-t) *	0.27	0.05	0.05	0.05	0.1	0.05	0.15	1	0.005	0.0005	1	0.0005	1	2.223	0.00025	271.3	271.3	10.82	34.61	186	78.2	232.1
% of Detects	0	0	0	0	0	0	0	100	0	0	100	0	100	29	0	100	100	0	4	24	8	24
% of Non-Detects	100	100	100	100	100	100	100	0	100	100	0	100	0	71	100	0	0	100	96	76	92	76

* A Non Detect Multiplier of 0.5 has been applied.

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						Organochlorine Pesticides																							
					Phosphorus	2,4-DDT	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Oxychlordane	Chlorpyrifos
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.2	0.01	0.02
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																										
PFAS NEMP 2.0 Table 2 Health Public open space																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																										
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																										
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil																										
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																										
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																										
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																										
		TP09 - 1.0	Normal	1080155	4.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
		TP09 - 1.50	Normal	1080155																						
	12 Mar 2024	TP09 - 0.0	Normal	1084649																						
TP10		TP10 - 0.0	Normal	1080155	42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
		TP10 - 1.0	Normal	1080155	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
TP11	14 Mar 2024	TP11 - 0.0	Normal	1080155	70	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP11 - 0.25	Normal	1080155																						
		TP11 - 0.50	Normal	1080155																						
		TP11 - 0.75	Normal	1080155																						
		TP11 - 1.0	Normal	1080155	9.6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP11 - 1.25	Normal	1080155																						
		TP11 - 1.50	Normal	1080155																						
		TP11 - 1.75	Normal	1080155																						
		TP11 - 2.0	Normal	1080155																						
				1084649																						
TP12	13 Mar 2024	TP12 - 0.0	Normal	1080155	100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
TP13	13 Mar 2024	TP13 - 0.0	Normal	1080155	100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP13 - 0.25	Normal	1080155																						
		TP13 - 0.50	Normal	1080155																						
		TP13 - 0.75	Normal	1080155																						
		TP13 - 1.0	Normal	1080155	2.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP13 - 1.25	Normal	1080155																						
		TP13 - 1.50	Normal	1080155																						
		TP13 - 1.75	Normal	1080155																						
		TP13 - 2.0	Normal	1080155																						
				1084649																						
TP14	13 Mar 2024	TP14 - 0.0	Normal	1080155	140	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP14 - 0.25	Normal	1080155																						
				1084649																						
TP15	13 Mar 2024	TP15 - 0.0	Normal	1080155	80	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP15 - 0.25	Normal	1080155																						
		TP15 - 0.50	Normal	1080155																						
		TP15 - 0.75	Normal	1080155																						
				1084649																						
		TP15 - 1.0	Normal	1080155	14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP15 - QC1	Normal	1080155																						
TP16	13 Mar 2024	TP16 - 0.0	Normal	1080155	160	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
		TP16 - QC2	Normal	1080155	110	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
		TP16 - QC3	Normal	1080155	140	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
TP17	13 Mar 2024	TP17 - 0.0	Normal	1080155	48	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP17 - 0.25	Normal	1080155																						
				1084649																						
		TP17 - 0.50	Normal	1080155																						
TP18	14 Mar 2024	TP18 - 0.0	Normal	1080155	36	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
TP19	14 Mar 2024	TP19 - 0.0	Normal	1080155	15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
				1084649																						
		TP19 - 0.25	Normal	1080155																						
		TP19 - 0.50	Normal	1080155																						
				1084649																						
TP20	14 Mar 2024	TP20 - 0.0	Normal	1080155	120	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
WM01	26 Feb 2024	WM01-0.0	Normal	1075587	19	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02
		WM01 - 0.0	Normal	1084676																						
		WM01-0.5	Normal	1075587	27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.01	<0.02

| | | |

					Organophosphorous Pesticides				Pesticides																	Pe
					Diazinon	Ethion	Fenitrothion	Malathion	Bifenthrin	Bromophos	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	Perfluorononane sulfonate (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	UG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.2	0.05	0.1	0.1	0.2	0.05	0.005	5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial															20		20							50		
PFAS NEMP 2.0 Table 2 Health Public open space															1		1							10		
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																										
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																										
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil																										
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																										
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																										
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																										
Location Code	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																						
TP01	**14 Mar 2024**	**TP01 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP01 - 0.25	**Normal**	**1080155**																						
		TP01 - 0.50	**Normal**	**1080155**																						
		TP01 - 0.75	**Normal**	**1080155**																						
		TP01 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP01 - 1.25	**Normal**	**1080155**																						
		TP01 - 1.50	**Normal**	**1080155**																						
		TP01 - 1.75	**Normal**	**1080155**																						
		TP01 - 2.0	**Normal**	**1080155**																						
				1084649																						
TP02	**14 Mar 2024**	**TP02 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
				1084649																						
		TP02 - 0.25	**Normal**	**1080155**																						
		TP02 - 0.50	**Normal**	**1080155**																						
		TP02 - 0.75	**Normal**	**1080155**																						
				1084649																						
		TP02 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
TP03		**TP03 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP03 - 0.25	**Normal**	**1080155**																						
		TP03 - 0.50	**Normal**	**1080155**																						
		TP03 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
	12 Mar 2024	**TP03 - 0.0**	**Normal**	**1084649**																						
		TP03 - 1.0	**Normal**	**1084649**																						
TP04		**TP04 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
		TP04 - 0.50	**Normal**	**1080155**																						
		TP04 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP04 - 1.25	**Normal**	**1080155**																						
		TP04 - 1.75	**Normal**	**1080155**																						
	12 Mar 2024	**TP04 - 0.0**	**Normal**	**1084649**																						
TP05	**13 Mar 2024**	**TP05 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP05 - 0.25	**Normal**	**1080155**																						
		TP05 - 0.50	**Normal**	**1080155**																						
		TP05 - 0.75	**Normal**	**1080155**																						
TP06	**13 Mar 2024**	**TP06 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
				1084649																						
		TP06 - 0.25	**Normal**	**1080155**																						
		TP06 - 0.50	**Normal**	**1080155**																						
				1084649																						
		TP06 - QC2	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
		TP06 - QC3	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
TP07	**14 Mar 2024**	**TP07 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP07 - 0.25	**Normal**	**1080155**																						
		TP07 - 0.50	**Normal**	**1080155**																						
		TP07 - 0.75	**Normal**	**1080155**																						
		TP07 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP07 - 1.25	**Normal**	**1080155**																						
		TP07 - 1.50	**Normal**	**1080155**																						
TP08		**TP08 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
		TP08 - 0.25	**Normal**	**1080155**																						
		TP08 - 0.50	**Normal**	**1080155**																						
		TP08 - 0.75	**Normal**	**1080155**																						
		TP08 - 1.0	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP08 - 1.25	**Normal**	**1080155**																						
		TP08 - 1.50	**Normal**	**1080155**																						
		TP08 - 1.75	**Normal**	**1080155**																						
		TP08 - 2.0	**Normal**	**1080155**																						
TP09		**TP09 - 0.0**	**Normal**	**1080155**	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP09 - 0.25	**Normal**	**1080155**																						

					Organophosphorous Pesticides				Pesticides																		Pe
					Diazinon	Ethion	Fenitrothion	Malathion	Bifenthrin	Bromophos	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	Perfluorononane sulfonate (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	UG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.2	0.05	0.1	0.1	0.2	0.05	0.005	5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial															20		20									
PFAS NEMP 2.0 Table 2 Health Public open space															1		1							50		
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																								10		
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																										
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																										
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil																										
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																										
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																										
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																										
		TP09 - 1.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP09 - 1.50	Normal	1080155																						
	12 Mar 2024	TP09 - 0.0	Normal	1084649																						
TP10		TP10 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
		TP10 - 1.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
TP11	14 Mar 2024	TP11 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP11 - 0.25	Normal	1080155																						
		TP11 - 0.50	Normal	1080155																						
		TP11 - 0.75	Normal	1080155																						
		TP11 - 1.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP11 - 1.25	Normal	1080155																						
		TP11 - 1.50	Normal	1080155																						
		TP11 - 1.75	Normal	1080155																						
		TP11 - 2.0	Normal	1080155																						
				1084649																						
TP12	13 Mar 2024	TP12 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
				1084649																						
TP13	13 Mar 2024	TP13 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP13 - 0.25	Normal	1080155																						
		TP13 - 0.50	Normal	1080155																						
		TP13 - 0.75	Normal	1080155																						
		TP13 - 1.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP13 - 1.25	Normal	1080155																						
		TP13 - 1.50	Normal	1080155																						
		TP13 - 1.75	Normal	1080155																						
		TP13 - 2.0	Normal	1080155																						
				1084649																						
TP14	13 Mar 2024	TP14 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
				1084649																						
		TP14 - 0.25	Normal	1080155																						
				1084649																						
TP15	13 Mar 2024	TP15 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP15 - 0.25	Normal	1080155																						
		TP15 - 0.50	Normal	1080155																						
		TP15 - 0.75	Normal	1080155																						
				1084649																						
		TP15 - 1.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP15 - QC1	Normal	1080155																						
TP16	13 Mar 2024	TP16 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
		TP16 - QC2	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		TP16 - QC3	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
TP17	13 Mar 2024	TP17 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP17 - 0.25	Normal	1080155																						
				1084649																						
		TP17 - 0.50	Normal	1080155																						
TP18	14 Mar 2024	TP18 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
				1084649																						
TP19	14 Mar 2024	TP19 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
				1084649																						
		TP19 - 0.25	Normal	1080155																						
		TP19 - 0.50	Normal	1080155																						
				1084649																						
TP20	14 Mar 2024	TP20 - 0.0	Normal	1080155	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
WM01	26 Feb 2024	WM01-0.0	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM01 - 0.0	Normal	1084676																						
		WM01-0.5	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																

					Organophosphorous Pesticides				Pesticides																	Pe
					Diazinon	Ethion	Fenitrothion	Malathion	Bifenthrin	Bromophos	2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	Perfluorononane sulfonate (PFNS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoate (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	UG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.2	0.05	0.1	0.1	0.2	0.05	0.005	5	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial															20		20							50		
PFAS NEMP 2.0 Table 2 Health Public open space															1		1							10		
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																										
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																										
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																										
NEPM 2013 HIL recreational., Coarse Soil																										
NEPM 2013 HIL commercial/industrial., Coarse Soil																										
NEPM 2013 ESL Comm./Ind., Coarse Soil																										
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																										
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																										
NEPM 2013 Management Limits, C/I, Coarse Soil																										
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																										
		WM01-0.25	Normal	1075587																						
		WM01-0.75	Normal	1075587																						
		WM01-1.0	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM01 - 1.0	Normal	1084676																						
		WM01-1.5	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
WM02	28 Feb 2024	WM02-0.0	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM02 - 0.0	Normal	1084676																						
		WM02-0.5	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM02-1.0	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM02 - 1.0	Normal	1084676																						
		WM02-1.5	Normal	1075587																						
WM03	29 Feb 2024	WM03-0.0	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM03 - 0.0	Normal	1084676																						
		WM03-0.5	Normal	1075587	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05																
		WM03 - 0.25	Normal	1084676																						
		WM03-1.0	Normal	1075587																						
		WM03 - 1.0	Normal	1084676																						
		WM03-1.5	Normal	1075587																						

Statistics

Number of Results	50	50	50	50	50	50	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.2	<0.05	<0.1	<0.1	<0.2	<0.05	<0.005	<5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.1	0.025	0.05	0.05	0.1	0.025	0.0025	2.5	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Geometric Average *	0.1	0.025	0.05	0.05	0.1	0.025	0.0025	2.5	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Median Concentration *	0.1	0.025	0.05	0.05	0.1	0.025	0.0025	2.5	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geometric Standard Deviation *	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
95% UCL (Student's-t) *	0.1	0.025	0.05	0.05	0.1	0.025	0.0025	2.5	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

* A Non Detect Multiplier of 0.5 has been applied.

rfluorocarbons

	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of PFHxS and PFOS	Sum of PFOS + PFOA
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.005	0.01	0.005	0.005	0.05	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																20	
PFAS NEMP 2.0 Table 2 Health Public open space																1	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																	
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																	
NEPM 2013 HIL recreational., Coarse Soil																	
NEPM 2013 HIL commercial/industrial., Coarse Soil																	
NEPM 2013 ESL Comm./Ind., Coarse Soil																	
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																	
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																	
NEPM 2013 Management Limits, C/I, Coarse Soil																	
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																	

Location Code	Date	Field ID	Sample Type	Lab Report Number															
TP01	14 Mar 2024	TP01 - 0.0	Normal	1080155															
				1084649															
		TP01 - 0.25	Normal	1080155															
		TP01 - 0.50	Normal	1080155															
		TP01 - 0.75	Normal	1080155															
		TP01 - 1.0	Normal	1080155															
				1084649															
		TP01 - 1.25	Normal	1080155															
		TP01 - 1.50	Normal	1080155															
		TP01 - 1.75	Normal	1080155															
		TP01 - 2.0	Normal	1080155															
				1084649															
TP02	14 Mar 2024	TP02 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
				1084649															
		TP02 - 0.25	Normal	1080155															
		TP02 - 0.50	Normal	1080155															
		TP02 - 0.75	Normal	1080155															
				1084649															
		TP02 - 1.0	Normal	1080155															
				1084649															
TP03		TP03 - 0.0	Normal	1080155															
		TP03 - 0.25	Normal	1080155															
		TP03 - 0.50	Normal	1080155															
		TP03 - 1.0	Normal	1080155															
	12 Mar 2024	TP03 - 0.0	Normal	1084649															
		TP03 - 1.0	Normal	1084649															
TP04		TP04 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
		TP04 - 0.50	Normal	1080155															
		TP04 - 1.0	Normal	1080155															
		TP04 - 1.25	Normal	1080155															
		TP04 - 1.75	Normal	1080155															
	12 Mar 2024	TP04 - 0.0	Normal	1084649															
TP05	13 Mar 2024	TP05 - 0.0	Normal	1080155															
				1084649															
		TP05 - 0.25	Normal	1080155															
		TP05 - 0.50	Normal	1080155															
		TP05 - 0.75	Normal	1080155															
TP06	13 Mar 2024	TP06 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
				1084649															
		TP06 - 0.25	Normal	1080155															
		TP06 - 0.50	Normal	1080155															
				1084649															
		TP06 - QC2	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
		TP06 - QC3	Normal	1080155															
TP07	14 Mar 2024	TP07 - 0.0	Normal	1080155															
				1084649															
		TP07 - 0.25	Normal	1080155															
		TP07 - 0.50	Normal	1080155															
		TP07 - 0.75	Normal	1080155															
		TP07 - 1.0	Normal	1080155															
				1084649															
		TP07 - 1.25	Normal	1080155															
		TP07 - 1.50	Normal	1080155															
TP08		TP08 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
		TP08 - 0.25	Normal	1080155															
		TP08 - 0.50	Normal	1080155															
		TP08 - 0.75	Normal	1080155															
		TP08 - 1.0	Normal	1080155															
		TP08 - 1.25	Normal	1080155															
		TP08 - 1.50	Normal	1080155															
		TP08 - 1.75	Normal	1080155															
		TP08 - 2.0	Normal	1080155															
TP09		TP09 - 0.0	Normal	1080155															
		TP09 - 0.25	Normal	1080155															

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					Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of PFHxS and PFOS	Sum of PFOS + PFOA
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.005	0.01	0.005	0.005	0.05	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																				20	
PFAS NEMP 2.0 Table 2 Health Public open space																				1	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																					
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																					
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																					
NEPM 2013 HIL recreational., Coarse Soil																					
NEPM 2013 HIL commercial/industrial., Coarse Soil																					
NEPM 2013 ESL Comm./Ind., Coarse Soil																					
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																					
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																					
NEPM 2013 Management Limits, C/I, Coarse Soil																					
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																					
		TP09 - 1.0	Normal	1080155																	
		TP09 - 1.50	Normal	1080155																	
	12 Mar 2024	TP09 - 0.0	Normal	1084649																	
TP10		TP10 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
		TP10 - 1.0	Normal	1080155																	
TP11	14 Mar 2024	TP11 - 0.0	Normal	1080155																	
				1084649																	
		TP11 - 0.25	Normal	1080155																	
		TP11 - 0.50	Normal	1080155																	
		TP11 - 0.75	Normal	1080155																	
		TP11 - 1.0	Normal	1080155																	
				1084649																	
		TP11 - 1.25	Normal	1080155																	
		TP11 - 1.50	Normal	1080155																	
		TP11 - 1.75	Normal	1080155																	
		TP11 - 2.0	Normal	1080155																	
				1084649																	
TP12	13 Mar 2024	TP12 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
				1084649																	
TP13	13 Mar 2024	TP13 - 0.0	Normal	1080155																	
				1084649																	
		TP13 - 0.25	Normal	1080155																	
		TP13 - 0.50	Normal	1080155																	
		TP13 - 0.75	Normal	1080155																	
		TP13 - 1.0	Normal	1080155																	
				1084649																	
		TP13 - 1.25	Normal	1080155																	
		TP13 - 1.50	Normal	1080155																	
		TP13 - 1.75	Normal	1080155																	
		TP13 - 2.0	Normal	1080155																	
				1084649																	
TP14	13 Mar 2024	TP14 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
				1084649																	
		TP14 - 0.25	Normal	1080155																	
				1084649																	
TP15	13 Mar 2024	TP15 - 0.0	Normal	1080155																	
				1084649																	
		TP15 - 0.25	Normal	1080155																	
		TP15 - 0.50	Normal	1080155																	
		TP15 - 0.75	Normal	1080155																	
				1084649																	
		TP15 - 1.0	Normal	1080155																	
				1084649																	
		TP15 - QC1	Normal	1080155																	
TP16	13 Mar 2024	TP16 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
		TP16 - QC2	Normal	1080155																	
		TP16 - QC3	Normal	1080155																	
TP17	13 Mar 2024	TP17 - 0.0	Normal	1080155																	
				1084649																	
		TP17 - 0.25	Normal	1080155																	
				1084649																	
		TP17 - 0.50	Normal	1080155																	
TP18	14 Mar 2024	TP18 - 0.0	Normal	1080155	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005
				1084649																	
TP19	14 Mar 2024	TP19 - 0.0	Normal	1080155																	
				1084649																	
		TP19 - 0.25	Normal	1080155																	
		TP19 - 0.50	Normal	1080155																	
				1084649																	
TP20	14 Mar 2024	TP20 - 0.0	Normal	1080155																	
WM01	26 Feb 2024	WM01-0.0	Normal	1075587																	
		WM01 - 0.0	Normal	1084676																	
		WM01-0.5	Normal	1075587																	

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					Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	8:2 Fluorotelomer sulfonate (8:2 FtS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFAS	Sum of PFHxS and PFOS	Sum of PFOS + PFOA
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.005	0.01	0.005	0.005	0.05	0.005	0.005
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																				20	
PFAS NEMP 2.0 Table 2 Health Public open space																				1	
CRCCARE 2011 Soil HSL for Direct Contact, HSL-C Rec/OP																					
CRCCARE 2011 Soil HSL for Direct Contact, HSL-D Com/Ind																					
CRCCARE 2011 Soil HSL for Direct Contact, Intrusive Maintenance Worker																					
NEPM 2013 HIL recreational., Coarse Soil																					
NEPM 2013 HIL commercial/industrial., Coarse Soil																					
NEPM 2013 ESL Comm./Ind., Coarse Soil																					
NEPM 2013 Soil HSL Commercial/Industrial D, for Vapour Intrusion, Sand																					
NEPM 2013 Soil HSL Recreational C, for Vapour Intrusion, Sand																					
NEPM 2013 Management Limits, C/I, Coarse Soil																					
NEPM 2013 Management Limits, R/P&POS, Coarse Soil																					
		WM01-0.25	Normal	1075587																	
		WM01-0.75	Normal	1075587																	
		WM01-1.0	Normal	1075587																	
		WM01 - 1.0	Normal	1084676																	
		WM01-1.5	Normal	1075587																	
WM02	28 Feb 2024	WM02-0.0	Normal	1075587																	
		WM02 - 0.0	Normal	1084676																	
		WM02-0.5	Normal	1075587																	
		WM02-1.0	Normal	1075587																	
		WM02 - 1.0	Normal	1084676																	
		WM02-1.5	Normal	1075587																	
WM03	29 Feb 2024	WM03-0.0	Normal	1075587																	
		WM03 - 0.0	Normal	1084676																	
		WM03-0.5	Normal	1075587																	
		WM03 - 0.25	Normal	1084676																	
		WM03-1.0	Normal	1075587																	
		WM03 - 1.0	Normal	1084676																	
		WM03-1.5	Normal	1075587																	

Statistics

Number of Results	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005	
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.01	<0.005	<0.005	<0.05	<0.005	<0.005	
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.005	0.005	0.0025	0.005	0.0025	0.0025	0.025	0.0025	0.0025	
Geometric Average *	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.005	0.005	0.0025	0.005	0.0025	0.0025	0.025	0.0025	0.0025	
Median Concentration *	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.005	0.005	0.0025	0.005	0.0025	0.0025	0.025	0.0025	0.0025	
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Geometric Standard Deviation *	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
95% UCL (Student's-t) *	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.005	0.005	0.0025	0.005	0.0025	0.0025	0.025	0.0025	0.0025	
% of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Non-Detects	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

* A Non Detect Multiplier of 0.5 has been applied.

Appendix F Historic Desktop Report (2023)

BEENUP WIND FARM
GEOTECHNICAL DESKTOP REPORT

04 July 2023

Prepared for:
Synergy Renewable Energy Developments

Prepared by:
Stantec Australia Pty Ltd

Internal Project Number:
304501017

Document Internal Reference: 304501017_GE_RP_001

Rev	Description	Author	Date	Authorised	Date
A	Internal Review	B. Petracca	29/05/23	A. Petty	29/05/23
0	Issued for Client Review	B. Petracca	30/05/23	A. Petty	30/05/23
1	Issued for Use	B. Petracca	03/07/23	A. Petty	03/07/23

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Prepared by: 

Brenton Petracca

Senior Engineering Geologist

Reviewed by: 

Alex Petty

Geotechnical Service Lead WA/NT

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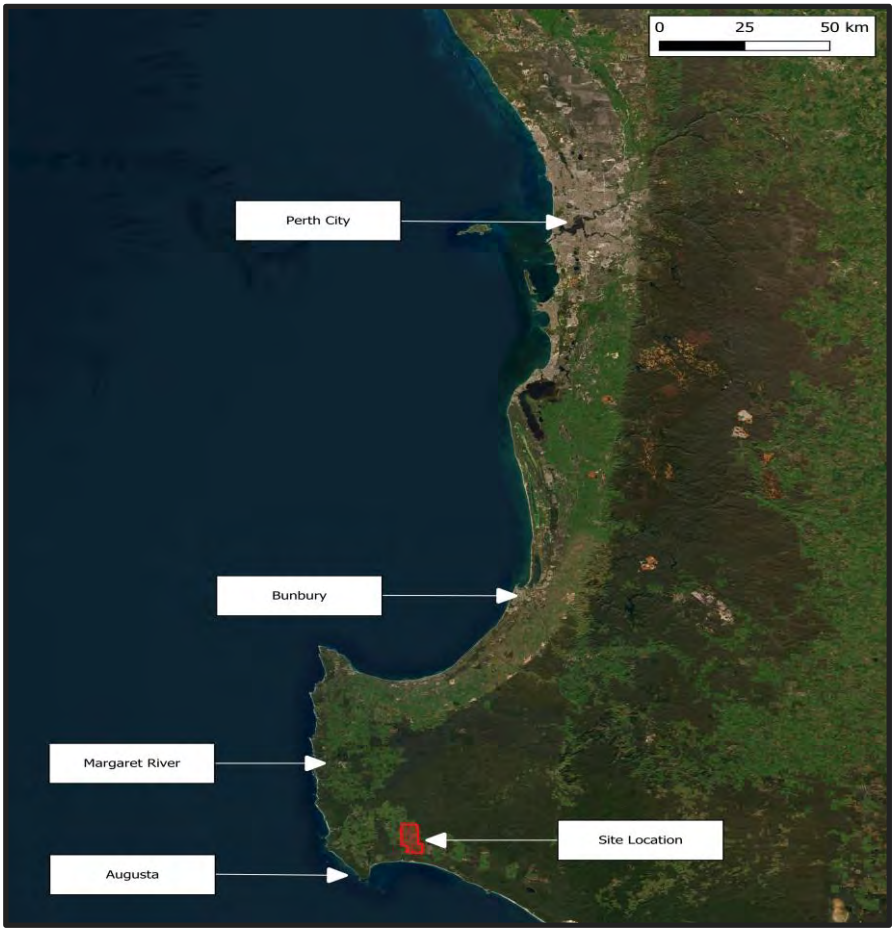
1 Introduction

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is currently progressing through the planning and approvals phase for a proposed new wind energy project (currently titled the Beenup Wind Farm Project) approximately 15 km east of Augusta in WA's Margaret River region as shown on the site location plan below (*Figure 1-1*).

A confirmed site layout is not yet known, however, preliminary plans and information provided by SynergyRED suggest that the Beenup Wind Farm Project will likely comprise the installation of between 20 and 40 wind turbines as well as the associated supporting infrastructure. A preliminary site plan is provided in Appendix A.

This desktop study report presents the findings of a review of both published and publicly accessible preliminary information relating to the site and its surroundings. This preliminary information is provided to assist with future planning of subsequent phases of works from initial preliminary geotechnical and contamination assessments to tendering for 'design and construct'.

Figure 1-1: Site Location Plan



2 Publicly Available Information

The following publicly available sources of information were reviewed during for the desktop assessment:

- The Geological Survey of Western Australia (1967) Geological Series - 1:250,000 scale - Busselton and Augusta map sheet.
- The Geological Survey of Western Australia (2002) Regolith Landform Resources Series - 1:50,000 scale - Karridale–Tooker map sheet.
- The Geological Survey of Western Australia (2019) State Interpreted Bedrock Geology – 1:500,000 – Western Australia.
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- Department of Water and Environmental Regulation. (2017, December 19). Acid Sulfate Soil Risk Map - Lower Southwest (DWER-052). Retrieved from Data WA: https://catalogue.data.wa.gov.au/dataset/acid-sulfate-soil-risk-map-lower-south-west-dwer-052.

3 Desktop Assessment

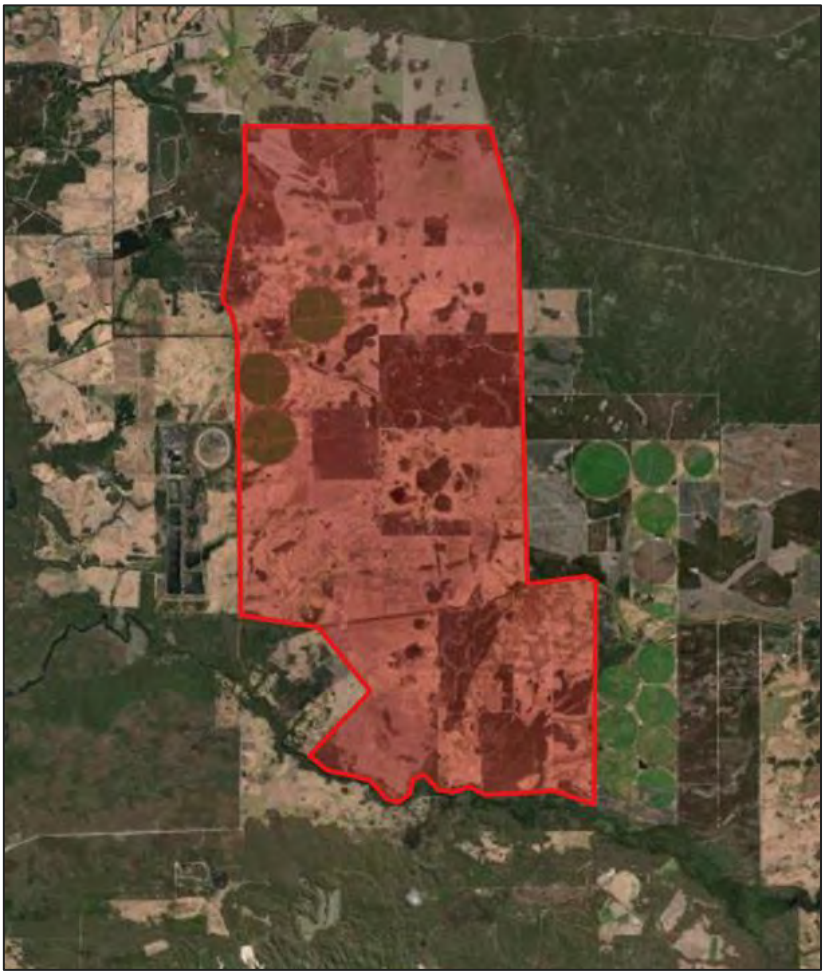
3.1 Site Identification and Description

3.1.1 SITE DESCRIPTION

The proposed Beenup Wind Farm is located in the southwestern region of Western Australia, approximately 15 km northeast of the town of Augusta and within the Shire of Augusta-Margaret River. The site geometry can be identified by two areas, a rectangular prism-shaped section north of Gov Broome Road and an irregular shaped section south of Gov Broome Road.

Occupying an approximate area of 5,500 Hectares and located within an agriculturally active region, the site is bound by fence-lines which separate neighbouring properties. Beyond the fence-lines, the site is bound to the north and west largely by cleared farmland, to the east by forest land (northern segment) and cleared farmland (southern segment) and to the south by a lesser tributary of the Scott River as shown on the site plan (*Figure 3-1*).

Figure 3-1: Proposed Wind Farm Site Area



3.1.2 SITE TOPOGRAPHY

With the southern boundary of the site located approximately 4 km north of the Indian Ocean-Southwestern Australian coastline, the surface topography of the region abruptly rises in elevation, from 0 m AHD at the coastline to greater than 30 m (at the top of nearby sand dunes) only a few hundred meters north. From the east, the surface topography from the Scott River (approximately 4 km from the site's western boundary), also at 0 m AHD, gently increases in elevation to 20 m AHD where the western boundary is intersected in the south, and as great as 37 m in the north. Locally across the site itself, there exists a gradual increase in elevation from the southwest (as little as 9 m AHD) to the northeast (as great as 38 m AHD).

3.1.3 PRIMARY PHYSIOGRAPHIC FEATURES

Based on aerial imagery obtained through Landgate, the site looks to be primarily cleared for farming practices, although some forested (presumably re-forested) areas remain present, primarily proximate to the northwest, east, and southeastern boundaries.

Although surface drainage features are generally difficult to determine based on the broad-scale aerial imagery available, significant wetlands and ponds are visible sporadically across the site, not necessarily constrained to low lying areas. Furthermore, where available historic 'Street View' imagery was reviewed, significant waterlogged surface conditions were observed. It is likely that shallow groundwater (possibly localised perched conditions) is present across the site, possibly driven by the underlying low permeability geological conditions.

3.1.4 HISTORIC LAND USE

Aerial imagery, obtained through Landgate, a government land agency, dating back to 1971 shows that the site area has historically been primarily utilised for agricultural purposes. The 1971 imagery indicates the site was largely undeveloped, although, some clearing had already been undertaken. Imagery taken in 2000, shows farming-related homesteads, sheds and other farm related facilities, likely built during the late 1990s on the southwestern side of the plot. The latest satellite imagery shows these buildings remain on the site to date. A series of available images are shown as Figure 3-2 to Figure 3-5 below.

Figure 3-2: Aerial Imagery 1971 - Landgate

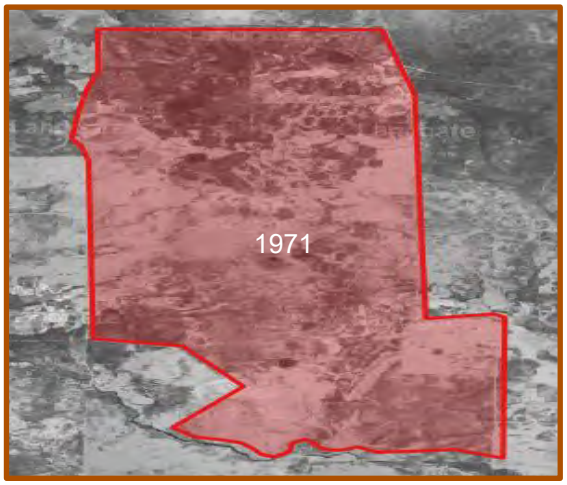


Figure 3-3: Aerial Imagery 2000 - Landgate

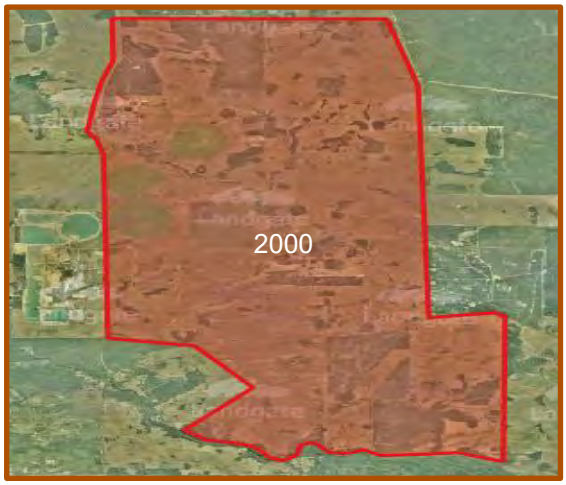


Figure 3-4: Aerial Imagery 2010 - Landgate

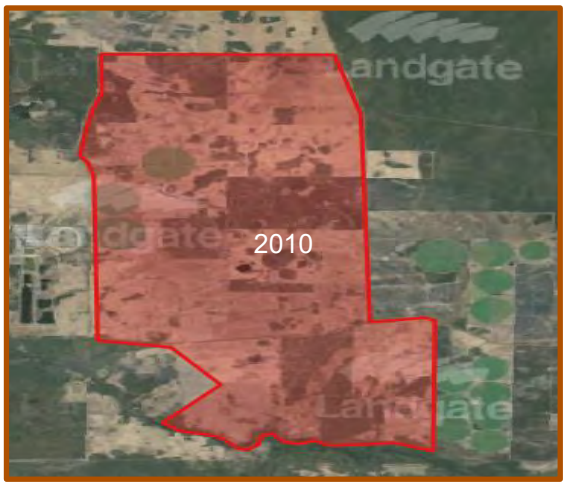
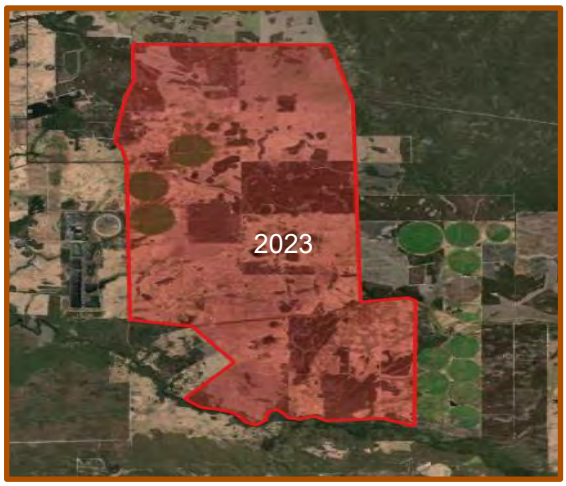


Figure 3-5: Aerial Imagery 2023 - Landgate



3.1.5 VEGETATION

Based on the vegetation map for WA from the Department of Agriculture and Food as well as a review of aerial and site-based imagery, the site comprises the following vegetation facets:

Forest and Woodland

Comprising namely Jarrah (E. marginata), Marri (Corymbia calophylla) and Wandoo (E. wandoo).

Low forest and Low woodland with Scattered Trees

Comprising a variety of Wattle (Acacia rostellifera), Rottnest pine (Callitris preissii), moort (Eucalyptus platypus) or mixed tropical forest with scattered Jarrah (E. marginata), banksia (Banksia spp.) or casuarina (Allocasuarina spp.).

Open Low Woodland

Comprising wattle (Acacia spp.), banksia (Banksia spp.), peppermint (Agonis flexuosa), cypress pine (Callitris spp.), casuarina (Alllocasuarina spp.) and York gum (E. loxophleba)

Scrub, Open Scrub or Sparce Scrub

Comprising Wattle (Acacia spp.), Teatree (Melaleuca spp.) and other species.

3.2 Geotechnical Assessment

3.2.1 PUBLISHED GEOLOGY

Published geological, geomorphological and soil landscape information has been reviewed, where a summary of the applicable findings is presented below. Excerpts of the available maps have been cropped, with the site area superimposed as presented in the series of geological maps of Section 3.2.1.1 (Figure 3-6 to Figure 3-9).

Based on our own understanding of the site area and information presented within The Geological Survey of Western Australia (1967) 1:250,000 scale; Busselton and Augusta map sheet, it is anticipated that the site is primarily underlain by the following geological units:

- Quaternary Alluvium comprising quartz-rich sand dunes; and
- Cainozoic Laterite.

At greater resolution, the nearby 1:50,000 scale Karridale – Tooker map sheet also developed by The Geological Survey of Western Australia (2002) would suggest that the Leederville Formation, comprising interbedded sedimentary rock and associated units derived via weathering may be encountered underlying the dune deposits and laterite across the site.

Within the 1:500,000 linear structures' geological map, a fault or shear zone runs North to South in the western portion of the site, and a major fault (Busselton Fault) runs along, and parallel to, the eastern boundary of the site.

Based on the information presented within the soil landscape map (DPIRD-064), as shown on Figure 3-8 below, the site is located within the Scott Coastal Plain. The Scott Coastal Plain is flanked by the Blackwood Plateau to the North, separated by the Barlee Scarp, and the Leeuwin Naturaliste Ridge to the West. According to the published information, the coastal plain is comprised of alluvial, lake, swamp, estuarine and shoreline deposits unconformably overlying sediments and basalt flows of the Mesozoic or marine sediments of the Eocene. Whilst the site appears to be uniform, with its base siliceous sands according to geological maps, variability exists with the secondary inclusions within the geological profile. These secondary inclusions comprise organic stained siliceous sands, bleached siliceous sands and shallow sands overlying ferricrete (‘Coffee Rock’).

An investigation was undertaken between 2014 and 2015 by Brockman South for the Alexandra Iron Ore Project (C19/2014) where a more detailed lithology map pertaining to the Beenup Wind Farm site area was developed and presented within their report (Brockman South Pty Ltd, 2015). It was noted that there was no outcropping basement, and the site is covered extensively by surficial deposits of the Cainozoic age, which in turn is underlaid by unconsolidated sediment from the early Cretaceous Warnbro group.

3.2.1.1 Published Series of Geological Maps

Figure 3-6: Beenup Wind Farm 250k Geological Setting

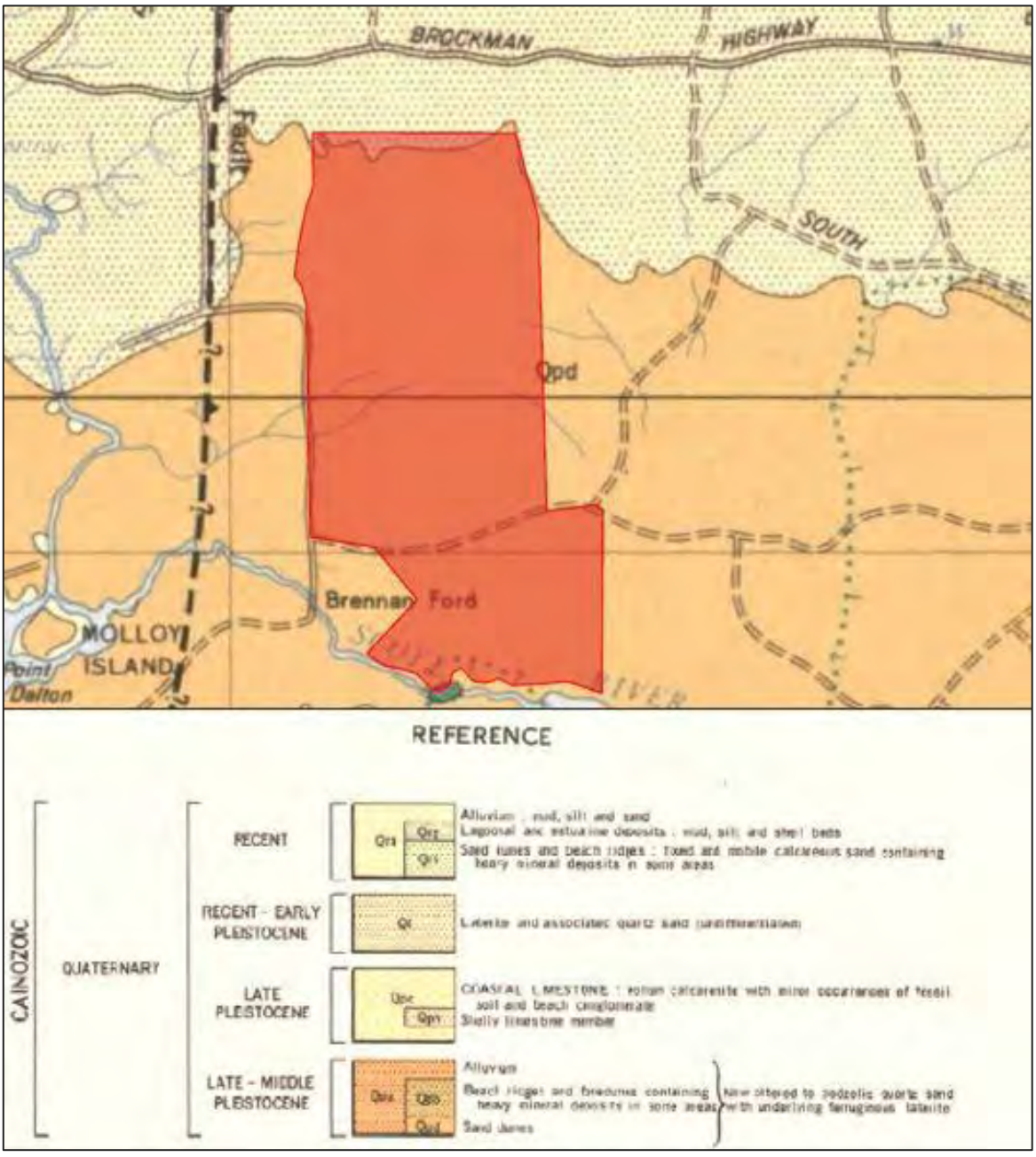


Figure 3-7: Beenup Wind Farm Site Linear Geological Structures

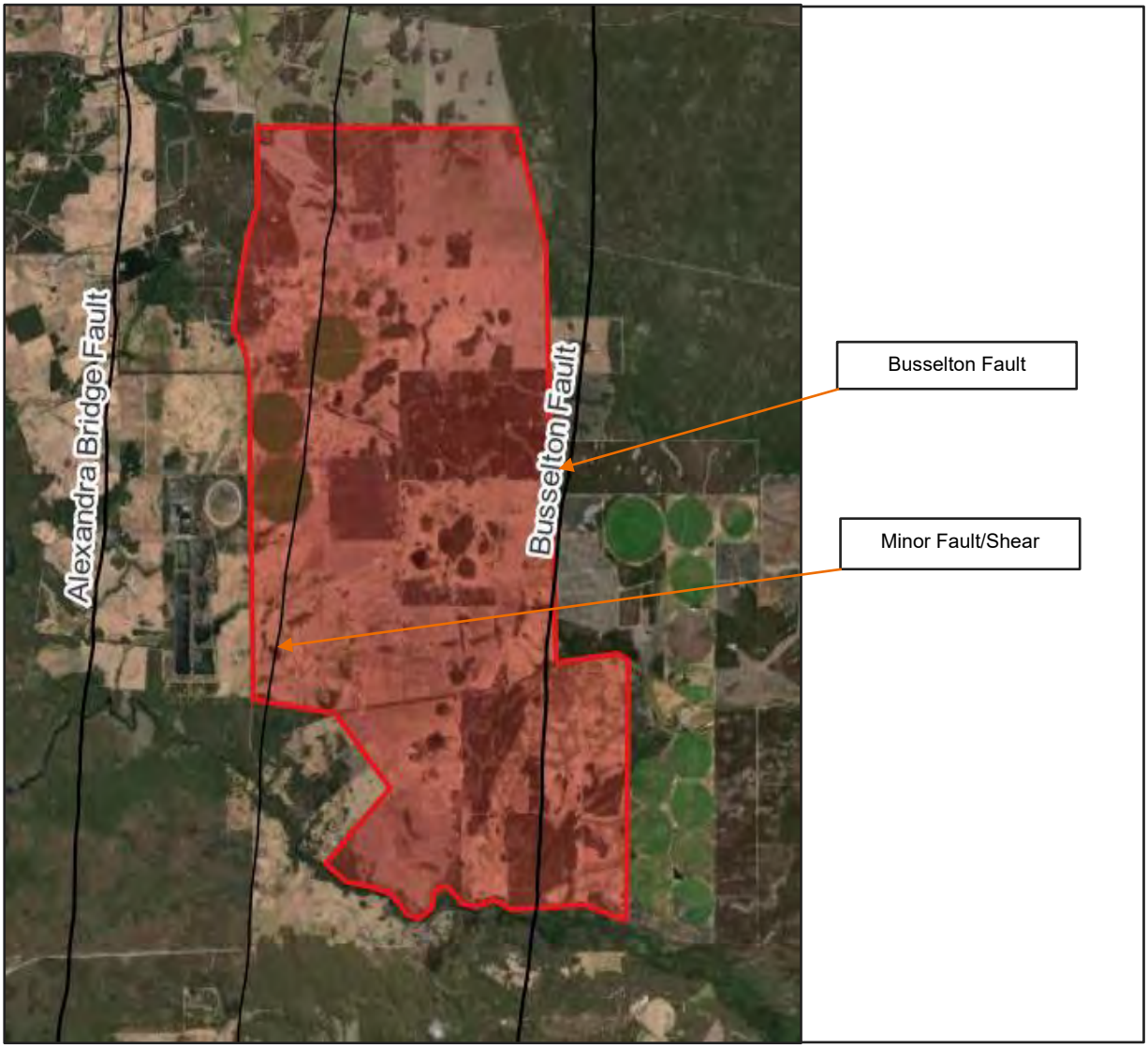


Figure 3-8: Soil Landscape Map

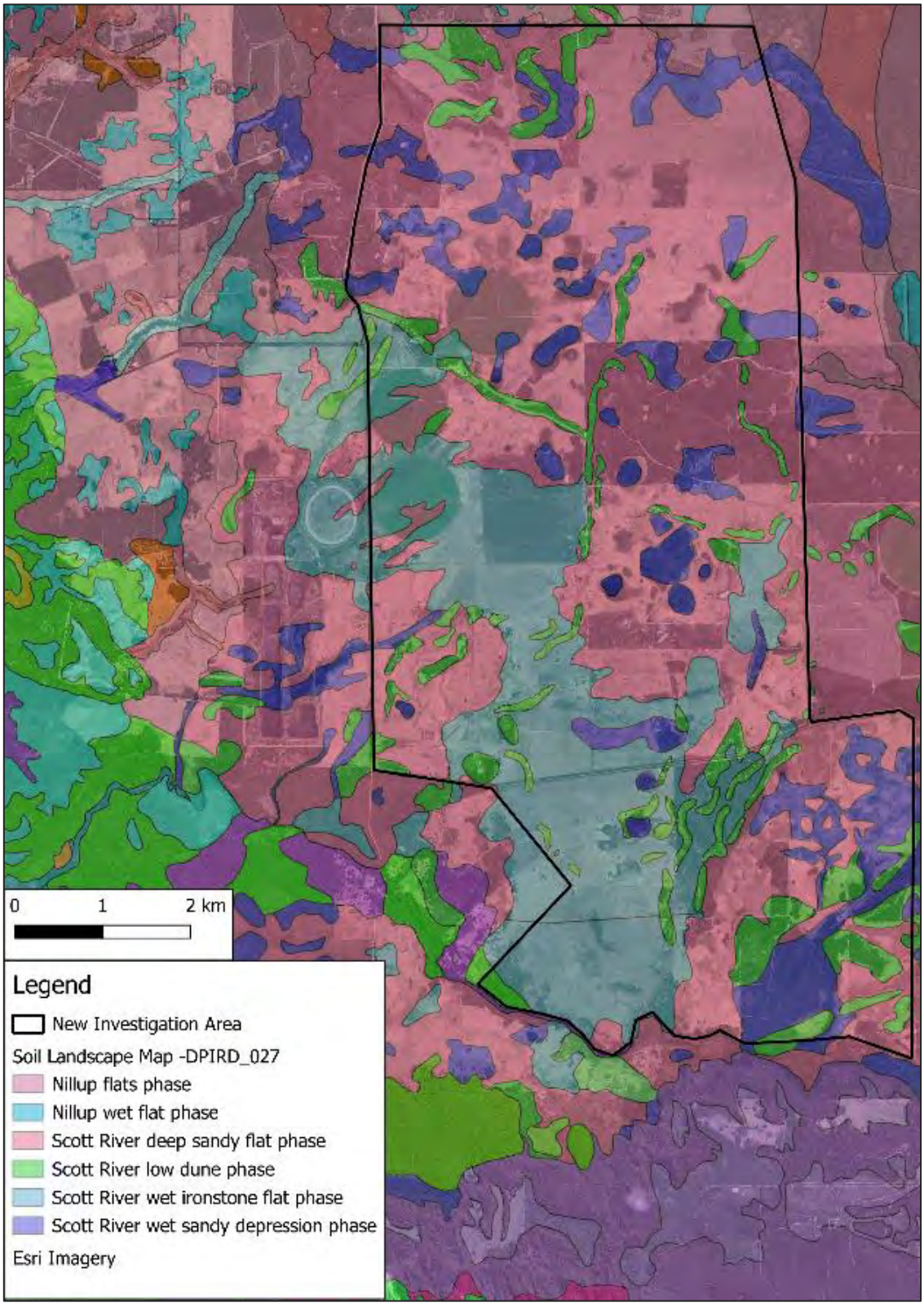
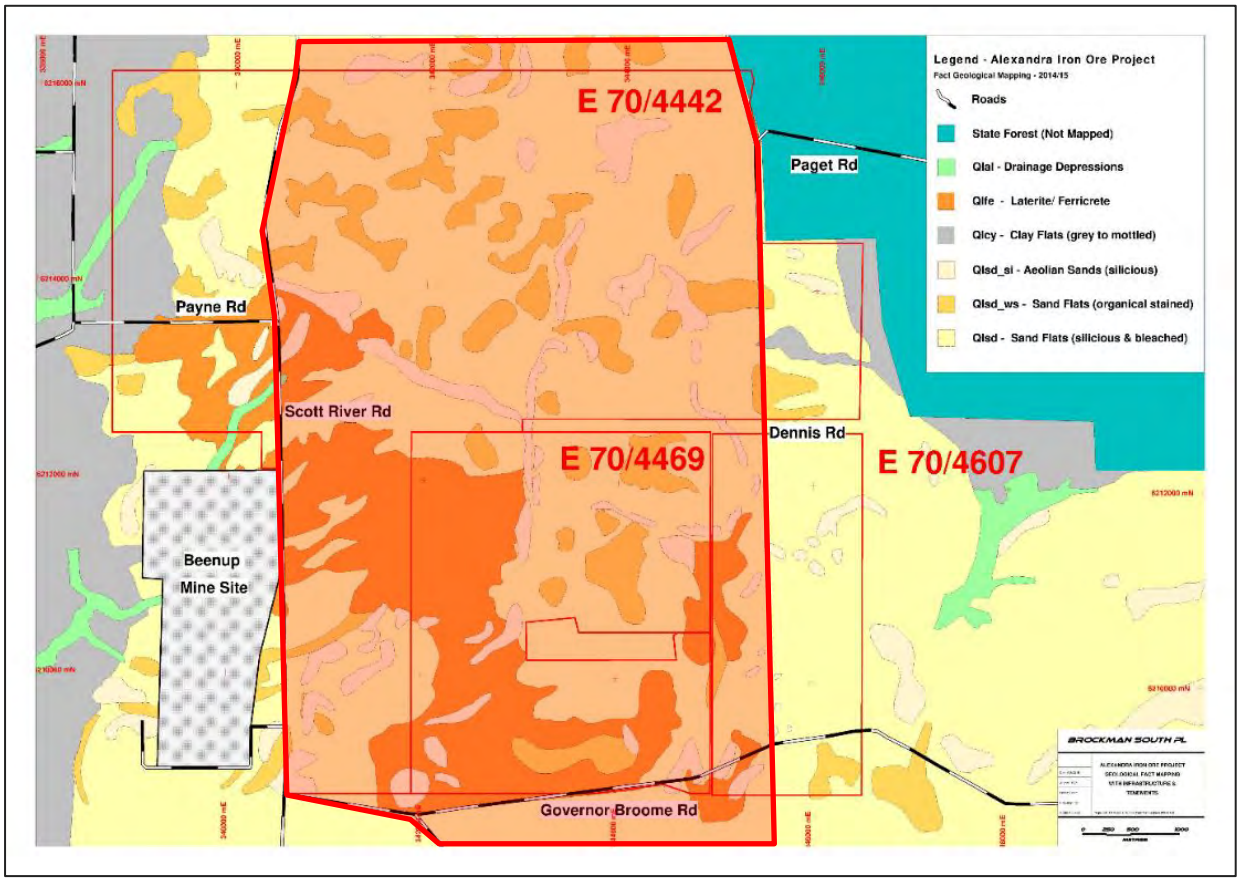


Figure 3-9: Geological Map of Investigation Area developed by Brockman South Pty Ltd



3.2.2 GEOTECHNICAL SETTINGS

As part of the nearby Beenup Mineral Sands project (M70/574-577), BHP Engineering Geotechnical have made available a number of borehole logs within their report, referenced (BHP Engineering Geotechnical - Smyth, 1992). Although not within the site bounds themselves, the historic borehole logs remain a useful source of geotechnical data recovered from the adjacent lot beyond the western boundary.

Considering both the broader geological context as well as the borehole logs from (BHP Engineering Geotechnical - Smyth, 1992), the following simplified profile is summarised below, presenting lithologies that are anticipated to be encountered across the site from surface level to depths of up to 25 m below ground level.

- **TOPSOIL: SAND:** Fine- to medium-grained; yellow brown; with low plasticity silty fines. (topsoil); overlies
- **FERRICRETE:** Fine- to coarse-grained, clast supported; pale brown; with gravel, fine to coarse (<25mm), sub-rounded, pisolitic laterite clasts; suspended within a clayey/sandy matrix. (Duricrust / ‘Coffee Rock’); overlies

- **SAND (SP) & SILTY-CLAY SAND (SC)**: Fine- to coarse-grained, sub-rounded, quartz; grey, mottled orange and red brown; with silt and clay, non-plastic to high plasticity; with gravel, fine to coarse. (Alluvium/Aeolian).

The above information is considered preliminary and additional variability is expected to be encountered during subsequent phases of geotechnical works. A ground model considering the above information as well as intrusive data recovered during geotechnical investigations across the site, and proposed infrastructure locations (once known) should be developed for the project.

3.2.3 GROUNDWATER

Accurate groundwater information proved difficult to acquire for the region, and in particular the site area. Based on information within, (BHP Engineering Geotechnical - Smyth, 1992) and the latest satellite imagery taken of the region. It is likely that shallow groundwater exists across the site (at least in areas where lower permeability soil or 'Coffee Rock' is present).

3.2.4 PRELIMINARY GEOTECHNICAL RISKS IDENTIFIED

Cementation 'Coffee Rock' – Constructability / Differential Settlements

The presence of locally cemented zones of 'Coffee Rock' throughout the shallow subsurface profile is likely, as is well documented within publicly accessible geological maps and historic geotechnical logs. It is noted that variability in strength and resistance to penetration was encountered across various depths during the reviewed historic drilling records.

In addition to the difficulties and cost increases arising during excavation works, well-cemented zones may also increase the risk of intolerable differential settlements where foundations are allowed to span across both cemented and uncemented zones.

A reduction of permeability should also be anticipated if large zones of cementation are present beneath drainage structures.

Low Permeability Soils Causing Flooding – Constructability and Trafficability

Based on a flooding study conducted in 1992 of the Scott River, for a 1 in 100-year flood event, it can be inferred that due to the distance from the river, the site will not be affected by overtopping of the Scott River. However, the flood risk map developed by DPIRD-007 that captures a small portion of the site (<10%) and suggests that a moderate to high flood risk exists.

As mentioned previously in this report, numerous wetlands and ponds were noted to exist across the site. In addition, surface/street view images taken during wetter periods were noted to show ponding water across vast areas of the site.

It is likely that low permeability soils or the presence of the aforementioned 'Coffee Rock' at shallow depths results in low infiltration of precipitation during the wetter months periods of the year. Perched groundwater which protrudes lower lying areas is likely also a contributing factor which should be anticipated and investigated further across the site.

Shallow groundwater or ponding surface water may be a risk during construction due to destabilising exposed slopes (risk to embankments and excavations), softening of soils relied upon for foundation,

and resulting in trafficability issues. The presence, extent, and likelihood of construction being impacted by such conditions should be investigated further and considered within design.

3.2.5 EARTHQUAKE DESIGN

Based on the location of the site with reference to Figure 3.2 (B) of AS1170.4-2007 Structural Design Action Part 4: Earthquake Actions, Section 3-Site Hazard, a Hazard Design Factor (Z) of 0.09 is appropriate for the site.

Based on the likely geological and geotechnical conditions inherent to the site and considering the depth limitations of the historic data on-hand (maximum drill depths of 25 m below surface), a site sub-soil classification of Ce – Shallow Soil or De – Deep Soil is likely applicable in accordance with Section 4 of AS1170.4-2007 Structural Design Action Part 4: Earthquake Actions. This should be further investigated and confirmed during subsequent phases of design.

3.3 Contamination and Acid Sulphate Soils

3.3.1 POTENTIAL CONTAMINATION

As identified, the site has been predominantly utilised for agricultural purposes dating back to at least 1971 with evidence of farming-related homesteads, sheds and other farm related facilities. Based on the agricultural activities that have been undertaken across the site there are a number of contaminants of potential concern (CoPC).

It is also noted that the previous mining lease to the west of the site has been classed within DWER-059 - contaminated sites as remediated, for restricted use. Although it is likely that contamination was the result of the land use.

Within Appendix B of the Department of Water and Environmental Regulation (DWER) Assessment and management of contaminated sites, November 2021 (DWER, 2021) is a list of CoPC associated with agriculture, including but not limited to:

- Carbamates.
- Organochlorine pesticides (e.g., Aldrin, Dieldrin, Endrin, Methoxychlor, Pentachlorophenol).
- Organophosphate pesticides.
- Herbicides (e.g., Triazine, Atrazine, 2,4,5-T 2,4-D, MCPA, Picloram).
- Insecticides DDT, DDE and DDD, Bifenthrin.
- Nitrates.
- Metals (e.g., aluminium, arsenic, cadmium, copper, iron, lead, magnesium, potassium).
- Nutrients (e.g., nitrogen, phosphorus).
- Toxaphene.

In addition, to the identified CoPC there is also the potential for the presence of asbestos containing materials (ACM) based on the nature and age of the buildings located across the site.

3.3.2 ACID SULPHATE SOILS

Based on Acid Sulphate Soils (ASS) risk maps developed by DWER, the proposed wind farm site is located on region which is mapped as Moderate to High ASS risk.

Acid Sulfate Soils (ASS) are iron sulphides residing within the soil and present no effects when left submerged and undisturbed in the environment. However, exposure to air via decreases in water levels or excavation can cause iron compounds to oxidise and form sulfuric acid. Sulfuric acid poses a potential structural threat due to its oxidising effect, in addition to the environmental implications of ASS.

As mentioned within the geotechnical assessment, ferruginous soils and iron cemented soils are likely present across the shallow subsurface of much of the site. It is likely that the published risk rating is a product of such ground conditions.

3.4 Recommended Investigations

It is understood that the project is currently in the approvals stage. As such, the location of proposed infrastructure is not yet confirmed. Preliminary geotechnical and contamination-based site investigation is presumably required to satisfy the approvals progression. This should comprise a geotechnical, groundwater, and contamination (including PASS) assessment across the entire site area in such a way as to capture, as much as practical, inherent variability and representative conditions of the site.

Three boreholes and twenty test pits are currently planned to be undertaken across the site with geotechnical and contamination-based sampling and laboratory testing proposed. Given the scale of the site (approximately 5,500 Hectares), these quantities are likely to provide high level information only to satisfy approvals. Significant variability is expected across such a large area; thus, extensive additional testing is recommended at subsequent phases to enable detailed design.

Based on a preliminary site layout provided by SynergyRED as shown in Appendix A, and considering the inherent variability likely present across the site as well as likely geotechnical hazards to construction, the following scope of works is recommended.

3.4.1 FIELDWORK

The following fieldworks are recommended to be undertaken at the locations shown in Appendix A. Based on the locations, it is recommended that clear access points and paths to each location be documented prior to site mobilisation to avoid unnecessary delays associated with accessibility constraints.

Test Pits

Twenty (20) test pits excavated to a target depth of 3 m bgl or prior practical refusal (due to rock refusal, inundation of groundwater, side-wall collapse, penetration limit or machine limit) at the locations shown on Appendix A. In order to provide a practical/realistic assessment of excavatability

across the site, the test pit excavation shall be undertaken utilising equipment which best represents likely construction equipment / methodologies (trenching and footing excavations using a >20 tonne excavator with appropriate bucket selection options).

Bulk and disturbed sampling shall be undertaken from the excavated materials as to best capture material variation across the site. Recovered materials and side walls shall be logged in accordance with AS1726-2017.

Upon completion, the test pits shall be backfilled with the excavated spoil and tamped in place utilising the excavator bucket and tracks (at surface). Any excess spoil is to be mounded over the test pit to allow for future settlement. Topsoil and vegetation is to be stripped and placed to the side of each test pit prior to excavating and shall be replaced upon the surface to assist with rehabilitation.

Penetrometer To assist with assessing soil strength, a Dynamic Cone Penetrometer (DCP) test shall be undertaken adjacent to each test pit location, advanced to a target depth of 1.5 m bgl or prior penetration refusal.

The locations have been positioned with the aim of providing a reasonable distribution of geotechnical information across the site, specifically where infrastructure is proposed as per the current site plan

Boreholes

Three (3) geotechnical boreholes shall be drilled to a depth of 25 m below ground level (bgl) at the locations shown on Appendix A. The boreholes shall be drilled using a truck or track mounted drill rig and is to be advanced by direct-push probing techniques in soil and where refusal is encountered, continued via HQ3 diamond drilling techniques.

In order to assess relative density and provide additional samples for laboratory testing, Standard Penetration Tests (SPT's) are to be undertaken at nominal 1.5 m intervals when drilling through granular soils.

Recovered soil and rock shall be placed inside of 1 m length metal core trays where they are to be logged in accordance with AS1726-2017 and subsequently photographed.

It is noted that the boreholes were positioned previously by SynergyRED however, they are distributed in such a way which will likely provide a reasonable spread of information across the site, albeit limited to three locations.

Standpipes

Upon completion of the boreholes a standpipe piezometer (groundwater well) is to be installed in each to a depth of 10 m bgl and following the well design as presented within Appendix B. The purpose of the standpipe is to allow for future shallow groundwater level monitoring which may impact construction at possible excavation depths.

A water level logger shall be installed within each of the wells to provide long-term hourly groundwater level information. A barometric logger shall also be installed at the site to allow for future groundwater / barometric compensation during data collation. Initial groundwater levels shall be recorded (at meters below ground level) upon logger installation. It is recommended that monthly groundwater

level monitoring be undertaken as well as the groundwater data downloaded from the loggers. It is understood that SynergyRED will undertake such monitoring.

Contamination Sampling

Environmental soil samples are to be recovered at 0.5 m intervals, where a change in lithology occurs and immediately above groundwater level (if encountered) to a minimum depth of 1.5 m bgl in both the boreholes and test pits. Screening for volatile organic compounds will be undertaken from each sample using a calibrated photoionisation detector (PID), and the readings are to be recorded on the logs. Samples shall be chilled, stored and transported in laboratory supplied coolers.

Acid Sulphate Soils (ASS) samples shall be recovered at 0.5 m intervals to allow for laboratory testing across the entire ground profile.

3.4.2 LABORATORY TESTING

Geotechnical

The quantities and types of laboratory testing will largely be determined by the recovered materials at the time of investigation. However, based on the anticipated lithologies at the site, the following testing is recommended:

- 6 nos. Particle Size Distribution;
- 6 nos. Atterberg Limits including Linear Shrinkage;
- 6 nos. Soil Aggressivity testing (SO4, Cl and pH);
- 2 nos. Modified Maximum Dry Density (MMDD);
- 2 nos. 4-Day Soaked California Bearing Ratio;
- 2 nos. Emerson Class;
- 1 no. Thermal Resistivity dry out curve (4-stage);
- 6 nos. Natural Moisture Content;
- 2 nos. Direct Shear;
- 6 nos. Point Load Index;
- 2 nos. Uniaxial Compressive Strength; and
- 2 nos. Uniaxial Compressive Strength with modulus.

Environmental / Contamination

46 samples are to be submitted for the following:

- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- Total Recoverable Hydrocarbons (TRH) (NEPM 2013 fractions);

- Metals (As, Be, B, Cd, Ch(VI), Co, Cu, Pb, Mn, Hg, Ni, Se, Zn);
- Organochlorine (OC) and Organophosphate (OP) pesticides (basic suite);
- Nutrients (Ammonia-N, Nitrate-N, Nitrite-N, NOx-N, TKN, TN, reactive P, total P); and
- Asbestos (fibrous).

Acid Sulphate Soils

- Preliminary analysis of 240 samples for field pH (pHF) and oxidized field pH (pHFOX);
- QA/QC (preliminary analysis of 12 samples samples for field pH (pHF) and oxidized field pH (pHFOX); and
- Confirmatory analysis of 60 samples for either suspension peroxide oxidation combined acidity and sulfate (SPOCAS) or Chromium Reducible Sulfur (CRS) suite;
    - *Where the preliminary analysis indicates the absence of ASS the DWER regulations requires a minimum of 25% of samples to be submitted for confirmatory analysis. Where the preliminary analysis indicates the presence of potential ASS (PASS) or actual ASS (AASS) this frequency will need to be increased to between 25% and 100% depending on the magnitude of the preliminary results.*

3.4.3 REPORTING

The results of the investigation above shall be collated and provided in a geotechnical investigation report. The report shall document the investigation undertaken as well as the following:

- A site plan detailing the location of all testing locations;
- Provision of comprehensive graphical borehole and test pit logs;
- A summary of core tray photos and site photographs;
- A summary of field tests and results;
- A summarised description of the subsurface conditions across the study area;
- Soil/Rock descriptions, classifications and typical profile including any existing fill and groundwater levels at the time of the investigation;
- Development of an inferred subsurface cross section, composition and in-situ strength. I.e. a Ground Model;
- A summary of geotechnical and environmental laboratory test results;
- Comments and recommendations regarding suitable foundation systems and preliminary geotechnical parameters to be considered for tenderers prior to detailed investigations;
- Comments on potential reuse of materials and earthworks requirements; and

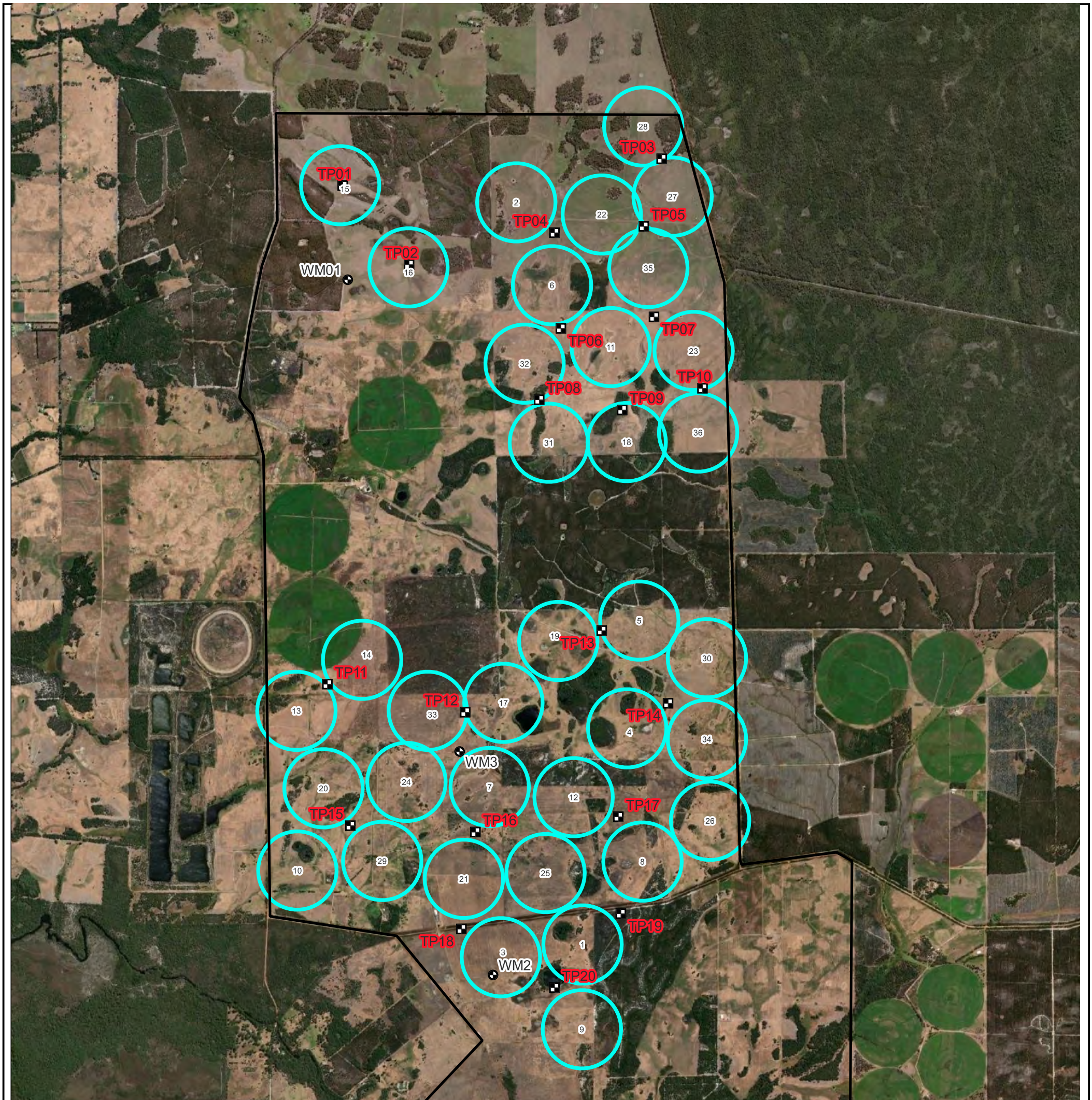
- Any other relevant geotechnical/environmental constraints and/or risks that are identified at the time of the field investigation.

4 Limitations

The findings within this report are the result of a review of desktop level published (and publicly available) information only which has been developed by others. The information should be considered as preliminary and not relied upon for design purposes. Under no circumstances, can it be considered that these findings represent the actual state of the ground conditions across the site.

It is recommended that geotechnical investigations be undertaken to a level that satisfies the relevant stage of the project throughout the approvals and design process.

Appendix A – Site Plans



Beenup Wind Farm - Geotechnical Investigation

Scenario 2: Targeted Investigation Locations

Legend

- Test Pit (TP) Locations
- Borehole (GW) Groundwater Monitoring Locations
- Proposed Windfarm Area
- Turbine Location

0 1 2 km

Scale: 1:50000

Key Map



Client: Synergy Red
Project Code: 304501017
Drawn By: Edvinder Singh, Checked By: BP
Date: (2023-06-18)
Figure No: 1.2 - Scenario 2

Stantec

This document has been prepared based on information provided by others as cited in the data sources. Stantec has not verified the accuracy and/or completeness of this information as shall not be help responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and recipient accepts full responsibility for verifying the accuracy and completeness of the data.

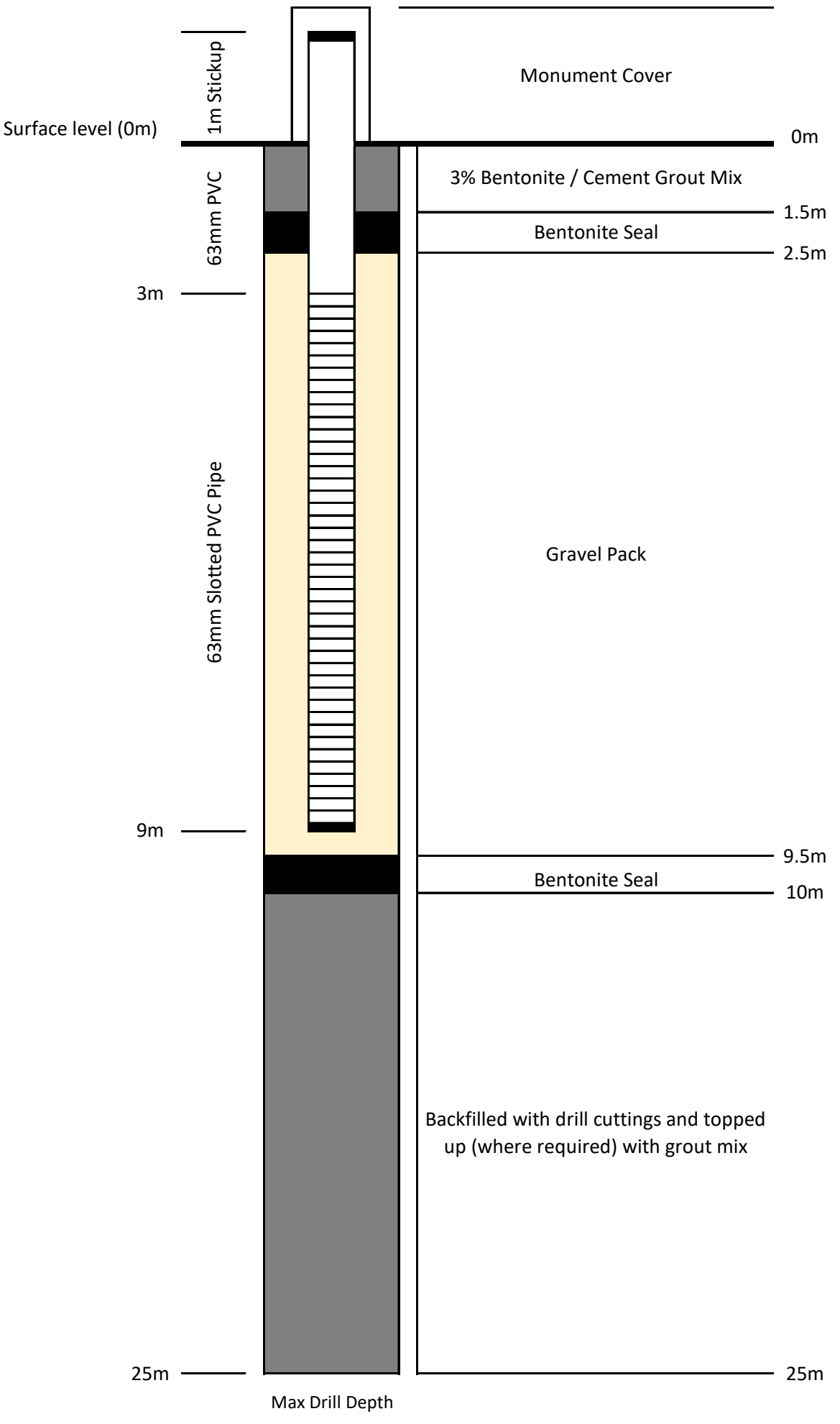
Appendix B – Preliminary Well Design

Stantec

8-May-23

Beenup Wind Farm - Proposed Well Designs

Not to Scale



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Attachment 4 (RSD) - Appendix H

Preliminary Construction Environmental Management Plan

REDACTED ON REQUEST EPA

synergyRED

Windfarm in Scott River

Preliminary Construction Environmental Management Plan

September 2025

Document title
Wind Farm in Scott River – Preliminary Construction Environmental Management Plan

Version	Author	Reviewer	Approver		
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SynergyRED acknowledges the Traditional Owners of the Land on which we operate and their continuing connection to the land, water and community. We pay our respects to all Aboriginal and Torres Strait Islander communities, their cultures and to Elders past, present and emerging.

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Acronyms

AEP	Annual Exceedance Probability
ADLS	Aircraft Detection Lighting Systems
AH Act	*Aboriginal Heritage Act 1972*
ASS	Acid Sulphate Soil
ASSDMP	Acid Sulfate Soil and Dewatering Management Plan
BAM Act	*Biodiversity and Agriculture Management Act 2007*
BBAMP	Bird and Bat Adaptive Management Plan
BBUS	Bird and Bat Utilisations Surveys
BC Act	*Biodiversity Conservation Act 2016*
BMP	Bushfire Management Plan
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CEMP	Construction Environmental Management Plan
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DFES	Department of Fire and Emergency Services
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EMI	Electromagnetic Interference

EN	Endangered
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity conservation Act 1999*
ERGA	Environmental Research Group Augusta
GDE	Groundwater Dependent Ecosystem
KKAC	Karri Karrak Aboriginal Corporation
LCU	Landscape Character Unit
MI	Migratory
MW	Megawatt
NCR	Non-conformance Report
NVCP	Native Vegetation Clearing Permit
O&M Area	Operations and Maintenance Area
OS	Other Specially Protected Fauna
P	Priority
PASS	Potential Acid Sulfate Soils
PD Act	*Planning and Development Act 2005*
PFAS	Per- and Polyfluoroalkyl Substances
RiWI Act	*Rights in Water and Irrigation Act 1914*
RSA	Rotor Swept Area
RSD	Referral Supporting Document
SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheet
SRE	Short Range Endemic
STATCOMS	Static Synchronous Compensators
SWIS	South West Interconnected System
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
TEC	Threatened Ecological Community
TKN	Total Kjeldahl Nitrogen
UBC	Urban Bushland Council
VU	Vulnerable
WA	Western Australia

WoNS	Weeds of National Significance
WSWA	Wildflower Society of Western Australia

1 Introduction

1.1 Overview

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is proposing to develop an onshore wind farm generating up to 100 Megawatt (MW) in the Scott River region, approximately 15 km north-east of Augusta, in the South West of Western Australia (WA) (the Proposal; Figure 1-1). The Proposal will include the construction and operation of up to 20 wind turbines and associated infrastructure within a 3,597 ha Development Envelope, with an Indicative Disturbance Footprint of 107 ha (Figure 1-2). The Proposal is part of an initiative by SynergyRED to explore, scope and develop a range of renewable energy assets across WA, to meet the State Government's 2030 decarbonisation targets.

The Proposal is in the Scott River region of WA, within the Warren bioregion, approximately 250 km south of Perth. The Proposal is located within the Shire of Augusta-Margaret River and the South West Boojarah Indigenous Land Use Agreement (ILUA). Karrak Aboriginal Corporation (KKAC) is the regional corporation for the South West Boojarah region that was established under the ILUA.

The land surrounding the Proposal is zoned as general agricultural and the Development Envelope is situated almost entirely on Freehold land, with some extents on public land comprised of reserves managed by state and local government. These lots are zoned "General Agriculture" and "Local Roads" within the Shire of August-Margaret River Local Planning Scheme No. 1 (DPLH 2024a).

The Proposal intersects eleven privately owned agricultural properties, used primarily for dairy and beef farming as well as Blue Gum plantation. A total of 2,476.41 ha within the Development Envelope has been cleared of vegetation, primarily for these agricultural operations.

1.2 Purpose

The purpose of this Preliminary Construction Environmental Management Plan (CEMP) is to ensure the Proposal:

- Establishes systems to minimise environmental risks to as low as reasonably practicable
- Sets management actions and monitoring requirements to meet Proposal specific environmental performance objectives
- Complies with legislative requirements, relevant guidelines, and Proposal approvals
- Guides all project personnel and contractors on what they need to address in their specific CEMP.

This Preliminary CEMP will support Proposal approvals and be used as a foundation for the detailed CEMPs. Detailed CEMPs will be developed later as the Proposal progresses to the detailed design phase and will be prepared by each contractor according to their specific scope of work.

This Preliminary CEMP has been prepared in accordance with the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA 2023) to support the referral of the Proposal to the Environmental Protection Authority (EPA) under Part IV (s 38) of the *Environmental Protection Act 1986* (EP Act).

1.3 Scope

The scope of this Preliminary CEMP primarily relates to the design and construction of the Proposal. Where commissioning and operational risks are known they will be addressed; however, a review of this CEMP will be undertaken at the transition of construction to operations to ensure operational risks are identified and suitable mitigation measures developed.

This Preliminary CEMP will be used to support approvals, guide detailed design, provide evidence that environmental impacts are being considered and will be appropriately managed, and guide contractors on what they need to address in their specific CEMPs.

In addition, this Preliminary CEMP seeks to:

- Summarise the existing environment of the Proposal including factor specific environmental outcomes referred to in the s 38 Referral Supporting Document (RSD)
- Provide an overview of the construction methodology and the Proponent's Environmental Management Framework
- Identify the environmental impacts associated with relevant environmental factors and document the rationale and approach to the management of these factors during the construction of the Proposal
- Provide guidance on the management measures to be implemented to minimise adverse impacts
- Detail the roles and responsibilities of personnel, the monitoring and reporting requirements as well as contingency actions if objectives and outcomes are not met.

The EPA Environmental Factors relevant to this CEMP are:

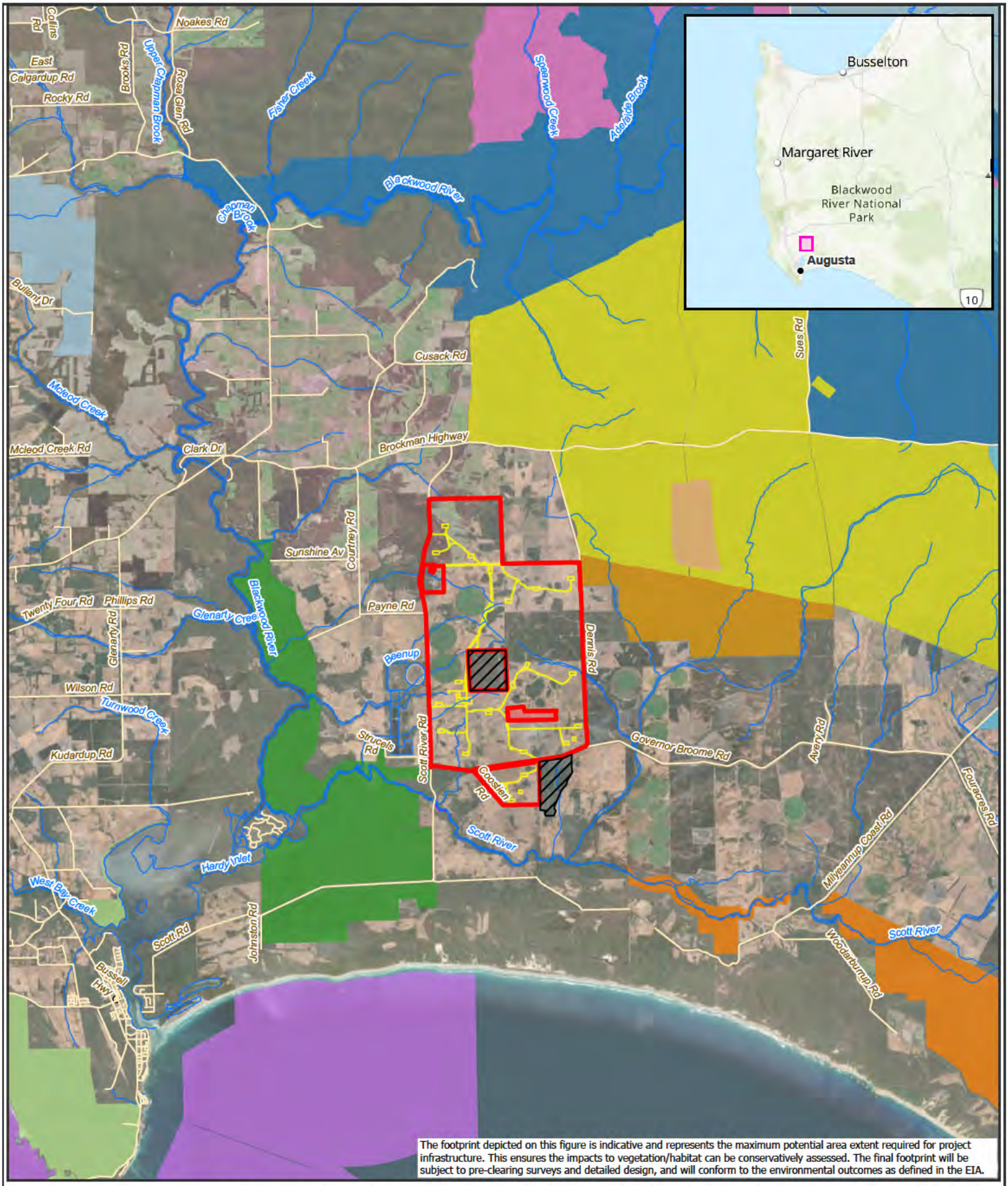
- Terrestrial Environmental Quality
- Inland Waters
- Flora and Vegetation
- Terrestrial Fauna
- Social Surroundings.

A number of other management plans will be prepared and implemented to manage the impacts to these Environmental Factors:

- An Acid Sulfate Soil and Dewatering Management Plan (ASSDMP) will be developed and implemented in accordance with relevant guidance to manage the potential acid sulfate soils (PASS) and dewatering requirements associated with the Proposal. A Preliminary ASSDMP (PTG 2025) has been prepared to support s 38 referral and assessment, which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP, to be developed following the completion of detailed design and site investigations and further modelling prior to construction of the Proposal.
- A preliminary Bird and Bat Adaptive Management Plan (BBAMP, ELA 2025a) has been prepared to support s 38 referral and assessment, to monitor and manage potential impacts to bird and bat species arising from the commissioning and operation of the Proposal.
- A Dieback Management Plan will be developed and implemented to assess and mitigate the risks related to the introduction and/or spread of dieback during the design and construction phase of the Proposal, where required, and will be informed by a Phytophthora dieback survey completed prior to construction.
- A Bushfire Management Plan (BMP; Linfire 2025a) and Bushfire Risk Management Plan (BRMP; Linfire 2025b) have been developed in accordance with the *Bushfire Management Plan Manual* (DPLH 2024b) to manage bushfire risks during the construction and operational phase of the Proposal.
- A Traffic Management Plan will be developed and implemented to manage impacts associated with traffic safety and disruptions to local road users.

- An Operational Noise Management Plan will be developed and implemented to manage impacts during the operation phase of the Proposal and will include noise monitoring.
- A Preliminary Decommissioning Plan has been prepared to provide preliminary strategy for managing the decommissioning phase of the Proposal.

As such, this Preliminary CEMP does not include management measures for dewatering, PASS, operational impacts to birds and bats, dieback, bushfire risk, traffic or operational noise.



The footprint depicted on this figure is indicative and represents the maximum potential area extent required for project infrastructure. This ensures the impacts to vegetation/habitat can be conservatively assessed. The final footprint will be subject to pre-clearing surveys and detailed design, and will conform to the environmental outcomes as defined in the EIA.

Figure 1-1: Regional Context of the Proposal

- Development Envelope
- Indicative Disturbance Footprint
- DBCA Lands of Interest (Crown Freehold Land)
- Watercourses
- Roads

DBCA managed lands

- Blackwood State Forest
- Milyeannup State Forest
- Ngari Capes Marine Park
- South Blackwood State Forest
- Forest Grove National Park
- Blackwood River National Park
- Leeuwin-Naturaliste National Park
- Scott National Park
- Pagett Nature Reserve
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Wiltshire-Butler National Park
- Unnamed WA42377 Nature Reserve
- Unnamed WA42942 Nature Reserve

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Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/24/2025

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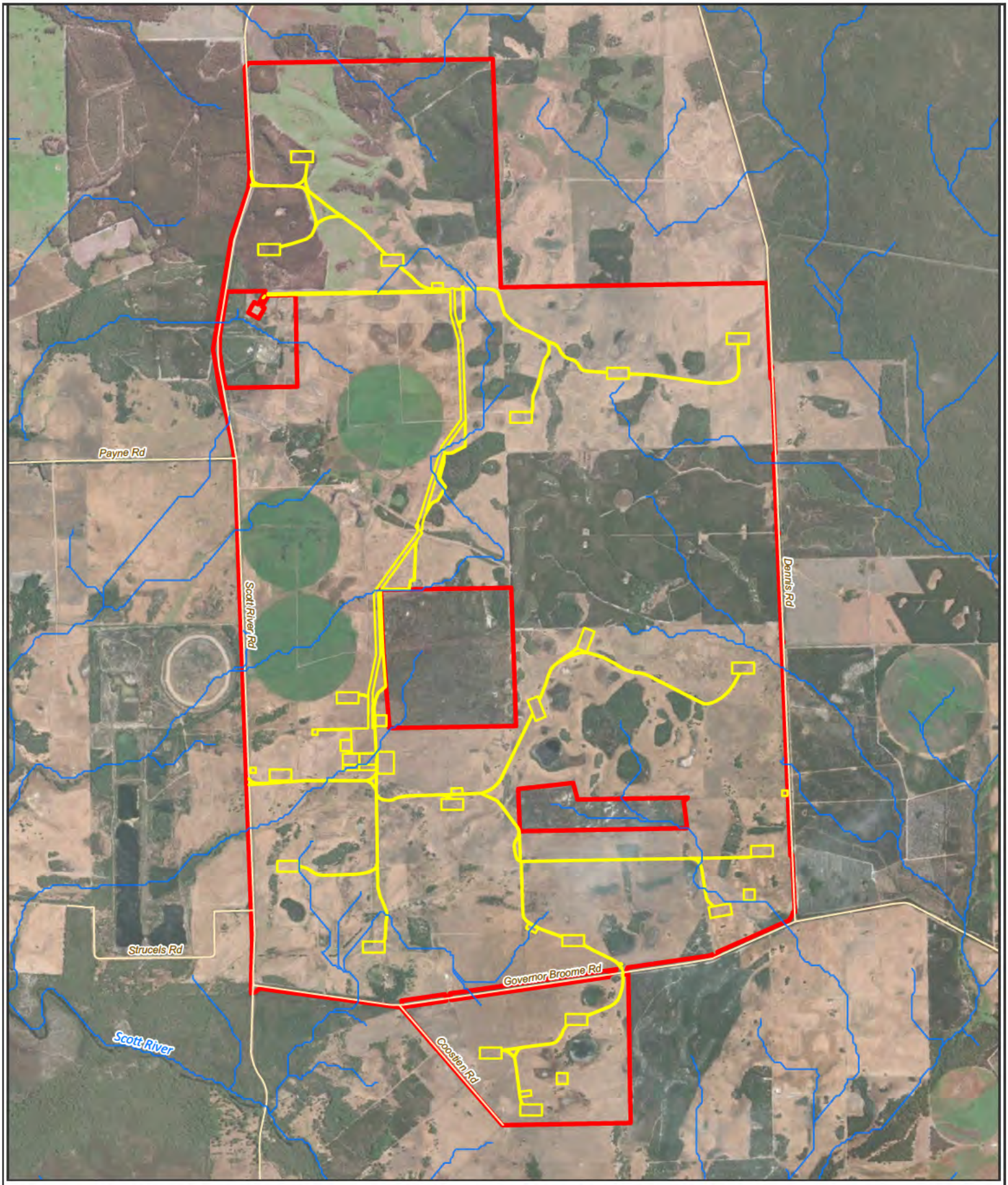

Figure 1-2: Development Envelope and Indicative Disturbance Footprint

- Roads
- Rivers and Tributaries
- Development Envelope
- Indicative Disturbance Footprint

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Kilometers

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Project: 24PER7886-DH Date:
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2 Proposal elements

Table 2-1 defines the key elements of the Proposal.

Table 2-1: Proposal Elements

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Physical elements		
Wind turbines including associated foundations and hardstands	Figure 1-2	107 ha of disturbance, including clearing of no more than 1 ha of remnant native vegetation, within a 3,597 ha Development Envelope.
Meteorological masts and communication towers		
Substation and transmission infrastructure		
Operations and maintenance area		
Site entrances, internal access roads and public viewing area		
Other supporting infrastructure and utilities (e.g. concrete batching plants, borrow pits, site office, water storage and construction laydown areas)		
Construction element		
Construction water supply	Within the Development Envelope (Figure 1-2)	Water tanks and/or storage dams will be installed to support construction and operational water requirements. Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction.
Concrete batching plants	Within the Development Envelope (Figure 1-2)	Concrete for the foundations will be mixed at the concrete batching plants. Concrete batching materials may be sourced offsite.
Dewatering for construction of underground infrastructure, including turbine, meteorological mast and communication tower foundations	Within the Development Envelope (Figure 1-2)	Groundwater drawdown will not exceed 2 mbgl, measured from the natural land surface at the perimeter of each foundation.
Operational elements		
Wind energy production	Within the Development Envelope (Figure 1-2)	A maximum of 20 turbines, with a maximum total energy production of 100 MW.

Proposal Element	Location / Description	Maximum Extent, Capacity or Range
Rehabilitation		
The Proposal utilises existing cleared areas (i.e. agricultural and tree plantation land devoid of native vegetation) wherever possible. Minor areas of native vegetation necessary for construction and operation of the Proposal will be cleared. Following construction, and where practicable, the Proponent will conduct progressive rehabilitation in areas no longer required, to meet the original land use or to an agreed post closure land use with the landowners. The rehabilitation of sites used for temporary infrastructure can inform the broader post-decommissioning rehabilitation strategy by identifying the most effective rehabilitation techniques.		
Commissioning		
The Proposal's commissioning stage has no additional effects on the environment.		
Decommissioning		
Once the initial operational life of the Proposal comes to an end, the wind farm can be repowered by replacing the wind turbines, or wind turbine components to extend Proposal life. If repowering the wind farm is not viable, the Proponent will decommission and rehabilitate the Proposal site to an agreed post-closure land use with landowners. This will involve the dismantling and removal of all turbines and above ground infrastructure, unless otherwise agreed with the relevant landowners, noting it is likely that the landowner may want to retain some infrastructure (e.g. access roads). Below ground infrastructure will also be removed if environmentally acceptable and agreed upon with landowners, in accordance with the Decommissioning Plan. The removal and disposal of materials and components will be conducted in a manner that minimises impacts to the environment and the infrastructure itself, to allow for the reuse of components, if viable.		
Other elements which affect extent of effects on the environment		
Proposal time	Maximum project life	64 years*
	Construction phase	18 to 24 months
	Operations phase	30 to 60 years
	Decommissioning and rehabilitation phase	24 months

* This accounts for potential repower after 30 years of operation.

3 Preliminary construction methodology

3.1 Proposal delivery timeframes

The maximum project life for the Proposal is 64 years. This includes a construction phase of 18 to 24 months, an operations phase of 30 to 60 years and a decommissioning and rehabilitation phase of 24 months.

3.2 Equipment and machinery

The physical elements of the Proposal include (Figure 3-1):

- Wind turbines including associated foundations and hardstands
- Meteorological masts and communication towers
- Substation and transmission infrastructure
- Operations and maintenance areas
- Site entrances, internal access roads and a public viewing area
- Other supporting infrastructure and utilities (e.g. concrete batching plants, borrow pits, site office, water storage and construction laydown areas).

Wind turbines including associated foundations and hardstands

The Proposal will have a maximum of 20 wind turbines, generating up to 100 MW. The wind turbines will have a maximum blade length of 90 m, a maximum tower height of 164 m, and a maximum overall turbine tip height of 250 m. A rotor swept area (RSA; the physical areas swept by the rotating blades during operation) of 40 m above ground and 250 m above ground level has been considered to account for varied turbine models.

Three turbine foundation designs are proposed including two primary options (above ground and partially above ground) and one secondary option (traditional below ground). Traditional below ground turbine foundations will only be used where it is confirmed, prior to construction through detailed site investigation and further modelling, that no dewatering would be required.

Meteorological masts and communication towers

Two permanent meteorological masts (met masts) will be erected to measure wind speed and direction. The met masts will be up to 164 m tall, depending on the height of the selected wind turbine, and will be a suitable distance from the nearest turbines to ensure that accurate and unimpeded wind measurements can be obtained throughout the life of the Proposal, in accordance with international standards. In addition, up to four temporary met masts will be erected during construction to calibrate permanent met mats from proposed turbine locations. Visual bird diverters will be installed during construction on guy wires of permanent met masts.

Two microwave communications towers may also be required each up to 100 m tall. Met masts and communication towers will utilise similar foundation solutions to turbines.

Substation and transmission infrastructure

A 132 kV substation is required for the Proposal adjacent to the Operation and Maintenance Area to connect the Proposal to the South West Interconnected System (SWIS) via the existing Beenup to Manjimup 132 kV

transmission line. This Proposal will also involve minor upgrade of the existing Beenup substation, with minimal new ground disturbance required (0.02 ha).

The Proposal substation infrastructure will include the following:

- Cabling between the wind turbines and the substation
- Electrical protection infrastructure
- A transmission line connecting the wind farm substation to the existing Beenup to Manjimup 132 kV (MJP–BNP 81) transmission line via a local tee connection
- Communication infrastructure such as Supervisory Control and Data Acquisition (SCADA)
- Metering
- Transformers
- Static Synchronous Compensators (STATCOMS).

The cabling between the wind turbines and the substation that connects the Proposal with the 132 kV transmission line will be underground and follow existing and proposed internal access roads where possible to minimise disturbance. Visual bird diverters will also be installed during construction along the new connecting transmission line.

Operations and maintenance areas

The Operations and Maintenance Area (O&M Area) will be located near the Proposal substation and is anticipated to utilise an onsite septic system. The buildings are expected to include the following:

- Office
- Warehouse
- Workshop
- Kitchen/staff room
- Amenities
- Carpark and laydown.

Site entrances, internal access roads and a public viewing area

There will be two main access points to the Proposal situated along Scott River Road. A new site entrance will also be installed across Governor Broome Road to facilitate transport of turbine components to south of Governor Broome Road.

Internal access roads will generally have a construction footprint of 10 m and be designed to utilise existing tracks and other cleared areas as much as practicable, with the aim of minimising disturbance to native vegetation and agricultural activities. The construction footprint for internal access roads in sensitive areas will be limited to maximum width of 6 m to avoid clearing impacts along existing tracks as necessary, supported by the provision of passing bays. Roads will be unsealed and gravel-capped with locally sourced material where available and will be designed and constructed to minimise impacts to natural surface water flows.

A public viewing area will also be developed along Scott River Road to ensure a safe pull over area where tourists can stop and observe the wind farm. The viewing area will include informative signage about wind as a renewable energy source and be capable of accommodating four to six vehicles.

Other supporting infrastructure and utilities

Other supporting plant and equipment to facilitate Proposal construction will include, but are not limited to:

- Concrete batching plants
- Construction site offices
- Construction laydown areas
- Generator(s) for emergency and construction power supply
- Borrow pits, for local sourcing of gravel, including mobile crushing and screening plant if required
- Water storage infrastructure for construction and operational water requirements.

3.3 Construction workforce

The Proposal is expected to require a workforce of up to 150 personnel at peak construction periods. It is anticipated that workers throughout the construction period will be accommodated in local accommodation in surrounding towns and localities with no construction camp or temporary onsite accommodation proposed. Once operational, it is anticipated that five full-time operations staff who reside locally will be required throughout the life of the Proposal.

3.4 Construction water supply

Permanent and temporary water tanks and/or storage dams will be installed to support construction and operational water requirements (Figure 3-1). Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction.

3.5 Concrete batching plant

Concrete for the infrastructure foundations will be mixed at concrete batching plants (Figure 3-1). Concrete batching materials may be sourced offsite.

3.6 Dewatering for construction

Dewatering may be required for construction of underground infrastructure, including turbine and meteorological mast and communication tower foundations. Groundwater drawdown will not exceed 2 mbgl, measured from the natural land surface at the perimeter of each foundation.

Dewatering during construction will be managed by the ASSDMP and is therefore not included in this CEMP.

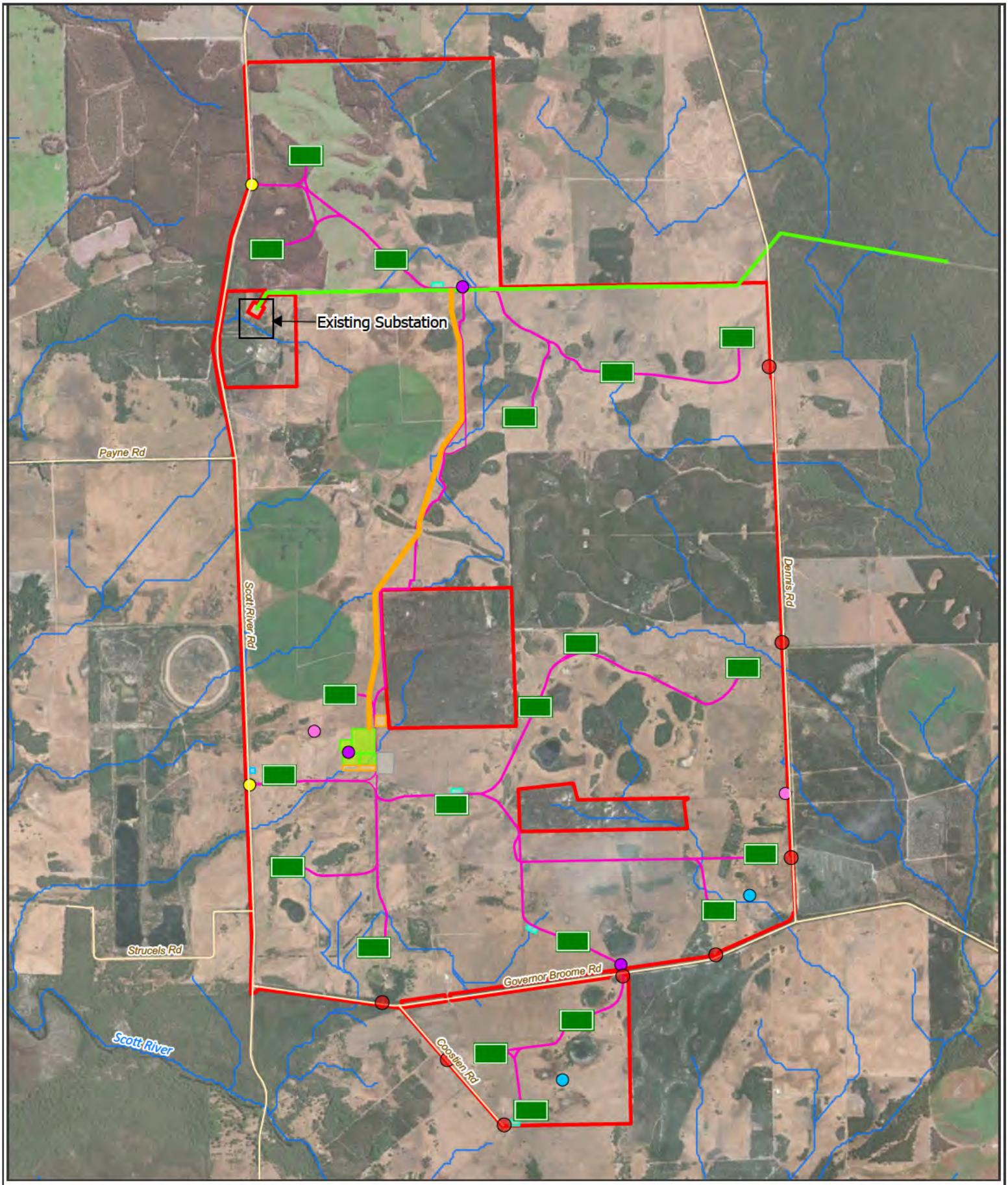

Figure 3-1: Proposal Elements

- Existing Farm Entrance/Emergency Access
- Existing 132 kV Beenup to Manjimup
- Roads
- Rivers and Tributaries
- Development Envelope

Proposal Physical Elements

- Wind Turbine
- Communication Tower
- Main Site Entrance
- Water Tank
- Meteorological Mast
- Transmission Line
- Borrow Pit
- Public Viewing Area
- Internal Access Road
- Concrete Batching Plants
- Construction Laydown Areas
- O&M Area, Project Substation, Construction Site Offices

0 0.5 1 2
Kilometers

Datum/Projection:
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4 Receiving environment

This section provides a summary of the results of desktop analyses and surveys that have been conducted to understand the baseline conditions of the key environmental factors relevant to the Proposal (Section 1.3). Further detail on the results of these desktop analyses and surveys can be found in the RSD and appendices.

4.1 Terrestrial Environmental Quality

The terrestrial environmental quality study undertaken relevant to this CEMP is a Geotechnical and Baseline Contamination Assessment (Stantec 2024). This assessment was undertaken for the Proposal and comprised testing via geotechnical boreholes and test pits. The assessment provided preliminary information on the geology of the site, including soil profile, contamination and presence of acid sulfate soils (ASS).

A summary of the key findings of this study include:

- Soils fall mostly within the Scott River Plain Land System, with a small northern portion intersecting the Nillup Plain System (DPIRD 2022). Both systems are described as “poorly drained coastal plains in the southern Donnybrook Sunkland”.
- The shallow soil profile (<3 m) was generally found to comprise a thin layer of topsoil and dune sand overlying ferricrete, or alternating bands of clayey and sandy soils with pockets of organic and peaty material. These units are generally underlain by clayey and sandy soils to a depth of approximately 25 m. Outcrops of ferricrete also occur throughout.
- ASS risk mapping identifies the top 3 m of soils as having moderate to high risk of ASS occurring (DWER 2017). PASS was found to be present within all soil types, except for shallow pale grey/white sands that occur less than 1 mbgl. The dark grey/brown sands and sandy clay which occur more than 2 mbgl are considered the highest risk soils within the Development Envelope due to the presence of elevated concentrations of inorganic sulfur.
- No asbestos has been identified, and all elements of potential concern (including Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene, Total Recoverable Hydrocarbons, metals [arsenic, beryllium, boron, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium and zinc], Organochlorine, Organophosphate, pesticides, and Per- and polyfluoroalkyl substances [PFAS]) were recorded below the laboratory limit of reporting or adopted assessment criteria, where relevant. Concentrations of nutrients, including potassium, nitrogen and total kjeldahl nitrogen (TKN), nitrate, nitrite, nitrogen and phosphorus were recorded above the laboratory limit of reporting; noting that there are no assessment criteria for nutrients in soil (Stantec 2024).

4.2 Inland Waters

The hydrological and hydrogeological study undertaken relevant to this CEMP is a Surface Water and Hydrogeological Assessment (Stantec 2025) undertaken to investigate the hydrological and hydrogeological regimes and to assess the potential impacts to inland waters associated with the construction and implementation of the Proposal.

A summary of the key findings of this study include:

- The Development Envelope intersects the Blackwood River catchment and Scott River catchment and several ephemeral waterways. A poorly defined ridgeline occurs through the middle of the Development Envelope, which segregates the eleven Blackwood River and Scott River headwater catchments which discharge from the Development Envelope.
- There is existing drainage infrastructure within the Development Envelope to facilitate plantation and agricultural activities. This drainage has not been established to coordinate with roads and natural drainage lines, which has resulted in catchment modification and several areas of localised ponding (Stantec 2025).
- In both frequent (approximately 50% Annual Exceedance Probability [AEP]) and rare events (1% and 2% AEP), inundated areas with depths greater than 0.5 m typically occur upstream of roads that act as hydraulic barriers, with some ponding occurring in areas of wetlands and perched ponds (Stantec 2025). Inundation is widespread during rare flow regimes (1% and 2% AEP), with a maximum ponding depth of approximately 2.8 m occurring towards the north of the Development Envelope (Stantec 2025).
- During frequent (50% AEP) and rare flow regimes (1% AEP), peak flow rates vary from 0.5 m^3/s to approximately 20 m^3/s, respectively, with the maximum discharge rate occurring south to the Scott River.
- Surface water quality is characterised by elevated nutrients, salinity, turbidity, and metals, influenced mainly by agricultural land use and associated runoff, with some parameters tested exceeding health and ecological guideline thresholds.
- The Development Envelope intersects three Surface Water Management Areas: Lower Blackwood, Beenup and Scott Surface.
- The groundwater system comprises two main aquifers:
    - Superficial Aquifer: within the Development Envelope, the Superficial Aquifer is generally less than 3 m deep. This discontinuous, perched aquifer is present across the Development Envelope and likely to be seasonal (Stantec 2025). This aquifer is comprised of sand and ferricrete of variable thickness, with the presence of ferricrete potentially representing the accumulation and precipitation of dissolved iron in the watertable. Groundwater standing levels in the Superficial Aquifer ranged from 0.11 mbgl to 3.15 mbgl.
    - Leederville Aquifer: a confined aquifer that lies beneath the superficial formations of the coastal plains. The Leederville Aquifer was identified in groundwater monitoring bores across the Development Envelope at depths ranging from 0.07 mbgl to 2.25 mbgl.
- A total of 24 registered groundwater bores occur within 500 m of the Development Envelope.
- The Development Envelope occurs within the Beenup and Blackwood Groundwater Management Areas and Beenup Subarea of the South-West Groundwater Allocation Plan. It also intersects Groundwater Management Zone 7, which is classified as ‘a buffer zone area defined by acid sulfate soil plume from Beenup mine site’ (DoW 2009).

4.3 Flora and Vegetation

The flora and vegetation studies undertaken relevant to this CEMP include:

- A Detailed and Targeted flora and vegetation survey undertaken in spring 2023 (Phoenix 2025a). The survey covered 99.95% of the Development Envelope and was conducted across three phases to target certain flora flowering periods.
- A reconnaissance flora and vegetation assessment undertaken in 2025 to fill the gap in the Development Envelope (ELA 2025b).

A summary of key findings of the flora and vegetation study include:

- Occurrence of a total of 18 native vegetation types and four non-native vegetation types.
- The majority (approximately 80%) of remnant vegetation is considered to be in Completely Degraded condition.
- 83.58 ha of the Scott River Ironstone Association Threatened Ecological Community (TEC) intersects the Development Envelope. This TEC is listed as Endangered (EN) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act). Vegetation types XpMdLm, EmmTpAs, Mj and AmBsHc are considered representative of this TEC, and as such are considered regionally significant. In accordance with the *Approved conservation advice for Scott River Ironstone Association* (DSEWPaC 2013) occurrences of XpMdLm, EmmTpAs, Mj and AmBsHc mapped as Degraded were not defined as TEC.
- Vegetation types AmBsHc, ClcVi and MpXpHfSs were identified as restricted communities, and as such, are considered locally significant.
- Vegetation types AmBsHc, AsLs, ClcVj, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb, TiLs, XpAs and XpMdLm support populations of Threatened or Priority flora species, and as such, are considered locally significant.
- Vegetation types associated with the Scott River Ironstone TEC are considered obligate groundwater dependent ecosystems (GDEs). Vegetation types MpXpHfSs, MrCh, and MrTjLs are considered facultative GDEs.
- A total of 423 flora taxa (353 native and 70 introduced), representing 65 families and 209 genera were identified during the survey.
- Four flora species listed as Threatened under the EPBC Act and/or the BC Act occur within the Development Envelope (including unconfirmed records):
  - *Conospermum quadripetalum* (listed as Critically Endangered [CR] under the BC Act)
  - *Darwinia ferricola* (listed as EN under the EPBC Act and BC Act)
  - *Lambertia orbifolia* subsp. *vespera* (listed as EN under the EPBC Act and BC Act)
  - *Grevillea brachystylis* subsp. *australis* (listed as Vulnerable [VU] under the EPBC Act and BC Act).
- A total of 15 Priority species occur within the Development Envelope.
- A total of 70 introduced flora species were recorded during the survey. None of these species are listed as a Declared Pest or Weed of National Significance (WoNS) under the *Biosecurity and Agricultural Management Act 2007* (BAM Act).

4.4 Terrestrial Fauna

The terrestrial fauna studies undertaken relevant to this CEMP include:

- A Basic and Targeted fauna survey covering 99.95% Development Envelope and undertaken across three phases between from 2023 to 2025 (Phoenix 2025b).
- A Basic fauna and Targeted black cockatoo and Western Ringtail Possum habitat assessment was undertaken in 2025 to fill the gap in the Development Envelope (ELA 2025b).
- A Bird and Bat Risk Assessment Survey conducted within the Development Envelope which included a level two investigation comprising a regional overview of the area, bird and bat utilisation surveys (BBUS) and a preliminary risk assessment (Phoenix 2025c). BBUS were conducted across two years.
- A Short Range Endemic (SRE) Invertebrate Desktop Assessment covering an area of approximately 100,000 ha, including the Development Envelope (Invertebrate Solutions 2024).

A summary of the key findings of the terrestrial fauna studies include:

- Ten broad fauna habitat types occur within the Development Envelope, including three wetland habitats, two woodlands and five highly modified habitats which provide limited value for fauna (Phoenix 2025b).
- Field surveys recorded a total of 137 vertebrate fauna species, comprising nine amphibians, 105 birds, 17 mammals and six reptiles.
- Seven introduced fauna species were recorded, including three feral predators, namely Cat, Dog and Red Fox (Phoenix 2025b).
- Seven fauna species listed under the EPBC Act, BC Act or as Priority fauna by Department of Biodiversity, Conservation and Attractions (DBCA) were recorded within the Development Envelope (Phoenix 2025b):
  - Baudin's Cockatoo (*Zanda baudinii*; EN)
  - Carnaby's Cockatoo (*Zanda latirostris*; EN)
  - Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU)
  - Wood Sandpiper (*Tringa glareola*; Migratory [MI])
  - Osprey (Pandion haliaetus; MI)
  - Western False Pipistrelle (*Falsistrellus mackenziei;* listed as P4 by DBCA)
  - Western Ringtail Possum (*Pseudocheirus occidentalis*; CR).
- Another seven conservation significant fauna species are considered likely to occur within the Development Envelope, based on the currency and proximity of desktop records and the suitability of habitat present. This includes the Peregrine Falcon (*Falco peregrinus*; listed as Other Specially Protected Fauna [OS] under the BC Act), Quenda (*Isoodon fusciventer*; listed as P4 by DBCA) and Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; listed as P3 by DBCA) which were recorded from outside the Development Envelope.
- The Development Envelope contains five potential SRE habitats of Low suitability (Invertebrate Solutions 2024).

4.5 Social Surroundings

The social surroundings studies undertaken relevant to this CEMP include:

- Proposed Wind Farm – Archaeological and Ethnographic Heritage Survey (AHA Logic 2024).
- SynergyRED Scott River Wind Farm Feasibility: Social Values Assessment (Place.ID 2025).

A summary of the key findings of the social surroundings consultation and studies as they relate to the CEMP include:

- One Registered Aboriginal site and one Lodged Aboriginal place intersect the Development Envelope (DPLH 2025; AHA Logic 2024):
  - Blackwood River (Registered site ID: 20434).
  - Scott River (Lodged place ID: 22928).
- The Blackwood River/Goorbilyup Buerle and the Scott River are important and significant cultural heritage sites (AHA Logic 2024).
- Key social values for the local community include (Place.ID 2025):
  - Water values (rivers, wetlands and swamps)
  - Unique bird life
  - Forest and National Parks
  - Environmental conservation and restoration of cleared land
  - Peace and quiet
  - Visual amenity of the clouds, horizon and sky
  - Agriculture production and history
  - Aboriginal history and culture
  - Access to remote areas, community and networks
  - Local employment opportunities
  - Tourism and visitor enjoyment.

5 Environmental management framework

5.1 Environmental policy

The Proponent's environmental policy details its commitment to conducting its activities and services in a manner that respects and protects the environment and heritage, meets compliance obligations, and manages the impacts of climate change. The Proponent is committed to net zero emissions by 2050 in alignment with the State Government's commitment.

Contractors must comply with the Proponent's environmental policy. The policy must be communicated to all members of the project team, contractors and subcontractors.

5.2 Environmental risk

An assessment of the risk of potential impacts to key environmental factors has been undertaken as part of the RSD. The Proponent has adopted the mitigation sequence for environmental management, which involves avoiding, minimising, controlling, mitigating, and offsetting the significant residual impacts of Proposal activities on the environment. This CEMP is an outcome of this risk assessment. Contractors will also be required to develop their own risk register specific to their scope using the RSD and this CEMP as a guide.

5.3 Other regulatory processes

The other environmental approvals and regulations that may be relevant to the Proposal are outlined in Table 5-1. This table also presents the relevant Environmental Factor which can be managed by each process.

Table 5-1: Other Regulatory Processes Relevant to the Proposal

Legislative framework	Environmental Factor and relevance	Timing
EP Act, Part V: Native Vegetation Clearing Permit (NVCP)	Regulations specific to the clearing of native vegetation. **Relevant Environmental Factors**: Flora and Vegetation and Terrestrial Fauna	Prior to clearing
BC Act Section 40 Authorisation	Authorisation to take and disturb threatened fauna in accordance with the definition as per s 5 of the BC Act. **Relevant Environmental Factor:** Terrestrial Fauna	Prior to clearing
BC Act Section 45 Authorisation	Authorisation to modify a threatened ecological community listed as CR, EN or VU under s 27 of the BC Act. **Relevant Environmental Factor:** Flora and Vegetation	Prior to clearing
Rights in Water and Irrigation Act 1914 (RiWI Act): Section 5C licence, Section 26D licence and bed and banks permit	Authorisation to take a specified amount of water from a proclaimed surface water resource and authorisation for the construction or alteration of wells (bores). **Relevant Environmental Factor:** Inland Waters	Prior to construction

Legislative framework	Environmental Factor and relevance	Timing
EP Act Part V Environmental Protection Regulations 1987: Works Approval, Operating Licence, Registration for prescribed activities.	Authorisation to construct or commission a prescribed premises (Works Approval), authorisation to operate that premises under enforceable environmental conditions (Operating Licence), and authorisation for low-risk prescribed activities via streamlined registration under standard conditions (Registration for prescribed activities). **Relevant Environmental Factor:** Terrestrial Environmental Quality and Inland Waters	Prior to construction
Aboriginal Heritage Act 1972 (AH Act): Section 16, Section 18, Regulation 10, Regulation 7.	Authorisation to enter, excavate, examine or remove items from an Aboriginal site (Section 16), consent to impact an Aboriginal site (Section 18), authorisation for minor activities and impacts on Aboriginal sites (Regulation 10), and authorisation to bring plant and equipment onto an Aboriginal site (Regulation 7). **Relevant Environmental Factor:** Social Surroundings	Prior to construction
Planning and Development Act 2005 (PD Act): Development Application	A regulatory approval that grants permission to proponents to develop on a defined piece of land. **Relevant Environmental Factors:** Flora and Vegetation, Terrestrial Fauna, Inland Waters, Social Surroundings and Terrestrial Environmental Quality	Prior to construction
Environmental Protection (Noise) Regulations 1997	Controls in relation to construction noise levels at environmental receptors. Includes management of activities that could breach levels including timing of activity, duration, notification to stakeholders and noise monitoring. **Relevant Environmental Factor:** Social Surroundings	Prior to construction
EPBC Act	An Act that provides the legal framework to protecting and managing unique environmental values within Australia. **Relevant Environmental Factors:** Flora and Vegetation and Terrestrial Fauna	Prior to clearing
Health Act 1911: Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974	These Regulations provides provisions for the treatment of sewage and the disposal of effluent and liquid waste. **Relevant Environmental Factors:** Inland Waters, Terrestrial Environmental Quality	Prior to construction

5.4 Environmental reporting

The Proponent will ensure all statutory environmental performance and compliance reporting required by this CEMP are undertaken in accordance with relevant requirements. Other and general reporting responsibilities and requirements are outlined in Sections 5.5, 5.8 and 6.

5.5 Roles and responsibilities

All staff and contractors are responsible for the environmental performance of their activities and for reporting any environmental hazards and incidents. Environmental responsibilities for staff and contractors are contained within position descriptions, company procedures and work instructions.

Key roles and responsibilities for the Proposal are detailed in Table 5-2.

Table 5-2: Roles and Responsibilities

Role	Key Responsibilities
Project Manager	• Holds accountability for all elements of the Proposal. • Providing all necessary resources including personnel, materials and equipment to ensure works can be conducted in accordance with this CEMP. • Assigning responsibilities and providing resources and training to ensure compliance with the environmental measures outlined within this CEMP. • Review and investigate all environmental hazard and incident reports.
Contractor / Construction Managers	• Oversee relevant construction activities and maintain overall responsibility on site within the Construction Team to meet the environmental conditions provided in environmental approvals. • Managing environmental issues and risks that may arise, in accordance with regulatory requirements, site procedures and non-conformance reporting. • Communicating the environmental management requirements to all contractors and working closely and cooperatively with all contractors as to ensure environmental management measures are implemented and maintained by each contractor. • Reporting all environmental hazards and incidents.
Environmental Advisor	• Management of complaints that may be lodged regarding noise, vibrations, dust and other environmental impacts. • Conducting regular site inspections to verify the effectiveness, and compliance to the requirements, of this CEMP. • Ensuring all personnel have been instructed on the requirements of this CEMP and their responsibilities. • Review and investigate all environmental hazard and incident reports.
All personnel	• Receive an induction prior to commencement of work on site. • Conduct works in compliance with this CEMP. • Following directions given by the Construction Manager and/or other senior staff with regard to onsite environmental management. • Report all observed environmental non-conformances, incidents and hazards to a supervisor. • Continually seek to identify areas for improvement of environmental management and report these to the Environment Advisor.

5.6 Environmental training and awareness

All staff and contractors will be required to undertake an environmental and heritage induction program prior to commencement of works on the Proposal. The environmental and heritage induction and training will be relevant to the site and Proposal activities, targeted to educating staff and contractors on environmental and heritage considerations related to their individual work.

All workers and visitors to the site will also be required to undergo an induction that incorporates environmental and heritage matters relevant to the site and Proposal activities.

An induction and qualification matrix (including licences and competency verification) will be maintained for all contractor personnel.

5.7 Stakeholder consultation

The Proponent is committed to comprehensive and ongoing stakeholder engagement throughout all stages of the Proposal and is committed to building sustainable partnerships with stakeholders to achieve mutually beneficial outcomes. The purpose of stakeholder consultation to date has been to:

- Obtain appropriate input into the ongoing improvement of the Proposal
- Keep key stakeholders up to date with the Proponent's activities
- Ensure timely response to landholder issues
- Maintain dialogue with regulatory authorities.

Further detail of the environmental issues raised during this consultation, and the Proponent's response to these comments/issues, is provided in the RSD.

5.8 Adaptive management and review

Inspections and audits

Contractors must prepare and undertake regular environmental inspections and audits of their site and Proposal activities. Site inspection reports, audit reports and corrective actions must be maintained as Proposal records and made available for review on the Proponent's request. Any deviations to the specified requirements will be documented and evaluated by the Project and Construction Managers, or delegate, and be raised in a Non-conformance Report (NCR) if required.

The Proponent's assurance program includes inspections, audits and other monitoring programs at Proposal sites to monitor contractor activity and review Proposal documentation. Field audits, inspections and testing will assess the implementation of the Contractor's environmental management plans. Works compliance will also be carried out and will include audits of the Contractor's environmental management performance. Contractors must make work sites accessible to the Proponent's personnel. Contractor representatives may be invited to participate in scheduled inspections or audits and will be responsible for undertaking any corrective actions.

Non-conformances and corrective actions

The Contractor must report any non-conformances with management targets and outcomes immediately to the Project Manager. The Contractor will receive formal notification in relation to acceptance, assessments or rejection of proposed remedies and mitigation strategies. An NCR submission will include:

- Contractor details
- Type and nature of the non-conformance
- The origin or cause of the non-conformance

- The Contractor's proposed remedy or resolution
- The Contractor's mitigation strategies to avoid reoccurrences of the non-conformance
- Where the non-conformance has triggered a Hold Point, how the Hold Point is to be released
- Impact of the non-conformance on the progress of the Contractor's activities.

An NCR register will be maintained by the Site Contract Administrators.

Outstanding corrective actions resulting from incident investigations, audits and inspections must be included in monthly progress meetings to ensure they are closed out in a timely manner. The Contractor will be assigned to monitor the proper resolution and close-out of NCRs.

Document control

The Contractor must ensure all personnel have access to Proposal documentation relevant to the scope of works. Any change to environment and heritage documentation will be communicated to Proposal personnel to ensure change to responsibilities, process and controls are understood.

On a monthly basis, the Contractor will be responsible for collating the relevant information and producing the environmental portion of the Monthly Progress Report for issue to the Project Manager. The Monthly Progress Report will include reporting on Environmental and Sustainability matters.

Supporting Proposal documentation and records, which can include but not limited to training documentation, inspection and audit reports, risk assessments, communications, laboratory reports and waste records, must be provided to the Proponent upon request.

Document review

This CEMP will be reviewed every six months and may also be revised due to changes in good industry practices and technology, legislation and statutory requirements, and due to any findings identified in lessons learned from significant incidents. The Proponent will review and update any subsequent procedures affecting the management of environmental risk to align with this CEMP, in consultation with the relevant stakeholders and regulatory authorities.

6 Environmental management

This section of the CEMP identifies the provisions that the Proponent proposes to implement, to reduce residual impacts on environmental factors associated with the construction of the Proposal. This section identifies management actions that will be implemented to mitigate and manage potential impacts to the following environmental factors:

- Flora and Vegetation
- Terrestrial Fauna
- Inland Waters
- Social Surroundings
- Terrestrial Environmental Quality.

As discussed in Section 1.3, this Preliminary CEMP does not include management measures for dewatering, PASS, operational impacts to birds and bats, dieback, bushfire risk, traffic or operational noise which are addressed under separate management plans.

6.1 Key assumptions

The information provided in this CEMP relies on the accuracy and adequacy of the information and methods provided in the investigations and studies undertaken for the Proposal. Several assumptions were made during the development of the mitigation measures to address impacts to environmental factors. These include:

- Environmental values within and surrounding the Proposal have been adequately and accurately identified
- Name, distribution and status of conservation significant fauna and flora have been adequately and accurately reported
- Surveys have been undertaken when conditions were ideal for recording conservation significant fauna and flora species, unless otherwise specified
- Local and regional surroundings have been described to enable accurate determination of potential direct and indirect impacts
- The occurrences of sensitive receptors in the surrounding landscape have been captured
- Surveys have been completed as per relevant technical guidance survey methods, unless otherwise specified
- Investigations and studies have provided suitable descriptions of the findings
- The likelihood and severity of predicted impacts is accurate and complete
- Even targeted surveys may not record every individual of a conservation significant species and therefore the known records are considered to represent the lower limits of actual populations present.
- The adaptive management processes adopted by this CEMP allows for management actions and monitoring to be revised as new information becomes available.

6.2 Clearing Exclusion Area

For the purpose of this CEMP, the Proponent has developed a Clearing Exclusion Area and associated Clearing Exclusion Area Buffer within the Development Envelope to manage potential impacts of the Proposal and ensure the environmental commitments of the RSD are achieved. No clearing of native vegetation will occur within the Clearing Exclusion Area, and no clearing of contiguous native vegetation will occur within the Clearing Exclusion Area Buffer (Figure 6-1).

These areas have been spatially-delineated to avoid and minimise impacts to native vegetation, flora, fauna habitat and heritage sites within the Development Envelope (Section 6.6, Section 6.7 and Section 6.8).

Requirements prior to clearing activities will include either spatially or physically (depending on whether clearing technology is spatially guided or not) demarcating the clearing area and determining that these do not interact with Clearing Exclusion Areas or Buffers.

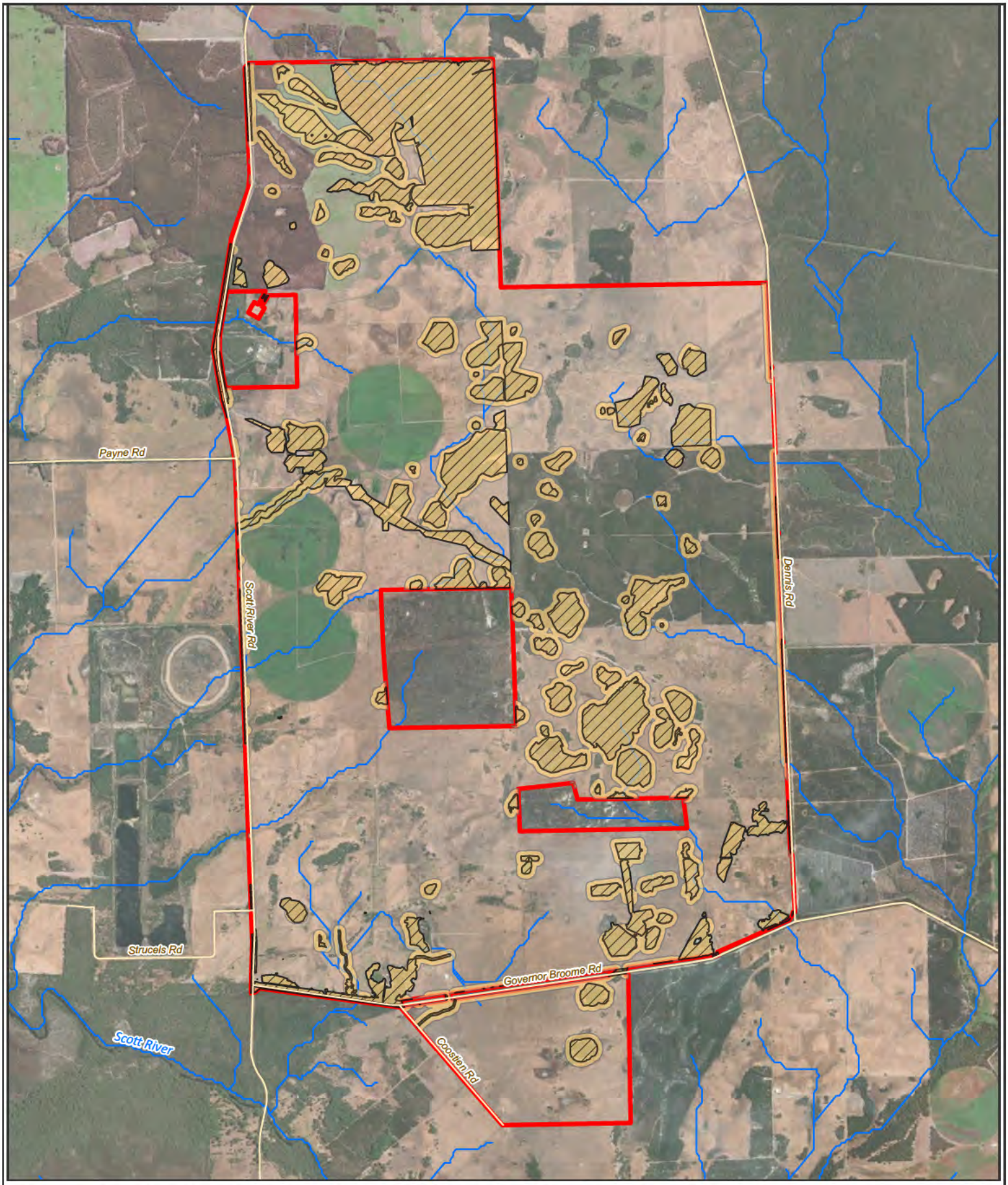

Figure 6-1: Clearing Exclusion Area and Clearing Exclusion Area Buffer

- Roads
- Rivers and Tributaries
- Development Envelope
- Clearing Exclusion Area
- Clearing Exclusion Area Buffer

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date:
9/10/2025

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6.3 Rationale and approach

Management and monitoring provisions for the construction of the proposal have been split into:

- Outcome-based, where a specific measurable outcome incorporating threshold and trigger criteria are proposed
- Objective-based, relating to the achievement of desired management targets/objectives.

Table 6-1 summarises the potential direct and indirect impacts to Terrestrial Environmental Quality, Inland Waters, Flora and Vegetation, Terrestrial Fauna and Social Surroundings from the construction of the Proposal, the management approach, and rationale for the approach to ensure the environmental outcomes detailed in this section are achieved.

As detailed in Section 1.3, impacts associated with the commissioning and operation of the Proposal, bushfire, dieback, dewatering and PASS will be managed through the implementation of separate management plans and are; therefore, not addressed in this CEMP.

Table 6-1: Rationale for management provisions

EPA Factor	Potential Impact	Management Provision	Rationale for provision
Terrestrial Environmental Quality	Soil erosion due to ground disturbing activities	Objective-based management	Clearing of vegetation and excavation required for the Proposal has the potential to impact soil quality due to erosion. Objective-based management provisions have been adopted to minimise the impact of erosion on soil quality. While good industry practice design and industry standards will be followed to minimise the impacts associated with erosion to as low as reasonably practicable, they cannot be entirely avoided.
	Soil contamination from the accidental loss or spills of hydrocarbons and other hazardous materials	Objective-based management	Storage and use of hydrocarbons and hazardous materials on site poses a risk for soil contamination from accidental loss or spills. Objective-based management provisions have been adopted to minimise the risk of accidental loss or spills of hazardous materials. While good industry practice design and industry standards will be followed to minimise the risks associated with the storage of hazardous materials on site to as low as reasonably practicable, they cannot be entirely avoided.
Inland Waters	Changes to surface hydrological regimes due to Proposal infrastructure	Objective-based management	Objective-based provisions have been adopted for impacts to surface water flow patterns within the Development Envelope. The key management for surface water regimes within the Development Envelope is the design of Proposal infrastructure. Objective-based provisions are considered appropriate as while impacts to surface water flows can be minimised as far as practicable, they cannot be entirely avoided.
	Reduced water quality due to erosion, sedimentation and/or mobilisation of nutrients from ground disturbing activities	Objective-based management	Objective-based provisions have been adopted for water quality. Robust management practices will reduce the risk of the erosion, sedimentation, mobilisation of nutrients or the accidental loss or spill of hazardous materials, and the subsequent risks of contamination and changes to water quality. Objective-based provisions are considered appropriate as while impacts to surface water and groundwater quality can be minimised as far as practicable, they cannot be entirely avoided.
	Contamination of surface water and/or groundwater from accidental loss or spills of hydrocarbons and other hazardous materials		
Flora and Vegetation	Loss of native vegetation and conservation significant flora and communities due to clearing	Outcome-based management	Clearing of vegetation beyond the defined limits may lead to unacceptable outcomes to flora and vegetation values. Effective management of clearing is a commitment by the Proponent and the responsibility of all personnel and contractors. Outcome-based management conditions will be implemented as clearing limits are a measurable target.

			These provisions will ensure that all personnel are inducted on land disturbance and clearing management, as well as to ensure an active ground and vegetation disturbance permit is in place for all land clearing activities.
	Degradation of vegetation from introduction and/or spread of weeds	Objective-based management	Objective-based management provisions have been adopted to ensure correct hygiene management measures are in place to minimise the introduction and spread of weeds. As part of this, contractors will be required to report opportunistic sightings of the occurrence of weed species and observe if there are any increases in weed species or abundance. Objective-based provisions are considered appropriate as while the impacts from the introduction and spread of weeds can be minimised as far as practicable, it cannot be entirely avoided.
	Degradation of vegetation from dust deposition	Objective-based management	Objective-based provisions have been adopted to minimise the impact of dust deposition on native vegetation. Management actions include the implementation of dust suppression techniques during construction activities. Objective-based provisions are considered appropriate as while impacts from dust can be minimised as far as practicable, it cannot be entirely avoided.
	Degradation or alteration of vegetation as a result of altered hydrological regimes	Objective-based management	Objective-based provisions have been adopted for impacts to surface water flow patterns and subsequent effects on native vegetation within the Development Envelope as described in Section 6.5 and Table 6-3. Objective-based provisions are considered appropriate as while impacts to surface water flows can minimised as far as practicable, it cannot be entirely avoided.
Terrestrial Fauna	Loss and fragmentation of vertebrate fauna habitat	Outcome-based management	Clearing beyond the defined areas may lead to unacceptable outcomes to fauna values. Effective management of clearing is a commitment by the Proponent and the responsibility of the Environmental Advisor, site operators and contractors. Outcome-based management conditions will be implemented as clearing limits and widths are a measurable target. These provisions will ensure that all personnel are inducted on land disturbance and clearing management, as well as to ensure an active ground and vegetation disturbance permit is in place for all land clearing activities.
	Loss or injury to fauna individuals through vehicle/machinery movements and entrapment in excavations, dams, basins and borrow pits during construction	Objective-based management	Objective-based provisions have been adopted, as whilst the risk of fauna mortality from construction activities is low and can be minimised through robust management practices and opportunistic monitoring, it cannot be completely avoided.

	Increased competition or predation by feral fauna	Objective-based management	Objective-based provisions have been adopted to minimise the potential for an increase in the abundance of feral fauna species, as whilst hygiene management measures can be in place to minimise the risk of introducing or increasing the abundance of feral species, it cannot be entirely avoided.
	Disturbance to fauna movement patterns and behaviour from vibration, light and noise	Objective-based management	Objective-based provisions have been adopted to minimise the impact of dust, vibration, light and noise emissions on fauna. While good industry practice design and industry standards will be followed to minimise the impacts associated with dust, noise, vibration or light to as low as reasonably practicable, they cannot be entirely avoided.
	Degradation of fauna habitat from introduction and/or spread of weeds	Objective-based management	Objective-based management provisions have been adopted to ensure correct hygiene management measures are in place to minimise the introduction and spread of weeds. As part of this, contractors will be required to report opportunistic sightings of the occurrence of weed species and observe if there are any increases in weed species or abundance. Objective-based provisions are considered appropriate as while impacts from the introduction and/or spread of weeds can be minimised as far as practicable, they cannot be entirely avoided.
	Degradation of fauna habitat as a result of altered hydrological regimes	Objective-based management	Objective-based provisions have been adopted for impacts to surface water flow patterns and subsequent effects on fauna habitat within the Development Envelope as described in Section 6.5 and Table 6-3. Objective-based provisions are considered appropriate as while impacts to surface water flows, and subsequent effect on fauna habitat, can be minimised as far as practicable, they cannot be entirely avoided.
Social Surroundings	Impacts to known Aboriginal heritage sites or cultural values through ground disturbance associated with the construction of the Proposal	Outcome-based management Objective-based management	Outcome-based conditions have been implemented to ensure all personnel are inducted on existing Aboriginal cultural heritage surroundings the Development Envelope. Objective-based provisions are also proposed to ensure the appropriate management of the Blackwood and Scott rivers, as well as any new Aboriginal Heritage sites/artefacts uncovered or identified in accordance with the requirements of the *Aboriginal Heritage Act 1972*.
	Impacts to any unknown (e.g., subsurface artefacts) Aboriginal heritage artefacts/sites	Objective-based management	Discovery of any potential sub-surface Aboriginal cultural heritage will lead to ceasing work immediately until further arrangements for recommencement of work is determined. Objective-based provisions are considered appropriate to ensure the appropriate management is placed to minimise potential impact to unknown Aboriginal heritage artefacts/sies can be minimised as far as practicable, they cannot be entirely avoided.
	Reduced amenity as a result of light, noise or dust emissions	Objective-based management	Objective-based provisions have been adopted to minimise the impact of light, noise and dust emissions on landscape and visual amenity. While good industry practice design and industry standards will be followed to minimise the impacts associated with light, noise or dust emissions to as low as reasonably practicable, they cannot be entirely avoided.

6.4 Terrestrial Environmental Quality management

Table 6-2 outlines the rationale for the proposed objective-based management targets, actions and monitoring for Terrestrial Environmental Quality.

Table 6-2: Terrestrial Environmental Quality objective-based management

EPA Factor	Terrestrial Environmental Quality
EPA Objectives	*To maintain the quality of land and soils so that environmental values are protected*
Key Impacts and Risks	• Soil erosion due to ground disturbing activities. • Soil contamination from the accidental loss or spills of hydrocarbons and other hazardous materials.

Management Target	Management Actions	Monitoring/ Timing/ Frequency	Reporting
Impacts to soil quality due to erosion from ground disturbing activities is minimised.	The following controls will be implemented to minimise potential impacts associated with soil erosion: • Limit clearing of native vegetation within the Development Envelope to a maximum of 1.00 ha, as outlined in Table 6-4 • Capture and direct runoff from infrastructure (such as the substation, O&M and concrete batching areas) to on-site retention basin(s) for settlement and infiltration and/or controlled discharge through the stormwater overflow designed to manage sediment removal and reduce stormwater velocity • Locate, design, construct and maintain drainage controls (e.g. drains and culverts) to maintain surface water flow regimes and minimise erosion • Paddock dump topsoil stockpiles to a maximum height of 2 m • Site topsoil stockpiles to avoid areas likely to experience substantial surface water flows, where practicable • Install windrows of sufficient height around topsoil stockpiles to prevent surface water erosion • Stabilise and water all access tracks to minimise the generation of airborne dust and soil • Install erosion protection in line with relevant guidelines.	• Weekly inspections of stockpiles and drainage management infrastructure. • Pre and post severe wet weather inspections of all drainage management infrastructure.	• Inspections and audit reports. • Incident and hazard reporting. • Monthly reports.

Management Target	Management Actions	Monitoring/ Timing/ Frequency	Reporting
Soil contamination resulting from the accidental loss or spills of hydrocarbons and other hazardous materials is minimised.	The following controls will be implemented to minimise potential impacts associated with the storage and handling of hazardous materials: • Store and handle potentially contaminating substances such as solid and liquid wastes and bulk hydrocarbons as per the requirements of the *Dangerous Goods Safety Act 2004* • Bund all liquid chemicals. Bunds will be impermeable, have a capacity of 110% of the largest container stored or 2% of the total volume stored and be covered/protected from rainfall and stormwater ingress. Keep bunds free of residue, litter and stormwater. • Label storage containers as per the relevant Safety Data Sheet (SDS) • Ensure appropriate spill equipment is available during the transportation and handling of hazardous materials • Treat any potentially contaminated water on site before discharging into stormwater drainage or contain and remove as contaminated waste.	• Testing of all potentially contaminated water prior to disposal. • Regular inspections of all chemical and fuel containing bunds and facilities.	• Inspection and audit reports. • Incident and hazard reporting. • Water testing reports. • Monthly reports. • DWER reporting (as required).

6.5 Inland Waters management

Table 6-2 outlines the proposed objective-based management targets, actions and monitoring for Inland Waters.

Table 6-3: Inland Waters objective-based management

EPA Factor	Inland Waters
EPA Objectives	*To maintain hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*
Key Impacts and Risks	• Changes to surface hydrological regimes and flow patterns due to Proposal infrastructure. • Changes to surface and groundwater quality.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Changes to surface hydrological regimes and flow patterns from Proposal infrastructure will be minimised.	• Locate and design civil infrastructure to ensure specific risk-based flood vulnerability requirements have been addressed and will be located outside of the 1% AEP flood extent, where practicable. • Avoid modification of existing drainage infrastructure, where practicable, unless the proposed modification will improve drainage and not lead to any detrimental impacts to downstream receptors. • Locate, design, construct and maintain drainage controls (e.g. drains and culverts) to maintain surface water flow regimes and minimise erosion. • Maintain flow velocities below 2 m/s upstream and downstream of disturbance areas, including at culvert inlet and outlets. • Ensure design and construction works are such that local grading and excavation areas do not create areas of pooled water. • Vegetate or cover (e.g. with rock or synthetic liners) exposed soils in disturbed areas where surface water velocities are predicted to exceed 1 m/s and remain below 2 m/s. • A bed and banks permit will be obtained for any works likely to interfere with bed and banks. Works will be undertaken in accordance with commitments and conditions of the bed and banks permits issued.	• Weekly inspections of drainage management infrastructure. • Pre and post severe wet weather inspections of all drainage management infrastructure.	• Inspections and audit reports. • Incident and hazard reporting. • Monthly reports.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Changes to surface and groundwater quality will be minimised.	• Delay ground disturbance adjacent to waterbodies as long as possible to minimise potential for sedimentation. • Capture and direct runoff from infrastructure (such as the substation, O&M and concrete batching area) to an on-site retention basin for settlement and infiltration and/or controlled discharge through the stormwater overflow designed to manage sediment removal and reduce stormwater velocity. • Install erosion protection in line with relevant guidelines. • Locate, design, construct and maintain drainage controls (e.g. drains and culverts) to maintain surface water flow regimes and minimise erosion. • Schedule civil construction activities to occur in the dry season where practicable. • Maintain flow velocities below 2 m/s upstream and downstream of disturbance areas, including at culvert inlets and outlets. • Vegetate or cover (e.g. with rock or synthetic liners) exposed soils in disturbed areas where velocities exceed 1 m/s and remain below 2 m/s. • Store and handle potentially contaminated substances such as solid and liquid wastes and bulk hydrocarbons as per the requirements of the *Dangerous Goods Safety Act 2004*. • Locate infrastructure that may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, concrete batching area, refuelling locations) at least 100 m from any wetland. • Bund all liquid chemicals. Bunds will be impermeable, have a capacity of 110% of the largest container stored or 25% of the total volume stored and be covered/protected from rainfall and stormwater ingress. • Inspect bunds regularly and keep free of residue, litter and stormwater. • Inspect all chemical and fuel containing facilities regularly for leaks and spills. • Label storage containers as per the relevant SDS. • Ensure appropriate spill response equipment is available during the transportation and handling of hazardous materials. • Treat any potentially contaminated water on site before discharging into stormwater drainage or contain and remove as contaminated waste. • Implementation of sediment barriers to prevent runoff into wetlands and waterways during construction, where required.	• Weekly inspections of drainage management infrastructure. • Pre and post severe wet weather inspections of all drainage management infrastructure. • Testing of all potentially contaminated water prior to disposal. • Regular inspections of all chemical and fuel containing bunds and facilities.	• Inspection and audit reports. • Incident and hazard reporting. • Water testing reports. • Monthly reports. • DWER reporting (as required).

6.6 Flora and Vegetation management

Table 6-4 outlines the proposed outcomes-based management indicators, actions and monitoring for Flora and Vegetation. Table 6-5 outlines the proposed objective-based management targets, actions and monitoring for Flora and Vegetation.

Specifically for Flora and Vegetation the implementation of the Clearing Exclusion Area and Buffer (Section 6.2) will ensure that the following environmental commitments are achieved within the Development Envelope (Figure 6-2; Figure 6-3):

- No clearing of native vegetation within conservation covenant areas
- No clearing of native vegetation growing in association with wetland habitats, including any contiguous native vegetation within 50 m
- No clearing of vegetation considered to represent the Scott River Ironstone TEC
- No clearing of known Threatened and Priority flora records, including any contiguous native vegetation within 50 m of known Threatened and P1 species, or within 20 m of P2, P3 and P4 species
- No clearing of locally restricted vegetation types (AmBsHc, ClcVj and MpXpHfSs)
- Clearing of no more than 0.01 ha of contiguous native vegetation within 50 m of the Scott River Ironstone TEC
- Clearing of no more than 1.00 ha of native vegetation, including a maximum of 0.02 ha of native vegetation in Very Good or better condition.

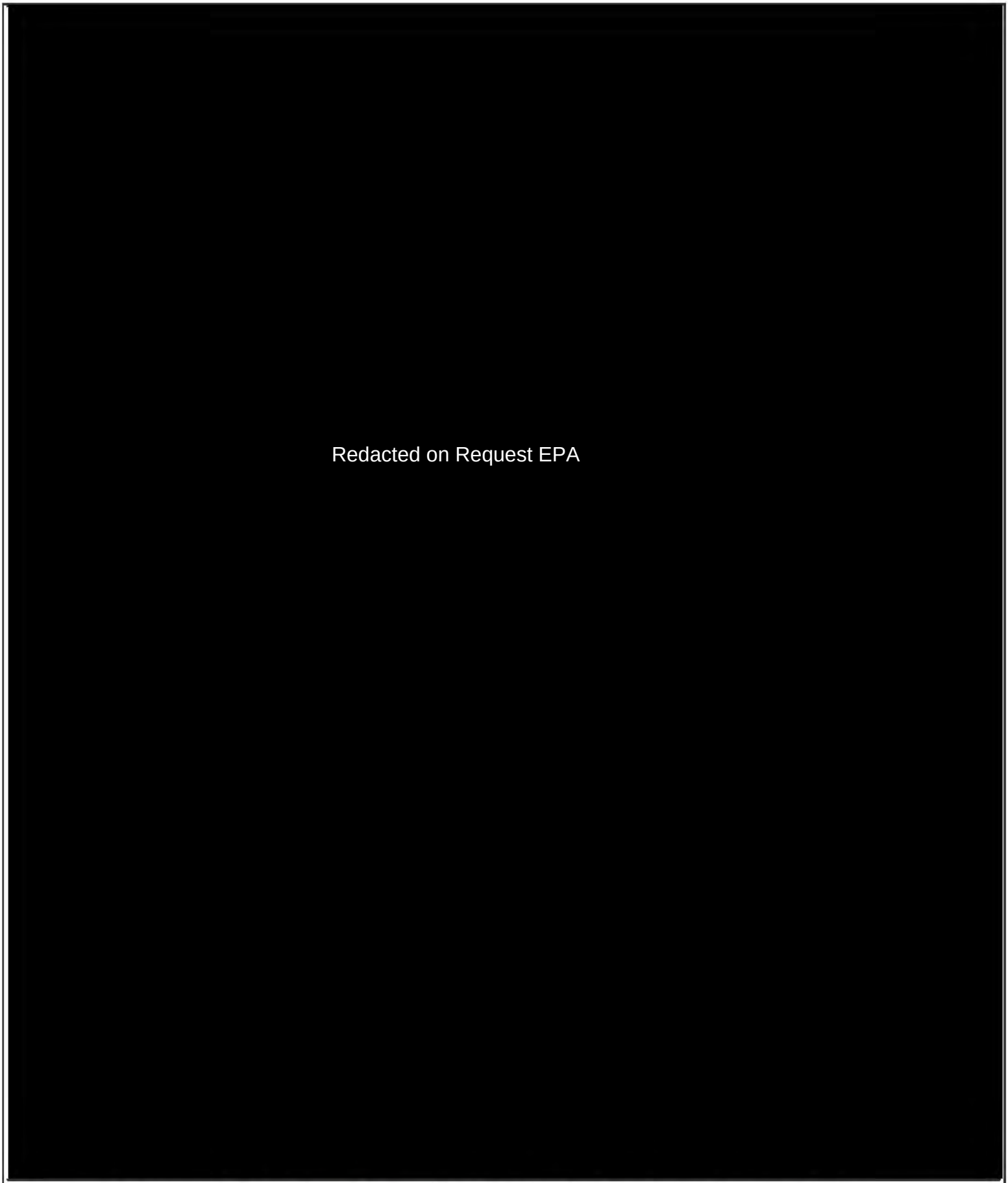

Figure 6-2: Flora and Vegetation Values within the Clearing Exclusion Area and Buffer

Roads
Clearing Exclusion Area
Clearing Exclusion Area Buffer
Development Envelope

Flora and Vegetation Values

Threatened
Priority
Scott River Ironstone Association (Phoenix 2025a)
Locally Restricted Vegetation Types

Native Vegetation

Pristine
Excellent
Very Good

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/19/2025

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Flora and Vegetation outcome-based management

Table 6-4: Flora and Vegetation outcome-based management

EPA Factor	Flora and Vegetation			
EPA Objectives	*To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*			
Key Impacts and Risks	• Unauthorised clearing of native vegetation.			
Outcome	**Indicators (Trigger Criteria / Threshold Criteria)**	**Response Actions (Trigger level actions / Threshold contingency actions)**	**Monitoring/ Timing/ Frequency of Monitoring**	**Reporting**
No clearing within the Clearing Exclusion Area and no clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer	**Trigger criterion:** • Clearing within 50 m of the Clearing Exclusion Area Buffer. **Threshold criterion:** • Clearing of native vegetation within the Clearing Exclusion Area OR • Clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer.	**Trigger actions:** • Ensure sufficient area remains to complete the planned clearing within defined limits. • Ensure active ground and vegetation disturbance permit is in place and clearing boundaries and avoidance areas are both clearly demarcated prior to disturbance. **Threshold contingency actions** • Immediately cease all clearing activities. • Report the incident immediately to the Project Manager & Environmental Advisor, who will investigate the incident further. • Review and revise current ground and vegetation disturbance procedures and permits, induction and training records and this CEMP to identify and address the cause of the incident. • Re-establish the approved boundary. • Advise relevant government agencies if non-conformance confirmed, in accordance with relevant approval conditions. • Undertake rehabilitation of the unauthorised clearing in consultation with relevant government agencies.	• Regular routine inspections of clearing and ground disturbing activities. • Ground and vegetation disturbance permit close-out inspections.	• Inspection and audit reports. • Incident and hazard reporting. • Ground and vegetation disturbance permits including close-out inspection reporting.
Clearing of native vegetation will not exceed 1.00 ha	**Trigger criterion:** • Clearing of native vegetation within 10% of threshold criterion (0.90 ha or above). • Clearing within 20 m of the Development Envelope boundary. **Threshold criterion:** • Clearing of native vegetation exceeds 1.00 ha. • Clearing occurs outside of the Development Envelope.			

*Contiguous native vegetation is defined as remnant native vegetation not separated by more than 5 m of cleared land.

Flora and Vegetation objective-based management

Table 6-5: Flora and Vegetation objective-based management

EPA Factor	Flora and Vegetation
EPA Objectives	*To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
Key Impacts and Risks	• Degradation of vegetation from the introduction and/or spread of weeds. • Degradation of vegetation from dust deposition. • Degradation or alteration of vegetation as a result of altered hydrological regimes.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Degradation of vegetation from the introduction and/or spread of weeds is minimised	Implement the following weed management controls to manage the spread of weeds within the Development Envelope and surrounding environment: • Undertake a risk assessment to identify potential spread of weeds associated with planned activities • Limit site entry points to only those necessary • Carry out a pre and post construction weed survey to validate controls and provide baseline • Vehicles and machinery arriving to site will be required to arrive clean and free of weeds and debris and will be inspected on arrival prior to working on site • Manage all imported basic raw materials to minimise the risk of introducing weeds, seeds and pathogens • Handle, store and dispose of any vegetation or soil that is infested with weeds or pathogens as pest contaminated material (e.g. covered during transport, contained) • Confirm any cleared material to be mulched and reused onsite is free of weed material prior to use.	• Pre and post construction weed survey. • On arrival inspections of vehicles and machinery. • Opportunistic sightings of WoNs or Declared Weed species. • Routine inspections/audits, including weekly inspections of topsoil stockpiles.	• Risk assessment. • Vehicle-machinery hygiene inspection forms. • Records of imported material and disposal or reuse of cleared material. • Inspection and audit reports. • Monthly reporting.
Degradation of vegetation from dust deposition is minimised	Implement the following controls to reduce the impacts of dust deposition including: • Paddock dump topsoil stockpiles to a maximum height of 2 m • Implement dust suppression techniques, such as water tanks • Implement speed limits on unsealed roads/tracks • Undertake progressive rehabilitation of temporary construction areas.	• Routine inspections/audits.	• Inspection and audit reports. • Incident and hazard reporting. • Monthly reporting.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Degradation or alteration of vegetation as a result of altered hydrological regimes is minimised	• Implementation of measures as per Table 6-3.		

6.7 Terrestrial Fauna management

Table 6-6 outlines the proposed outcomes-based management indicators, actions and monitoring for Terrestrial Fauna. Table 6-7 outlines the proposed objective-based management targets, actions and monitoring for Terrestrial Fauna.

Implementation of the Clearing Exclusion Area and Buffer (Section 6.2will ensure that the following environmental commitments are achieved for terrestrial fauna within the Development Envelope (Figure 6-3):

- No clearing of wetland habitats, including any contiguous native vegetation within 50 m
- No clearing of potential breeding trees for black cockatoos or any contiguous native vegetation within 10 m
- No clearing of High-quality Western Ringtail Possum habitat
- Clearing no more than 0.03 ha of Moderate-quality Western Ringtail Possum habitat.

Other clearing limits (not addressed/captured by the clearing and exclusion area) that will also need to be assessed as part of every ground and vegetation disturbance permit:

- Clearing no more than 1.00 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality native foraging habitat.
- Width of clearing for all internal access roads will be limited to 6 m (and 5 m at Governor Broome Road crossing/entrance), where they pass through a Western Ringtail Possum habitat patch
- Clearing of no more than 0.5 ha of native Western Ringtail Possum habitat (including maximum of 0.03 ha of Moderate-quality and excluding High-quality, as above).

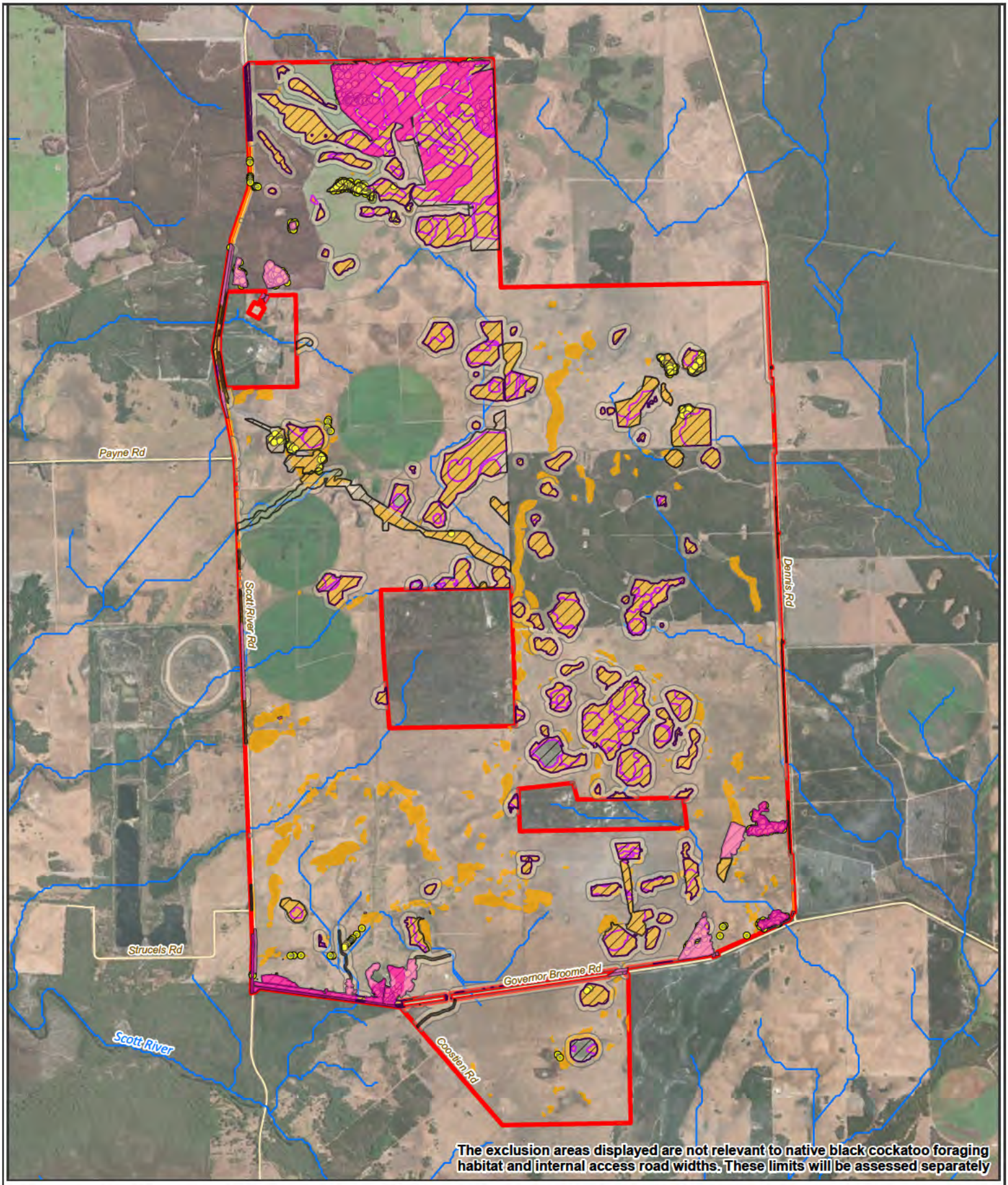

Figure 6-3: Terrestrial Fauna Values within the Clearing Exclusion Area and Buffer

- Roads
- Rivers and Tributaries
- Development Envelope
- Clearing Exclusion Area
- Clearing Exclusion Area Buffer

Terrestrial Fauna Values

- Potential Nesting Trees
- Wetland habitats
- Native Vegetation

Western Ringtail Possum Habitat Quality Score (Phoenix 2025b)

- Moderate
- High

0 0.5 1 2
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/19/2025

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Terrestrial Fauna outcome-based management

Table 6-6: Terrestrial Fauna outcome-based management

EPA Factor	Terrestrial Fauna			
EPA Objectives	*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*			
Key Impacts and Risks	• Unauthorised clearing of fauna habitat represented by native vegetation, including Western Ringtail Possum habitat and black cockatoo foraging habitat. • Loss and fragmentation of fauna habitat.			
Outcome	**Indicators (Trigger Criteria / Threshold Criteria)**	**Response Actions (Trigger level actions / Threshold contingency actions)**	**Monitoring/ Timing/ Frequency of Monitoring**	**Reporting**
No clearing within the Clearing Exclusion Area and no clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer	**Trigger criterion:** • Clearing within 50 m of the Clearing Exclusion Area Buffer. **Threshold criterion:** • Clearing of native vegetation within the Clearing Exclusion Area OR • Clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer.	**Trigger actions:** • Ensure sufficient area remains to complete the planned clearing within defined limits. • Ensure active ground and vegetation disturbance permit is in place and clearing boundaries and avoidance areas are both clearly demarcated prior to disturbance. **Threshold contingency actions** • Immediately cease all clearing activities. • Report the incident immediately to the Project Manager & Environmental Advisor, who will investigate the incident further. • Review and revise current ground and vegetation disturbance procedures and permits, induction and training records and this CEMP to identify and address the cause of the incident. • Re-establish the approved boundary. • Advise relevant government agencies if non-conformance confirmed, in accordance with relevant approval conditions. • Undertake rehabilitation of the unauthorised clearing in consultation with relevant government agencies.	• Regular routine inspections of clearing and ground disturbing activities. • Ground and vegetation disturbance permit close-out inspections.	• Inspection and audit reports. • Incident and hazard reporting. • Ground and vegetation disturbance permits, including close-out inspection reporting.
Clearing of black cockatoo foraging habitat represented by native vegetation will not exceed 1.00 ha, including a maximum of 0.50 ha of Moderate to High quality foraging habitat	**Trigger criterion:** • Clearing of Moderate to High quality black cockatoo foraging habitat represented by native vegetation within 20% of threshold criterion (0.40 ha or above) OR • Clearing of black cockatoo foraging habitat represented by native vegetation within 10% of threshold criterion (0.90ha or above). **Threshold criterion:** • Clearing of Moderate to High quality black cockatoo foraging habitat represented by native vegetation exceeds 0.50 ha OR • Clearing of black cockatoo foraging habitat represented by native vegetation exceeds 1.00 ha.			

Clearing of Western Ringtail Possum habitat will not exceed 0.50 ha*	**Trigger criterion:** • Clearing of Western Ringtail Possum habitat represented by native vegetation within 20% of threshold criterion (0.4 ha or above). **Threshold criterion:** • Clearing of Western Ringtail Possum habitat exceeds 0.5 ha.			
Internal access road widths will be limited to 6 m (and 5 m at Governor Broome Road crossing/ entrance) where they pass through a Western Ringtail Possum patch to limit fragmentation impacts	**Trigger criterion:** • Where any native vegetation clearing in support of internal access road widths of 5 m or more are proposed. **Threshold criterion:** • Where clearing occurs through Western Ringtail Possum habitat patch in support of internal access road width over 6 m (or 5 m at Governor Broome Road crossing/entrance).			

*This includes a maximum of 0.03 ha of Moderate quality habitat and no clearing of High quality habitat, which are captured within the Exclusion Area

Terrestrial Fauna objective-based management

Table 6-7: Terrestrial Fauna objective-based management

EPA Factor	Terrestrial Fauna
EPA Objectives	*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*
Key Impacts and Risks	• Loss or injury to fauna individuals through vehicle/machinery movements and entrapment in excavations, dams, basins and borrow pits during construction. • Disturbance to fauna movement patterns and behaviour from vibration, light and noise. • Increased competition or predation by feral fauna. • Degradation of fauna habitat as a result of the introduction and/or spread of weeds. • Degradation of fauna habitat as a result of changes to hydrological regimes.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Loss or injury to fauna individuals through vehicle/machinery movements and entrapment in excavations, dams, basins and borrow pits during construction is minimised	Implementation of the following controls to minimise the occurrence of injury, mortality, entrapment or displacement of conservation significant fauna: • During clearing of the 0.03 ha of Moderate quality Western Ringtail Possum habitat, a fauna spotter will be available on-site to spot and respond to any Western Ringtail Possum individuals encountered within the clearing area. • Clearing to occur in a slow, progressive manner, towards native vegetation to allow fauna to move into adjacent habitat. • If fauna is found on site, works in the immediate vicinity will cease until the individual moves or can be safely relocated by a fauna handler. • Restrict vehicle movement to existing/authorised access tracks. • Limit speed limits on access tracks to 50 km/hr. • Nighttime construction activities will be avoided where practicable. • If any native fauna is injured during works, contact the Wildcare Helpline (9474 9955) for advice and rehabilitation. • Excavations will be kept open for the minimum time required to enable construction activities. Inspect excavations deeper than 500 mm and open for more than 24 hours, twice daily. • Design and construct borrow pits to permit egress of fauna.	• Twice daily inspection of any excavation/trench deeper than 500 mm (in the early morning and late afternoon) left open for more than 24 hours. • Routine inspections/audits • Recording of all fauna interactions and sighting of conservation significant fauna.	• Inspection and audit reports. • Hazard and incident reporting. • Monthly reporting. • Ground and vegetation disturbance permits, including close-out inspection reporting.

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
	- Water storage dams and dewater treatment and settlement basins will be fenced and constructed to ensure point of fauna egress • Ensure infiltration basins are shallow and low profile. • Visual bird diverters will be installed on the Proposal transmission line and guy wires of permanent met masts.		
Disturbance to fauna movement patterns and behaviour from vibration, light and noise is minimised	Implementation of the following controls to minimise disturbance to fauna species associated with noise, light and dust including: • Implement of dust management measures as per Table 6-5. • Keep lighting to a minimum to avoid attracting birds, bats and insects to Proposal infrastructure. Specific measures include: the use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable. • Avoid nighttime works where practicable. • Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by CASA/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions. • Ensure vehicles and machinery are serviced and maintained to minimise machinery noise. • Turbines will be regularly maintained to ensure noise emissions are not adversely impacted by turbine wear. • Locate wind turbine infrastructure to prevent blade overhang over remnant native vegetation/habitat.	• Routine inspections/audits.	• Inspection and audit reports. • Hazard and incident reporting. • Monthly reporting.
Increased competition or predation by feral fauna is minimised	Implementation of the following controls to minimise increased competition by feral fauna: • Store food wastes in sealed bins. • Water storage dams and dewater treatment and settlement basins will be fenced to limit access from feral fauna.	• Opportunistic recording of all feral animal sightings.	• Hazard and incident reporting. • Inspection and audit reports. • Monthly reporting.
Degradation of fauna habitat as a result of the introduction and/or spread of weeds Is minimised	• Implementation of weed control measures as per Table 6-5.		

Management Target	Management Action	Monitoring/ Timing/ Frequency	Reporting
Degradation of fauna habitat as a result of changes to hydrological regimes is minimised	• Implementation of measures as per Table 6-3.		

6.8 Social Surroundings management

Table 6-8 outlines the proposed outcomes-based management indicators, actions and monitoring for Social Surroundings. Table 6-9 outlines the proposed objective-based management targets, actions and monitoring for Social Surroundings.

Impacts to other Wardandi and Bibulum/Pibleman environmental values were considered a key concern for the South West Boojarah group. Objective-based management measures for these values are described in Sections 6.2 Flora and Vegetation, 6.3 Terrestrial Fauna and 6.4 Inland Waters.

Implementation of the Clearing Exclusion Area and Buffer will ensure that the following environmental commitment is achieved for heritage values within the Development Envelope:

- No clearing of native vegetation within 50 m of a Registered heritage site and/or Lodged heritage place.

Potential impacts to Aboriginal heritage sites or cultural values through changes to surface water flows, groundwater levels and water quality which may impact the Blackwood River / Goorbilyup Buerle or Scott River are addressed through measures proposed in Section 6.5.

Social Surroundings outcome-based management measures

Table 6-8: Social Surroundings outcome-based management

EPA Factor	Social Surroundings			
EPA Objectives	*To protect social surroundings from significant harm*			
Key Impacts and Risks	• Unauthorised clearing of native vegetation/ damage to Registered heritage site and/or Lodged heritage place.			
Outcome	**Indicators (Trigger Criteria / Threshold Criteria)**	**Response Actions (Trigger level actions / Threshold contingency actions)**	**Monitoring/ Timing/ Frequency of Monitoring**	**Reporting**
No clearing within the Clearing Exclusion Area and no clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer	**Trigger criterion:** • Clearing within 50 m of the Clearing Exclusion Area Buffer. **Threshold criterion:** • Clearing of native vegetation within the Clearing Exclusion Area OR • Clearing of contiguous* native vegetation within the Clearing Exclusion Area Buffer.	**Trigger actions:** • Ensure sufficient area remains to complete the planned clearing within defined limits. • Ensure active ground and vegetation disturbance permit is in place and clearing boundaries and avoidance areas are both clearly demarcated prior to disturbance. **Threshold contingency actions** • Immediately cease all clearing activities. • Report the incident immediately to the Project Manager & Environmental Advisor, who will investigate the incident further. • Review and revise current ground and vegetation disturbance procedures and permits, induction and training records and this CEMP to identify and address the cause of the incident. • Re-establish the approved boundary. • Advise KKAC and relevant government agencies if unauthorised clearing occurs within Registered heritage site or Lodged heritage place. • Undertake rehabilitation of the unauthorised clearing in consultation with KKAC and relevant government agencies.	• Regular routine inspections of clearing and ground disturbing activities. • Ground and vegetation disturbance permit close-out inspections	• Inspection and audit reports. • Incident and hazard reporting. • Ground and vegetation disturbance permits, including close-out inspection reporting.

*Contiguous native vegetation is defined as remnant native vegetation not separated by more than 5 m of cleared land.

Social Surroundings objective-based management measures

Table 6-9: Social Surroundings objective-based management

EPA Factor	Social Surroundings
EPA Objectives	*To protect social surroundings from significant harm*
Key Impacts and Risks	• Unauthorised damage to Registered heritage site and/ or Lodged heritage place as a result of construction activities. • Damage to previously unidentified Aboriginal heritage sites as a result of construction activities. • Impacts to landscape and visual amenity from light, noise and dust.

Management Target	Management Action	Monitoring/ Timing/ Frequency of Monitoring	Reporting
No unapproved loss or damage of Registered site/ Lodged heritage place as a result of construction activities.	• All site personnel and contractors will undertake site-specific induction and training program, including communication of Registered site and Lodged heritage place to the workforce and implementation of protective controls (e.g., ground and vegetation disturbance permits). • Impacts to the Blackwood River (Goorbilyup Buerle) registered Aboriginal heritage site and the Scott River lodged place will be managed through the implementation of water management measures as described in Table 6-3. • Any proposed impact to tributaries of the Scott River will require consultation with KKAC and relevant authorisation under the AH Act.	• Routine inspections, including of clearing and ground disturbing activities. • Ground and vegetation disturbance permit close-out inspections.	• Induction and training records. • Inspection and audit reports. • Hazard and incident reporting. • Ground and vegetation disturbance permits, including close out inspection reporting. • Consultation register. • Survey reports. • Heritage due diligence assessments. • AH Act authorisation.

Management Target	Management Action	Monitoring/ Timing/ Frequency of Monitoring	Reporting
Minimise damage to previously unidentified Aboriginal heritage sites as a result of construction activities	• Ensure heritage due diligence and survey (where required) has been completed over proposed work area prior to issue of ground and vegetation disturbance permit/s. • If while conducting works on-site, potential artefacts or remains are uncovered, all works must cease immediately and a 'no work zone' established until it can be assessed by the appropriate specialists. The project manager and Environmental Advisor must be notified immediately.	• Routine inspections of clearing and ground disturbing activities.	• Induction and training records. • Inspection and audit reports. • Hazard and incident reporting. • Ground and vegetation disturbance permits, including close-out inspection reporting. • Survey report/s. • Heritage due diligence assessments
Impacts to landscape and visual amenity from light, noise and dust are minimised	• Implement dust management measures as per Table 6-5. • Implement noise and light management measures as per Table 6-7.	• Routine inspections.	• Inspection and audit reports. • Hazard and incident reporting. • Monthly reports.

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synergyRED

Attachment 4 (RSD) - Appendix I

Detailed Flora and Vegetation Survey

REDACTED ON REQUEST EPA

PHOENIX
ENVIRONMENTAL SCIENCES

Detailed flora and vegetation survey for a Proposed Wind Farm in Scott River

Prepared for Synergy Renewable Energy Development

February 2025

Final



Detailed flora and vegetation survey for a Proposed Wind Farm in Scott River

Prepared for Synergy Renewable Energy Development

Version history

Author/s	Reviewer/s	Version	Version number	Date submitted	Submitted to
J. Alford, B. Loneragan N. Rogers, B. Arbery	J. Clark, D. Leach	Draft for client comments	0.1	18-Mar-24	Natassja Bell
N. Rogers, D. Leach, K. Crews	K. Crews, D. Leach	Draft for client comments	0.2	29-Aug-24	Natassja Bell
G. Wells, N. Rogers	G. Wells	Final, client comments addressed	1.0	27-Sep-24	Natassja Bell
N. Rogers	K. Crews	Update with additional field trip results	2.0	05-Dec-24	Natassja Bell
N. Rogers	K. Crews	Final, client comments addressed	3.0	26-Feb-25	Natassja Bell

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EXECUTIVE SUMMARY

Synergy Renewable Energy Development (SynergyRED) is investigating the feasibility of a developing a Wind Farm in Scott River, located approximately 15 km north-east of Augusta, Western Australia. Phoenix Environmental Sciences Pty Ltd was commissioned by SynergyRED to undertake a detailed flora and vegetation survey, to identify any significant flora and vegetation values present in the 3,891.56 ha study area. The survey results are to be used to inform the feasibility and design layouts for the proposed wind farm and support environmental and planning approvals.

The scope of work was to undertake a desktop assessment in preparation for the field survey, a single season detailed flora and vegetation survey within the most appropriate season, and targeted searches for Threatened flora. The methods of the detailed flora and vegetation survey were as per the Environmental Protection Authority Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment.

A total of 423 flora taxa representing 65 families and 209 genera were recorded during the survey. The assemblage included 353 native taxa, 70 introduced taxa, 340 perennial taxa, 74 annual or short-lived taxa and 9 taxa that exhibit both annual and perennial lifecycles. The most prominent families recorded were Fabaceae, Proteaceae, Poaceae and Myrtaceae.

Three Threatened flora (*Grevillea brachystylis* subsp. *australis*, *Lambertia orbifolia* subsp. *vespera* and *Verticordia plumosa* var. *vassensis*), 16 Priority flora, and one species representing a significant range extension, were recorded in the study area. The survey confirmed the presence of many desktop records as well as identifying many new records of significant flora. Other desktop significant flora records were determined to no longer be current.

Records of significant flora were assigned to populations, categorised as either new populations or confirmed desktop populations. A total of 74 unique populations of significant flora were delineated, encompassing 60 new populations (1 Threatened and 59 Priority flora populations) and 14 confirmed desktop populations (4 Threatened and 10 Priority flora populations).

The survey identified 20 vegetation types, comprising of 18 native and 2 non-native vegetation types. Native vegetation covered 20.3% (790 ha) of the study area, occurring as remnant patches mainly within farmland, and roadside vegetation corridors.

Fifteen of the 18 native vegetation types were designated to have local or regional significance. Significant vegetation within this survey was classified under 4 categories: representative of a Threatened Ecological Community (TEC) (regionally significant), restricted vegetation types (locally significant), habitat for significant flora species types (locally significant) and groundwater dependent ecosystems (GDEs; locally significant).

Four vegetation types were identified as analogous to the Scott River Ironstone TEC. Three vegetation types were identified as 'restricted'. Twelve vegetation types were identified as habitat for significant flora species. Seven vegetation types were identified as known or potential GDEs. AmBsHc was the only vegetation type to be identified as significant in all 4 categories.

In terms of vegetation condition, a very large proportion of the study area (79.4%) was classified as Completely Degraded, representing cleared areas and plantations. Native vegetation in the study area was in varying states of condition, with 279.1 ha (7.2% of the study area) containing remnant vegetation in Pristine or Excellent condition, and the rest being impacted by grazing or invasive species (with Very Good to Degraded condition ratings).

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ACRONYMS AND ABBREVIATIONS

BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CD	Conservation Dependent
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Regional Development
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EN	Endangered
EP Act	*Environmental Protection Act 1986*
ESA	Environmentally Sensitive Area
EX	Extinct
GDE	Groundwater dependent ecosystems
GW	Groundwater
IBRA	Interim Biogeographic Regionalisation of Australia
IBSA	Index of Biodiversity Surveys for Assessment
LGA	Local Government Area
NES	National Environmental Significance
NP	National park
NR	Nature reserve
NVIS	National Vegetation Information System
P	Priority
PEC	Priority Ecological Community
RE	Range Extension
RIA	Road intersection area
SoW	Scope of Works
SW	South West
SWREL	South West Regional Ecological Linkages
T	Threatened
TEC	Threatened Ecological Community
VU	Vulnerable
WA	Western Australia
WAPC	Western Australian Planning Commission
WFA	Wind Farm area
WoNS	Weed of National Significance

1 INTRODUCTION AND BACKGROUND

Synergy Renewable Energy Development (SynergyRED) is a wholly owned subsidiary of Synergy Pty Ltd. SynergyRED is investigating the feasibility of a Proposed Wind Farm in Scott River (the Project), located approximately 15 km north-east of Augusta, Western Australia (WA; Figure 1-1).

In April 2023, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by SynergyRED to undertake a detailed flora and vegetation survey, basic and targeted fauna survey, and to determine ecological values for the Project. The purpose of the surveys was to identify flora, vegetation, significant fauna and habitats, to inform the feasibility and design layouts. This report focuses on the findings from the detailed flora and vegetation survey.

1.1 OBJECTIVES AND SCOPE OF WORK

The scope of works was prepared to identify flora and vegetation of conservation significance to inform the feasibility and design layouts. The flora and vegetation survey will be used to support environmental and planning approvals as required.

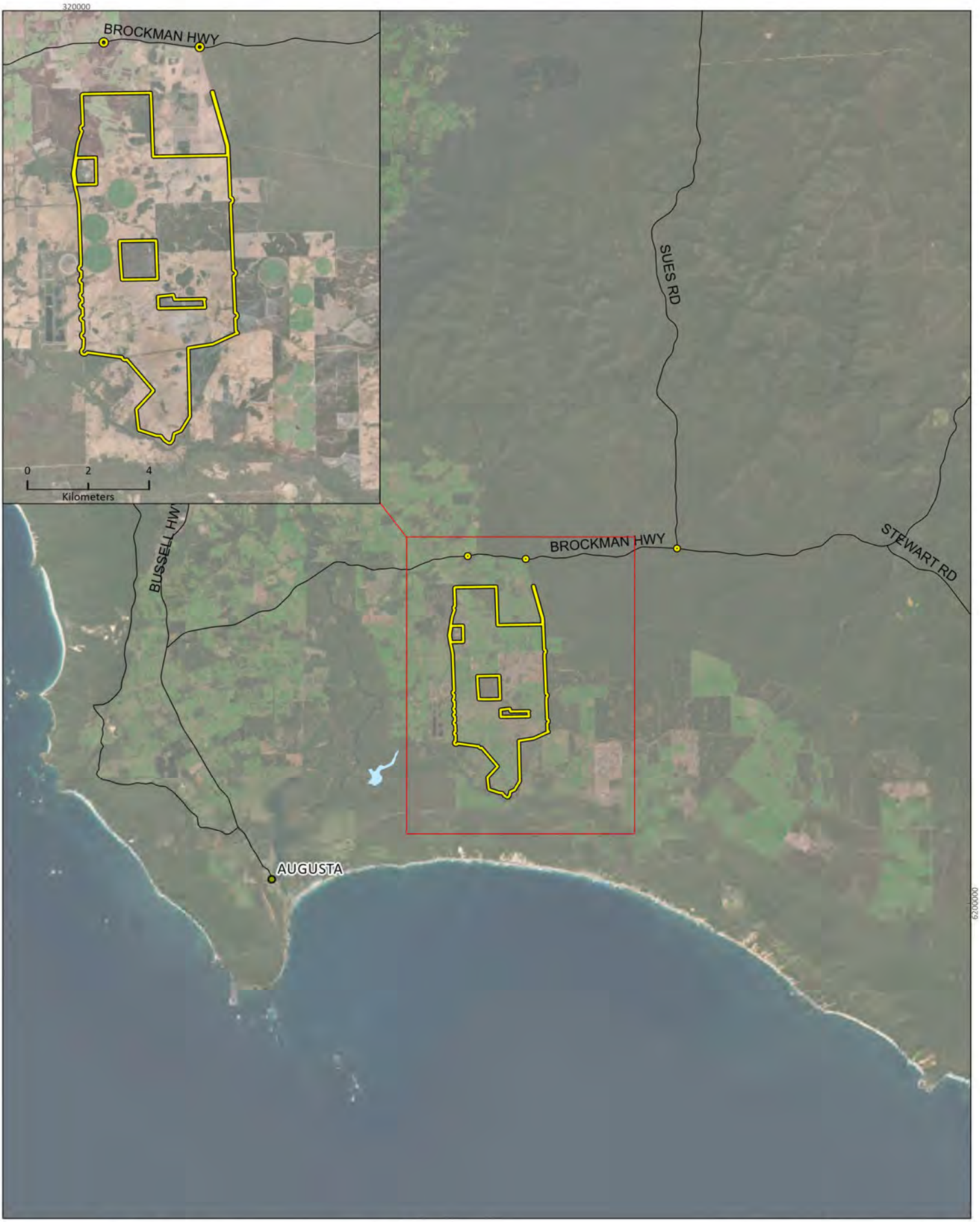
The objectives for the flora and vegetation survey were to:

a) undertake a single season detailed flora and vegetation survey with targeted searches for Threatened flora in spring 2023.
b) complete the field surveys during the most appropriate season(s) for the detection and identification of conservation significant flora that are likely or may occur within the study area, based on an initial desktop review and database searches.
c) ensure the surveys completed satisfy the following guidelines, by employing adequate survey methodology and effort by suitably qualified and experienced practitioners.

1.2 STUDY AREA

The total study area is 3,891.56 ha and comprises (Figure 1-1):

- the wind farm area (the 'WFA', 3,882.18 ha)
- 3 road intersection areas (the 'RIAs', 9.41 ha).





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
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Study area
Lakes
Roads

Figure 1-1
Project location and study area

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2 LEGISLATIVE CONTEXT

The protection of flora in WA is principally governed by 3 acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

2.1 COMMONWEALTH

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act provides for the listing of Threatened flora and Threatened Ecological Communities (TEC) as matters of National Environmental Significance (NES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES, require approval from the Australian Government Minister for the Environment through a formal referral process. Key threats and habitat critical to the survival of EPBC Act Threatened species are usually defined in the conservation advice and/or recovery plan for the species.

Conservation categories applicable to Threatened flora and fauna species under the EPBC Act are as follows:

- Extinct (EX)[1] – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD)[1] – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat' (English & Blyth 1997). There are 3 categories under which ecological communities can be listed as TECs under the EPBC Act:

- Critically endangered (CR) – If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
- Endangered (EN) – If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
- Vulnerable (VU) – If, at that time, an ecological community is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future (indicative timeframe being the next 50 years).

[1] Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened flora species (Government of Western Australia 2022) in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future[2]
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future[2]
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future[2].

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and maintains a non-statutory list of Priority flora. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority flora list are assigned to one of 4 Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern. The DBCA list also includes Threatened (T) flora, a consolidation of any species listed under the EPBC or BC acts.

An additional category under the BC Act is Extinct (EX) and the DBCA equivalent code is (X). This is defined as: no reasonable doubt that the last member of the species has died.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species, or a TEC and its listing is otherwise in accordance with the ministerial guidelines. This provision pertains to formal listing by the Minister, as distinct from (for example) critical habitat for a Threatened flora species referred to in a recovery plan or conservation advice.

2.2.3 Threatened and Priority Ecological Communities

The BC Act provides for the listing of TECs in the following categories:

- Critically Endangered – facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future[2]
- Endangered – facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future[2]
- Vulnerable – facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future[2].

An ecological community may be listed as a collapsed ecological community under the BC Act if there is no reasonable doubt that the last occurrence of the ecological community has collapsed, or the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure.

The DBCA also maintains a non-statutory list of Priority Ecological Communities (PECs), which may become TECs in the future; however, do not currently meet survey criteria or that are not adequately defined. PECs are assigned to one of 5 categories depending on their priority for survey or definition, with Priority 1 of highest concern and Priority 5 of lowest concern.

[2] As determined in accordance with criteria set out in the ministerial guidelines.

Each of the TEC/PEC known records are inclusive of a buffer. A buffer is included around each TEC or PEC to help ensure:

- that nearby developments with potential for impact are considered
- for ecological communities driven by hydrological processes, buffers are applied to ensure essential ecological functions are maintained and/or potential impact of nearby developments can be considered
- mapping inaccuracies are accounted for.

2.2.4 Other significant flora and vegetation

Under the EPA's environmental factor guidelines, flora, vegetation and fauna may be considered significant for a range of reasons other than listing as a Threatened or Priority species or ecological community.

In addition to listing as Threatened or Priority, EPA (2016a) identifies the following:

- flora may be significant for
    - local endemism or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems; GDEs)
    - new species or anomalous features that indicate a potential new species
    - representing the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
    - being unusual species, including restricted subspecies, varieties or naturally occurring hybrids
    - having relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.
- vegetation may be significant for:
    - having restricted distribution
    - subject to a degree of historical impact from threatening processes
    - having a role as a refuge
    - providing an important function required to maintain ecological integrity of a significant ecosystem.

Provided in the guide for assessment of applications to clear native vegetation (DER 2014) is a scale for assessing the bioregional conservation status of ecological vegetation classes (Table 2-1).

Table 2-1 Bioregional conservation status of ecological vegetation classes

Conservation status	Description
Presumed extinct	Probably no longer present in the bioregion
Endangered*	Less than 10% of pre-European extent remains
Vulnerable*	10-30% of pre-European extent exists
Depleted*	More than 30% and up to 50% pre-European extent exists
Least concern	More than 50% of pre-European extent exists and subject to little or no degradation over a majority of this area

*or a combination of depletion, loss of quality, current threats and rarity gives a comparable status.

2.2.5 Environmentally Sensitive Areas

Under Section 51B of the EP Act the Minister for Environment may declare by notice either a specified area of the State or a class of areas of the State to be Environmentally Sensitive Area (ESA). ESAs are

declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Government of Western Australia 2005).

ESAs are areas where the vegetation has high conservation value. Several types of areas are declared ESAs including:

- the area covered by vegetation within 50 metres (m) of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located
- the area covered by a TEC
- a defined wetland (Ramsar wetlands, conservation category wetlands and nationally important wetlands) and the area within 50 m of the wetland
- Bush Forever sites.

2.2.6 Introduced flora

Introduced flora (weeds) pose threats to biodiversity and natural values by successfully out-competing native species for available nutrients, water, space and sunlight; reducing the natural structural and biological diversity by smothering native plants or preventing them from growing back after clearing, fire or other disturbance; replacing the native plants that animals use for shelter, food and nesting; and altering fire regimes, often making fires hotter and more destructive (Australian Weeds Committee 2007).

Management of some weed species is required under Commonwealth or State frameworks. Key classifications for significant introduced flora that are relevant to this report are:

- Declared Pest – the Biosecurity and Agriculture Management Act 2007, Section 22, makes provision for a plant taxon to be listed as a Declared Pest organism in parts of, or the entire State. Under the Biosecurity and Agriculture Management Regulations 2013 Declared Pests are assigned to one of 3 control categories that dictate the level of management required (DPIRD 2023).
- Weed of National Significance (WoNS) – high-impact, established introduced flora causing major economic, environmental, social and/or cultural impacts in a number of states/territories, and which have strong potential for further spread (Australian Weeds Committee 2012). Management is required in accordance with Department of Primary Industries and Regional Development (DPIRD) guidelines for particular WoNS.

Throughout this report, introduced flora species are indicated with an asterisk (*).

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into 89 'bioregions' and 419 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). In WA there are 27 bioregions and 55 subregions. The study area is located within the Warren and Jarrah Forest IBRA bioregions, predominantly in the Warren (WAR01) subregion, with a very small area in the north within the Southern Jarrah Forest (JAF02) subregion (Figure 3-1).

The Warren bioregion (and analogous subregion) is made up of dissected undulating country of the Leeuwin Complex, Southern Perth Basin (Blackwood Plateau), south-west intrusions of the Yilgarn Craton and western parts of the Albany Orogen. The area sustains loamy soils supporting Karri forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting low Jarrah woodlands and paperbark/sedge swamps, and Holocene marine dunes with *Agonis flexuosa* and *Banksia* woodlands and heaths (May & McKenzie 2003).

The Southern Jarrah Forest subregion is characterised by duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean (May & McKenzie 2003).

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

DPIRD undertook land system mapping for the South West using a nested soil-landscape mapping hierarchy (Purdie *et al.* 2004). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage. The study area intersects 2 land systems (Table 3-1; Figure 3-2).

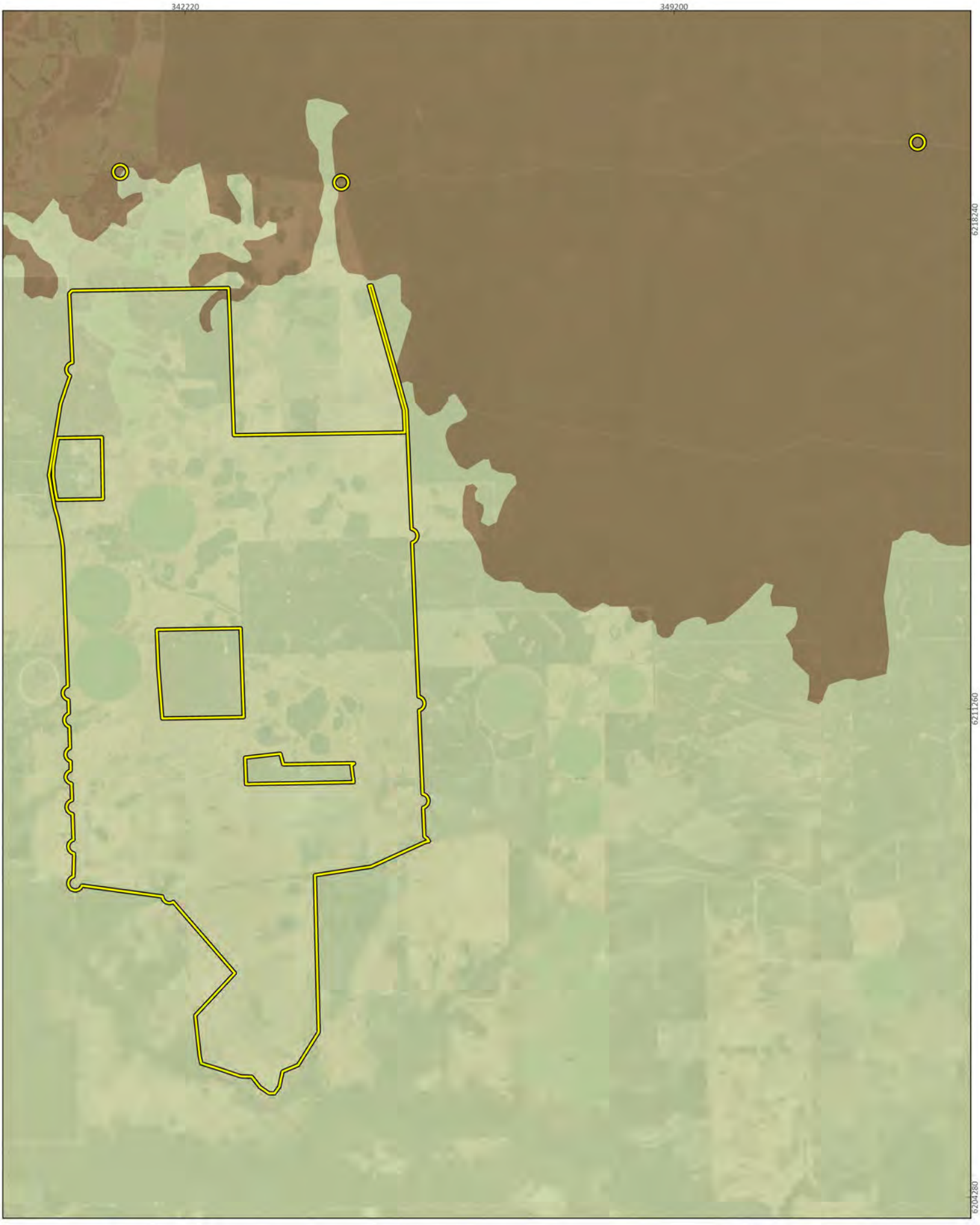
Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
Nillup Plain System	Poorly drained plain, in the southern Donnybrook Sunkland. Sandy gravel, non-saline wet soil, grey deep sandy duplex, loamy gravel and pale deep sands. Jarrah-Marri-paperbark woodland.	26.8	0.7
Scott River Plain System	Poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and Jarrah-Marri-paperbark woodland.	3,864.8	99.3
	Total	**3,891.6**	**100**

According to the Surface Geology of Australia 1:1,000,000 scale, WA database (Stewart *et al.* 2008), the study area intersects 3 geological formations (Table 3-2; Figure 3-2).

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
Estuarine, lagoonal, and lacustrine deposits 74394	Cze	Estuarine, lagoonal, and lacustrine deposits. Numerous small lakes and swamps. Linear dunes common.	3,832.9	98.5
Bunbury basalt	Kbb	Porphyritic tholeiitic basalt.	49.3	1.3
Ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite.	9.4	0.2
		Total	**3,891.6**	**100**





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

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Kilometers

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Study area

Region, subregion

Jarrah Forest, Southern Jarrah Forest

Warren, Warren

Figure 3-1

Study area in relation to IBRA bioregions and subregions

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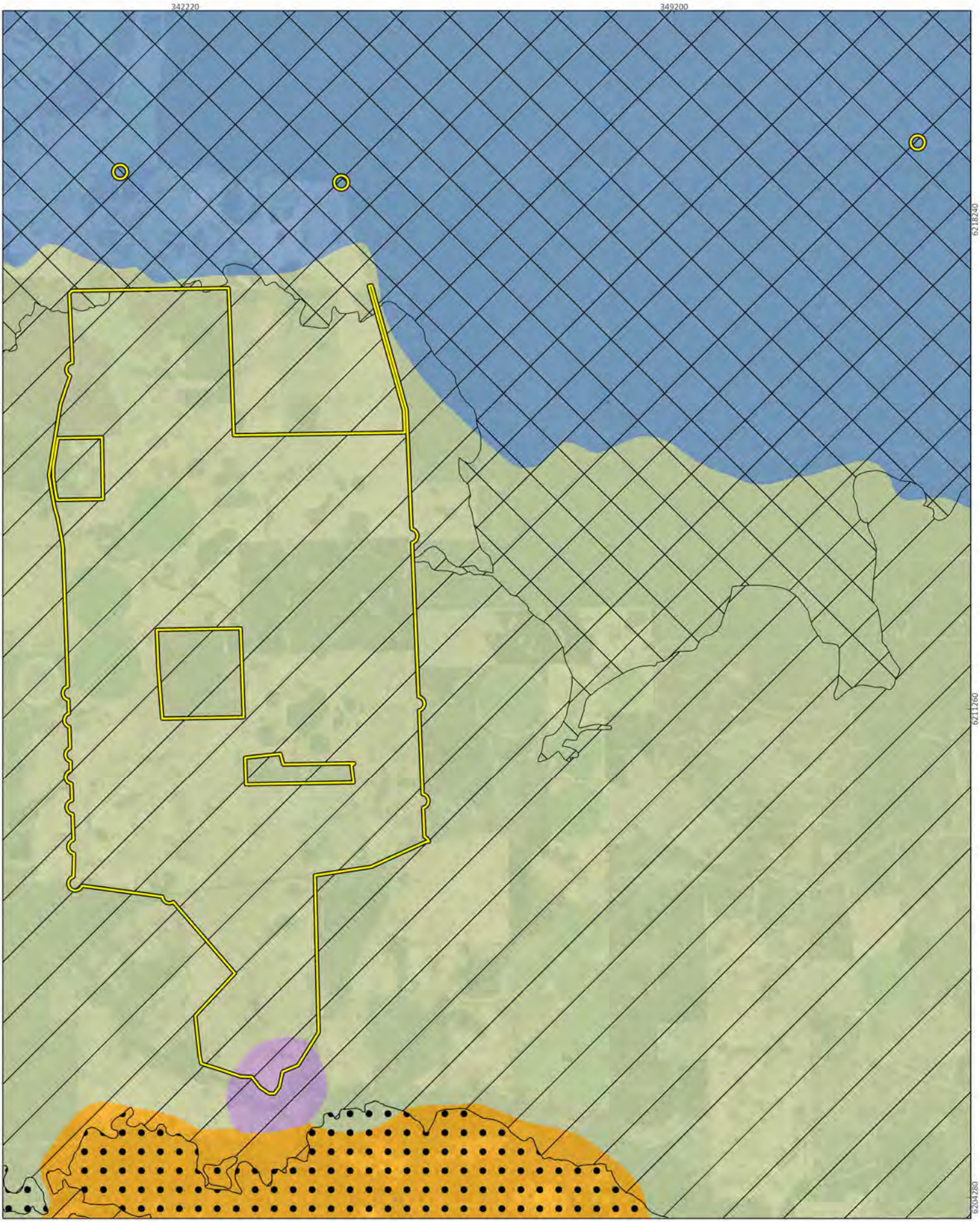



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Study area
Surface geology selection

Surface geology
- Cze
- Czl
- Kbb
- Qdct

Land system
- D'Entrecasteaux Dunes System
- Nillup Plain System
- Scott River Plain System

Figure 3-2
Land systems and surface geology in the study area

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3.3 CLIMATE AND WEATHER

The climate of the Warren (WAR01) subregion is described as Warm Mediterranean and moderate Mediterranean, respectively. The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate data is Cape Leeuwin (no. 009518, Latitude: 34.37°S Longitude 115.14°E), located 17.76 km south-west of the study area.

Cape Leeuwin records the highest mean maximum monthly temperature (24.4°C) in February (lowest in June, 16.6°C) and the lowest minimum mean monthly temperature (11.6°C) in June (highest in February, 18.2°C) (Figure 3-3). Mean annual rainfall recorded the highest monthly means in June and April (179 and 104.2 mm respectively; Figure 3-3).

Daily mean temperatures at Cape Leeuwin preceding the surveys were relatively consistent with long-term averages, although the mean maximum temperature in October was 2.0 °C warmer than the average (Figure 3-3). The daily minimum temperatures were also generally consistent with the long-term averages, though November recorded minimum temperatures 1.7 °C above average (Figure 3-3). This shows a warming trend within the South West region.

Records from Cape Leeuwin show the highest rainfall preceding the survey was June with a total monthly rainfall of 179 mm, which was 5.3 mm higher than the long-term average (Figure 3-3). Rainfall in May can be considered an outlier due to the vast difference between the long-term average (104.7 mm less than long-term average). The 2022-2023 total annual rainfall (600.4 mm) was 352.8 mm less than the long-term average (953.2 mm; Figure 3-3).

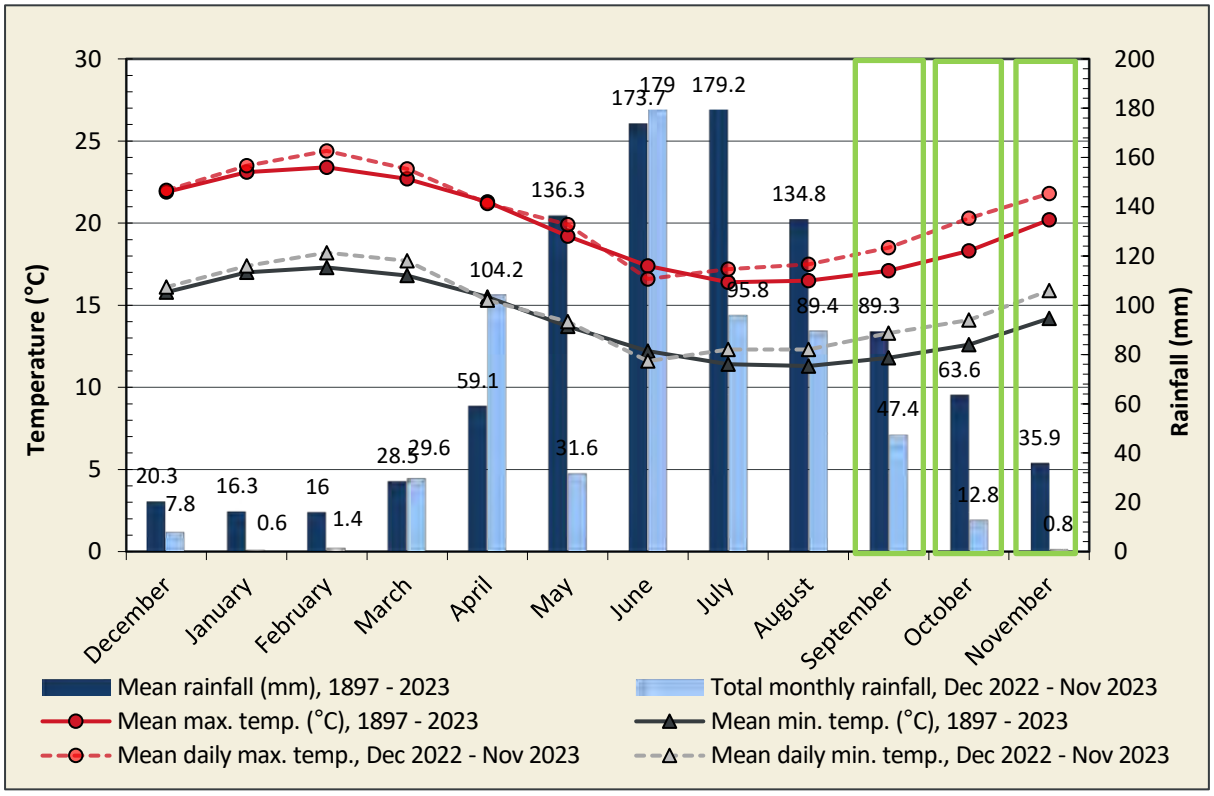


Figure 3-3 Annual climate and weather data for Cape Leeuwin (no. 009518) and mean monthly data for the 12 months preceding the survey (BoM 2024)

The 3 phases of field surveys are each marked with a green rectangle.

3.4 LAND USE

Land use within the Warren and Southern Jarrah Forest regions consists of predominantly dryland agriculture and plantations (3,739,542 ha or 36%), the majority of which is modified pastures for grazing, and cropping (Table 3-3). This is closely followed by conservation and natural environments (3,572,471 ha or 34%), the majority of which is nature conservation (Table 3-3).

Table 3-3 Land use within the Warren and Southern Jarrah Forest regions (ABARES 2018)

Land use	Area (ha)
1 Conservation and natural environments	**3,572,471**
1.1 Nature conservation	2,486,646
1.2 Managed resource protection	1,089
1.3 Other minimal use	1,084,737
2 Production from relatively natural environments	**2,649,200**
2.1 Grazing native vegetation	61,997
2.2 Production native forests	2,587,203
3 Production from dryland agriculture and plantations	**3,739,542**
3.1 Plantation forests	771,191
3.2 Grazing modified pastures	1,830,075
3.3 Cropping	1,128,405
3.4 Perennial horticulture	361
3.5 Seasonal horticulture	95
3.6 Land in transition	9,414
4 Production from irrigated agriculture and plantations	**132,365**
4.0 Production from irrigated agriculture and plantations	35
4.1 Irrigated plantation forests	598
4.2 Grazing irrigated modified pastures	56,813
4.3 Irrigated cropping	334
4.4 Irrigated perennial horticulture	62,330
4.5 Irrigated seasonal horticulture	8,406
4.6 Irrigated land in transition	3,849
5 Intensive uses	**101,356**
5.0 Intensive uses	4
5.1 Intensive horticulture	249
5.2 Intensive animal production	6,865
5.3 Manufacturing and industrial	2,008
5.4 Residential and farm infrastructure	41,183
5.5 Services	10,148
5.6 Utilities	268
5.7 Transport and communication	24,566
5.8 Mining	15,462
5.9 Waste treatment and disposal	599
6 Water	**162,785**
6.0 Water	8
6.1 Lake	51,489

Land use	Area (ha)
6.2 Reservoir/dam	32,353
6.3 River	10,755
6.4 Channel/aqueduct	63
6.5 Marsh/wetland	53,748
6.6 Estuary/coastal waters	14,369
Grand total	**10,357,716**

3.5 CONSERVATION RESERVES AND ESAS

Numerous conservation reserves, national parks and state forest occur within 10 km of the study area (Figure 3-4). Two national parks and 2 nature reserves and one state forest share a partial intersection and/or boundary with the study area:

- Blackwood River National Park – intersects part of the most eastern RIA
- Scott National Park – very small connection to the south-west (SW) boundary of the WFA
- Pagett Nature Reserve – adjoins part of the eastern boundary of the WFA
- Unnamed R42377 Nature Reserve – occurs within but excluded from the WFA
- South Blackwood State Forest – intersects part of the central RIA and adjoins part of the eastern boundary of the WFA.

Several additional reserves also occur within 10 km of the study area:

- Milyeannup National Park
- Wiltshire-Butler National Park
- Leeuwin-Naturalist National Park
- Unnamed WA46400 National Park
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Ngari Capes Marine Park
- Unnamed R42942 Nature Reserve
- Unnamed R15185 Nature Reserve
- Unnamed O20125 Timber Reserve
- Unnamed O12925 Timber Reserve
- Blackwood State Forest
- Milyeannup State Forest.

The gazetted ESA dataset (DWER 2023) shows 61 ESAs intersecting the study area, collectively covering 3,853.3 ha (99% of the study area; Figure 3-5). These appear to be associated with Threatened flora, TEC and wetlands. The mapped polygons encompass buffers for these values, typically 50 m for Threatened flora and between 500 m – 2,000 m for TEC, therefore the extent of actual ESAs in the study area is much lower than the mapped ESA polygons. Refer to Section 5.1.1 and 5.1.5 for the more detailed desktop results for Threatened flora and TECs. Brief comment on wetlands is provided in Section 3.6.

3.6 WETLANDS

The Augusta Estuary is located within 8 km of the study area as well as several smaller wetlands. Approximately 10 km of coastline is also present within the buffer area south of the study area. The Geomorphic Wetlands, Augusta to Walpole (DBCA-017) dataset (WRC 2017) also indicates that the study area is dominated by Palusplain (seasonally waterlogged flat) wetlands, and includes numerous Damplands (seasonally waterlogged basin) and Sumplands (seasonally inundated basin).

3.7 ECOLOGICAL LINKAGES

The importance of ecological linkages is recognised by existing environmental and planning policy documents (e.g. EPA Guidance Statement 10, EPA Guidance Statement 33 - Chapters B1, B2 and B3, EPA Bulletin 1108 Greater Bunbury Region Scheme Report and Recommendations, and the Western Australian Planning Commission Statement of Panning Policy No 2 Environment and Natural Resources Policy 2003) and is increasingly considered as part of Environmental Impact Assessment, particularly in the South West, Great Southern and Wheatbelt regions of WA due to the high degree of fragmentation in those landscapes.

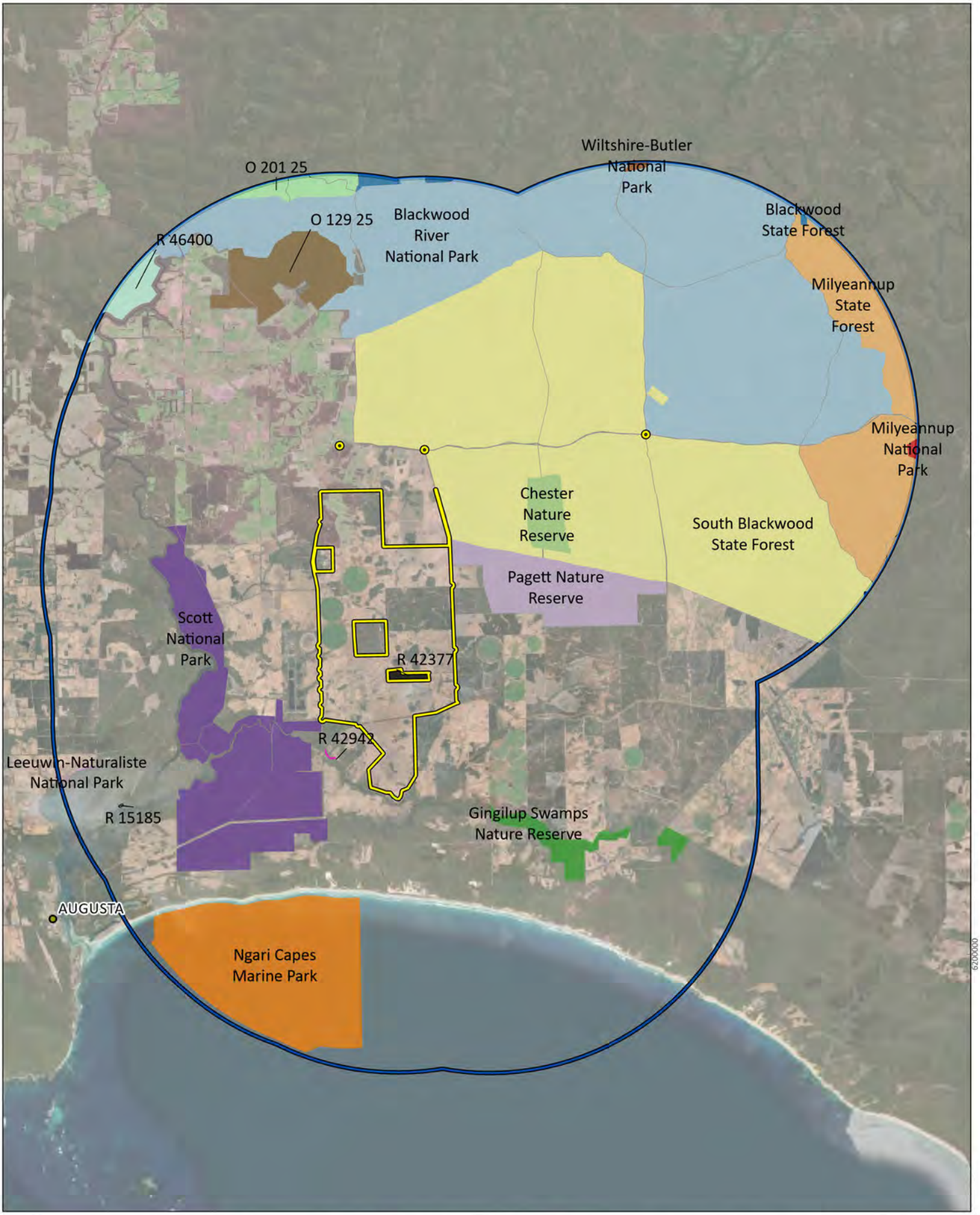
The South West Regional Ecological Linkages Project identified a network of regional-scale ecological linkages throughout the south-west of the State (Molloy *et al.* 2009). The network was subsequently extended into the eastern Jarrah Forest, Avon Wheatbelt, and Mallee (IBRA areas) and into the Serpentine-Jarrahdale Shire (Molloy & Deeley 2013).

An ecological linkage was defined by Molloy *et al.* (2009) as

> "a series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape."

Ecological linkages are just one measure of the biodiversity conservation value of a patch of native vegetation. The purpose of an ecological linkage therefore is to recognise a patch's additional value to biodiversity conservation and thus they allow managers and planners to achieve more effective planning and impact assessment.

As can be seen in Figure 3-5, the study area lies at the junction of several regionally important ecological linkages due to its proximity to large areas of National Park to the north and east, Scott River at its southern border, and the Blackwood River to the west.





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	26/09/2024
Drawn by	BK
Map author	BA

0 2.5 5
Kilometers

1:181,800 (at A4) GDA 1994 MGA Zone 50

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- Study area
- 10 km desktop search extent

DBCA managed land

- Blackwood River National Park
- Blackwood State Forest
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Leeuwin-Naturaliste National Park
- Milyeannup National Park
- Milyeannup State Forest
- Ngari Capes Marine Park
- Pagett Nature Reserve
- Scott National Park
- South Blackwood State Forest
- Wiltshire-Butler National Park
- O 129 25
- O 201 25
- R 15185
- R 42377
- R 42942
- R 46400

Figure 3-4
Conservation reserves

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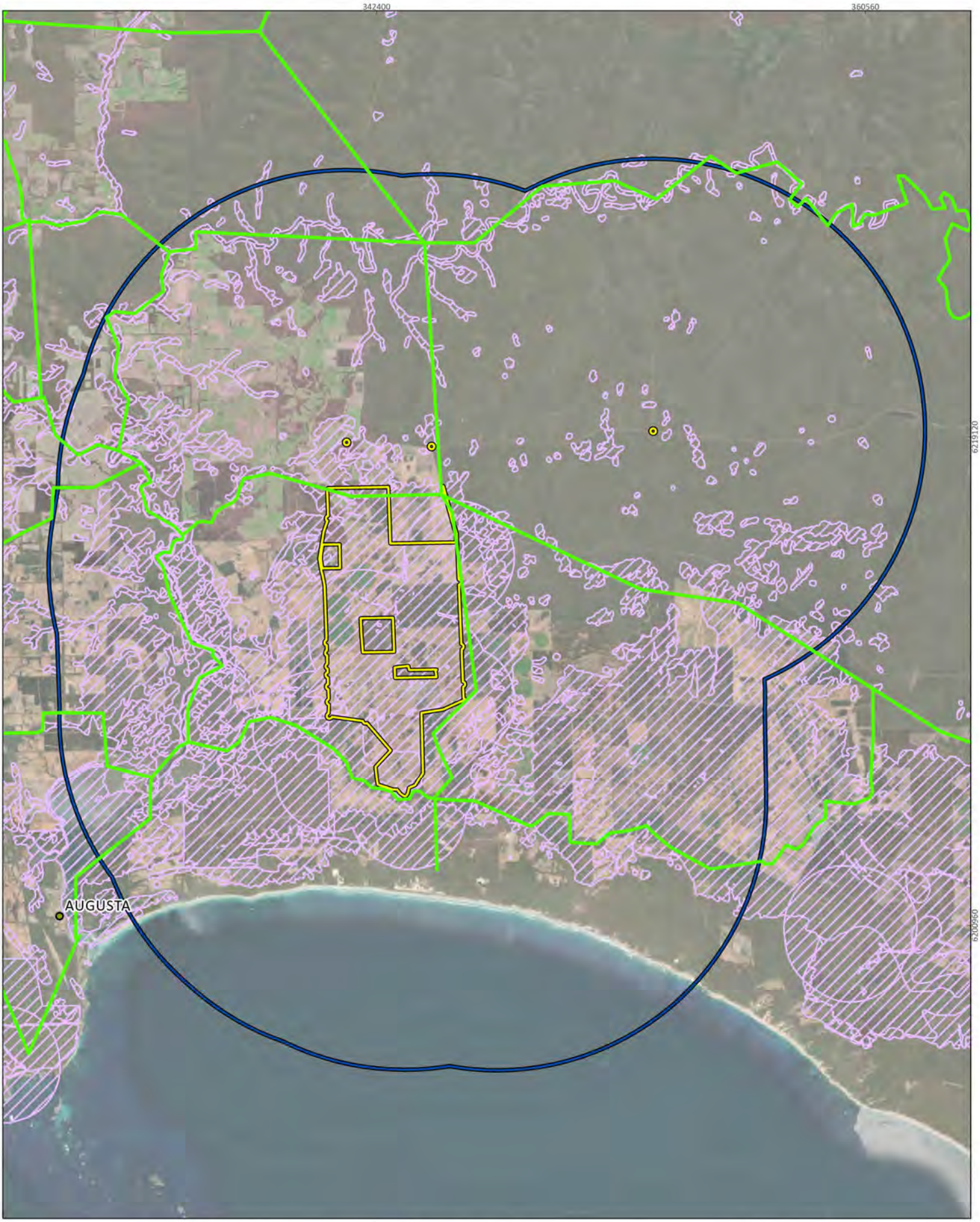



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0 3 6
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1:181,600 (at A4) GDA 1994 MGA Zone 50

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- Study area
- 10 km desktop search extent
- Environmentally Sensitive Areas
- South West Ecological Linkages

Figure 3-5
ESAs and Ecological linkages

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4 METHODS

The various surveys were conducted in accordance with the following relevant survey guidelines and guidance:

- *Environmental Factor Guideline: Flora and vegetation* (EPA 2016a)
- *Technical Guidance: Flora and vegetation surveys for Environmental Impact Assessment* (EPA 2016b)
- *Approved Conservation Advice for Scott River Ironstone Association* (SEWPaC 2013)
- *Survey Guidelines for Australia's Threatened Orchids. Guidelines for detecting orchids listed as "Threatened" under the Environment Protection and Biodiversity Conservation Act 1999* (DoE 2014).

4.1 DESKTOP REVIEW

Searches of several biological databases were undertaken to identify and prepare lists of significant flora and vegetation that may occur within the study area (Table 4-1).

A literature search was conducted for accessible reports for biological surveys conducted within 10 km of the study area to build on the lists developed from the database searches; these are listed in Table 4-2. While not a survey report, one other literature sources for this study are relevant for wider context: Lyons *et al.* (2000), who compiled a list of vascular flora of the Warren bioregion from desktop sources; and on a smaller scale, Gibson *et al.* (2001) who subsequently compiled a list for the Scott National Park and Gingilup Swamps Nature Reserve.

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2023)	EPBC Act Threatened flora, fauna and ecological communities	Study area plus a 10 km buffer
DBCA Threatened and Priority Flora Database (DBCA 2023g)	Threatened and Priority flora	Study area plus a 10 km buffer
DBCA Threatened and Priority Ecological Communities database (DBCA 2023f)	TECs and PECs	Study area plus a 25 km buffer[1]
NatureMap (DBCA 2023b)	Flora and fauna records	Study area plus a 10 km buffer
Index of Biodiversity Surveys for Assessment (IBSA) database (IBSA 2023), for nearby survey reports and data	Flora, vegetation and fauna survey records and data	Study area plus a 10 km buffer

[1] 25 km buffer as per the DBCA search.

Table 4-2 Survey reports included in the desktop review

Report author	Survey description	Project/area	Proximity to study area
Biota (2009)	Single season detailed flora and vegetation assessment	Proposed Milyeannup Wind Farm	Approx. 10 km SE of study area
Robinson and Keighery (1997)	Flora and vegetation surveys conducted between 1990-1991	Scott National Park	Adjacent to the SWW corner of the study area
Woodman (2019a)	Site inspection report	Site inspection report of ESA C98	Within study area
Woodman (2019b)	Site inspection report	Site inspection report of ESA C458	Within study area

4.2 FIELD SURVEY

4.2.1 Survey timing

Multiple field surveys for flora and vegetation were undertaken. The flora survey timing was based on targeting the predominant flora (particularly conservation significant flora) flowering periods to facilitate finding them in the field. Flowering in the Warren bioregion peaks between September and November. Field survey types and dates are provided in Table 4-3.

Table 4-3 Survey dates

Survey type	Season	Dates
Single season detailed flora and vegetation survey	Spring – Phase 1	1–5 September 2023
	Spring – Phase 2	23–27 October 2023
	Spring – Phase 3	13–17 November 2023
	Targeted flora searches	20 November 2024

4.2.2 Field methods

Field methods for the flora and vegetation survey included:

- surveying of quadrats and relevés (see 4.2.2.1)
- targeted flora searches (4.2.2.2)
- vegetation type and condition mapping (4.2.2.3, 4.2.2.4)
- TEC/PEC and GDE assessments (4.2.2.5, 4.2.2.6).

Prior to the commencement of the field survey, data including satellite imagery, survey boundary, and pre-selected vegetation quadrats and relevés were loaded onto electronic field devices. The field survey involved assessing and mapping vegetation boundaries, conducting quadrat and relevé sampling and collecting opportunistic flora specimens. GPS locations of vegetation and condition boundaries, survey sites and flora specimen data were recorded digitally.

4.2.2.1 Quadrats and relevés

Quadrat locations were selected to ensure that an accurate representation of vegetation types within the study area were sampled adequately, with a minimum of at least 3 quadrats per vegetation type, where practicable. Two methods were used for the selection of quadrat placement within the study area. Preliminary quadrat locations were pre-selected using aerial photography at a 1:10,000 scale, with selection based on apparent changes in the vegetation, landform, geology, elevation, slope, aspect, water and soil. Final quadrat placement was determined in the field while ground-truthing the study area on foot. Some preliminary quadrats were moved to locations which better represented vegetation types and some quadrats were changed to relevés, where only dominant vegetation was recorded. This may have been done for various reasons such as, sufficient replicates of a vegetation type, unsafe terrain (deep water), vegetation is unnatural (plantations).

In total, 72 quadrats (10m x 10m) and 30 relevés were sampled across the study area (Figure 4-1; Appendix 1). In addition, 123 mapping notes (i.e. additional vegetation descriptions, ground-truthing notes) were made to provide supplementary data to the quadrats and relevés.

Quadrat sampling dimensions were 10 m x 10 m in accordance with EPA guidance for the South West Botanical Province. The following information was recorded for each quadrat (Appendix 2):

- location – the geographic coordinates of all 4 corners of the quadrat in WGS84 projection

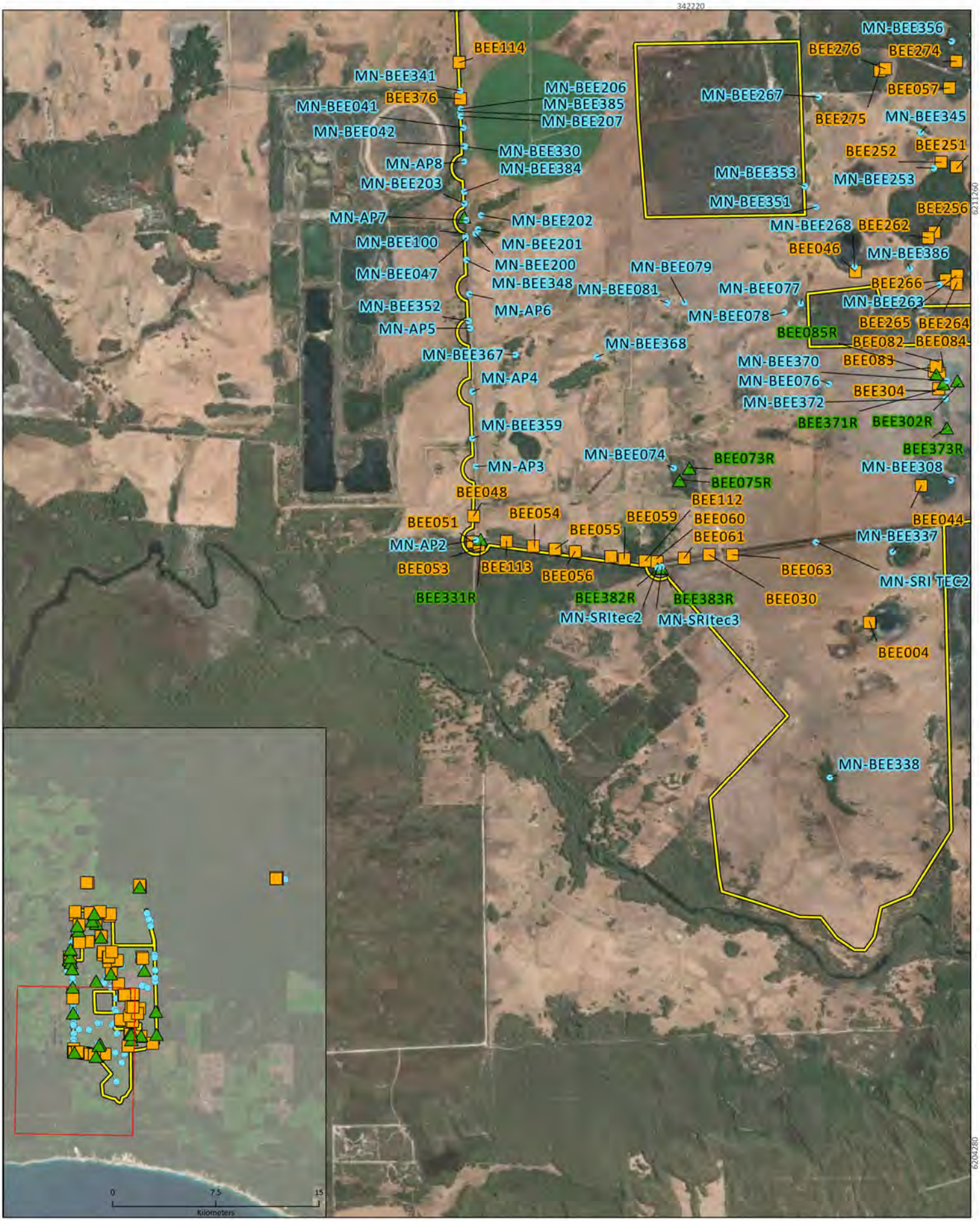
- description of vegetation – a broad description utilising the structural formation and height classes based on National Vegetation Information System (ESCAVI 2003) and in accordance with (EPA 2016b) (Appendix 3)
- habitat – a brief description of landform and habitat
- geology – a broad description of surface soil type and rock type
- disturbance history – a description of any observed disturbance including an estimate of time since last fire, weed invasions, soil disturbance, human activity, and fauna activity
- vegetation condition – using the condition scale in EPA (2016b) for the South West Botanical Province
- height and percentage foliage cover (PFC) – a visual estimate of cover of total vegetation cover, cover of shrubs and trees >2 m tall, cover of shrubs <2 m, total grass cover and total herb cover
- photograph – a colour photograph of the vegetation within each quadrat in a south-easterly direction from the north-west corner of the quadrat
- flora species list – comprehensive list of all flora species recorded within the quadrat.

To ensure accurate taxonomic identification of flora species present within the study area, collections were made of each specimen at least once and each collection was pressed and documented for identification using the WA Herbarium resources.

For each species identified, records on Florabase and the Australasian Virtual Herbarium were consulted to provide information on known ranges to determine whether the survey area represented a range extension for the species.

Relevés were sampled within vegetation units where dominant species, soils and topography were representative of vegetation surveyed in quadrats. To enable inclusion within vegetation analysis alongside relevés, Information collected in relevés was the same as for quadrats with the exception that:

- only a single geographic coordinate was recorded
- only prominent flora species were recorded.



Western Australia

PERTH

SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

0 0.75 1.5
Kilometers

1:35,750 (at A4) GDA 1994 MGA Zone 50

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Study area

Sample method

- Relevé
- Quadrat
- Mapping note

Figure 4-1a

Survey sites

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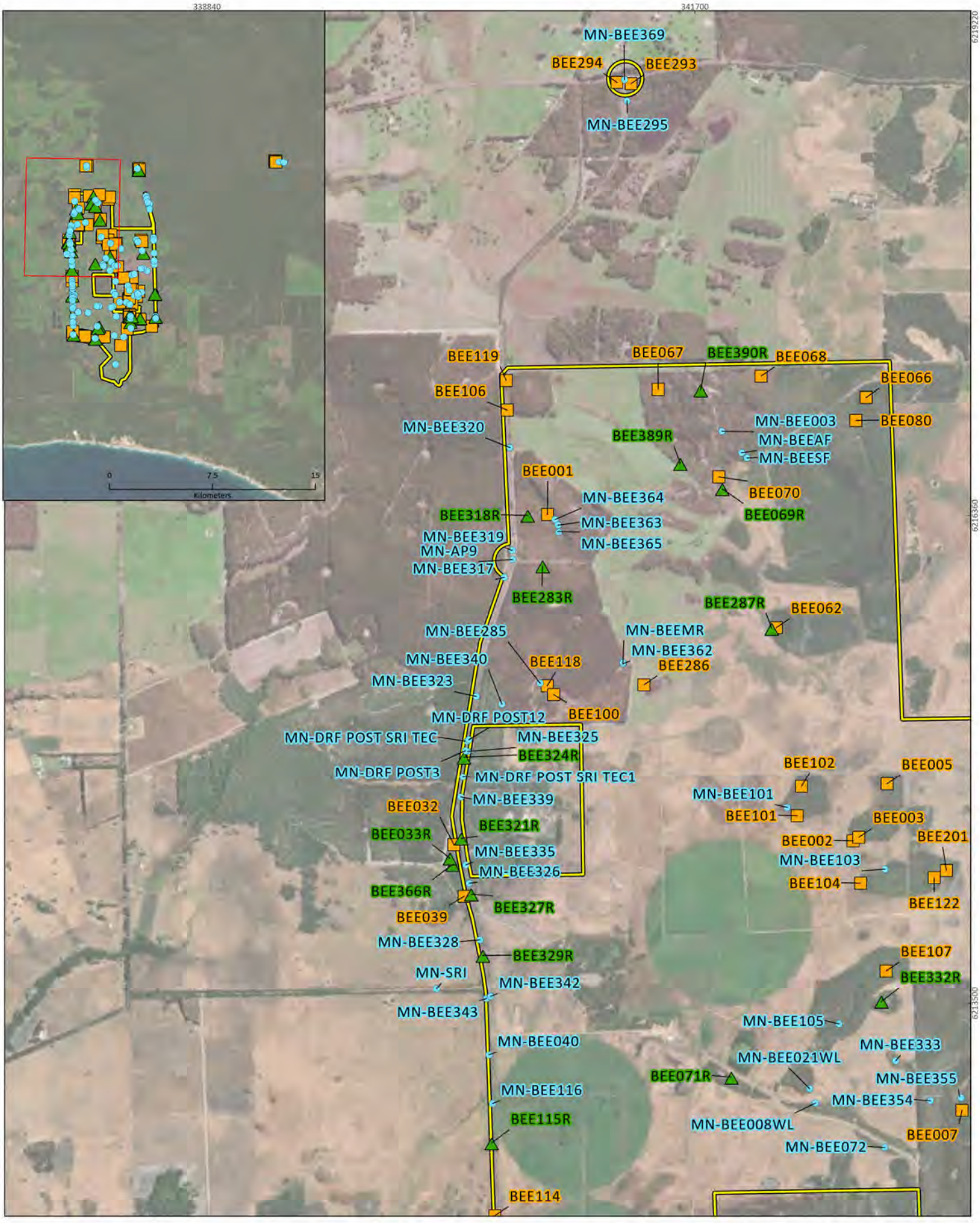



SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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Study area

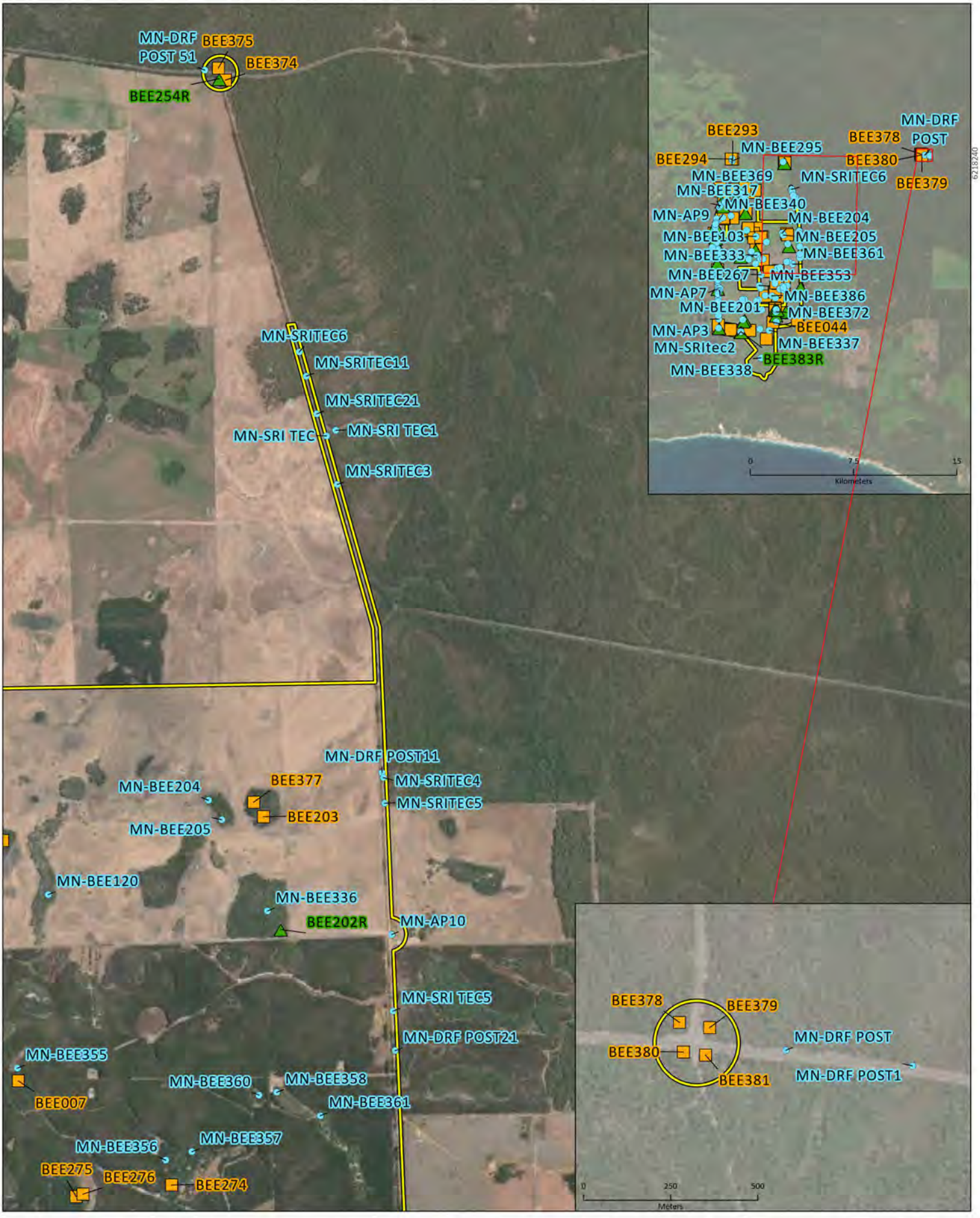
Sample method

- Relevé
- Quadrat
- Mapping note

Figure 4-1b

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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Study area

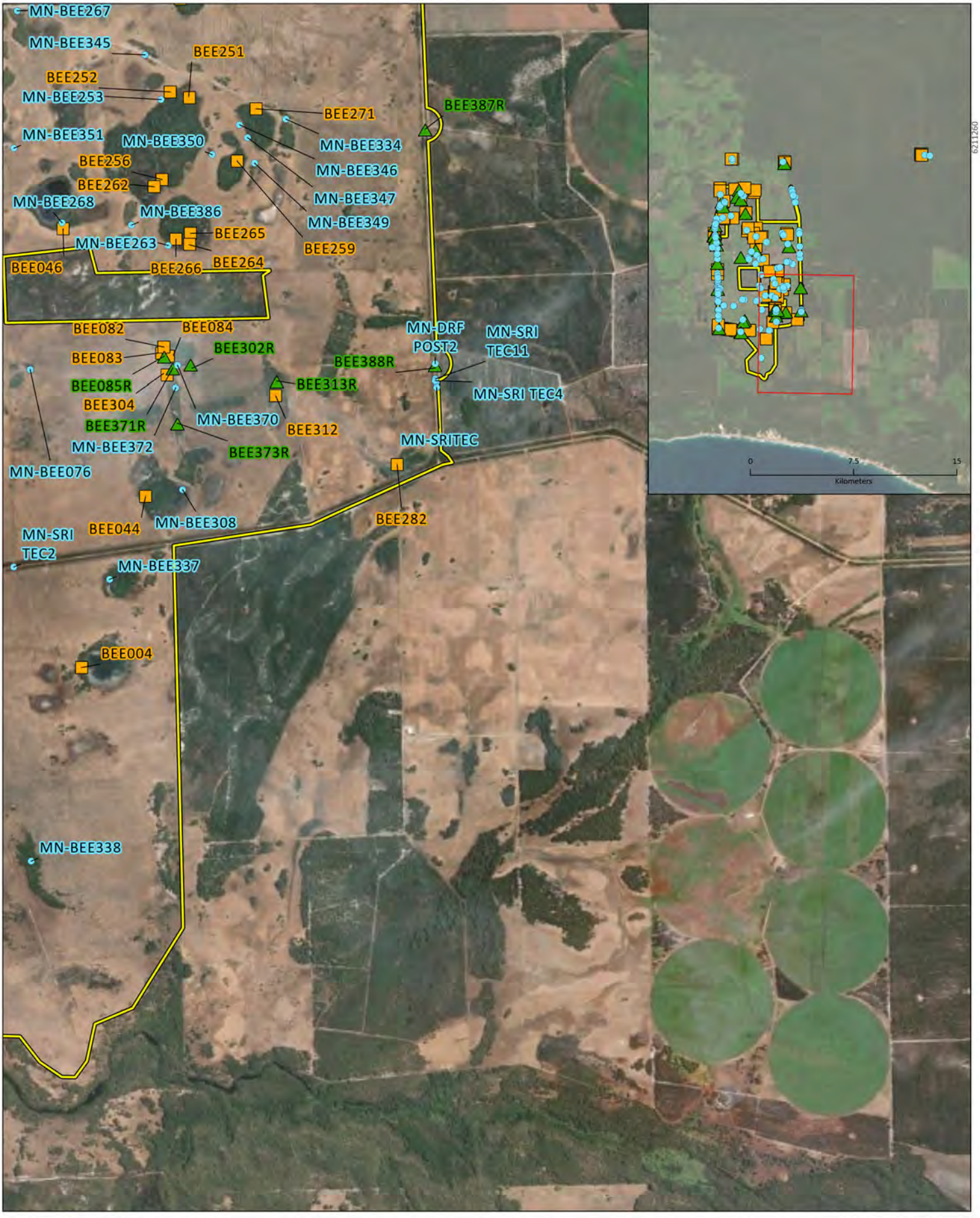
Sample method

- Relevé
- Quadrat
- Mapping note

Figure 4-1c

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	30/09/2024
Drawn by	BK
Map author	BA

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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Study area

Sample method

- Relevé
- Quadrat
- Mapping note

Figure 4-1d

Survey sites

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4.2.2.2 Targeted flora searches

Targeted searches were undertaken for significant flora (Threatened and Priority), Declared Pests and WoNS. Remnant vegetation was traversed by foot in systematic searches focused on habitats considered likely to support significant flora, in addition to previously recorded locations of significant plants or populations near the study area.

If a flora species was considered to potentially be a significant species (i.e. similar floristic characteristics and occurring within suitable habitat) the following information was collected:

- GPS coordinates, including population boundary where applicable
- description of the habitat and floristic community in which the potential significant species was located
- population size estimate (i.e. estimated number of individual plants) where applicable
- specimen collection for taxonomic identification and lodgement at the WA Herbarium
- photograph of live plant in situ and description of important details, such as flower colour, height of individual or average height of population.

Following the field survey, the likelihood of occurrence for each significant flora species identified in the desktop review was assessed and assigned to one of 3 ratings:

- Recorded – species recorded within the study area by previous or current survey.
- Possible – study area within known range of species; potential habitat within the study area, records within 5 km of study area and may not have been detectible during survey (e.g. survey conducted outside flowering period, annual plant survey conducted outside likely period of occurrence, small herbaceous plant in dense vegetation), or entire area of habitat not thoroughly searched.
- Unlikely – study area outside known range of species and/or no suitable habitat present in study area and/or suitable/potential habitat present but study area considered adequately searched for the species.

A GPS coordinate was considered a 'locality' as a point record of a potential significant species' location.

Populations of significant flora were delineated in accordance with the DBCA Threatened and Priority flora report form (DPaW 2010), as plants that are at least 500 m from another. For the purpose of population delineation, both field records and unconfirmed desktop records in the study area were included. Discounted desktop records were excluded (i.e. those found to be no longer present during the survey, old record in a now cleared location, or desktop record considered inaccurate).

4.2.2.3 Vegetation analysis and mapping

Multivariate comparative (cluster) analysis was performed to delineate vegetation types prior to vegetation type mapping. Several preliminary iterations of analysis were conducted to detect possible data errors for investigation and correction (where errors confirmed) prior to running the final analysis.

Software package PATN (Belbin 2003) was employed to conduct association (Bray and Curtis), classification (flexible UPGMA technique of agglomerative hierarchical fusion), and ordination (semi-strong hybrid) analyses parameters. Both species presence and dominance were factored within the site-species matrix (Appendix 9) through transformation of each species' percent foliage cover values into appropriately balanced cover class codes. Introduced flora species and native annual species were excluded from analysis to ensure the output produced survey site groupings based on perennial/structural native species. Singleton species (only occurring in a single site) were excluded for clarity, as they are non-contributary to site similarity/dissimilarity in analysis.

A dendrogram was produced to illustrate the similarities and/or differences amongst vegetation units identified. Local scale vegetation units were described at National Vegetation Information System (NVIS) Level V – Association (ESCAVI 2003). The term 'vegetation type' was used for local scale vegetation units in accordance with EPA technical guidance (EPA 2016b). Though often excluded in vegetation analysis, non-discriminatory (lesser importance) species were retained within final analysis due to their contribution to the finer-scale splits amongst vegetation types at an NVIS Level 5 resolution.

A small number of outlier survey sites containing limited numbers of native species skewed preliminary vegetation analysis and interrupted coherent formation of vegetation types. These sites were demoted to mapping notes to allow valid analysis output with cohesive vegetation types. These vegetation units (Psp and Aff) were described entirely from the demoted survey sites and were retained for vegetation mapping.

Non-vegetated units within the study area were excluded from analysis. These units contain no vegetation data, and therefore no speculations can be made about the potential vegetation type. These units can be categorised as:

- Cleared areas – absent or near absent of native vegetation, such as roads, tracks, pastures
- Water – standing water without observable flora species.

Vegetation mapping was also used to classify some locally significant vegetation:

- Restricted vegetation is classified in this report as <1% cover of native vegetation within the study area, excluding vegetation types that are obviously abundant outside the study area
- Habitat for significant flora is determined by the intersection of significant flora records identified during the survey and vegetation type mapping, separated into 2 categories
    - primary habitat (locally significant) is the predominant vegetation type(s) that a significant flora inhabits
    - incidental habitat is a vegetation type where a significant flora rarely or incidentally occurs.

Vegetation mapping was undertaken at a scale of 1:10,000 using the NVIS association level (L5) for structural descriptions (ESCAVI 2003). Extent and boundaries of each vegetation type were determined through locations of survey quadrats, relevés, and mapping notes (each designated with vegetation type) in conjunction with ArcGIS ESRI imagery aerial imagery. Initial versions of vegetation type mapping were further refined for more precise boundaries at a scale of up to 1:2,500 in areas of key importance to Synergy RED's potential access routes.

4.2.2.4 Vegetation condition mapping

The condition of vegetation was mapped across the study area based on the appropriate condition scale for the South West Botanical Province (Keighery 1994 in EPA 2016b) (Table 4-4). The vegetation condition ratings relate to vegetation structure, the level of disturbance and weed cover at each structural layer and the ability of the vegetation unit to regenerate. Vegetation condition ranges from Excellent being the highest rating to Completely Degraded as the lowest.

Vegetation condition was attributed within the vegetation type mapping. Completely cleared areas (e.g. roads, tracks, paddocks) were mapped as 'cleared' and assigned a vegetation condition rating of Completely Degraded

Table 4-4 Vegetation condition rating scale (EPA 2016b)

Condition rating	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching Good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

4.2.2.5 TEC/PEC assessment

The DBCA TEC/PEC database search provided a brief description and locations of TEC/PEC within the desktop extent. From the database outputs, more extensive literature review was conducted for more detailed descriptions of each TEC/PEC (e.g. vegetation, landform, geology, land system, elevation, slope, aspect, water and soil).

Preliminary identification of the presence of any TECs/PECs in the study area was then undertaken in the field survey, whereby any sites suspected to be characteristic of a TEC or PEC were tagged and if deemed necessary, additional sites or data collected within the suspected TEC/PEC.

Further analysis of TEC/PEC presence was conducted following statistical analysis and vegetation mapping, where vegetation types identified in the survey were matched the TEC/ PEC description. Consideration was also given to additional criteria for TEC/PEC designation as defined in relevant conservation advice, such as minimum patch size and/or vegetation condition.

4.2.2.6 Groundwater dependent ecosystem assessment

A literature search was conducted to identify known groundwater dependent vegetation communities and species in the South West that may be relevant to the study area. Groundwater dependency (if known) was identified, as described below.

GDEs are so defined because they have at least some reliance on groundwater to meet their ecological water requirements (Hatton & Evans 1998; Richardson *et al.* 2011). Terrestrial vegetation that accesses groundwater via the capillary fringe and is dependent on this water source for all or part of its ecological water requirements falls within a class of GDEs defined as those dependent on sub-surface presence of groundwater (Eamus *et al.* 2006; Richardson *et al.* 2011).

The degree of groundwater dependency can differ markedly between GDEs and establishing the degree of groundwater dependency in individual plant species and vegetation communities is difficult (Eamus & Froend 2006; Eamus *et al.* 2006). Following Eamus *et al.* (2006), on a simple scale, dependence is categorised in this assessment as:

- obligate – species or vegetation community has an obligate reliance on groundwater for maintenance of all or part of its ecosystem function; obligate reliance may be continual, seasonal or infrequent
- facultative – species or community that uses groundwater facultatively when it is available, but its absence does not cause loss of this vegetation element.

Field investigations have indicated that obligate phreatophytes are more susceptible to water stress than facultative phreatophytes (e.g. Froend and Drake 2006 for Banksia species).

Species and vegetation types recorded in the field survey were reviewed against the GDEs identified in the literature review to identify groundwater dependent communities/species present in the study area. Vegetation types dominated by a GDE species from the desktop review were designated as 'GDE' vegetation types, as were vegetation types aligning with formally defined GDEs (e.g. by TEC listings). Individual vegetation polygons that contained incidental or non-dominant occurrences of a GDE species as were classified as 'Known to contain record(s) of GDE associated species'.

4.2.2.7 Analysis of survey completeness

A species accumulation curve based on accumulated species versus number of sites surveyed was used to evaluate the level of adequacy of the survey effort. The species accumulation curve was generated by inputting the site-species matrix into Phoenix's proprietary spreadsheet (Appendix 9).

4.2.3 Survey personnel

The personnel involved in the surveys are listed in Table 4-5. All survey work was carried out under relevant licences issued by DBCA under the BC Act (Table 4-5).

Table 4-5 Survey personnel

Name	Permit	Qualifications	Role/s
Jenifer Alford	FB 62000326	BSc. (Hons)	Senior Botanist, fieldwork, reporting
Julie Fielder	FB 62000476	BSc. (Hons)	Senior Botanist, fieldwork
Tim Morald	FB 62000317 TFL 093-2122	BSc. (Applied Sci.)	Botanist, fieldwork
Andrew Perkins	FB 62000560 TFL 2223-0134	BSc. (Hons), PhD (Botany)	Botanical Taxonomist, fieldwork, taxonomy
Grant Wells	FB6 2000538 TFL 2324-0016	PhD (Botany)	Senior Botanist, fieldwork, report review
Brody Loneragan	FB 62000296-2 TFL 092-2122	BSc. Hons (Env. Sci.)	Botanist, fieldwork, reporting
Natasha Rogers	FB 62000518 TFL 2223-0135	BSc. (Botany)	Botanist, fieldwork, reporting
Bethany Arbery	FB 62000639 TFL 2324-0057	BSc. (Env. Sci., Cons. & Wildlife Bio.)	Botanist, fieldwork, reporting
Jarrad Clark	BA27000943	BSc. (Env. Mgt.)	Project management, fieldwork, reporting
Calvin Williams	FB 62000525 TFL 2324-0015	BSc. (Env. Sci.)	Botanist, fieldwork
Brigitte Kovar	NA	MSc. (Geospatial Intelligence)	GIS specialist, mapping
Grant Wells	NA	PhD (Botany)	Principal Botanist, report review
David Leach	NA	BSApSc. (Hons), PhD (Plant Biology)	Senior Botanist, vegetation analysis and mapping, report review

5 RESULTS

5.1 DESKTOP REVIEW

5.1.1 Flora assemblage

The database searches and literature review identified a combined 1,116 flora taxa within the desktop search extent which extended 10 km outside of the study area boundary and comprised 1,034 native species and 82 introduced species. A total of 107 families and 357 genera were represented including the dominant families Fabaceae (115 taxa), Orchidaceae (88 taxa), Proteaceae (83 taxa), Myrtaceae (82 taxa) and Cyperaceae (70 taxa).

The broader Augusta – Margaret River Local Government Area (LGA) in which the study area occurs yielded 1,837 native taxa and 317 introduced species in Florabase (WA Herbarium 1998). The dominant families within this LGA are Fabaceae (143 native taxa), Orchidaceae (133 native taxa), Myrtaceae (106 native taxa), Cyperaceae (93 native taxa), Proteaceae (116 native taxa) and Asteraceae (59 native taxa).

The Lyons *et al.* (2000) desktop compilation of vascular flora for the Warren bioregion, which was based on based on several sources, identified 2,283 taxa for the bioregion, of which 1,853 are native. They noted Orchidaceae, Myrtaceae, Fabaceae, Proteaceae and Cyperaceae as important families for the bioregion.

Of the 4 flora and vegetation survey reports from the literature review (Table 4-2), Biota (2009) was the only detailed survey with a method statement. Biota (2009) surveyed an area of 845.8 ha on a coastal strip, approximately 7 km from the study area. This single season detailed flora and vegetation survey comprised 23 quadrats and systematic searches for significant flora. A total of 182 flora taxa were recorded, 24% (44 taxa) were introduced species. The most prominent families were Orchidaceae, Asteraceae, Fabaceae and Myrtaceae.

The Robinson and Keighery (1997) study of Scott National Park to the west of the study area (Figure 3-4) identified high species richness in the park with 681 native taxa recorded, as well as 53 introduced species. This report contains no method statement but refers to extensive field survey being undertaken between 1990 and 1991. Gibson *et al.* (2001) subsequently increased the flora assemblage for the park to 744 native and 73 introduced species. Based on these studies, the most dominant families of native species in Scott National Park are Orchidaceae, Fabaceae, Myrtaceae, Cyperaceae, Proteaceae and Restionaceae.

The Woodman (2019a, b) site inspection reports were limited to targeted searches for significant flora and TEC/PEC, and therefore were only referred to for desktop significant flora, not assemblage data

5.1.2 Significant flora

Records of 84 significant flora species were identified within the desktop search extent (inclusive of both database searches and reviewing previous reports), comprising one presumed extinct species, 9 Threatened flora and 74 Priority flora (DBCA 2023g). Six Threatened and 20 Priority flora were recorded within the study area (Table 5-1; Figure 5-1).

Biota (2009) recorded 2 flora species that have maintained a Priority status; one individual of *Caladenia abbreviata* (P3) and *Banksia sessilis* var. *cordata* (P4) individual counts were not recorded but was suggested to have a scattered to moderately dense distribution with the survey area.

Woodman (2019a) recorded 2 Threatened and 7 Priority flora species that have maintained a significant listing:

- 5 individual counts of *Conospermum quadripetalum* (CR BC Act)
- 263 individual counts of *Grevillea brachystylis* subsp. *australis* (VU EPBC Act; EN BC Act)
- 137 individual counts of *Synaphea nexosa* (P1)
- 3 individual counts of *Boronia anceps* (P3)
- 93 individual counts of *Calothamnus lateralis* var. *crassus* (P3)
- 149 individual counts of *Gastrolobium formosum* (P3)
- 244 individual counts of *Grevillea papillosa* (P3)
- 535 individual counts of *Adenanthos detmoldii* (P4)
- 9 individual counts of *Stylidium leeuwinense* (P4).

Woodman (2019b) recorded 3 Threatened and 8 Priority flora species that have maintained a significant listing:

- 90 individual counts of *Banksia nivea* subsp. *uliginosa* (EN EPBC & BC Acts)
- 18 individual counts of *Darwinia ferricola* (EN EPBC & BC Acts)
- 114 individual counts of *Verticordia plumosa* var. *vassensis* (EN EPBC & BC Acts)
- 98 individual counts of *Synaphea nexosa* (P1)
- 62 individual counts of *Boronia anceps* (P3)
- 68 individual counts of *Calothamnus lateralis* var. *crassus* (P3)
- 10 individual counts of *Dampiera heteroptera* (P3)
- 28 individual counts of *Gastrolobium formosum* (P3)
- 514 individual counts of *Grevillea manglesioides* subsp. *ferricola* (P3)
- 6 individual counts of *Grevillea papillosa* (P3)
- 942 individual counts of *Loxocarya magna* (P3).

Table 5-1 Significant flora identified in the desktop review

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Leptomeria dielsiana	X (VU EPBC Act; EX BC Act)	1.6 km W	Shrub, to 0.5 m high, known only from type collection of J. Drummond 228, locality & description unknown. Presumed extinct.	✓	✓	✓	
Conospermum quadripetalum	T (CR BC Act)	Within	Shrubs, 0.20-0.30 m high. Sandy clay, sand. Flats behind coastal hills. Peppermint and Jarrah/ paperbark woodlands over mixed shrubs and sedgelands. Flowers September to November.	✓		✓	✓
Reedia spathacea	T (CR EPBC Act; EN BC Act)	3.0 km WNW	Robust, tufted caespitose sedge with a woody trunk that forms large leafy clumps to over 1 m. Peaty sand. Swamps, river edges. Flowers November to December or January.	✓	✓	✓	
Banksia nivea subsp. *uliginosa*	T (EN EPBC & BC Acts)	Within	Shrub, 0.5-1.5 m high; branchlets hairy. Sandy clay, gravel. Flowers in September.	✓	✓	✓	✓
Boronia exilis	T (EN EPBC & BC Acts)	Within	Shrub. Seasonally wet heath. Flowers in September.	✓	✓	✓	
Darwinia ferricola	T (EN EPBC & BC Acts)	Within	Large, much branched, semi-climbing or rounded shrub, to 1.5 m high. Shallow red or brown clays over winter-wet ironstone. Flowers late winter to early summer, peak in spring.	✓	✓	✓	✓
Lambertia orbifolia subsp. *vespera* (*L. orbifolia sens. lat.* under EPBC)	T (EN EPBC & BC Acts)	Within	Shrub or small tree 2–5 m high. Sand or sandy clay in association with ironstone, around seasonally wet areas. Flowers September to May, peaking from January to February.	✓	✓	✓	
Verticordia plumosa var. *vassensis*	T (EN EPBC & BC Acts)	Within	Shrub 0.3-1m high. White/grey sand in winter-wet flats. Pink flowers from September to December or January to February.	✓	✓	✓	✓
Drakaea micrantha	T (VU EPBC Act; EN BC Act)	6.4 km NNE	White-grey sand. Flowers appear in September and October.	✓	✓	✓	
Grevillea brachystylis subsp. *australis*	T (VU EPBC Act; EN BC Act)	Within	Shrub, 0.3-1 m high. Sand, sandy clay. Swampy situations, stream banks. Flowers in July, August–November.	✓	✓	✓	✓

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Andersonia ferricola	P1	425 m S	A straggling shrub to 50 cm high. Grows in dense low heath on winter-wet ironstone flats, in skeletal white sand over massive ironstone. Flowers in October.	✓		✓	
Darwinia terricola	P1	7.2 km ESE	Erect compact perennial dwarf shrub. Green flowers from September to December.	✓		✓	
Hemigenia obovata	P1	23 m WSW	Erect shrub, to 0.5 m high. White and black wet sand, black clay. Flats. Wetland sedges and spare shrubland. Blue-purple flowers from October to November.	✓		✓	
Pericalymma megaphyllum	P1	Within	Shrub to 0.35 m high. Woodlands of Jarrah-Marri and Sheoak, and shrublands. White sand over red-brown lateritic clay. Flowers in November.	✓		✓	
Philydrella pygmaea subsp. *minima*	P1	4.2 km SW	Bulbaceous, perennial, herb, 0.02-0.2 m high. Damp sites. Flowers August to November.	✓		✓	
Platychorda rivalis	P1	8.2 km NNE	Peat, laterite. Edges of swamps, valleys. Flowers in November.	✓		✓	
Schoenus indutus	P1	4.8 km W	Perennial, grass-like or herb (sedge), 0.6 m high. Gravelly sand. Flowers in October.	✓		✓	
Stylidium sp. Scott River Plain (N.G. Marchant 74/23)	P1	2.5 km SW	Scott River Crossing. Only record is from January 1974.	✓		✓	
Synaphea macrophylla	P1	1.4 km NE	Shrub. Gravelly loam. Flowers in October.	✓		✓	
Synaphea nexosa	P1	Within	Shrub. Clay-loam. Winter-wet flats. Flowers in October or November.	✓		✓	✓
Thysanotus formosus	P1	209 m E	Caespitose, perennial herb to 0.3 m. Clayey sand, sandy loam. Habitat often inundated in winter. Jarrah-Marri forest. Flowers November to December or January.	✓		✓	
Diuris heberlei	P2	715 m SSW	Tuberous, perennial herb. Clay. Winter-wet flats between sand dunes. Flowers December or January to February.	✓		✓	
Drosera binata	P2	8.3 km NNE	Herb. Black peat. Winter-wet swamps. Flowers spring to summer.	✓		✓	
Euphrasia scabra	P2	8.6 km NNE	Erect annual herb 8.5–50 cm high. Open damp grassy situations. Flowers October to February.	✓		✓	
Hemigenia sp. Nillup (R.D. Royce 98)	P2	2.4 km NW	Perennial shrub. Grey/brown clay-loam/sand. Inundated areas. Pale mauve or lilac flowers from November to January.	✓		✓	
Leptomeria furtiva	P2	6.8 km SW	Lax, sprawling shrub, 0.2-0.45 m high. Grey-black peaty sand over clay on winter-wet flat. Amongst various grasses, sedges, herbs and shrubs. Flowers August to October.	✓		✓	
Lepyrodia extensa	P2	48 m E	Grows around 0.3 m high. Sand & sandy peat. Seasonally inundated swamps. Jarrah forests and Balga shrublands over sedges. Flowers September to October, December or February.	✓		✓	

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Leucopogon incisus	P2	1.4 km E	Grows on a winter-damp sandy flats. Flowering peaks September to October.	✓		✓	
Machaerina ascendens	P2	2.4 km NW	Sprawling sedge up to 1.8m tall. Swamp-like areas, sandy clay, floodplains.	✓		✓	
Pigea volubilis	P2	4.8 km W	Twinning herb. Sandy clay/loam. Seasonally inundated areas. Flowers from September to December.	✓		✓	
Schoenus loliaceus	P2	3.5 km SSW	Annual, grass-like or herb (sedge), 0.03-0.06 m high. Sandy soils. Winter-wet depressions. Flowers August to November.	✓		✓	
Stenanthemum sublineare	P2	4.8 km SW	Erect shrub that typically grows to ~10 cm high and 4 cm wide. Flowers from October to December.	✓		✓	
Styphelia intricata	P2	40 m SSE	Erect shrub. Seasonally wet flat plains and wetlands in *Melaleuca* woodlands/shrublands over sedgelands/rushlands. Sandy clay or sand over ironstone. Flowers mainly April to June.	✓			
Xyris maxima	P2	5.9 km N	Robust, erect, tufted perennial, herb, 0.16-0.6 m high. Black peaty sand. Drainage flats. Flowers from November to December or January.	✓		✓	
Acacia inops	P3	5.5 km W	Scrambling shrub with weak filiform branches. Grows along watercourses and in swamps in black peaty sand, clay. Flowers September to November.	✓		✓	
Acacia lateriticola glabrous variant (B.R. Maslin 6765)	P3	4.8 km W	A variant with glabrous branchlets, pinnules and pods. Lateritic soils. Flowers August to October.	✓		✓	
Actinotus repens	P3	7.7 km N	Suffrutescent, prostrate perennial, to 5 cm high. Sandy clay and mud in valleys along creek lines amongst *Eucalyptus* or *Melaleuca* dominated woodland. Flowers January to March.	✓		✓	
Andersonia auriculata	P3	8.0 km NE	Erect or spreading shrub, 0.1-0.3(-0.5) m high. Grey or peaty sand, often over laterite. Swampy areas, granite outcrops. Flowers April to October.	✓		✓	
Andersonia sp. Amabile (N. Gibson & M. Lyons 355)	P3	1.8 km W	Small perennial, erect and compact shrub grows up to 7-30 cm tall. Flowers October to December. Winter-wet areas and swamps in *Melaleuca* woodlands/shrublands, mixed shrublands and shrublands over sedgelands.	✓		✓	
Blennospora doliiformis	P3	3.7 km SSW	Annual herb 5–15 cm high. Occurs on seasonally wet clay soils, grey or red clay over ironstone. Flowers October to November. Mature fruits and seeds in late December to January.	✓		✓	
Boronia anceps	P3	Within	Shrub. White sand, gravelly laterite. Seasonally swampy heaths. Flowers in September to January.	✓		✓	✓

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Caladenia abbreviata	P3	640 m SSE	Perennial, deciduous, herb with an underground tuber and single erect, hairy leaf 8–20 cm (3–8 in) long. Consolidated sand dunes and disturbed places. Flowers October to early December.	✓		✓	✓
Calothamnus lateralis var. *crassus*	P3	Within	Shrub 1 - 2 m tall, without lignotuber. Winter-wet flats, riverbanks, wet depressions, swamps. Clayey peaty sands, often amongst *Agonis flexuosa, Hakea* spp., Restionaceae spp. Flowers August to October or January or June.	✓		✓	✓
Caustis sp. Boyanup (G.S. McCutcheon 1706)	P3	5.2 km N	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.7-1 m high. Occurs on white or grey sand. Flowers October or January to February.	✓		✓	
Chordifex gracilior	P3	Within	Rhizomes spreading, hairy. Peaty sand, sand over clay. Swamps, winter-wet flats. Myrtaceae shrublands over sedgelands. Flowers September to December.	✓		✓	
Chordifex jacksonii	P3	Within	Rhizomes tufted, hairy 0.4-1 m high. Sand, loamy sand. Seasonally inundated swamps. *Melaleuca* over mixed shrubs, sedgelands. Flowers August, October, December to April.	✓		✓	
Chorizema carinatum	P3	Within	Erect, shrub, spindly shrub (broom-like). Sand, sandy clay. Flowers in October to December.	✓		✓	
Cyathochaeta stipoides	P3	148 m ENE	Tall tussock-forming perennial, grass-like or herb (sedge), (0.25-)0.35-1 m high. Grey or red-brown sand. Seasonally wet flats. Mixed shrublands, sedgelands. Flowers October to January.	✓		✓	
Cyathochaeta teretifolia	P3	1.8 km W	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Grey sand, sandy clay. Swamps, creek edges. Flowers from September to January.	✓		✓	
Dampiera heteroptera	P3	13 m S	Erect to semi-prostrate perennial, herb or shrub, 0.3-0.6 m high. Sandy soils. Swampy areas. Flowers September to October.	✓		✓	✓
Gastrolobium formosum	P3	Within	Small, trailing shrub, with red flowers, up to 1 m high. Clay-loam soils. Along riverbanks or in swamps. Flowers in November.	✓		✓	✓
Grevillea manglesioides subsp. *ferricola*	P3	Within	Erect or spreading shrub, 1.5 m high. Red sandy clay over ironstone. Winter-wet flats. Flowers in October.	✓		✓	✓
Grevillea papillosa	P3	Within	Spreading shrub to 0.3–1.2 m high. Branchlets more or less glabrous. Brown or peaty sand, sandy clay, loam. Seasonally wet areas, swamps. Flowers April, September to October.	✓		✓	✓

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Isopogon formosus subsp. dasylepis	P3	Within	Low, bushy or slender, upright, non-lignotuberous shrub, 0.2-2 m high. Sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas. Flowers June to December.	✓		✓	
Juncus meianthus	P3	9.0 km NNW	Tufted perennial, herb, 0.05-0.2 m high, to 0.4 m wide. Black sand, sandy clay. Creeks, seepage areas. Flowers November to January.	✓		✓	
Leptinella drummondii	P3	2.0 km WNW	Grows in red clay-loam on riverbanks in woodland. Flowers late November to December or January to February.	✓		✓	
Lepyrodia heleocharoides	P3	4.0 km WNW	Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps. Flowers in December.	✓		✓	
Leucopogon alternifolius	P3	15 m W	Sprawling shrub to 40 cm high, single stem at the base, young branchlets thin and glabrous. Grey/white sand. Swampy areas, seasonally wet areas. Flowers August to December.	✓		✓	
Leucopogon wheelerae	P3	Within	Restricted to heath or woodland edge on seasonally wet flats. Flowers from August to November.	✓		✓	
Loxocarya magna	P3	Within	Sand, loam, clay, ironstone. Seasonally inundated or damp habitats. Flowers in September or November.	✓		✓	✓
Netrostylis sp. Blackwood River (A.R. Annels 3043)	P3	10.0 km NNE	Sprawling sedge 30 cm–1.7 m high x 50 cm wide. Grows on drainage line/ creek beds. Flowers in November.	✓			
Pultenaea pinifolia	P3	5.1 km NNW	Erect shrub to 1–3 m high. Loam or clay. Floodplains, swampy areas. Flowers October to November.	✓		✓	
Stylidium trudgenii	P3	3.7 km SSW	Caespitose perennial, herb, 0.05-0.5 m high. Grey sand, dark grey to black sandy peat. Margins of winter-wet swamps, depressions. Flowers October to early November.	✓		✓	
Synaphea otiostigma	P3	2.6 km E	Shrub. Clayey laterite, gravelly loam, sand. Flowers in October or November.	✓		✓	
Synaphea petiolaris subsp. *simplex*	P3	378 m NNE	Shrub. Sandy soils. Flats, winter-wet areas. Flowers in September or October.	✓		✓	
Tricostularia davisii	P3	3.6 km SE	Tufted herb. Flowers brown.	✓		✓	
Acacia tayloriana	P4	3.0 km WNW	Prostrate shrub. Grey or yellow/orange sandy soils, lateritic gravel, clay-loam. Winter-wet areas. Flowers in January.	✓		✓	

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Adenanthos detmoldii	P4	Within	Shrubs, 1-4 m high. Grey or black peaty sand, wet. Swamps, roadsides. Flowers April to January.	✓		✓	✓
Adenanthos x *pamela*	P4	Within	Naturally occurring hybrid of *A. detmoldii* and *A. obovatus*. Erect, lignotuberous shrub, 0.75-1.7 m high. Grey sand, laterite. Damp flats, roadsides. Flowers May or October to December.	✓		✓	
Aotus carinata	P4	Within	Erect, slender shrub, 0.6-1.5 m high. Sandy soils. Seasonally wet flats. Flowers September to November.	✓		✓	
Astartea onycis	P4	724 m E	Shrub 0.2-1.2 m tall, spindly, often very slender, up to 1 m wide. Pale grey sand or sandy clay over clay in seasonally wet sedgelands and swamps in *Eucalyptus* and *Melaleuca* woodlands, shrublands and shrublands over sedgelands. Flowers November to March, esp. Dec. and Jan.	✓		✓	
Banksia meisneri subsp. *ascendens*	P4	Within	Shrub, 0.70-1.5 m high; branchlets hairy. Sand, sandy loam and sandy clay over laterite. Swampy flats. Jarrah low woodlands, mixed shrublands over sedgelands. Flowers April to September.	✓		✓	
Banksia sessilis var. *cordata*	P4	8.3 km ESE	Shrub, 1.5-3 m high; branchlets glabrous or hairy. White/grey sand. Coastal limestone. Flowers June to October.	✓		✓	✓
Calothamnus quadrifidus subsp. *teretifolius*	P4	4.6 km N	Erect shrub which sometimes grows to a height of 5 m. Grows in clay in winter-wet areas in shrubland. Flowers September to December and is followed by fruits.	✓		✓	
Drosera fimbriata	P4	Within	Single erect stem that grows to ~15 cm high. Mainly from heathland habitats in deep white sand. Also grows on moss pads atop granite outcrops. Flowers September to October.	✓		✓	
Gonocarpus pusillus	P4	4.8 km W	Prostrate annual, herb, 0.05-1.2 m high. Grey sandy clay. Winter-wet swamps. Flowers November to December.	✓		✓	
Gonocarpus simplex	P4	254 m WSW	Tufted perennial, herb, 0.2-0.6 m high. Peaty sand. Swamps, seasonally inundated areas. Green/red-brown flowers from November to December.	✓		✓	
Hypolaena robusta	P4	5.4 km WNW	Rhizomes spreading, glabrous, 0.5 m high. White sand. Sandplains. Flowers September or October.	✓		✓	
Melaleuca basicephala	P4	Within	Grows to ~0.9 m high with glabrous branches. Black, peaty sand and clay in winter-wet flats and swamps. Flowers November to February.	✓		✓	

Species	Status	Proximity to study area	Description and habitat	Database			LR[1]
				DBCA	PM[1]	NM[1]	
Myriophyllum trifidum	P4	51 m ENE	Prostrate, compact, perennial and aquatic, 0.5 x 30 cm. Swamp. *Astartea*, *Beaufortia*, *Taxandria*, *Melaleuca* shrublands. Flowers in December to January or March.	✓		✓	
Pultenaea skinneri	P4	6.2 km W	Slender shrub that typically grows to 1–2 m high. Sandy or clayey soils. Winter-wet depressions. Flowers July to September.	✓		✓	
Stylidium leeuwinense	P4	Within	Erect perennial, herb, 0.15-0.6 m high. Grey to black peaty sand. Winter-wet habitats and depressions. Shrubland, heath, sedgeland or low woodland. Flowers February to May.	✓		✓	✓
Tripterococcus sp. Brachylobus (A.S. George 14234)	P4	217 m ENE	Slender erect multi-stemmed herb to 0.6 m high. Moist sandy flat. Winter-wet flats, peaty sand over clay, disturbed habitats. Flowers October to November.	✓		✓	
Verticordia lehmannii	P4	Within	Slender shrub with few side-branches, grows to 30-75 cm high. Sandy clay. Winter-wet flats. Flowers December to April.	✓		✓	

[1] DBCA – DBCA Threatened and Priority Flora List; PM – Protected Matters Database; NM – NatureMap Database; LR – literature review.

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SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

0 3 6
Kilometers

1:181,600 (at A4) GDA 1994 MGA Zone 50

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Study area

Status

- CR (BC Act)
- CR/EN (EPBC Act; BC Act)
- EN (BC Act)
- EN (EPBC & BC Acts)
- P1 (DBCA list)
- P2 (DBCA list)
- P3 (DBCA list)
- P4 (DBCA list)
- VU/EN (EPBC Act; BC Act)
- VU/EX (EPBC Act; BC Act)

Figure 5-1

Desktop records of significant flora

PHOENIX ENVIRONMENTAL SCIENCES

5.1.3 Introduced flora

The desktop review identified 82 introduced species within the desktop database and literature review search extent, of which one is a WoNS (**Genista monspessulana*) and 2 are Declared Pests (**Rubus anglocandicans* and **Solanum linnaeanum*) (Appendix 4). The Biota (2009) also recorded the Declared Pest, **Solanum linnaeanum* during its survey.

5.1.4 Vegetation associations

Regional-scale pre-European vegetation mapping for WA (Beard *et al.* 2013; DPIRD 2018) identifies mapped 11 vegetation associations in the study area (Table 5-2; Figure 5-2). These 11 associations were compared between 4 extents: statewide, within the Warren bioregion (equivalent to a Warren subregional extent), within the Jarrah Forrest bioregion and within the Southern Jarrah Forest (JAF02) subregion. Status for each association in each of the extents is classified using the bioregional conservation status of ecological vegetation classes table (Table 2-1).

Of the 11 vegetation associations identified, 7 were classed as being of Least concern in all 4 extents (27; 975; 3; 14; 1; 1132; 1134) (Table 5-2).

Vegetation association 1137 is only found in the Warren bioregion. Less than 350 ha (32.09%) of this association currently remains and it encompasses 17.22% (670.13 ha) of the study area. It is classed Depleted within the statewide and Warren bioregion extents; however, 78.63% (272.48 ha) of the current extent can be found on DBCA lands.

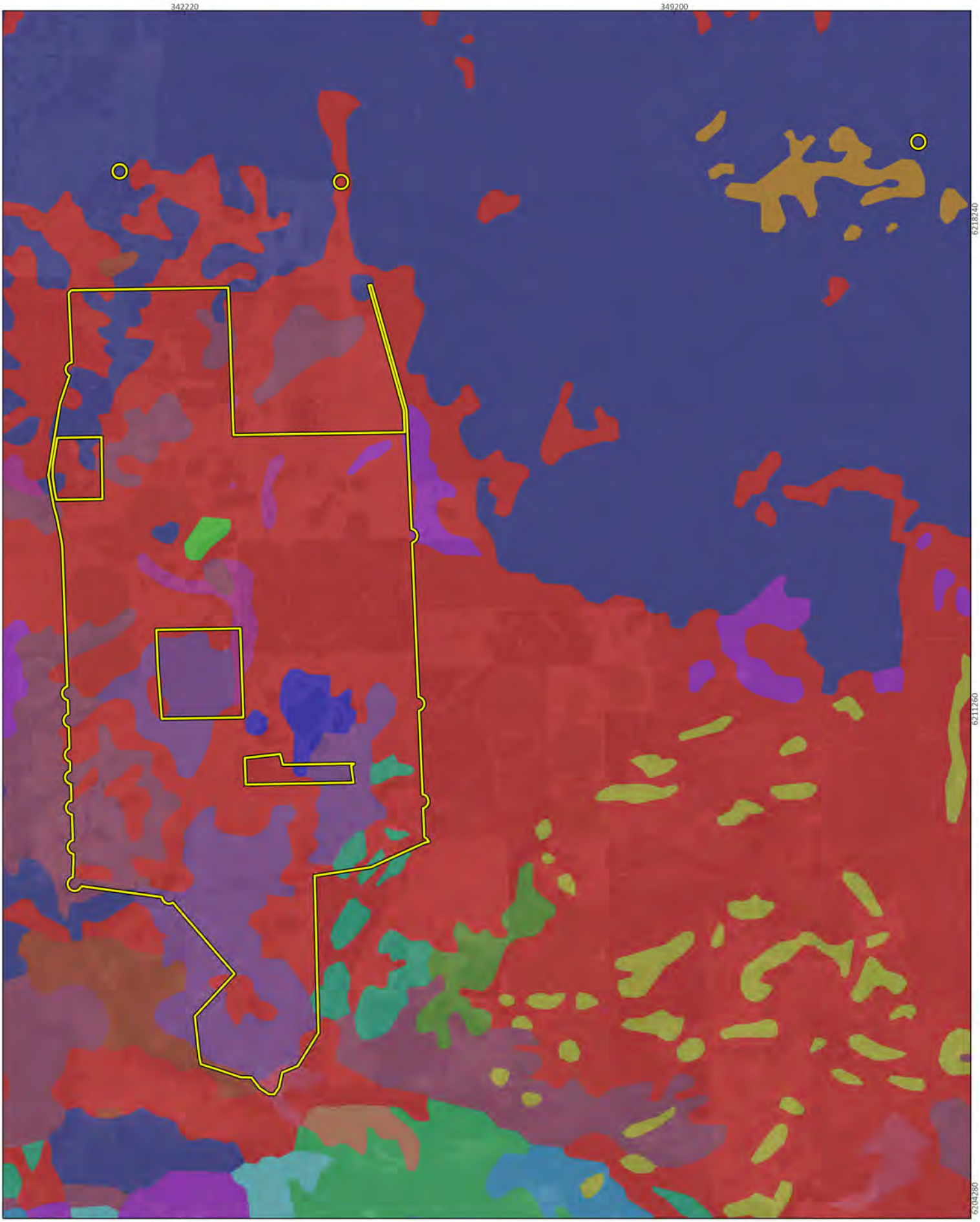
Vegetation association 51 is classed as Depleted within the Jarrah Forrest bioregional and subregional (JAF02) extents. Its current extent however, is more than 33,000 ha (55.95%) and over 68% (22,747.20 ha) is within DBCA lands. It is also of Least concern in all other extents.

Vegetation association 949 is classed as Depleted within the Jarrah Forrest bioregional and subregional (JAF02) extents but its current extent is more than 123,000 ha (56.42%), over 55% (68,765.91 ha) is within DBCA lands and encompasses less than 3% (87.95 ha) of the study area. It is of Least concern in all other extents.

Vegetation association 973 is classed as Depleted within the statewide and Warren bioregion extents. It only encompasses 0.64% (24.91 ha) of the study area and is of Least concern in all other extents.

Table 5-2 Extents of pre-European vegetation associations present in the study area (DPIRD 2018)

Vegetation association	pre-European extent (ha)	Current extent (ha)	Remaining statewide (%)	Remaining within Warren bioregion (%)	Remaining within Jarrah Forrest bioregion (%)	Remaining within JAF02 subregion (%)	Current extent in DBCA lands (%)	Current extent within the study area (ha)	Current extent within the study area (%)
27, Low woodland; paperbark (*Melaleuca* sp.)	130,385.33	92,501.98	70.95	74.44	73.65	73.65	83.50	2,408.49	61.89
1137, Shrublands; *Melaleuca incana, Hakea tuberculata, Viminaria juncea* scrub on ironstone, south coast	1,079.83	346.53	32.09	32.09	NA	NA	78.63	670.13	17.22
51, Sedgeland; reed swamps, occasionally with heath	59,085.59	33,057.98	55.95	90.63	36.01	35.81	68.81	370.87	9.53
3, Medium Forest; Jarrah-Marri	2,661,404.62	1,803,437.48	67.76	78.05	67.10	59.40	81.50	153.72	3.95
14, Low Forest; Jarrah	94,609.36	70,202.42	74.20	63.35	75.31	75.31	83.97	99.23	2.55
949, Low woodland; *Banksia*	218,193.94	123,104.02	56.42	58.12	36.32	46.81	55.86	87.95	2.26
975, Low woodland; Jarrah	17,275.64	15,563.36	90.09	78.13	88.90	88.90	93.17	43.20	1.11
973, Low Forest; paperbark (*Melaleuca rhaphiophylla*)	5,003.27	1,895.60	37.89	33.45	60.22	62.33	13.20	24.91	0.64
1134, Medium woodland; Jarrah (south coast)	37,488.91	30,358.47	80.98	86.95	77.25	77.25	89.33	17.12	0.44
1132, Medium Forest; Marri	307.42	259.5	84.41	69.77	99.42	99.42	74.52	9.00	0.23
1, Tall Forest; Karri (*Eucalyptus diversicolor*)	72,410.06	56,328.07	77.79	77.91	80.53	80.53	83.55	6.62	0.17





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

0 1 2
Kilometers

1:69,700 (at A4) GDA 1994 MGA Zone 50

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Study area

Vegetation association

- 990, Low forest: peppermint (Agonis flexuosa)
- 14, Low forest; jarrah
- 973, Low forest; paperbark (Melaleuca rhaphiophylla)
- 22, Low woodland; Agonis flexuosa
- 949, Low woodland; banksia
- 975, Low woodland; jarrah
- 23, Low woodland; jarrah-banksia
- 27, Low woodland; paperbark (Melaleuca sp.)
- 3, Medium forest; jarrah-marri
- 1132, Medium forest; marri
- 1002, Medium open woodland; jarrah
- 1134, Medium woodland; jarrah (south coast)
- 1000, Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree (Melaleuca spp.)
- 51, Sedgeland; reed swamps, occasionally with heath
- 1108, Shrublands, Acacia decipiens
- 1137, Shrublands; Melaueca incana, Hakea tuberculata, Viminaria juncea scrub on ironstone, south coast
- 1109, Shrublands; peppermint scrub, Agonis flexuosa
- 1, Tall forest; karri (Eucalyptus diverscolor)

Figure 5-2

Vegetation associations of the study area

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5.1.5 Significant vegetation

The DBCA Threatened and Priority Ecological Communities database search identified the presence of 4 TECs and 3 PECs within the desktop search extent (Table 5-3) (DBCA 2023e). The communities, inclusive of their buffers, are shown in Figure 5-3.

An additional TEC (*Empodisma* peatlands of southwestern Australia) has been included in the desktop review at the request of the client. The TEC/PEC database search was undertaken in June 2023 and this TEC was officially listed in September 2023. Consequently, Pheonix was not able to obtain spatial data on the exact locations and extent of this TEC. However, by comparing the distribution map in the listed conservation advice, it can be deduced that it falls within the 25 km desktop extent (Department of Climate Change 2023).

The Scott River Ironstone Association is the only Threatened or Priority community that intersects the study area (Figure 5-3). The DBCA boundaries of the Scott River Ironstone TEC within the study area are centred on a series of occurrences mapped by Tille and Lantzke (1990) and subsequently Gibson *et al.* (2000). Buffers for the occurrences in the study are either 500 m or 2000 m. Gibson *et al.* (2000) determined that the original extent of this TEC was 1,780 ha and in 2000 had declined to only 325 ha because of land clearing. Of the extant TEC in 2000, 82 ha was in nature reserves, and 2 ha in State Forest and National Park and several areas within Governor Broome Road and to a lesser extent Dennis Road and Scott River Road reserves.

Numerous threatening processes have been identified for the Scott River Ironstone Association TEC vegetation Luu and English (2004) including weeds, dieback, burning, grazing (domestic stock and kangaroos), construction of drainage channels, road works, and mowing of road verges. Dieback has been recorded within some occurrences of the TEC and impacts most markedly members of the Proteaceae and Ericaceae families (Luu and English 2004).

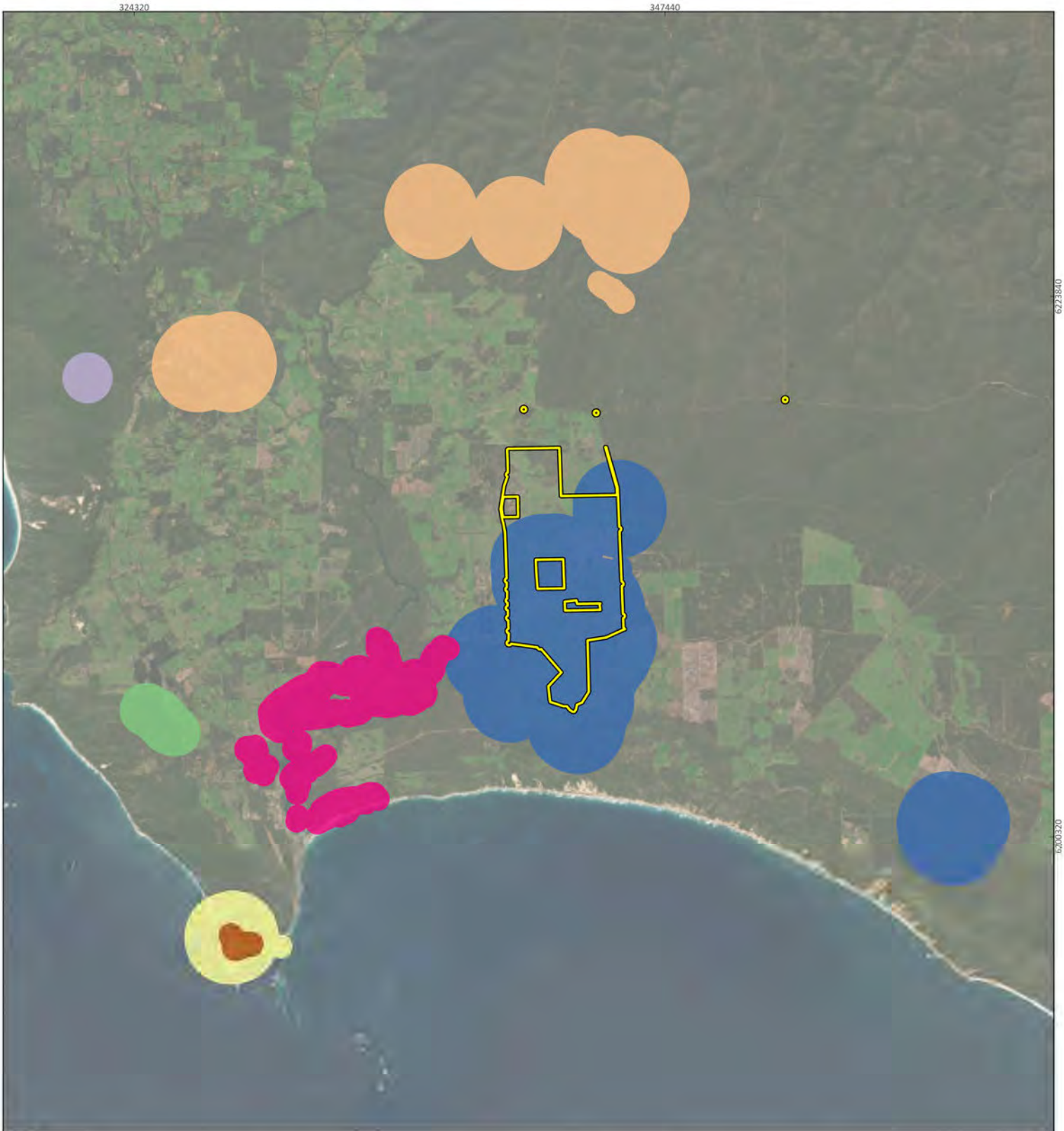
The Aquatic Root Mat Community Number 1 of Caves of the Leeuwin-Naturaliste Ridge (Easter and Jewel Caves), Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines (Augusta microbialites) and Aquatic Root Mat Community Number 4 of Caves of the Leeuwin-Naturaliste Ridge (Calgardup Cave) TEC are all characterised by their fauna composition, not their flora species. While the flora species present can be indicators of the TEC, they are not the defining characteristics for each of these TEC.

Table 5-3 TECs and PECs identified in the desktop review

Community name	Status	Proximity to study area	Description
Scott River Ironstone Association	T (EN EPBC Act; CR BC Act)	Within	The community occurs in a winter-wet habitat on red clay to clay-loam often over massive ironstone on the Scott Coastal Plain. It mainly comprises heaths, shrublands and thickets and is variously dominated by *Melaleuca preissiana* (moonah), *Hakea tuberculata*, *Kunzea micrantha* or *Melaleuca incana* subsp. Gingilup (Priority 2), depending on the degree of waterlogging. The understorey is generally dominated by *Loxocarya magna* (Priority 3). Most occurrences have very diverse annual flora of *Stylidium* spp. (trigger plants), *Centrolepis* spp., *Schoenus* spp., *Aphelia* spp. and other herbs. The community also contains a number of endemic and restricted taxa such as *Darwinia ferricola* (Endangered), *Grevillea manglesioides* subsp. *ferricola* (Priority 3), *Lambertia orbifolia* subsp. Scott River Plains (Endangered) and *Melaleuca incana* subsp. Gingilup (Priority 2) (DBCA 2023a). To be considered part of the community, the vegetation must meet the condition of Good or above.
Empodisma peatlands of southwestern Australia	T (EN EPBC Act)	<25 km	The *Empodisma* peatlands of southwestern Australia is the assemblage of native plants, animals and other organisms that comprise a type of seasonally waterlogged freshwater, peat-based wetland. The ecological community predominantly occurs in the Warren Bioregion and the Southern Jarrah Forest subregion of the Jarrah Forest Bioregion. Some occurrences may also occur in high rainfall areas of the Fitzgerald, Northern Jarrah Forest and Perth subregions where climatic, stratigraphic and topographic conditions are suitable for *Empodisma* peatlands to form. The structure of the ecological community is typically a sedgeland to shrubland vegetation complex on peaty substrates. The undisturbed ground layer of the ecological community is often dense and typically comprises a suite of native wetland graminoid and forb species. The ground layer is almost always characterised by the perennial restiad grass-like twig rush *Empodisma gracillimum* (tanglefoot). Co-dominant or otherwise often occurring Cyperaceae and Restionaceae species include: *Gahnia decomposita*, *Gymnoschoenus anceps*, *Lepidosperma striatum*, *Leptocarpus tenax* (slender twine rush), *Machaerina rubiginosa* (soft twig rush), *Schoenus multiglumis*, *Sporadanthus rivularis* and *Reedia spathacea* (reedia). Small trees/woody shrubs within the *Empodisma* peatlands vary from dense to sparse and may include *Acacia hastulata*, *Acidonia macrocarpa*, *Aotus intermedia*, *Boronia stricta*, *Callistemon glaucus* (Albany bottlebrush), *Cosmelia rubra* (spindle heath), *Dampiera leptoclada* (slender-shooted dampiera), *Homalospermum firmum, Sphaerolobium fornicatum*, *Taxandria fragrans*, *T. linearifolia* and *Tetratheca filiformis*. Trees vary from sparse to absent within the ecological community but may include *Eucalyptus megacarpa* (blue gum of Western Australia, Bullich), *Melaleuca preissiana* (moonah, modong) and *Taxandria juniperina* (watti, native cedar) as emergents or on the edge of the ecological community. The ecological community includes a diverse range of fauna species (Department of Climate Change 2023).

Community name	Status	Proximity to study area	Description
Subtropical and Temperate Coastal Saltmarsh (synonymous with the Subtropical and Temperate Coastal Saltmarsh EPBC-listed TEC)	P3 (DBCA list)	2.1 km	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of subtropical and temperate Australia (south of 23oS latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, *Melaleuca*, *Casuarina* or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community (DCCEEW 2024).
Reedia spathacea - *Empodisma gracillimum* - *Sporadanthus rivularis* dominated floodplains and paluslopes of the Blackwood Plateau.	P1 (DBCA list)	4.3 km	Diverse closed sedges and rushes to 1.5 m in height of *Reedia spathacea*/*Empodisma gracillimum*/*Sporadanthus rivularis* with open low shrubs to open scrub of *Taxandria linearifolia*. Threats: altered fire regimes, weed invasion, clearing (DBCA 2023c).
Aquatic Root Mat Community Number 1 of Caves of the Leeuwin-Naturaliste Ridge (Easter and Jewel Caves)	T (EN EPBC Act; CR BC Act)	13.9 km	The community occurs in the cave system of the Leeuwin-Naturaliste Ridge incorporating Easter and Jewel Caves. It comprises a complete food web. Rootlets and their associated microflora provide the primary food source, and root mat grazers, predators, parasites, detritivores, and scavengers complete the interactions. The root mats are produced by Eucalyptus diversicolor (Karri). Aquatic cavernicoles (cave animals) in the community include crustaceans (Amphipoda, Copepoda, Ostracoda) and worms (Oligochaeta). The ostracod *Acandona admiratio* Karanovic 2003 is specific to Jewel and Easter Caves. The community was originally described in Jasinska E.J. (1997) Faunae of aquatic root mats in caves of southwestern Australia: origins and ecology (unpublished doctoral thesis, The University of Western Australia) (DBCA 2023a).

Community name	Status	Proximity to study area	Description
Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines (Augusta microbialites)	T (EN BC Act)	14.9 km	The community occurs along the South West coast near Augusta and comprises microbialites, which are structures produced through the growth and metabolic activity of benthic microbial communities. The tufa that comprises the community are microbialite structures that have a less defined internal framework that are precipitated from freshwater springs and seeps, formed through the growth and metabolic activity of a diverse variety of microbial organisms, including cyanobacteria, diatoms, and other algal components. They form chemical sedimentary rock composed of calcium carbonate. This tufa have many forms including drapes, curtains, small cylindrical stalactites and larger campanulate (bell-shaped) masses on the sea cliffs, as well as fans or terraces consisting of a series of rimstone pools and nodular masses in small brackish pools (DBCA 2023d).
Tall closed sedgeland on shallow soils derived from granite gneiss on the Leeuwin-Naturaliste Ridge ('Sedgelands of the Cape Leeuwin Spring')	P1 (DBCA list)	15.9 km	Tall closed sedgeland of *Juncus kraussii*, *Baumea juncea*, and *Schoenoplectus validus*; tall closed sedgeland of *Typha orientalis*, over *S. validus*, *Lepidosperma gladiatum* and *Muehlenbeckia adpressa*; low closed sedgeland of *Ficinia nodosa* and *Baumea juncea* on shallow soils derived from granite gneiss on the Leeuwin-Naturaliste Ridge (DBCA 2023c).
Aquatic Root Mat Community Number 4 of Caves of the Leeuwin-Naturaliste Ridge (Calgardup Cave)	T (EN EPBC Act; CR BC Act)	17.4 km	The community occurs in the cave system of the Leeuwin-Naturaliste Ridge incorporating Calgardup Cave. It comprises a complete food web. Rootlets and their associated microflora provide the primary food source, and root mat grazers, predators, parasites, detritivores, and scavengers complete the interactions. The root mats are produced by *Corymbia calophylla* (Marri). Aquatic cavernicoles (cave animals) in the community include *Cherax preissii* (koonac), other crustaceans (*Perthia acutitelson*, Paracyclops, Harpacticoida), meiobenthic mites (*Soldanellonyx monardi* and Oribatida), non-biting midges (*Chironomus* aff. *alternans* Walker, *Polypedilum* sp.), rotifers (Rotifera) and microscopic worms (*Stenostomum* sp.). The community was originally described in Jasinska E.J. (1997) Faunae of aquatic root mats in caves of southwestern Australia: origins and ecology (unpublished doctoral thesis, The University of Western Australia) (DBCA 2023a).





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

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Kilometers

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Study area

PECs

Reedia spathacea - Empodisma gracillimum - Sporadanthus rivularis dominated floodplains and paluslopes of the Blackwood Plateau, Priority 1

Subtropical and Temperate Coastal Saltmarsh, Priority 3

Tall closed sedgeland on shallow soils derived from granite gneiss on the Leeuwin Naturaliste Ridge ('Sedgelands of the Cape Leeuwin Spring'), Priority 1

Figure 5-3

Location of Threatened and Priority Ecological Communities in relation to study area

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5.1.6 Groundwater dependent ecosystems

The literature review on GDEs and analysis against field survey results identified several groundwater dependent communities or plant taxa that occur or may occur in the study area (Table 5-4).

The conservation advice for the Scott River Ironstone TEC (SEWPaC 2013) states that this community is dependent on groundwater for its persistence and subsequently the TEC is considered an obligate GDE.

The interpretation of obligate versus facultative groundwater dependence for the taxa in Table 5-4 was based on available scientific literature for the species. None of the studies referenced were from the locality of the study area, therefore assignation of obligate or facultative here should be treated with caution as dependency at the referenced study sites may not reflect dependency of these species within the study area.

Table 5-4 Groundwater dependent communities or taxa identified in literature review

Community or taxon	Description/comments
Scott River Ironstone TEC	Assume obligate GDE based on conservation advice and recovery plan (Luu and English 2004; SEWPaC 2013). Confirmed to be groundwater dependent. The community occurs in a winter-wet habitat on red clay to clay-loam often over massive ironstone on the Scott Coastal Plain. A defining characteristic of the ecological community is seasonal inundation or wet/damp soils from winter rainfall and groundwater (SEWPaC 2013). The major groundwater aquifer of the Scott Coastal Plain is the South West Yarragadee Formation which is recharged through rainfall infiltration on outcrop areas and through leakage from overlying aquifers (SEWPaC 2013). Superficial formations also form an unconfined aquifer about 10 m thick over the SW Yarragadee Formation (Baddock 1995, in Luu and English 2004). The hydrology of the Scott Ironstone, and therefore the persistence of the TEC is thought to depend mainly on the superficial aquifer (Luu and English 2004). Critical habitat identified for the Scott River Ironstone community includes the groundwater and groundwater catchment that maintains the hydrology of the remaining vegetation on the Scott River Ironstone (Luu and English 2004). Change in the groundwater hydrological regime is identified as a threat to the community.
Banksia species	*Banksia littoralis* has been defined as an obligate phreatophyte commonly inhabiting low-lying winter-wet areas that has been shown to decline in vigour and distribution in response to declining groundwater levels on the Gnangara Mound (Froend and Drake 2006; Groom et. al. 2001). *B. ilicifolia* has also been classified as an obligate phreatophyte with a range restricted to environments of higher water availability and shallower depth to groundwater (Froend and Drake 2006). It has continuous dependence on groundwater for its water needs (Canham *et al.* 2009; Froend and Drake 2006). *B. attenuata* has facultative groundwater dependence. It occupies a range of topographical positions in the landscape and has been shown to switch between groundwater and soil moisture use depending on groundwater level (Groom 2004; Zencich *et al.* 2002). This suggests a seasonal dependence on groundwater, using it during winter when rainfall recharges the aquifer, and then relying on soil moisture at other times of the year (Nevill *et al.* 2010).
Melaleuca species	Many *Melaleuca* species are considered to be facultative phreatophytes, including *M. preissiana*, *M. rhaphiophylla (Groom et. al. 2001; Hatton & Evans 1998).*
Eucalyptus rudis	Facultative phreatophyte (Froend & Sommer 2010; Hatton & Evans 1998; Water 2008) that mainly occurs in swamps, lake edges and along watercourses.

5.2 FIELD SURVEY

5.2.1 Flora assemblage

A total of 423 flora taxa representing 65 families, and 209 genera identified to species level (excludes unidentified flora) were recorded in the study area during the field surveys (Appendix 5). Species richness ranged from 3 to 73 species amongst quadrats (Appendix 2). The assemblage included 353 native taxa and 70 introduced taxa, including 340 perennial taxa, 74 annual or short-lived taxa, and 9 taxa that exhibit both annual and perennial lifecycles. The most prominent families recorded were Fabaceae (51 spp.), Proteaceae (39 spp.), Poaceae (31 spp.), Myrtaceae (30 spp.) Restionaceae (27 spp.) and Cyperaceae (26 spp.).

5.2.2 Assessment of survey completeness

In accordance with the Technical Guidance EPA (2016b), a species accumulation curve by site was constructed to assess that the number of sites surveyed were sufficient to adequately capture flora present within the Phoenix survey area at the time of the survey.

The species accumulation curve (Figure 5-4) compares the total species recorded against the total number of quadrat and relevé sites. The sites are ordered by date performed, which enables a true representation of curve development over time during the survey. The additional 16 species collected opportunistically outside of sites are accounted for as the first data point in the accumulation curve and are why the species accumulation curve begins at 16.

The increase to the curve at approximately site 60 demonstrates that the third phase captured many additional species. This is likely due to additional quadrats targeting so far uncaptured vegetation types. The near flattening (no new species for last 6 sites) of the species accumulation curve indicates that sufficient sites (quadrat and relevé) were surveyed to capture the diversity of flora present at the time of the Phoenix surveys. The blue trendline beneath the accumulation curve is a product of fewer species than expected being detected during the mid stage of the survey program.

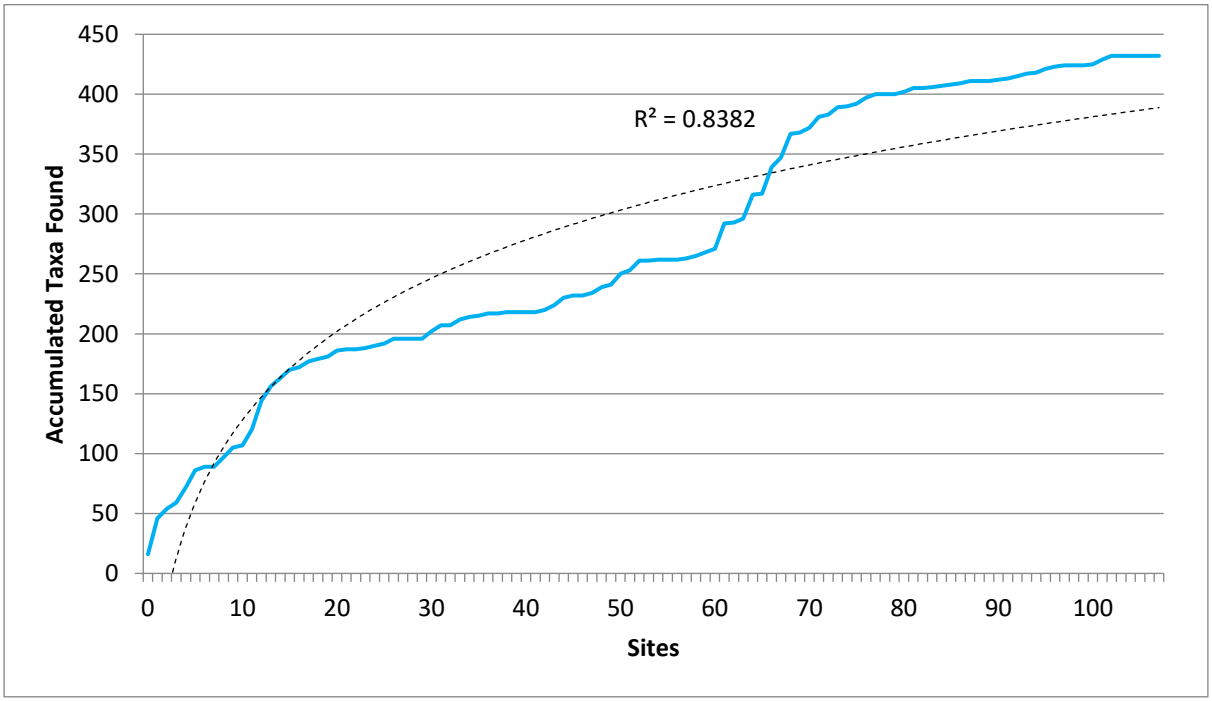


Figure 5-4 **Species accumulation curve for flora and vegetation sites (blue), and trend line (black)**

5.2.3 Significant flora

Three Threatened flora and 16 Priority flora were recorded during the field survey (Table 5-5; Figure 5-5). The Priority flora included:

- one Priority 1 species
- 11 Priority 3 species
- 4 Priority 4 species.

A significant range extension (RE) was recorded for one species, which is therefore considered locally significant (Table 5-5; Figure 5-5):

- *Centrolepis strigosa* subsp. *strigosa* was recorded approximately 215 km west-north-west of the nearest known record (WA Herbarium 1998).

Total number of plants recorded, and populations (see Section 4.2.2.2 for definition) of significant flora recorded are shown in Table 5-5. Populations were categorised into:

- new population – no confirmed desktop records associated with this population
- confirmed desktop population – populations were confirmed by visiting desktop records and potentially expanding the known plant counts and population boundaries with additional Phoenix records. Not necessarily all individual desktop records within the population were confirmed, but are considered likely to occur
- unconfirmed desktop population – no confirmed or Phoenix records associated with this population; only includes unconfirmed desktop records, excluding any desktop records that were discounted as extant, i.e. found to be no longer present, old record in a now cleared location, or desktop record considered inaccurate.

Locations of the unconfirmed significant flora within the study area are shown in Appendix 6 and unconfirmed population within the study area in Appendix 7. Desktop records were discounted as extant when the species could not be relocated at or near the point location of the record. Location data may not be accurate for old desktop records and some points may represent a general location of a dispersed population. While the immediate vicinity of the desktop record was searched, the potential for presence of a dispersed population beyond the search extent, in remnant vegetation, cannot be discounted.

Some records/populations were recorded outside the study area and have been noted in Table 5-5. All are within 400 m of the study area boundaries.

The likelihood of occurrence assessment (Section 4.2.2.2) for the remaining significant species identified in the desktop review (Section 5.1.1) determined that 48 species may possibly occur and 17 are unlikely to occur (Table 5-6).

Table 5-5 Distribution and habitats of significant flora recorded during the field survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Lambertia orbifolia subsp. *vespera* (*L. orbifolia sens. lat.* under EPBC Act)	T (EN EPBC & BC Acts)	Known only from the Scott River plain, east of Augusta and mostly in the Warren bioregion, where it is restricted to the 'Scott River Ironstone Association' TEC (Luu & English 2004). There are 24 records in Florabase indicate there are more than between 5,600-13,100 individuals however distribution seems highly restricted. Grows in sand or sandy clay in association with ironstone, around seasonally wet areas. Associated vegetation is open woodland of *Eucalyptus marginata, Corymbia calophylla* or *Agonis flexuosa* over closed shrubland, or shrubland over dense heath. It can form thickets in association with *Banksia littoralis, B. ilicifolia, B. grandis* and *Hakea prostrata* (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 confirmed desktop population. A total of 4 individual plants were recorded during the survey. Recorded growing on grey soil, on a sandy rise. Vegetation (Veg) types of confirmed records: XpAs.	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Verticordia plumosa var. *vassensis*	T (EN EPBC & BC Acts)	Occurs in the Swan Coastal Plain and Warren bioregions. There are 61 records of this species in Florabase. Population size for records in Florabase suggest at least 1,004 plants, however there are likely more as most records did not specify the frequency of plants. Habitat descriptions include brown, grey sandy loamy soils, on plains, winter-wet depressions and road verges. Usually growing amongst *Melaleuca* spp., *Viminaria* spp. and other *Verticordia* spp. (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 confirmed desktop population. A total of 71 individual plants were recorded during the survey. Recorded growing on brown soils on flat areas next to road verges. Veg types of confirmed records: XpMdLm. Veg types/ non-vegetated units of unconfirmed records (within confirmed populations): XpMdLm & cleared areas[3].	 Current survey
Grevillea brachystylis subsp. *australis*	T (VU EPBC Act; EN BC Act)	Occurs in the Jarrah Forest and Warren bioregions. There are 17 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 60 plants, however there are likely more as most records did not specify the frequency of plants. Habitat descriptions include wet depressions and swamps in grey clayey sand. Usually found growing amongst *Corymbia calophylla, Agonis flexuosa* and *Agonis parviceps* (WA Herbarium 1998).	Three recorded populations in the study area, comprising of: • 1 new population • 2 confirmed desktop populations. A total of 6 individual plants were recorded during the survey. Recorded growing on grey, brown soils, on flat areas next to road verges. Veg types/ non-vegetated units of confirmed records: EmmXpMtDb & cleared areas. Veg types/ non-vegetated units of unconfirmed records (within confirmed populations): Aff, EmmXpMtDb & cleared areas[3].	 Current survey

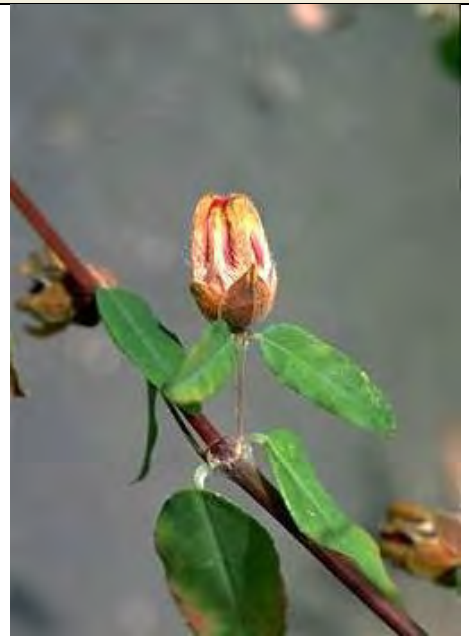
Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Synaphea nexosa	P1 (DBCA)	Occurs in the Warren bioregion. There are 8 records of this species in Florabase. Population sizes for records in the Florabase suggests at least 31 plants, however there are likely more as some of the records did not specify the frequency of plants. Habitat descriptions include depressions in road verges and other wet disturbed areas on brown clayey sand. Often growing amongst weeds and occasionally with *Eucalyptus marginata* and *Corymbia calophylla* (WA Herbarium 1998).	Three recorded populations in the study area, comprising of: • 1 new population • 2 confirmed desktop populations. One additional new population outside the study area. One additional unconfirmed population in the study area. A total of 36 (2 outside the study area) individual plants were recorded during the survey. Recorded growing on orange, brown, grey soils, on winter-wet depressions and flat areas next to road verges. Veg types of confirmed records: EmmXpMtDb. Veg types/ non-vegetated units of unconfirmed records (within confirmed & unconfirmed populations): EmmXpMtDb, XpMdLm & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Boronia anceps	P3 (DBCA)	Occurs in the Warren bioregion. There are 17 records of this species in Florabase generally classified as locally frequent. Habitat is described as white sand, gravelly laterite in seasonally swampy heaths. The vegetation descriptions for individual specimens included *Agonis flexuosa, Nuytsia floribunda, Eucalyptus marginata* and *Corymbia calophylla* with *Adenanthos detmoldii* (WA Herbarium 1998).	Five recorded populations in the study area, comprising of: • 4 new populations • 1 confirmed desktop population. One additional unconfirmed population in study area. A total of 160 individual plants were recorded during the survey. Recorded growing on black, grey, brown soils, on winter-wet depressions and flat areas next to road verges. Veg types of confirmed records: AmBsHc, ClcVj, EmmTpAs & EmmXpMtDb. Veg types/ non-vegetated units of unconfirmed records (within confirmed & unconfirmed populations): EmmXpMtDb & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Calothamnus lateralis var. *crassus*	P3 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 17 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 1,017 plants, however there are likely more as most records did not specify the frequency of plants. Habitat descriptions generally include winter-wet flat, swamps or depressions often amongst *Agonis flexuosa, Hakea* spp., Restionaceae spp. (WA Herbarium 1998).	Fourteen recorded populations in the study area, comprising of: • 12 new populations • 2 confirmed desktop populations. One additional unconfirmed population in study area. A total of 2,334 (2,009 outside the study area) individual plants were recorded during the survey. Recorded growing on black, brown, grey sandy loam soils, on seasonally wet areas, winter-wet depressions and drainage lines. Veg types/ non-vegetated units of confirmed records: AsLs, CcTlXpAp, ClcVj, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb, MrCh, PeeLs, TiLs, XpAs & cleared areas[3]. Veg types of unconfirmed records (within confirmed & unconfirmed populations): EmmTpAs, EmmXpMtDb & XpMdLm.	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Chorizema carinatum	P3 (DBCA)	Occurs in the Fitzgerald, Katanning, Perth and Southern Jarrah Forest subregions. There are 30 records of this species in Florabase. Most records do not cite how many plants, some 'occasional' with up to 30 individuals. This indicates there are less than a few hundred individuals known The closest record to the study area describes the habitat as upland depression (slight wet) in grey sandy loam. The associated vegetation comprised *Agonis parviceps, Podocarpus drouynianus* and *Melaleuca thyoides* forest. Some of the eastern records cite Jarrah Forest as habitat (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 new population. One additional new population recorded outside study area. No desktop records of *Chorizema carinatum* were within the study area. A total of 469 (including 240 outside the study area) individual plants were recorded during the survey. Recorded growing on brown, grey soils on seasonally wet areas and flat areas next to road verges. Veg types/ non-vegetated units of confirmed records: EmmTpGoMtPu & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Dampiera heteroptera	P3 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 18 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 67 plants, however there are likely more as some of the records did not specify the frequency of plants, and others were described as locally frequent or occasional. Habitat descriptions generally describe swampy plains and seasonally wet floodplains on grey-black- brown sandy peaty clayey sand. Often growing amongst *Eucalyptus marginata, Corymbia calophylla* and *Taxandria* spp. (WA Herbarium 1998).	Four recorded populations in the study area, comprising of: • 4 new populations. No desktop records of *Dampiera heteroptera* were within the study area. A total of 10 individual plants were recorded during the survey. However, a record that only accounts for 1 plant had a cover of 1%, suggesting multiple individuals. Recorded growing on black, grey, brown soils on winter-wet depressions, sandy rises, drainage lines. Veg types of confirmed records: CcTlXpAp, CcTpCeOh, ClcVj, EmmXpMtDb & XpAs.	 (WA Herbarium 1995)

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Gastrolobium formosum	P3 (DBCA)	Occurs in the Southern Jarrah Forest and Warren subregions. There are 39 records of which at least 400 individuals are estimated but for most records there are no details of frequency. The habitat is described as riverbanks or in swamps in clay-loam (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 confirmed desktop population. One additional unconfirmed population in study area. A total of 30 individual plants were recorded during the survey. However, a record that only accounts for 1 plant had a cover of 15%, suggesting multiple individuals. Recorded growing on brown, grey soils on a flat area next to road verge. Veg types of confirmed records: EmmXpMtDb. Veg types of unconfirmed records (within confirmed & unconfirmed populations): AmBsHc & EmmXpMtDb.	 (Crisp 1988)

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA)	Occurs in the Jarrah Forest, Swan Coastal Plain and Warren bioregions. There are 20 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 161 plants, however there are likely more as some records did not specify the frequency of plants, and other records that did, said abundant or common. Habitat descriptions generally describe swampy plains and winter-wet flats on red-brown clay-loam over ironstone. Often growing in heathlands or shrublands amongst *Viminaria juncea* and *Melaleuca* spp. (WA Herbarium 1998).	Six recorded populations in the study area, comprising of: • 5 new populations • 1 confirmed desktop population. One additional unconfirmed population in study area. A total of 285 (including 1 outside the study area) individual plants were recorded during the survey. Recorded growing on brown, black, grey soils on flat areas next to road verges, winter-wet depressions & drainage lines. Veg types/ non-vegetated units of confirmed records: AmBsHc, ClcVj, EmmTpAs, XpMdLm & cleared areas. Veg types/ non-vegetated units of unconfirmed records (within confirmed & unconfirmed populations): EmmXpMtDb, XpMdLm & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Grevillea papillosa	P3 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 31 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 1,129 plants, however likely more as some records did not specify the frequency of plants, and other records that did said frequent or locally common. Habitat descriptions generally include swamps and winter-wet flat on white-grey sandy soils. Often growing amongst *Adenanthos detmoldii, Melaleuca* spp. and *Nuytsia floribunda* (WA Herbarium 1998).	Twelve recorded populations in the study area, comprising of: • 11 new populations • 1 confirmed desktop population. Two additional unconfirmed populations in study area. A total of 396 individual plants were recorded during the survey. Recorded growing on brown, grey soils on flat areas next to road verges, drainage lines & winter-wet depressions. Veg types/ non-vegetated units of confirmed records: AsLs, EmmTpAs, EmmXpMtDb & cleared areas. Veg types/ non-vegetated units of unconfirmed records (within confirmed & unconfirmed populations): Aff, AsLs, CcTpCeOh, EmmXpMtDb & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Isopogon formosus subsp. *dasylepis*	P3 (DBCA)	Occurs in the Jarrah Forest, Swan Coastal Plain and Warren bioregions. There are 47 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 152 plants, however likely more as some records did not specify the frequency of plants, and other records that did said abundant or very common. Habitat descriptions include edges of wetland and winter-wet flats on brown clayey sand. Often growing amongst *Eucalyptus marginata, Eucalyptus calophylla* and *Pericalymma elliptica* (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 new population. No desktop records of *Isopogon formosus* subsp. *dasylepis* were within the study area. A total of 14 individual plants were recorded during the survey. Recorded growing on a flat area next to a road verge. Veg types of confirmed records: EmmTpAs.	 Current survey
Leucopogon alternifolius	P3 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 17 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 1,269 plants, however likely more as some records did not specify the frequency of plants, and other records that did said frequent or locally common. Habitat descriptions generally include swamps and wetlands on grey-black peaty sand. Almost always growing amongst *Homalospermum firmum* and *Beaufortia sparsa* (WA Herbarium 1998).	Two recorded populations in the study area, comprising of: • 2 new populations. No desktop records of *Leucopogon alternifolius* were within the study area. A total of 2 individual plants were recorded during the survey; however cover was recorded at 1% & 2%, suggesting multiple individuals at both populations. Recorded growing on brown, grey soils on winter-wet depressions. Veg types of confirmed records: XpAs.	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Loxocarya magna	P3 (DBCA)	Occurs in the Fitzgerald, Northern Jarrah Forest, Perth, Southern Jarrah Forest, Warren subregions. Of 46 records in Florabase (some are duplicates) there are at least 800 individuals with descriptions of 'occasional' to more than 250. Habitat is described as sand, loam, clay, ironstone in seasonally inundated or damp habitats (WA Herbarium 1998).	Five recorded populations in the study area, comprising of: • 4 new populations • 1 confirmed desktop population. A total of 189 individual plants were recorded during the survey. Recorded growing on brown, grey, orange soils on flat areas next to road verges. Veg types/ non-vegetated units of confirmed records: EmmTpAs, XpMdLm & cleared areas. Veg types/ non-vegetated units of unconfirmed records (within the confirmed population): AmBsHc, EmmXpMtDb, MrCh, XpMdLm & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Netrostylis sp. Blackwood River (A.R. Annels 3043)	P3 (DBCA)	Occurs in the Fitzgerald, Northern Jarrah Forest, Perth, Southern Jarrah Forest, Warren subregions. Of 17 records most describe the frequency as rare and 3 as isolated plants or common. Habitat described as creekbeds, swampy areas and flats (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 new population. No desktop records of *Netrostylis* sp. Blackwood River (A.R. Annels 3043) were within the study area. A single individual plant was recorded during the survey; however, cover was recorded at 5%, suggesting multiple individuals in the population. Recorded growing on brown soil on a seasonally wet area on a road verge. Veg type of confirmed record: EmmTpGoMtPu.	 Current survey

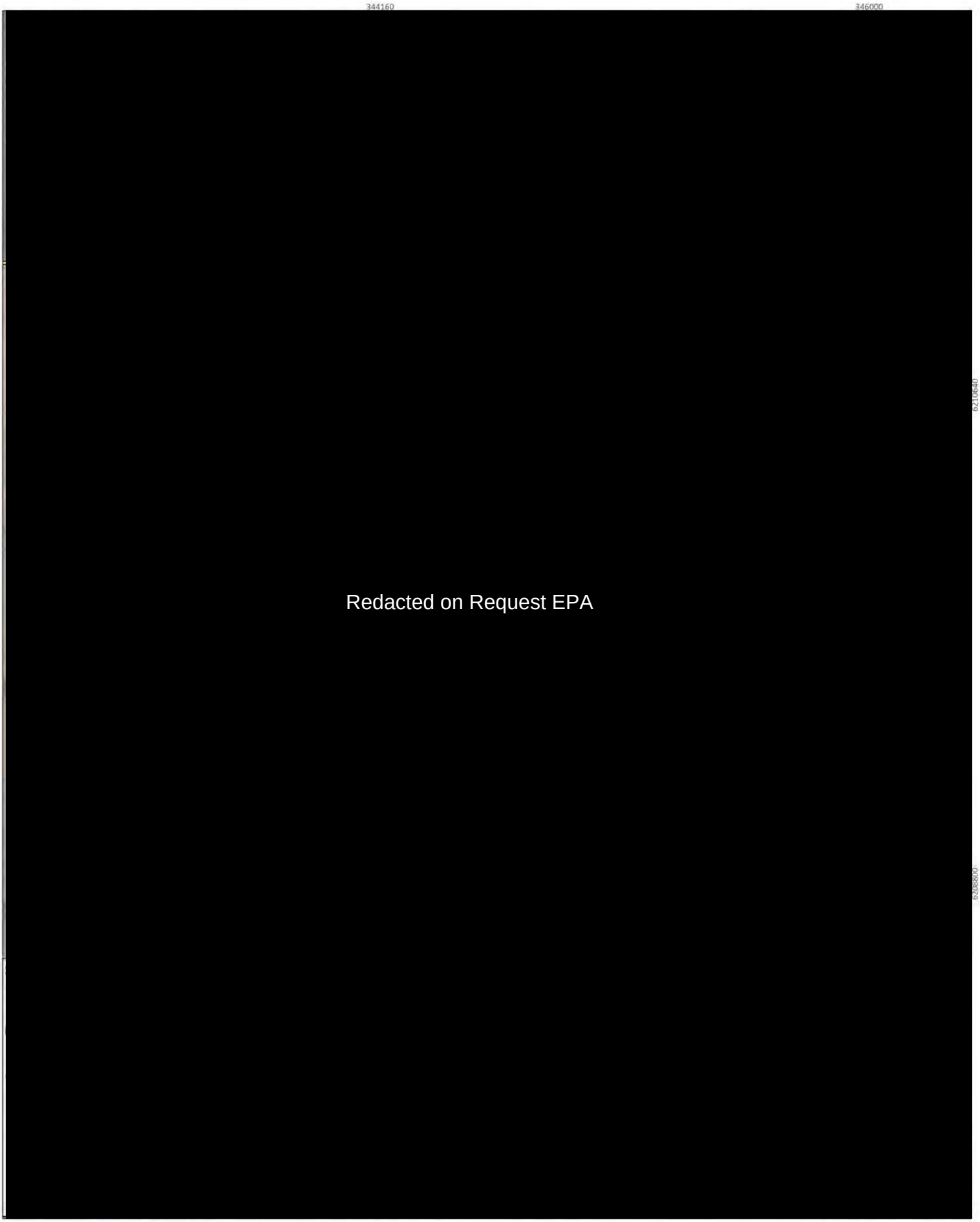
Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Adenanthos detmoldii	P4 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 43 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 1,290 plants, however likely more as some records did not specify the frequency of plants, and other records that did said frequent but localised and 1,000+ plants. Habitat descriptions describe swamy roadsides and wetland plains on white- grey clayey sand soils. Often growing amongst *Xanthorrhoea preissii, Agonis parviceps* and *Eucalyptus marginata* (WA Herbarium 1998).	Eight recorded populations in the study area comprising of: • 7 new populations • 1 confirmed desktop populations. Two additional unconfirmed populations in study area. A total of 1,779 (including 18 outside the study area) individual plants were recorded during the survey. Recorded growing on black, grey, brown sandy soils, in winter-wet depressions, plains and road verges. Veg types/ non-vegetated units of confirmed records: ClcVj, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb & cleared areas. Veg types/ non-vegetated units of unconfirmed records (within confirmed & unconfirmed populations): Aff, EmmAffMtAsDb, EmmXpMtDb & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Adenanthos x *pamela*	P4 (DBCA)	Occurs only in the Warren subregion. There are 14 records on Florabase but of these there are only 10 localities with most sites having only one individual listed and one locality with 20 individuals. The habitat is described as grey sand, laterite. Damp flats, roadsides (WA Herbarium 1998).	One recorded population in the study area, comprising of: • 1 new population. No desktop records of *Adenanthos x pamela* were within the study area. A total of 2 individual plants were recorded during the survey. However, one of the records, cover was recorded at 1%, suggesting multiple individuals. Recorded growing on brown, grey soils on flat areas next to road verges. Veg types/ non-vegetated units of confirmed records: EmmXpMtDb & cleared areas[3].	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Aotus carinata	P4 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 23 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 72 plants, however likely most records did not specify the frequency of plants, and often the ones that did said several or locally frequent. Habitat descriptions include wetlands and damp plains on brown clayey loam mixed with grey sand. Often occurring with *Eucalyptus marginata, Adenanthos detmoldii* and *Beaufortia sparsa* (WA Herbarium 1998).	Three recorded populations in the study area, comprising of: • 3 new populations A total of 18 individual plants were recorded during the survey. Recorded growing on brown, grey soils on winter-wet depressions & drainage lines. Veg types of confirmed records: EmmTpAs & XpAs.	 Current survey
Melaleuca basicephala	P4 (DBCA)	Occurs in the Jarrah Forest and Warren bioregions. There are 30 records of this species in Florabase. Population sizes for records in the Florabase suggest at least 90 plants, however likely more many records did not specify the frequency of plants, and often the ones that did said locally common or frequent. Habitat descriptions include swamps and winter-wet flats often growing amongst *Agonis* spp. and *Melaleuca* spp. over Restionaceae spp (WA Herbarium 1998).	Two recorded populations in the study area, comprising of: • 2 new populations. No desktop records of *Melaleuca basicephala* were within the study area. A total of 51 (including 50 outside the study area) individual plants were recorded during the survey. Recorded growing on grey soils a seasonally wet area on a road verge. Non-vegetated units of confirmed records: in cleared areas adjacent to EmmTpGoMtPu.	 Current survey

Significant flora species	Status	Distribution and ecology	Populations recorded	Photograph
Centrolepis strigosa subsp. *strigosa*	RE approx. 215 km WNW	Occurs in the Coolgardie, Esperance Plains, Jarrah Forest, Mallee and Swan Coastal Plain bioregions. Habitat descriptions include damp road verges, hill sides and margins of creek lines on sandy soils on or near granite outcrops. Often growing amongst *Borya nitida,* Proteaceae spp. and moss spp. (WA Herbarium 1998).	One recorded population in the adjacent to the study area, comprising of: • 1 new population. A single individual plant was recorded during the survey. Recorded growing on white, brown soils on a flat area next to road verge. Veg types of confirmed records: adjacent to XpAs.	 (Archer 2013)

[3]Cleared areas are not treated as habitat for Threatened or Priority flora, to account for potential location errors and/or the possibility that the plant/s no longer exist.





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	3/12/2024
Drawn by	BK
Map author	NR

0 250 500
Meters

1:18,400(at A4) GDA 1994 MGA Zone 50

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Study area

Map shows new records and confirmed desktop records

Figure 5-5a
Significant flora records from the field survey

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SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	3/12/2024
Drawn by	BK
Map author	NR

0 250 500
Meters

1:12,800(at A4) GDA 1994 MGA Zone 50

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Study area

Species, status

Grevillea manglesioides subsp. *ferricola*, P3 (DBCA list)

Loxocarya magna, P3 (DBCA list)

Map shows new records and confirmed desktop records

Figure 5-5b

Significant flora records from the field survey

PHOENIX ENVIRONMENTAL SCIENCES

340050

Redacted on Request EPA

6214400



SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	NR

0 0.45 0.9
Kilometers

1:23,411(at A4) GDA 1994 MGA Zone 50

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Study area

Species, status

★ *Adenanthos detmoldii*, P4 (DBCA list)

✱ *Gastrolobium formosum*, P3 (DBCA list)

Map shows new records and confirmed desktop records

Figure 5-5c

Significant flora records from the field survey

PHOENIX ENVIRONMENTAL SCIENCES

344960

Redacted on Request EPA

6214400



SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	NR

0 0.5 1
Kilometers

1:23,400(at A4) GDA 1994 MGA Zone 50

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Study area

Species, status

- *Lambertia orbifolia* subsp. *vespera*, EN (EPBC & BC Acts)
- *Adenanthos detmoldii*, P4 (DBCA list)
- *Adenanthos x pamela*, P4 (DBCA list)
- *Aotus carinata*,P4 (DBCA list)
- *Boronia anceps*, P3 (DBCA list)
- *Calothamnus lateralis* var. *crassus*, P3 (DBCA list)
- *Chorizema carinatum*, P3 (DBCA list)
- *Dampiera heteroptera*, P3 (DBCA list)
- *Gastrolobium formosum*, P3 (DBCA list)
- *Grevillea brachystylis* subsp. *australis*, VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides* subsp. *ferricola*, P3 (DBCA list)
- *Grevillea papillosa*, P3 (DBCA list)
- *Isopogon formosus* subsp. *dasylepis*, P3 (DBCA list)
- *Leucopogon alternifolius*, P3 (DBCA list)
- *Loxocarya magna*, P3 (DBCA list)
- *Melaleuca basicephala*, P4 (DBCA list)
- *Netrostylissp. Blackwood River (A.R. Annels 3043)*, P3 (DBCA list)
- Synaphea nexosa,P1 (DBCA list)
- *Verticordia plumosa* var. *vassensis*, EN (EPBC & BC Acts)
- *Centrolepis strigosa* subsp. *strigosa*, (RE)

Map shows new records and confirmed desktop records

Figure 5-5d
Significant flora records from the field survey

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Table 5-6 Likelihood of occurrence for significant flora identified in the desktop review and not recorded during the field surveys

Species	Status	Likelihood of occurrence	Potential habitat
Leptomeria dielsiana	X (VU EPBC Act; EX BC Act)	Unlikely - It is considered extinct as there are only 4 records of this species approximately 1.6 km outside of the study area, and it was last collected in 1957	
Conospermum quadripetalum	T (CR BC Act)	Possible - previous records in study area, records visited, and plants not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, EmmTpAs, XpAs, CcTlXpAp, EmmTpGoMtPu
Reedia spathacea	T (CR EPBC Act; EN BC Act)	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Banksia nivea subsp. *uliginosa*	T (EN EPBC & BC Acts)	Possible - previous records in study area, records visited, and some plants removed by clearing, others not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Boronia exilis	T (EN EPBC & BC Acts)	Possible - previous records in study area, records visited, and plants not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj
Darwinia ferricola	T (EN EPBC & BC Acts)	Possible - previous records in study area, records visited, and some plants removed by clearing, others not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj
Drakaea micrantha	T (VU EPBC Act; EN BC Act)	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Andersonia ferricola	P1	Possible - nearby desktop records (425 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Darwinia terricola	P1	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Hemigenia obovata	P1	Possible - nearby desktop records (23 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, Mj, MrCh, MrTjLs, MpXpHfSs, ClcVj
Pericalymma megaphyllum	P1	Possible - previous records in study area, records visited, and plants not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu

Species	Status	Likelihood of occurrence	Potential habitat
Philydrella pygmaea subsp. *minima*	P1	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Platychorda rivalis	P1	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Schoenus indutus	P1	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	CcTpCeOh, CcTlXpAp
Stylidium sp. Scott River Plain (N.G. Marchant 74/23)	P1	Possible - study area is just outside of the known range of the species, but closest record is <5 km	No habitat description provided so unable to determine potential habitat types
Synaphea macrophylla	P1	Possible - nearby desktop records (1.4 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Thysanotus formosus	P1	Possible - nearby desktop records (209 m), potential habitat present, entire area of habitat not thoroughly searched	EmmTpGoMtPu, EmmXpMtDb, CcTpCeOh, CcTlXpAp
Diuris heberlei	P2	Possible - nearby desktop records (715 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj
Drosera binata	P2	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Euphrasia scabra	P2	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Hemigenia sp. Nillup (R.D. Royce 98)	P2	Possible - nearby desktop records (2.4 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Leptomeria furtiva	P2	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Lepyrodia extensa	P2	Possible - nearby desktop records (48 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Leucopogon incisus	P2	Possible - nearby desktop records (1.4 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs
Machaerina ascendens	P2	Possible - nearby desktop records (2.4 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj

Species	Status	Likelihood of occurrence	Potential habitat
Pigea volubilis	P2	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Schoenus loliaceus	P2	Possible - nearby desktop records (3.5 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Stenanthemum sublineare	P2	Possible - nearby desktop records (4.8 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Styphelia intricata	P2	Possible - nearby desktop records (40 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Xyris maxima	P2	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Acacia inops	P3	Possible - nearby desktop records (5.5 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, Mj, MrCh, MrTjLs, MpXpHfSs, ClcVj
Acacia lateriticola glabrous variant (B.R. Maslin 6765)	P3	Possible - nearby desktop records (4.8 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Actinotus repens	P3	Unlikely - nearest record >5 km from study area and study area outside of the known range for the species	
Andersonia auriculata	P3	Unlikely - nearest record >5 km from study area and study area outside of the known range for the species	
Andersonia sp. Amabile (N. Gibson & M. Lyons 355)	P3	Possible - nearby desktop records (1.8 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Blennospora doliiformis	P3	Possible - nearby desktop records (3.7 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Caladenia abbreviata	P3	Possible - nearby desktop records (640 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj
Caustis sp. Boyanup (G.S. McCutcheon 1706)	P3	Unlikely - study area is just outside of the known range of the species; closest record is >5 km	
Chordifex gracilior	P3	Possible - previous record in study area, record visited, and plants removed by clearing, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj

Species	Status	Likelihood of occurrence	Potential habitat
Chordifex jacksonii	P3	Possible - previous record in study area, record visited, and plants removed by clearing, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Cyathochaeta stipoides	P3	Possible - nearby desktop records (148 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Cyathochaeta teretifolia	P3	Possible - nearby desktop records (1.8 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Juncus meianthus	P3	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Leptinella drummondii	P3	Unlikely - no suitable habitat present in study area	
Lepyrodia heleocharoides	P3	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Leucopogon wheelerae	P3	Possible - previous records in study area, records visited, and some plants removed by clearing, others not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Pultenaea pinifolia	P3	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Stylidium trudgenii	P3	Possible - nearby desktop records (3.7 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Synaphea otiostigma	P3	Possible - nearby desktop records (2.6 km), potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Synaphea petiolaris subsp. *simplex*	P3	Possible - nearby desktop records (378 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Tricostularia davisii	P3	Possible - nearby desktop records (3.6 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Acacia tayloriana	P4	Possible - nearby desktop records (3.0 km), potential habitat present, entire area of habitat not thoroughly searched, unlikely to be in flower during survey	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Astartea onycis	P4	Possible - nearby desktop records (724 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu

Species	Status	Likelihood of occurrence	Potential habitat
Banksia meisneri subsp. *ascendens*	P4	Possible - previous records in study area, records visited, and plants removed by clearing but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Banksia sessilis var. *cordata*	P4	Unlikely - no suitable habitat present in study area	
Calothamnus quadrifidus subsp. *teretifolius*	P4	Possible - study area is just outside of the known range of the species, but closest record is <5 km, potential habitat present, entire area of habitat not thoroughly searched	EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Drosera fimbriata	P4	Possible - previous records in study area, records visited, and plants not relocated, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, AmBsHc, XpMdLm, ClcVj, XpAs
Gonocarpus pusillus	P4	Possible - nearby desktop records (4.8 km), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Gonocarpus simplex	P4	Possible - nearby desktop records (254 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Hypolaena robusta	P4	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Myriophyllum trifidum	P4	Possible - previous records in study area, records visited, and plants removed by clearing, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Pultenaea skinneri	P4	Unlikely - study area is outside of the known range of the species; closest record is >5 km	
Stylidium leeuwinense	P4	Possible - previous record in study area, record visited, and plants removed by clearing, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu
Tripterococcus sp. Brachylobus (A.S. George 14234)	P4	Possible - nearby desktop records (217 m), potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj
Verticordia lehmannii	P4	Possible - previous record in study area, record visited, and plants removed by clearing, but there is potential habitat present, entire area of habitat not thoroughly searched	AsLs, TiLs, PeeLs, MpXpHfSs, XpAs, AmBsHc, XpMdLm, ClcVj, Mj

Possible to occur: grey fill.

5.2.4 Introduced flora

Seventy introduced flora species were recorded during the survey, of which none are a WoNS/Declared Pest (Appendix 8). **Juncus oxycarpus* was a range extension, recorded approximately 120 km west-south-west of the nearest record for this species (WA Herbarium 2024). Three unidentified flora (*Abutilon* sp., **Pinus* sp. and **Rumex* sp.; Section 5.2.5) are likely to be additional introduced species.

5.2.5 Unidentified flora

Fourteen specimens encountered during the survey could not be identified to species level (Table 5-7). The primary reason for the unidentified flora was lack of sufficient taxonomic characters available; plants were sterile (lacking reproductive structures) or reproductive structures were too old/dry or damaged to be useful.

Table 5-7 Unidentified taxa recorded during the field survey

Taxon	Comments
Abutilon sp.	One specimen collected at site BEE114 in poor condition without diagnostic structures present. No native species from the *Abutilon* genus have been recorded in the Warren bioregion or Southern Jarrah Forest subregion on Florabase, nor were any identified in the desktop review. No conservation significant *Abutilon* are known from the Southwest Botanical Province. Closest record of nearest native species is >250 km north of the study area. Specimen is most likely to represent **A. theophrasti* which has also been recorded near Bridgetown in the Southern Jarrah Forest subregion.
Banksia sp.	One record at site BEE389R. Plants at site were noted in poor condition, possibly dead, and no specimen was collected due to insufficient material for a positive identification. Three significant taxa from the same genus were found in the desktop review but these are unlikely to be represented at site as the plant was a low tree lifeform instead of a mid or low shrub typical for *Banksia nivea* subsp. *uliginosa* and *B. meisneri* subsp. *ascendens*. Unsuitable habitat at site for the other species, *B. sessilis* var. *cordata* which prefers coastal limestone soils.
Billardiera sp.	One specimen collected at BEE054 with insufficient material for complete ID. No significant flora from the genus *Billardiera* were recorded in IBRA subregions that intersect the study area.
?*Billardiera variifolia*	Two sterile specimens recorded at sites BEE286 and BEE287R. As for *Billardiera sp.* above, no *Billardiera* significant flora were recorded in IBRA subregions that intersect the study area.
Boronia sp.	An opportunistic collection in roadside vegetation along Scott River Road had insufficient material for a positive identification. Fifteen Boronia species/subspecies were identified in the desktop review, including 2 significant species. The indeterminate *Boronia* specimen may be the Priority 3 *B. anceps* or one of 4 common species (*B. crenulata, B. fastigiata, B. spathulata* or *B. tenuior*). The specimen was collected in similar habitat to the *B. anceps* recorded further south on Scott River Road.
Caladenia sp.	Two sterile specimens were not collected from sites BEE067 and BEE071 due to lack of identifiable features. There were 28 species or subspecies of *Caladenia* identified in the desktop review, with the study area occurring within the known range of many of these. Only one, *C. abbreviata*, is a significant species (P3). Robinson and Keighery (1997) recorded 15 different *Caladenia* species in their survey of Scott NP, directly west of the study area. The specimens may represent one of the common taxa or *C. abbreviata*.

Taxon	Comments
Cassytha sp.	Three sterile specimens were not collected from sites BEE063, BEE112, and BEE376 due to insufficient material. Nine *Cassytha* species were recorded in the subregions, and none are significant flora.
?*Centipeda cunninghamii*	A sterile specimen at site BEE082 had no structures useful for diagnostics and was not collected. *Centipeda cunninghamii* was the only species from the genus known from the subregions and is a common species.
Drosera sp.	Sterile *Drosera* were recorded at sites BEE071, BEE114, BEE200, plus at one opportunistic location. There were 23 *Drosera* species identified in the desktop review, 2 of which are significant flora (*D. fimbriata, D. binata*). The sterile specimens may represent one of the common taxa or *D. fimbriata* (P4). *D. binata* is unlikely to occur in the study area.
Lepidosperma sp.	A sterile specimen was collected at site BEE084. None of the 17 *Lepidosperma* recorded in the subregions in which the study area is located are significant flora, including 11 that were identified within the desktop search area.
Poaceae sp.	Five sterile records at sites BEE007, BEE068, BEE075R, BEE082, BEE083. No Poaceae taxa identified in desktop review were significant flora.
**Pinus* sp.	Trees observed at BEE352-MN. Not collected as fruiting material was not available to identify to species level, so only observed from a distance.
**Rumex* sp.	One specimen lacking diagnostic features was recorded at site BEE068. All 9 *Rumex* recorded in the relevant subregions are introduced species, not significant flora.
?*Scaevola striata* var. *striata*	Sterile specimen collected at site BEE379. Desktop review identified 7 *Scaevola* species however none are significant flora, nor have any significant *Scaevola* been recorded in the subregions of interest.

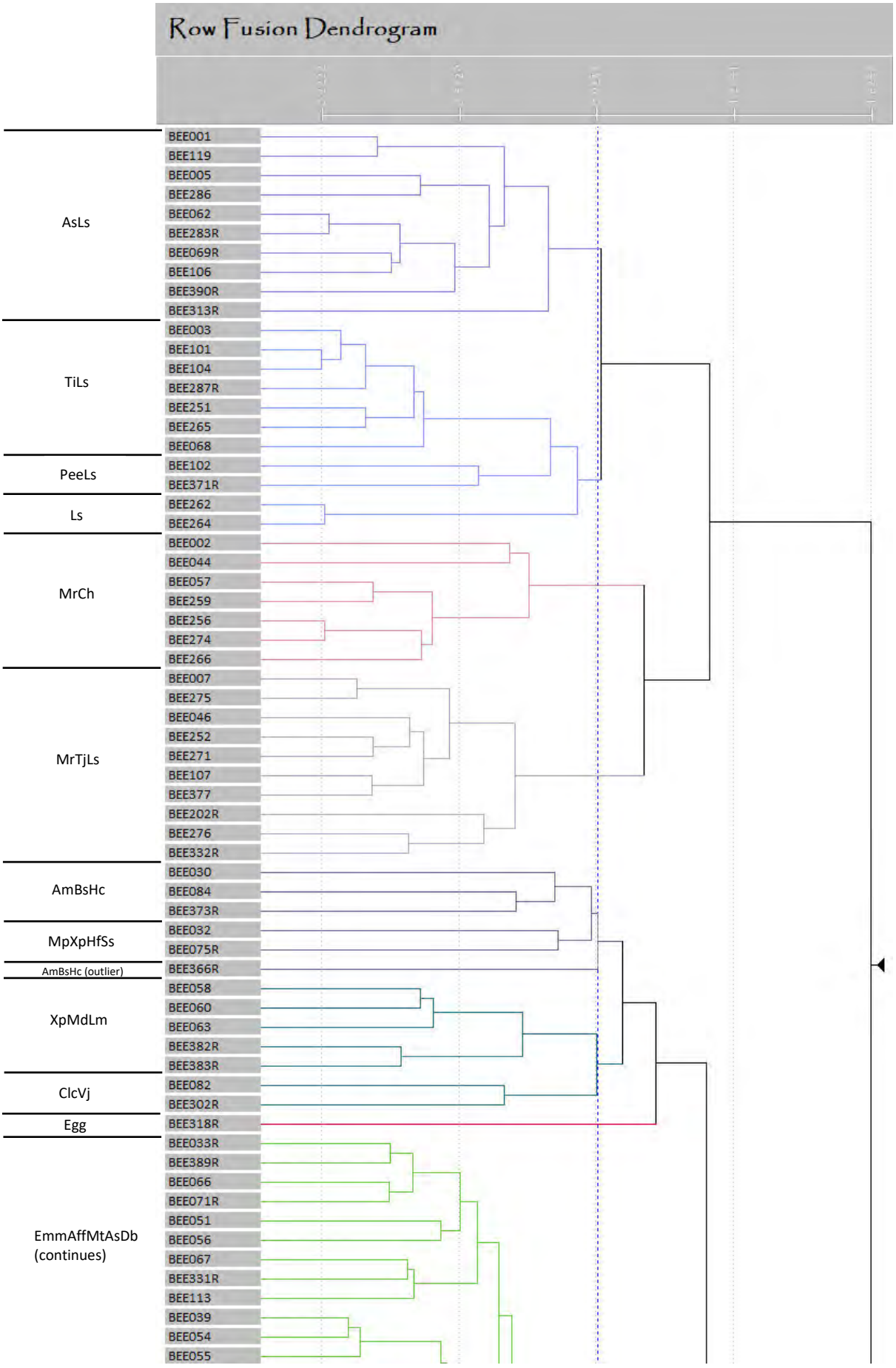
5.2.6 Vegetation types

Eighteen vegetation types were delineated in the cluster analysis, comprising 17 native and one non-native unit (Figure 5-6). One additional native unit (Aff), and 3 non-native units were excluded from the analysis (refer to Section 4.2.2.3 for reasoning), bringing the total number of mapped vegetation units in the study area to 18 native and 4 non-native/modified (Table 5-8; Figure 5-7).

The vegetation types are largely typified by 6 broad groupings:

1. Myrtaceae-dominated shrublands over sedgelands – AsLs, TiLs, PeeLs, MpXpHfSs
2. Mixed (Proteaceae/ Fabaceae/ Myrtaceae-dominated) shrublands over tall sedgelands: XpAs, AmBsHc, XpMdLm, ClcVj, Mj
3. Paperbark (*Melaleuca* spp.) woodland swamps over rushlands/ sedgelands – MrCh and MrTjLs
4. Modified landscapes, including plantations (Egg and Psp) and Peppermint over pastures (Aff)
5. Jarrah (*Eucalyptus marginata* subsp. *marginata*) woodlands and forests over mixed shrublands over tall sedgelands – EmmAffMtAsDb, EmmXpMtDb, and EmmTpAs
6. Jarrah-Marri (*Corymbia calophylla*) woodlands and forests over mixed shrublands over tall sedgelands – CcTpCeOh, CcTlXpAp, and EmmTpGoMtPu.

Cleared areas (2,671.9 ha; 68.7%%) dominate the study area (Table 5-9). Once cleared areas and water units are excluded, Blue Gum plantations (Egg) account for nearly one third of the vegetated portion of the study area (10.7%). Excluding plantations (Egg, Psp) and units (cleared areas and water) to leave vegetation types containing primarily native vegetation, the dominant remnant vegetation types include: Jarrah woodlands (EmmAffMtAsDb; 17.1%), sedgelands (Mj; 13.5%), Peppermint woodlands over pasture grasses (Aff; 12.5%), *Melaleuca* swamps (MrTjLs; 11.9%), and Jarrah-Marri woodlands (EmmXpMtDb; 10.0%) (Table 5-9).


Row Fusion Dendrogram
AsLs
TiLs
PeeLs
Ls
MrCh
MrTjLs
AmBsHc
MpXpHfSs
AmBsHc (outlier)
XpMdLm
ClcVj
Egg
EmmAffMtAsDb
(continues)
BEE001
BEE119
BEE005
BEE286
BEE062
BEE283R
BEE069R
BEE106
BEE390R
BEE313R
BEE003
BEE101
BEE104
BEE287R
BEE251
BEE265
BEE068
BEE102
BEE371R
BEE262
BEE264
BEE002
BEE044
BEE057
BEE259
BEE256
BEE274
BEE266
BEE007
BEE275
BEE046
BEE252
BEE271
BEE107
BEE377
BEE202R
BEE276
BEE332R
BEE030
BEE084
BEE373R
BEE032
BEE075R
BEE366R
BEE058
BEE060
BEE063
BEE382R
BEE383R
BEE082
BEE302R
BEE318R
BEE033R
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BEE113
BEE039
BEE054
BEE055

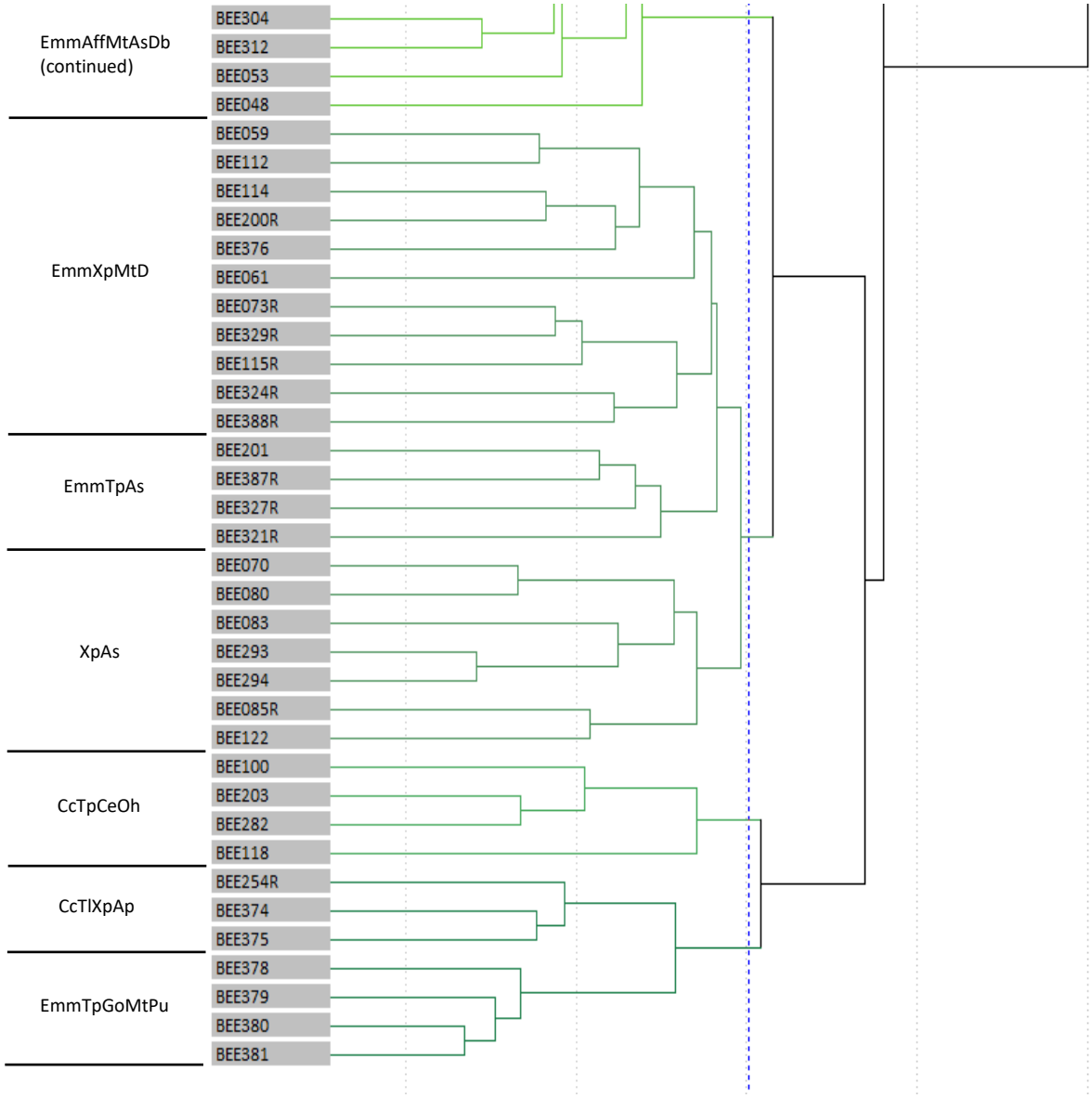


Figure 5-6 Hierarchical clustering (UPGMA) of the flora quadrats of the study area

Table 5-8 Vegetation types, description, and extent in the study area

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
AsLs	BEE001, BEE005, BEE062, BEE069R, BEE106, BEE119, BEE283R, BEE286, BEE313R, BEE390R	Occasionally present low open woodland of *Agonis flexuosa* var. *flexuosa*, over tall open to closed shrubland of *Astartea scoparia*, over tall sparse sedgeland to sedgeland of *Leptocarpus scariosus, Machaerina rubiginosa*, and *Cyathochaeta clandestina*.	24.02 ha 0.62%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
TiLs	BEE003, BEE068, BEE101, BEE104, BEE251, BEE265, BEE287R	Tall shrubland of *Taxandria inundata*, *Astartea scoparia*, and *Calothamnus lateralis* var. *crassus*, over open sedgeland to sedgeland of *Leptocarpus scariosus, Juncus pallidus*, and *Machaerina juncea*.	40.99 ha 1.05%	
PeeLs	BEE102, BEE371R	Low to mid open shrubland of *Pericalymma ellipticum* var. *ellipticum*, variously with *Grevillea papillosa* and/or *Grevillea diversifolia* subsp. *subtersericata*, over tall open sedgeland to sedgeland of *Leptocarpus scariosus, Chordifex amblycoleus*, and *Juncus pallidus*.	16.07 ha 0.41%	

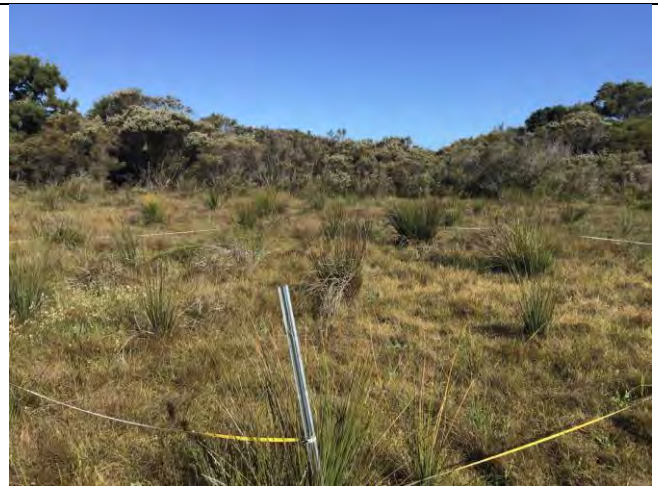
Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
Mj	BEE262, BEE264	Tall open sedgeland to sedgeland of *Machaerina juncea*, *Leptocarpus scariosus*, *Lepidosperma longitudinale*.	106.69 ha 2.74%	
MrCh	BEE002, BEE044, BEE057, BEE256, BEE259, BEE266, BEE274	Low to mid woodland of *Melaleuca rhaphiophylla* occasionally with *M. preissiana,* over irregular sparse rushland of *Cycnogeton huegelii, Lepidosperma longitudinale*, and *Juncus pallidus*.	41.39 ha 1.06%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
MrTjLs	BEE007, BEE046, BEE107, BEE202R, BEE252, BEE271, BEE275, BEE276, BEE332R, BEE377	Low open woodland to woodland of *Melaleuca rhaphiophylla* and/or *Melaleuca preissiana*, over tall open to closed shrubland of *Taxandria juniperina, Astartea scoparia*, and *occasionally Callistachys lanceolata*, over sedgeland of *Leptocarpus scariosus, Cycnogeton huegelii*, and *Aphelia cyperoides*.	93.64 ha 2.41%	
AmBsHc	BEE030, BEE073R, BEE084, BEE366R	Tall open shrubland variously composed of *Acacia myrtifolia, Banksia occidentalis*, and *Taxandria inundata*, over mid sparse shrubland variously composed *of Beaufortia sparsa, Hakea sulcata, and Hakea lasianthoides*, over variably present low to tall open sedgeland to sedgeland variously composed of *Hypolaena caespitosa, Machaerina rubiginosa*, and *Melanostachya ustulata*.	1.64 ha 0.04%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
MpXpHfSs	BEE032, BEE075R	Variably present low sparse woodland of *Melaleuca preissiana*, over mid to tall sparse to open shrubland of *Xanthorrhoea preissii*, variably with *Homalospermum firmum* and/or *Astartea scoparia*, over variable low to tall open sedgeland of *Sporadanthus strictus, Loxocarya cinerea*, and *Leptocarpus* spp.	3.84 ha 0.10%	
XpMdLm	BEE058, BEE060, BEE063, BEE382R, BEE383R	Mid sparse to open shrubland of *Xanthorrhoea preissii, Acacia myrtifolia*, and *Kunzea recurva*, over low sparse shrubland to shrubland of *Melaleuca densa, Pimelea rosea* subsp. *rosea*, and *Hibbertia stellaris*, over tall open sedgeland to sedgeland of *Loxocarya magna, Mesomelaena tetragona*, and *Hypolaena pubescens*.	15.05 ha 0.39%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
ClcVj	BEE082, BEE302R	Mid open to closed shrubland of *Calothamnus lateralis* var. *crassus*, *Adenanthos detmoldii*, and *Comesperma virgatum*, over tall open rushland/sedgeland variably composed of *Viminaria juncea, Leptocarpus laxus*, and *Leptocarpus scoparius*.	0.79 ha 0.02%	
Egg	BEE318R	Planted mid woodland of **Eucalyptus globulus* subsp. *globulus* over low isolated grasses to sparse grassland of **Bromus diandrus* and **Lolium perenne* with variable collection of isolated herbs.	415.43 ha 10.67%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EmmAffMtAsDb	BEE033R, BEE039, BEE048, BEE051, BEE053, BEE054, BEE055, BEE056, BEE066, BEE067, BEE071R, BEE113, BEE304, BEE312, BEE331R, BEE389R	Mid open woodland to woodland of *Eucalyptus marginata* subsp. *marginata*, over variably composed low open woodland to woodland of *Agonis flexuosa* var. *flexuosa, Nuytsia floribunda*, and *Allocasuarina fraseriana*, over mid sparse to open shrubland of *Melaleuca thymoides*, *Jacksonia horrida*, and *Xanthorrhoea preissii*, over tall sedgeland of *Anarthria scabra*, *Lyginia imberbis*, and *A. prolifera*, over low sparse forbland of *Dasypogon bromeliifolius* and *Phlebocarya ciliata*.	135.20 ha 3.47%	
EmmXpMtDb	BEE059, BEE061, BEE073R, BEE112, BEE114, BEE115R, BEE200R, BEE324R, BEE329R, BEE376, BEE388R	Low to mid open woodland to forest of *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa*, over mid sparse shrubland of *Xanthorrhoea preissii, Kunzea recurva*, and *Hakea ceratophylla*, over tall sparse to open sedgeland of *Mesomelaena tetragona, Hypolaena pubescens*, and *Anarthria scabra*, over low sparse forbland to forbland of *Dasypogon bromeliifolius, Conostylis aculeata* subsp. *aculeata*, and *Microtis media* subsp. *media*.	79.05 ha 2.03%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EmmTpAs	BEE201, BEE321R, BEE327R, BEE387R	Low to mid woodland to open forest of *Eucalyptus marginata* subsp. *marginata*, over tall sparse to open shrubland of *Taxandria parviceps* and *Melaleuca preissiana*, over tall sparse to open sedgeland of *Anarthria scabra, Juncus pallidus*, and *Machaerina articulata*.	28.43 ha 0.73%	
XpAs	BEE070, BEE080, BEE083, BEE085R, BEE122, BEE293, BEE294	Mid sparse to open shrubland of *Xanthorrhoea preissii, Gompholobium tomentosum*, and *Taxandria parviceps*, over tall open to closed sedgeland of *Anarthria scabra, A. prolifera*, and *Hypolaena caespitosa*.	25.38 ha 0.65%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
CcTpCeOh	BEE100, BEE118, BEE203, BEE282	Mid woodland to open forest of *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata*, and occasionally *Agonis flexuosa* var. *flexuosa*, over variable mid to tall sparse shrubland to shrubland of *Taxandria parviceps, Xanthorrhoea preissii*, and *Acacia myrtifolia*, over tall sedgeland of *Cyathochaeta equitans, Anarthria scabra*, and *Hypolaena caespitosa*, over low sparse forbland of *Opercularia hispidula, Patersonia occidentalis* var. *latifolia*, and *Dasypogon bromeliifolius*.	75.04 ha 1.93%	
CcTlXpAp	BEE254R, BEE374, BEE375	Mid open woodland to open forest of *Corymbia calophylla* occasionally with *Eucalyptus marginata* subsp. *marginata*, over tall sparse shrubland to shrubland of *Taxandria linearifolia*, variably with *T. parviceps* and *Acacia myrtifolia*, over mid open shrubland of *Xanthorrhoea preissii, Grevillea manglesioides* subsp. *manglesioides*, and *Hakea lasianthoides*, over tall sparse sedgeland to sedgeland of *Anarthria prolifera, Lepidosperma* sp. Blackwood (R. Davis 7696), and *Mesomelaena tetragona*.	2.12 ha 0.05%	

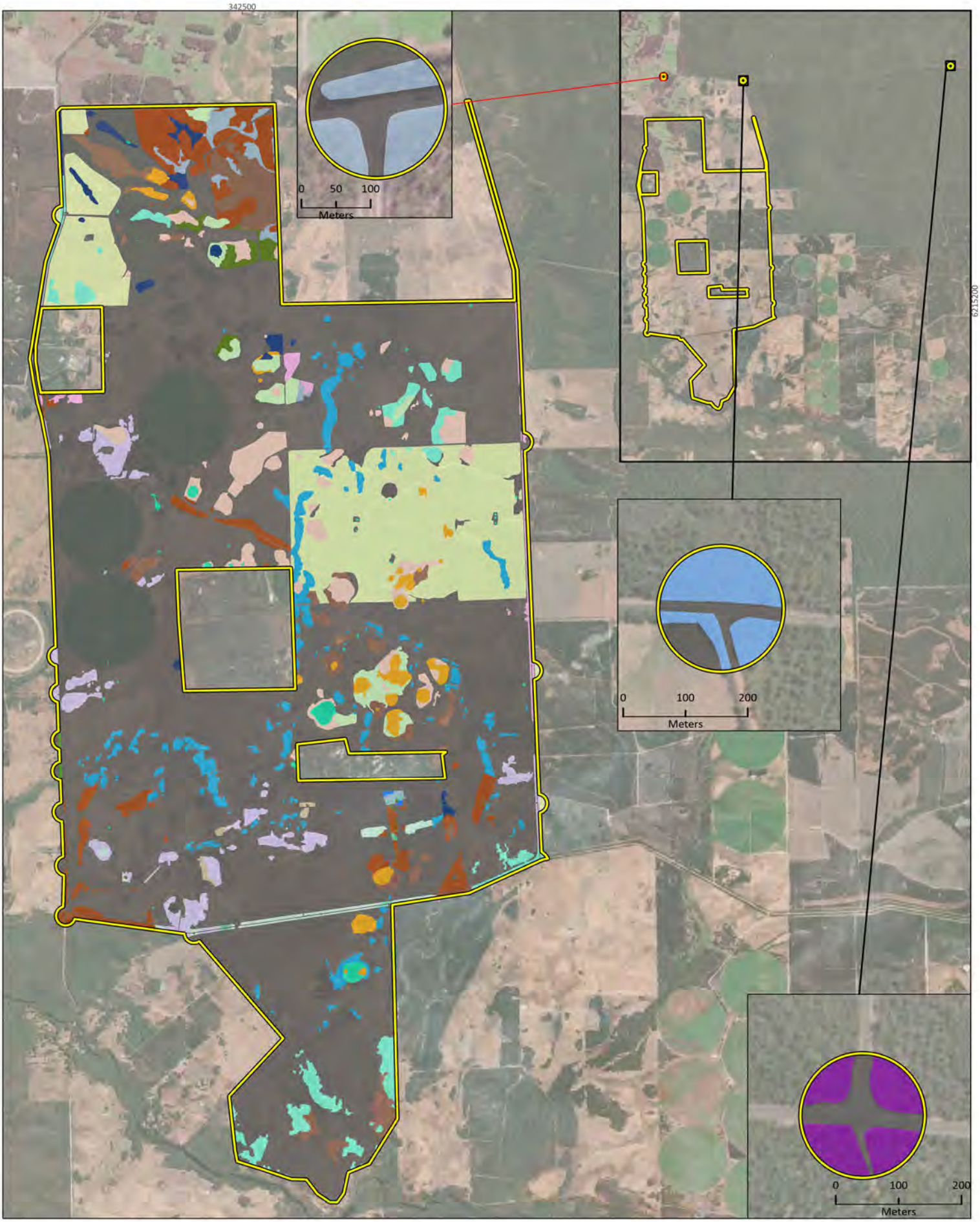
Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EmmTpGoMtPu	BEE378, BEE379, BEE380, BEE381	Mid open woodland to open forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*, over tall sparse to open shrubland of *Taxandria parviceps*, with clumps of *Kingia australis* and/or *Dasypogon hookeri*, over low sparse to open shrubland of *Gompholobium obovatum, Acacia browniana* var. *browniana*, and *Hibbertia cunninghamii*, over tall open sedgeland of *Anarthria prolifera, Mesomelaena tetragona*, and variable dense clumps of *Lepidosperma leptostachyum*, over tall sparse to open forbland of *Patersonia umbrosa* var. *xanthina, Lomandra pauciflora, Tetrarrhena laevis*.	2.13 ha 0.05%	
Aff	Collection of 8 mapping notes	Low sparse woodland to woodland of *Agonis flexuosa* var. *flexuosa*, over variable low grassland of pasture weed species.	98.90 ha 2.54%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
Psp	3 mapping notes	Planted mid open woodland of **Pinus* sp.	1.60 ha 0.04%	

Table 5-9 Vegetation types and extent in entire study area, and in native vegetated portion of study area

Vegetation type	Study area		Native vegetated portion of study area	
	Area (ha)	Area (%)	Area (ha)	Area (%)
AsLs	24.02	0.62%	24.02	3.04%
TiLs	40.99	1.05%	40.99	5.19%
PeeLs	16.07	0.41%	16.07	2.03%
Mj	106.69	2.74%	106.69	13.50%
MrCh	41.39	1.06%	41.39	5.24%
MrTjLs	93.64	2.41%	93.64	11.85%
AmBsHc	1.64	0.04%	1.64	0.21%
MpXpHfSs	3.84	0.10%	3.84	0.49%
XpMdLm	15.05	0.39%	15.05	1.90%
ClcVj	0.79	0.02%	0.79	0.10%
Egg	415.43	10.67%	-	-
EmmAffMtAsDb	135.20	3.47%	135.20	17.11%
EmmXpMtDb	79.05	2.03%	79.05	10.00%
EmmTpAs	28.43	0.73%	28.43	3.60%
XpAs	25.38	0.65%	25.38	3.21%
CcTpCeOh	75.04	1.93%	75.04	9.49%
CcTlXpAp	2.12	0.05%	2.12	0.27%
EmmTpGoMtPu	2.13	0.05%	2.13	0.27%
Aff	98.90	2.54%	98.90	12.51%
Psp	1.60	0.04%	-	-
Cleared	2,671.88	68.66%	-	-
Water	12.31	0.32%	-	-
Total[1]	**3,891.59**	**100**	**790.38**	**100**

[1] Percentages do not sum to exactly 100% because of truncation to 1 decimal place.





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	NR

0 1 2
Kilometers

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Study area

Vegetation type

- Aff
- AmBsHc
- AsLs
- CcTlXpAp
- CcTpCeOh
- ClcVj
- Cleared
- Egg
- EmmAffMtAsDb
- EmmTpAs
- EmmTpGoMtPu
- EmmXpMtDb
- Mj
- MpXpHfSs
- MrCh
- MrTjLs
- PeeLs
- Psp
- TiLs
- Water
- XpAs
- XpMdLm

Figure 5-7

Vegetation types recorded in the field survey

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5.2.7 Vegetation condition

Vegetation in the study area ranged from Completely Degraded to Pristine condition (Figure 5-8; Table 5-10), with the majority (79.4%) in Completely Degraded condition, representing the cleared areas and plantations.

Pristine condition accounted for the smallest portion of the study area (0.8%) and included native remnant patches of the highest vegetation quality within forest/ woodland, shrubland, and wetland habitats. Excellent vegetation condition, which accounted for 6.4% of the study area, was distributed throughout the study area occurring in high quality remnant vegetation patches amongst the cleared pastures, transport routes and plantations within 14 vegetation types that varied widely among wetlands, forests, woodlands, shrublands, and sedgelands.

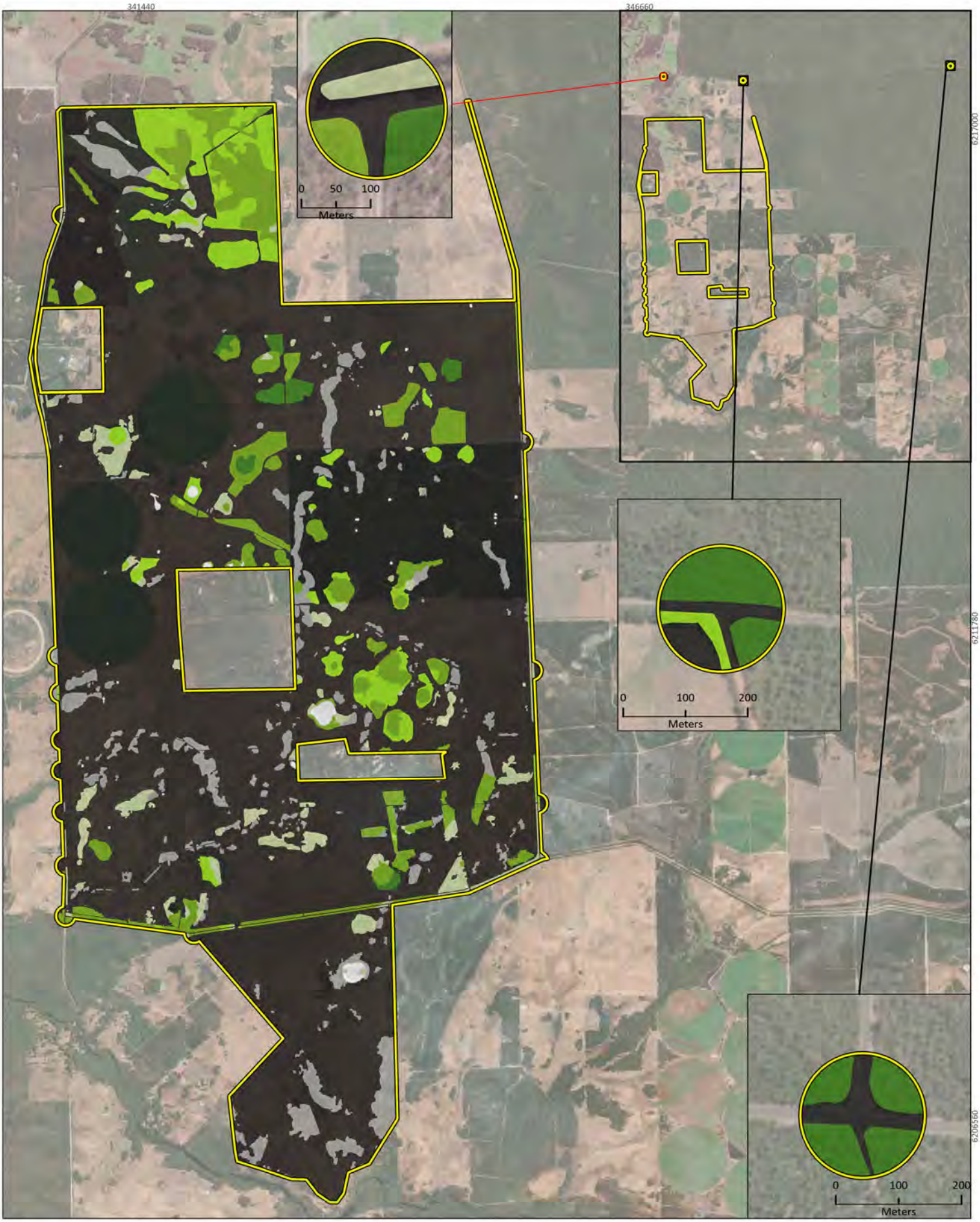
Very Good (4.6% of the study area, 14 vegetation types) and Good (3.2%, 13 vegetation types) condition ratings were designated to areas that occupied similar habitat types to the Excellent category.

Degraded condition occupied larger areas (5.3%) and fewer vegetation types (11) and was distributed similarly to areas in the categories ranging from Excellent to Good. All vegetation types were represented in higher condition categories, except Aff, at which the understorey was dominated by introduced pasture grasses. Areas mapped as Water were not assessed for condition.

In order of highest to lowest frequency, disturbances in the other condition categories included: weed infestation, historic clearing, high-level grazing, low-level grazing, evidence of feral animals, livestock tracks, large-scale clearing, vehicle tracks, current operations, medium-level grazing, litter, revegetation, and excavation. As the condition rating reduced, the trend was that more disturbances were recorded at sites, and/ or the intensity of the disturbances increased.

Table 5-10 Vegetation condition – extent of each condition rating in study area

Keighery condition rating	Vegetation types	Area (ha)	% of study area	% of native vegetated portion
Pristine	AsLs, TiLs, PeeLs, Mj, MrTjLs, EmmTpAs, XpAs, CcTpCeOh, CcTlXpAp, EmmTpGoMtPu	30.2	0.8	3.8
Excellent	AsLs, TiLs, PeeLs, Mj, MrCh, MrTjLs, AmBsHc, MpXpHfSs, XpMdLm, ClcVj, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, XpAs, CcTpCeOh	248.9	6.4	31.5
Very Good	AsLs, TiLs, PeeLs, Mj, MrCh, MrTjLs, AmBsHc, MpXpHfSs, XpMdLm, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, CcTlXpAp	178.6	4.6	22.6
Good	AsLs, TiLs, PeeLs, Mj, MrCh, MrTjLs, AmBsHc, MpXpHfSs, XpMdLm, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, XpAs, CcTpCeOh	124.9	3.2	15.8
Degraded	AsLs, Mj, MrCh, MpXpHfSs, XpMdLm, EmmAffMtAsDb, EmmXpMtDb, EmmTpAs, CcTpCeOh, Aff	207.7	5.3	26.3
Completely Degraded	Cleared, Egg, Psp	3,088.9	79.4	0
Not Assessed	Water	12.3	0.3	0
Total		**3,891.6**	**100.0**	**100.0**





SynergyRED
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- Study area

Vegetation condition

- Pristine
- Excellent
- Very good
- Good
- Degraded
- Completely degraded
- Not applicable

Figure 5-8

Vegetation condition in the study area

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5.2.8 Significant vegetation

In total, 15 native vegetation types were designated to have local and/or regional significance (Table 5-11). Four of these were considered important at both the regional and local spatial scales, with the remainder considered to have local significance.

5.2.8.1 Threatened and Priority Ecological Communities

One TEC was recorded in the WFA part of the study area, the Scott River Ironstone TEC. Four vegetation types (XpMdLm, EmmTpAs, Mj and AmBsHc) were considered representative of the TEC (described in Table 5-3) and therefore have regional significance. Occurrences of these vegetation types that were degraded (such as Mj in north-west of the study area) were not defined/ mapped as TEC because they do not meet the vegetation condition criteria listed in the conservation advice (SEWPaC 2013), i.e. Good condition or above. The total area occupied by the Scott River Ironstone TEC in the study area is 109.5 ha, 2.81% of the study area, 13.86% of the native vegetated portion (Table 5-11). This includes some occurrences that are not mapped as the community in the DBCA Threatened and Priority Ecological Communities database (Figure 5-9). It appears that other occurrences mapped as the TEC in the DBCA database do not qualify as TEC due to degraded condition.

No occurrences of the TEC were recorded in the RIAs (Figure 5-9).

Of the other TEC or PEC characterised by their flora species composition, none were deemed to occur within the study area. *Empodisma gracillimum* is a defining feature of both *Empodisma* peatlands of southwestern Australia TEC and *Reedia spathacea - Empodisma gracillimum - Sporadanthus rivularis* dominated floodplains and paluslopes of the Blackwood Plateau PEC and was recorded in the study area. However, the species was recorded in a woodland (vegetation type EmmXpMtDb), that is not representative of either the TEC or PEC. Additionally, neither the Subtropical and Temperate Coastal Saltmarsh TEC or the Tall closed sedgeland on shallow soils derived from granite gneiss on the Leeuwin-Naturaliste Ridge PEC descriptions matched any vegetation described within the study area.

5.2.8.2 Restricted vegetation types

Three vegetation types were classified as ‘restricted’ in accordance with the definition in Section 4.2.2.3 (<1% of native vegetation cover in study area) and therefore have local significance (Table 5-11). All 3 are shrublands over sedgelands (AmBsHc, MpXpHfSs, ClcVj).

Two other vegetation types with <1.0% coverage (CcTlXpAp and EmmTpGoMtPu) were not considered restricted, as they were mapped exclusively at RIAs in small polygons surrounding 2 of the 3 road intersections, disjunct from the main/ larger WFA. Their proportionate representation is an artifact of study area size and location, rather than these vegetation types truly having restricted distribution. Textures of the aerial imagery depicting CcTlXpAp and EmmTpGoMtPu were noticed to extend considerably beyond the study area boundaries into unsurveyed areas, suggesting that these vegetation types may be better represented regionally than the present survey can confirm.

5.2.8.3 Habitat for significant flora species

Eleven vegetation types are of local significance as habitat provision for significant flora recorded in the current survey (Table 5-11). Seven of these vegetation types are significant as primary habitat for more than one significant flora species; with EmmXpMtDb as primary habitat for 9 significant species, and both EmmTpAs and ClcVj as primary habitat for 5 significant species (Table 5-12). Three of the vegetation types locally significant as habitat (AmBsHc, XpMdLm, and EmmTpAs) also have regional significance as they represent the Scott River Ironstone TEC.

5.2.8.4 Groundwater dependent ecosystems

Seven vegetation types (Table 5-13; Figure 5-10) were assigned as locally significant known or potential GDEs based on either:

- being representative of the Scott River Ironstone Association TEC or analogous to it (same vegetation type as the TEC but condition of vegetation does not meet criteria for TEC status)
- being dominated by GDE species identified in the desktop review (Section 5.1.6).

Four of the GDE vegetation types were assigned as obligate GDEs due to being part of the Scott River Ironstone Association TEC. Due to the formal recognition of the TEC as being groundwater dependent, vegetation types associated with the TEC are considered 'known' GDEs.

The other 3, were assigned facultative GDEs due to the presence of *Melaleuca rhaphiophylla* and/or *M. preissiana* as dominant taxa in the community. These are considered 'potential' GDEs as no site-specific studies have been conducted to confirm groundwater dependence.

Eight other vegetation types contained incidental or non-dominant occurrences of one or more GDE species (Table 5-14). These did not qualify entire vegetation units for GDE status; however, the individual vegetation polygons of these communities that correspond with records of the GDE species are displayed in Figure 5-10.

A few occurrences of the facultative phreatophyte *Eucalyptus rudis* were identified in planted roadside vegetation by the fauna survey team (Phoenix 2024); these were considered planted species and therefore are not included as GDE here.

Table 5-11 Significant vegetation types in the study area

Vegetation type	Significance summary	Level of significance	TEC	Restricted	Habitat	GDE
AmBsHc	1.64 ha (0.21% of the native vegetated portion), represents TEC, restricted vegetation community, primary habitat for 1 significant flora species, GDE	Regional & Local	✓	✓	✓	✓
EmmTpAs	28.43 ha (3.60% of the native vegetated portion), represents TEC, primary habitat for 5 significant flora species, GDE	Regional & Local	✓		✓	✓
Mj	106.69 ha (13.50% of the native vegetated portion), represents TEC, GDE	Regional & Local	✓			✓
XpMdLm	15.05 ha (1.90% of the native vegetated portion), represents TEC, primary habitat for 3 significant flora species, GDE	Regional & Local	✓		✓	✓
AsLs	24.02 ha (3.04% of the native vegetated portion), represents primary habitat for 1 significant flora species	Local			✓	
CcTlXpAp	2.12 ha (0.27% of vegetated portion), represents primary habitat for 2 significant flora species	Local			✓	
ClcVj	0.79 ha (0.10% of the native vegetated portion), represents restricted vegetation community, primary habitat for 5 significant flora species	Local		✓	✓	
EmmAffMtAsDb	135.20 ha (17.11% of the native vegetation portion), represents primary habitat for 1 significant species	Local			✓	
EmmTpGoMtPu	2.13 ha (0.27% of the native vegetated portion), represents primary habitat for 3 significant flora species	Local			✓	
EmmXpMtDb	79.05 ha (10.00% of the native vegetated portion), represents primary habitat for 9 significant flora species	Local			✓	
MpXpHfSs	3.84 ha (0.49% of the native vegetated portion), represents restricted vegetation community, potential GDE	Local		✓		✓
MrCh	41.39 ha (5.24% of the native vegetated portion), represents potential GDE	Local				✓
MrTjLs	93.64 ha (11.85% of the native vegetated portion), represents potential GDE	Local				✓
TiLs	40.99 ha (5.19% of the native vegetated portion), represents primary habitat for 1 significant flora species	Local			✓	
XpAs	25.38 ha (3.21% of the native vegetated portion), represents primary habitat for 3 significant flora species	Local			✓	

Table 5-12 Habitats of significant flora identified in the field survey

Species	Status	TEC vegetation types				Non-TEC vegetation types																No. habitats
		XpMdLm	EmmTpAs	Mj	AmBsHc	AsLs	TiLs	PeeLs	MrCh	MrTjLs	MpXpHfSs	ClcVj	Egg	EmmAffMtAsDb	EmmXpMtDb	XpAs	CcTpCeOh	CcTlXpAp	EmmTpGoMtPu	Aff	Psp	Cleared	
Lambertia orbifolia subsp. Scott River Plains (L.W. Sage 684)	T (EN)															P							**1**
Verticordia plumosa var. *vassensis*	T (EN)	P																				I	**2**
Grevillea brachystylis subsp. *australis*	T (VU/EN)														P					I		I	**3**
Synaphea nexosa	P1	I													P							I	**2**
Boronia anceps	P3		I		I							P			P							I	**5**
Calothamnus lateralis var. *crassus*	P3	I	P			P	P	I	I			P		P	P	I		P				I	**12**
Chorizema carinatum	P3																		P			I	**2**
Dampiera heteroptera	P3											P			I	I	I	P					**5**
Gastrolobium formosum	P3				I										P								**2**
Grevillea manglesioides subsp. *ferricola*	P3	P	I		I							P			P							I	**6**
Grevillea papillosa	P3		P			I		I							P		I			I		I	**7**
Isopogon formosus subsp. *dasylepis*	P3		P																				**1**
Leucopogon alternifolius	P3															P							**1**
Loxocarya magna	P3	P	P		P				I						I							I	**6**
Netrostylis sp. Blackwood River (A.R. Annels 3043)	P3																		P				**1**
Adenanthos detmoldii	P4		P									P		I	P					I		I	**6**

Species	Status	TEC vegetation types				Non-TEC vegetation types																No. habitats
		XpMdLm	EmmTpAs	Mj	AmBsHc	AsLs	TiLs	PeeLs	MrCh	MrTjLs	MpXpHfSs	ClcVj	Egg	EmmAffMtAsDb	EmmXpMtDb	XpAs	CcTpCeOh	CcTlXpAp	EmmTpGoMtPu	Aff	Psp	Cleared	
Adenanthos x *pamela*	P4														P							I	**2**
Aotus carinata	P4		I													P							**2**
Melaleuca basicephala	P4																		P			I	**2**
No. significant flora species supported		**4**	**8**	**0**	**4**	**2**	**1**	**2**	**2**	**0**	**0**	**5**	**0**	**2**	**11**	**5**	**2**	**2**	**3**	**3**	**0**	**12**	
Locally significant as Primary habitat		**Y**	**Y**		**Y**	**Y**	**Y**					**Y**		**Y**	**Y**	**Y**		**Y**	**Y**				

P = Primary habitat, I = Incidental habitat.

342500

[redacted]

6215200

Redacted on Request EPA



SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	29/08/2024
Drawn by	BK
Map author	BA

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Kilometers

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Study area

Scott River Ironstone Association (EN EPBC Act; CR BC Act) recorded in the survey

Scott River Ironstone Association (EN EPBC Act; CR BC Act) DBCA TEC boundary (TEC + buffer)*

*buffers of DBCA TEC polygons are 500 m or 2000 m

Figure 5-9

Native vegetation recorded in the survey considered to represent Scott River Ironstone TEC

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Table 5-13 Vegetation types of the study area within groundwater dependent ecosystems

Vegetation type	Basis for inclusion as GDE	Likely GW dependence[1]
AmBsHc	GDE (TEC)	Obligate
EmmTpAs	GDE (Analogous to TEC[2]); GDE (TEC)	Obligate
Mj	GDE (TEC)	Obligate
MpXpHfSs	GDE (*Melaleuca* spp. dominated - *M. preissiana*)	Facultative
MrCh	GDE (*Melaleuca* spp. dominated - *M. rhaphiophylla*, *M. preissiana*)	Facultative
MrTjLs	GDE (*Melaleuca* spp. Dominated - *M. rhaphiophylla*, *M. preissiana*)	Facultative
XpMdLm	GDE (TEC)	Obligate

[1] Based on available literature for species or community. Assignation is tentative. No site-based assessment of dependence, including assessment against site hydrogeological conditions, has been conducted.
[2]Same vegetation type as the Scott River Ironstone Association TEC but condition of vegetation does not meet criteria for TEC (i.e. is below Good condition).

Table 5-14 Vegetation types recorded with incidental or non-dominant groundwater dependent species

Vegetation type	*Banksia littoralis*	*Banksia ilicifolia*	*Banksia attenuata*	*Melaleuca preissiana*	*Melaleuca rhaphiophylla*
GDE (TEC)					
AmBsHc				✓	
EmmTpAs				✓	
XpMdLm				✓	
Not designated a GDE vegetation type					
AsLs				✓	
CcTpCeOh			✓	✓	
EmmAffMtAsDb		✓	✓		
EmmTpGoMtPu			✓		
EmmXpMtDb	✓	✓		✓	
Mj				✓	
PeeLs	✓			✓	
TiLs					✓

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Study area

Confirmed GDE

Confirmed GDE (Analogous to TEC)

Confirmed GDE (TEC)

Potential GDE

Potential GDE (Melaleuca spp.)

Known to contain record(s) of GDE associated species

Figure 5-10

Location of known or potential groundwater dependent ecosystems

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5.3 SURVEY LIMITATIONS

The limitations of the flora and vegetation survey have been considered in accordance with EPA (2016b) (Table 5-15).

Table 5-15 Consideration of potential survey limitations

Limitations	Comments
Availability of contextual information at a regional and local scale	Not a limitation Desktop review considered 6 floristic surveys in the 'Scott River region'. Due to the detail and extent of those surveys a sufficient amount of floristic information was available.
Competency/experience of the team carrying out the survey	Not a limitation The survey team members were adequately experienced in the methods and species being targeted to complete the required scope of works.
Scope and completeness	Minor limitation The survey was completed in accordance with the scope provided by SynergyRED. Scope of survey was for a single season detailed survey. The absence of a second season is mitigated by repeat survey visits within the single season (as permitted by technical guidance). Desktop review found a high volume of historical significant flora records, and not all were able to be visited. An additional survey targeted survey was undertaken in December 2024 to confirm a greater proportion of records identified in the desktop review. The desktop significant flora records selected to be visited during the targeted survey were chosen by SynergyRED.
Proportion of flora recorded and/or collected, any identification issues	Minor limitation The flora species accumulation curve and comparative floristic statistics for the Warren bioregion and Augusta – Margaret River LGA indicates the survey adequately captured the species present at the time of the survey visits. Fourteen specimens could not be identified to species level due to poor available material. However, only 3 of the unidentified flora have potential to be conservation significant flora. Many revisited locations of historical conservation significant flora were found to be highly degraded or cleared, making these species unlikely to be extant there.
Access within the study area	Not a limitation Wetland areas containing surface water at the times of survey could not be traversed due to practical and safety considerations, and consequently access was restricted for some wetland related areas. Access permissions were at times changeable throughout the length of the survey. Areas south Governor Broome Road were accessible during some field visits but not others. However, the 3 largest and most consolidated area of remnant native vegetation within areas south Governor Broome Road were surveyed and allowed for sufficient data collection.
Timing, rainfall, season	Not a limitation The timing of the flora survey was appropriate for the species potentially occurring. Winter and spring rainfall was less than the long-term average, but not insufficient to expect a lower detectability of most species. While the repeated single season survey conforms with the technical guidance, the addition of a secondary season to the survey may enable the

Limitations	Comments
	detection of a small proportion of flora not evident during the single season performed.
Disturbance that may have affected the results of the survey	Not a limitation The majority of the study area has been widely impacted by agricultural activities, with much of the study area comprised of cleared areas. These impacts can skew the flora and vegetation values of the native remnant patches, but did not interrupt the completion of the survey.

6 DISCUSSION

6.1 FLORA ASSEMBLAGE

The desktop results indicate the study area occurs in a region of high floral richness, and this was reflected in the species assemblage recorded for the study area. The field survey resulted in the identification of 423 flora taxa (comprising 353 native species and 70 introduced species) representing 65 families and 209 genera. While the desktop species records within the 10 km buffer are considerably higher (1,034 native species and 82 introduced species), these would encompass material collected over a wider variety of habitats, seasons, longer period and would include species that flourish after fires and subsequent succession following fires. Further, only a small proportion of the study area lies within the JAF02 subregion, while almost 25% of the desktop review area intersected JAF02, so many of the desktop taxa from this subregion would not be expected to occur in the study area. Species richness was therefore as expected taking these factors into account.

The species accumulation curve indicated that the survey was comprehensive and achieved adequate sampling effort over the sampling time frame. Species richness within and across sampling sites reflected not only vegetation types but levels of disturbance and fragmentation.

The consolidated species list for Scott National Park (Gibson *et al.* 2001) just west of the study area (Figure 3-4) provides a relative indication of flora species richness that might be expected within an intact native landscape of the Scott River Plain. This study identified more than double the native flora of the current survey (744 spp.) within an area of similar size to the study area (roughly 3,300 ha, equating to approximately 4.5 species per ha). The native flora assemblage for the study area however is relatively high in comparison to the data for the park, considering over 80% of the study area is cleared or modified landscape (approximately 3.3 species per ha of native vegetation). This is likely due to the high diversity of native vegetation remnants in the study area, reflected in the large number of vegetation types defined.

The dominant families of Fabaceae, Proteaceae, Poaceae, Myrtaceae, Restionaceae and Cyperaceae largely aligned with the statistics for the desktop search area, Augusta – Margaret River LGA, the Warren bioregion and the Gibson *et al.* (2001) study (Section 5.1.1).

6.2 SIGNIFICANT FLORA

The study area was identified as having a high number and diversity of desktop records for significant flora. Many of these records were confirmed as present in the survey while many others (often older records) were found to be no longer extant due to clearing, record being visited and not found, or the desktop record was inaccurate. New populations were also recorded for several significant species. A total of 74 unique populations of significant flora were delineated, encompassing 60 new populations (1 Threatened species and 59 Priority flora) and 14 confirmed desktop populations (4 Threatened species and 10 Priority flora).

The survey confirmed the presence of 3 Threatened flora (*Grevillea brachystylis* subsp. *australis*, *Lambertia orbifolia* subsp. *vespera* and *Verticordia plumosa* var. *vassensis*), 16 Priority flora, and one species representing a significant range extension in the study area. Comments on significance of records for each is provided in Table 6-1. An additional 3 Threatened and 4 Priority species have previously been recorded within areas of road reserve within the study area. These desktop records were not targeted for survey and confirmed as impacts to these locations were not anticipated by the proponent. These unconfirmed desktop records should be treated as present unless additional targeted surveys are conducted to confirm otherwise. Three collections of material were indeterminate due to poor condition and were considered genera that may represent common species or significant flora: 2 *Caladenia* specimens that may represent *C. abbreviata* (P3) or one of

several common species; one *Boronia* specimen that may represent *B. anceps* (P3) or one of 4 common species; and 3 specimens of sterile *Drosera* that that may represent *D. fimbriata* (P4) or one of several common species.

The persistence of a high number of significant flora records in a highly modified and fragmented landscape is noteworthy but probably not atypical for the region. While it is evident that some loss of significant flora values has occurred due to agricultural practices, this survey also identified several new populations of significant flora. The high number of extant significant flora along roadside verges highlights the value of these corridors to the persistence of these taxa within a fragmented landscape.

Table 6-1 Comments on significant flora recorded in the survey

Species Status	Comments
Lambertia orbifolia subsp. *vespera* T (EN EPBC & BC Acts) (*L. orbifolia sens. lat.* under EPBC Act)	The federal (*sens. lat.*) status for *Lambertia orbifolia* applies to all subspecies entities recognised by the State. One confirmed population in a small vegetation remnant. Plant count from the survey was 4 but corresponding desktop records have a combined count of 114; population therefore likely to be larger than the current plant count. The survey determined that all the other desktop locations in the study area have either been cleared, or GPS coordinates were erroneous/unreliable. Two desktop records in the large vegetation remnant inside (but excised from) the study area were not checked. *L. orbifolia* subsp. *vespera* has some protection in conservation estate (has been recorded in Scott NP and Gingilup Swamps NR). The subspecies however is very habitat-specific, has a highly restricted distribution and limited desktop records, some of which appear to have been lost to clearing. It is therefore likely that any extant population would be considered important to the species survival.
Verticordia plumosa var. *vassensis* T (EN EPBC & BC Acts)	One confirmed population in the study area in roadside vegetation along Governor Broome Road comprising of at least 71 plants. Most of the desktop locations in the study area have either been cleared or sufficiently searched for during a field trip, and therefore are discounted. Species distribution is very fragmented, with known subpopulations occurring in isolated pockets of remnant vegetation, and limited protection in conservation reserves (DSEWPaC 2008b). Population in study area is therefore considered an important population and the vegetation that supports it is important to survival of the species.
Grevillea brachystylis subsp. *australis* T (VU EPBC Act; EN BC Act)	Three confirmed populations (one new and 2 that include confirmed desktop records**)** in the study area. Mainly occurs along roadside vegetation therefore vulnerable to disturbance. Historical record within a cleared portion of the study area was searched and no plants found, therefore this record discounted. Previously only known from 3 populations in the Scott River area (DSEWPaC 2008a), although records and distribution since expanded. Currently 17 records on Florabase (WA Herbarium 1998). Populations appear to be geographically very restricted and in small numbers. Protection in conservation estate appears limited to Scott NP. Populations in the study area are therefore considered important for the long-term survival of the species.

Species Status	Comments
Synaphea nexosa P1 (DBCA)	Three confirmed populations (one new and 2 that include confirmed desktop records) all in narrow roadside vegetation, plus one unconfirmed population in the study area. One additional new population outside the study area. Several old records in the study area discounted due to being cleared, GPS coordinates were erroneous/unreliable or sufficiently searched for during a field trip. Populations in the study area vulnerable to threatening processes as narrow roadside vegetation. The new population outside of the study area occurs in vegetation type EmmXpMtDb, on the boundary of South Blackwood State Forest; there are highly likely to be more yet undocumented populations in the State forest. The records from the survey (38 plants) have more than doubled the known occurrences but given the limited desktop records for the species the populations inside the study area are likely to be considered important.
Boronia anceps P3 (DBCA)	One individual recorded as part of a previously known population on Scott River Road and 4 new populations comprising 159 plants were found during the survey. The 3 new populations were recorded in narrow road reserve vegetation, 2 on Dennis Road and the third in a small remnant north of Governor Broome Road. Each is therefore vulnerable to disturbance from the road. An additional unconfirmed population remains in the study area. Much of the desktop locations in the study area have either been cleared or sufficiently searched for during a field trip, and therefore are discounted. Reasonably widespread species with 17 localities known within Florabase (WA Herbarium 1998).
Calothamnus lateralis var. *crassus* P3 (DBCA)	Two populations with desktop records confirmed in study area, along with 12 new populations. One additional unconfirmed population in study area. A total of 2,334 individual plants were recorded during the survey; 2,009 of these are outside the study area boundary. Some of the desktop records could be discounted as they sufficiently searched for during a field trip. Species occurs in diverse vegetation types: AsLs, CcTlXpAp, ClcVj, Cleared, EmmAffMtAsDb, EmmTpAs, EmmXpMtDb, MrCh, PeeLs, TiLs, XpAs and XpMdLM. Florabase records (WA Herbarium 1998) indicate that *C. lateralis* var. *crassus* is relatively common within its range.
Chorizema carinatum P3 (DBCA)	Two new populations recorded, one inside study area in the RIA at the intersection of Sues Road and Brockman Highway in Blackwood River National Park, and the other outside the study area in roadside vegetation contiguous with South Blackwood State Forest. No desktop records for this species in the study area. Both populations considered significant as few historical records exist and both populations occur in conservation estate. The population at the RIA extends outside the study area. Further surveys in the vicinity of these records would also likely extend their population boundaries and it is highly likely additional populations occur elsewhere in Blackwood River National Park and South Blackwood State Forest.
Dampiera heteroptera P3 (DBCA)	Four new populations recorded in study area. Only 10 plants recorded but collected from a range of vegetation types (CcTlXpAp, CcTpCeOh, ClcVj, EmmXpMtDb and XpAs). No desktop records of the species in the study area. Appears to have a fairly wide distribution. The 18 historical records on Florabase (WA Herbarium 1998) indicate that at least 67 plants occur elsewhere but highly likely to be additional populations. Several of the Florabase records appear to be in conservation estate therefore species is relatively well protected.

Species Status	Comments
Gastrolobium formosum P3 (DBCA)	One population recorded in study area includes confirmed desktop records, with 30 individual plants recorded. One additional unconfirmed population in study area. Most of the desktop locations in the study area have either been cleared or sufficiently searched for during a field trip, and therefore are discounted. Relatively large number of records in Florabase (WA Herbarium 1998) for this species (39), supporting at least 400 individuals and several of the desktop records appear to be in conservation reserve therefore species is relatively well protected.
Grevillea manglesioides subsp. *ferricola* P3 (DBCA)	Six populations recorded in the study area, comprising 5 new populations and one population that includes confirmed desktop records. One additional unconfirmed population in study area. One historic population supporting 100 individuals was discounted as it is now cleared farmland and several additional desktop records were also discounted because they were either cleared or sufficiently searched for. A total of 90 individual plants recorded in the survey (all but one occur inside the study area). Species has a fairly wide distribution occurring across 3 bioregions. Florabase records (WA Herbarium 1998) indicate the species is often abundant where it occurs (i.e. notes of frequent, abundant and common against records in the database). However, the confirmed desktop population that runs along Governor Broome Road encompasses at least 214 plants (only includes Phoenix plant counts) which is the largest known population of this species.
Grevillea papillosa P3 (DBCA)	Twelve recorded populations in the study area, comprising 11 new, and one population that include confirmed desktop records. Two additional unconfirmed populations in study area. A total of 396 individual plants recorded during the survey Fairly narrow distribution but large number of records (31) in Florabase (WA Herbarium 1998). Notes of frequent, 100s of plants, locally abundant and common, indicate the populations in the study area are unlikely to represent a significant proportion of the total population.
Isopogon formosus subsp. *dasylepis* P3 (DBCA)	One new population of 14 plants recorded in study area along Dennis Road verge. No desktop records in the study area. Large number of records in Florabase (WA Herbarium 1998) and a wide distribution. Population in the study area is unlikely to represent a significant proportion of the total population.
Leucopogon alternifolius P3 (DBCA)	Two new populations recorded in study area. Both populations detected in quadrats at cover values 1% and 2%, suggesting multiple plants present in each. No desktop records of *Leucopogon alternifolius* within the study area. Previously recorded 14 m west of the study area, one of 17 records of the species for which an estimated 1,269 individuals are extant. Has a relatively wide distribution extending east to Albany.
Loxocarya magna P3 (DBCA)	Five recorded populations in the study area, comprising of 4 new, and one that includes confirmed desktop records. All are in remnant roadside vegetation. A total of 189 individual plants recorded and species is an understorey component of the XpMdLm. Most of the desktop locations in the study area have either been cleared or sufficiently searched for during a field trip, and therefore are discounted. Large number of Florabase records (WA Herbarium 1998), many indicating *L. magna* is abundant at the site, with plant counts including 250+, 200+ plants. Five desktop populations are known from outside the study area on Scott River Road in an unassessed remnant near to Governor Broome Road. The species has a wide, although disjunct distribution across 4 bioregions. Several Florabase records are in conservation estate, so it is relatively well protected.

Species Status	Comments
Netrostylis sp. Blackwood River (A.R. Annels 3043) P3 (DBCA)	Single plant recorded as a new population in a road verge intersection of Brockman Hwy and Sues Road. No desktop records in the study area. Very widespread but poorly known species. Florabase (WA Herbarium 1998) contains only 16 historical records with frequencies described as rare, isolated or sometimes common. This location is relatively high in the landscape and the habitat of the species is described as seasonally wet or in permanent creeklines, so it is unlikely that there are many more plants of this taxon in the area.
Adenanthos detmoldii P4 (DBCA)	Eight populations recorded in the study area comprising 7 new populations and one population that include confirmed desktop records. Two additional unconfirmed populations in the study area. A total of 1,779 (18 outside the study area) individual plants were recorded. *A. detmoldii* has been reasonably well collected, with 43 Florabase records (WA Herbarium 1998), many with notes of locally abundant, frequent, common, or 100s or 1000s of plants. The species is habitat-specific but was recorded within 4 vegetation types, in cleared land and along road verges, therefore appears to be quite resilient.
Adenanthos x *pamela* P4 (DBCA)	One new population recorded in the study are in roadside vegetation, with 2 plants recorded. No desktop records in the study area. The available records indicate that this species is sparse, habitat-specific and in low numbers at the 10 historical localities it was recorded. Thus, this small population is considered significant.
Aotus carinata P4 (DBCA)	Three new populations recorded in the study area on winter-wet depressions & drainage lines. A total of 18 individual plants recorded. The 2 desktop records within the study area (each considered a unique population) were discounted because it was either cleared or sufficiently searched for during a field trip. Fourteen records in Florabase (WA Herbarium 1998), with very limited abundance data. The distribution is disjunct with most records north of Augusta and 2 records near Walpole. The records within the study area are considered significant given the paucity of knowledge of this species.
Melaleuca basicephala P4 (DBCA)	Two new populations recorded. Fifty plants recorded at one population outside study area along Dennis Road, in road verge that is contiguous with South Blackwood State Forest. One plant in the study area at the second population at the intersection of Chester Road and Brockman Highway. No desktop records in study area. Both populations likely extent further into the adjacent remnant vegetation. Species has a distribution (from 30 records) extending from Margaret River to Windy Harbour. Several of the Florabase records (WA Herbarium 1998) have notes of common, locally abundant or frequent. Survey records therefore unlikely to represent a significant portion of the total population and the 2 plants recorded in the study area would represent a negligible proportion.
Centrolepis strigosa subsp. *strigose* RE approx. 215 km WNW	One individual of *Centrolepis strigosa* subsp. *strigosa* recorded in the study area, approximately 215 km WNW of the closest historical record. Although not of conservation significance in that this species is widespread and common, the record can be considered locally significant due to an extension of range. The one plant was recorded at one locality in a roadside drainage channel near site BEE295R in XpAs vegetation. It is possible that other individuals occur within similar habitats in the study area and beyond.

6.3 INTRODUCED FLORA

No WoNS or Declared Pest flora species were recorded in the study area.

A total of 317 introduced species have been recorded in the August – Margaret River LGA, which represents 10% of the flora known from the LGA. The NatureMap search recorded 81 introduced species or 7.3% of the total flora (1,105) for the search area.

Introduced flora comprised 16.3% (69 species) of the flora species recorded during the survey, higher than for the LGA and NatureMap search areas. This is not surprising given that 79% of the study area was classified as Completely Degraded and is highly fragmented. The families with the greatest proportions of introduced species were Asteraceae and Poaceae. Of 15 Asteraceae taxa 10 (75%) were introduced species, and of 32 Poaceae taxa in the study area 23 (72%) were introduced species. These statistics reflect the levels of disturbance throughout the study area and its primary use as dairying/grazing country.

One individual plant of **Juncus oxycarpus* in vegetation type AmBsHc represents a 120 km range extension, WSW of the closest historical record.

6.4 VEGETATION

The desktop assessment identified 11 pre-European vegetation associations (scale of 1:1,000,000) in the study area (Table 5-2). These were dominated by *Melaleuca* sp. low woodland (59.1%), *Melaleuca incana* shrublands on ironstone (14%), swampland (12.4%), Jarrah (5.4%), Jarrah-Marri (*Banksia*) (5.3%) and *Banksia* low woodland (1.8%) (DPIRD 2018). Seven of these are of Least concern. Four associations (1137, 51, 949 and 973) all have extents considered to be either Depleted or Vulnerable; however, they are not considered to be highly concerning due to mitigating factors, i.e. a substantial current extent, a substantial current extent in DBCA lands, or a small extent within study area.

The remaining vegetation association, 1137, is Depleted within the Warren bioregion and statewide extents; it has a very small current extent (346.53 ha) and encompasses over 17% (670.13 ha) of the study area. When considering all these parameters, this vegetation association is considered the most vulnerable, as a significant portion of the current remaining extent occurs within the study area, and considering it has such a small remaining extent left, any clearance may be detrimental.

The vegetation types defined by this survey align well with the pre-European categories except for the *Melaleuca incana* shrublands on ironstone. Either they were completely cleared during the development of extensive agricultural and silvicultural ventures in the study area (and region) or were an artifact of mapping extrapolation. Given they comprised a very small part of the study area, it is considered most likely they were cleared. *Melaleuca incana* was recorded in the study area but not as a dominant species in any strata.

The current survey found that the study area comprised largely cleared (68.7%) and modified landscapes (*Agonis flexuosa* var. *flexuosa* (Peppermint) over pasture, pine and *Eucalyptus* plantations (13.3%)). The native vegetated portion comprised the following broad vegetation types in order of dominance: Jarrah woodlands and forests (30.70%), Mixed (Proteaceae/ Fabaceae/ Myrtaceae-dominated) shrublands (18.92%), Paperbark woodland swamps (17.08%), Myrtaceae-dominated shrublands (10.74%) and Jarrah-Marri woodland and forests (10.03%). The Aff (Peppermint over pasture) vegetation type is considered a modified landscape due to do extensive historical clearing, however it is also included in the native vegetated portion (12.51%) due to the defining presence of *Agonis flexuosa* var. *flexuosa.*

Four native vegetation types mapped in the study area were considered regionally significant as they represent occurrences of the Scott River Ironstone Association TEC (where their condition was rated Good or above) (Table 5-11). The species suite in these vegetation types (EmmTpAs, XpMdLm, Mj and AmBsHs) and their habitat aligned them with the TEC. The area occupied by Scott River Ironstone TEC within the study area is 109.5 ha, equivalent to 2.81% of the total study area, and 13.86% of the native vegetated portion of study area. Overall, despite the significant areas of cleared and degraded vegetation within the study area, the remnants within - particularly along the Governor Broome Road, Dennis Road, and Scott River Road - are of conservation significance. Sections of these roads are

recognised as TEC and support numerous Threatened and Priority species that are reliant on highly restricted habitat. In 2000, only 18% of the TEC remained and many of the remaining occurrences of the TEC continue to be vulnerable to threatening processes, particularly as most of them are highly fragmented and/or linear areas with extensive edges (high length to wide ratio). Therefore, it would be prudent to ensure that these areas are subjected to minimal disturbance.

Fifteen of the 18 native vegetation types mapped in the study area were considered locally significant, either as primary habitat for significant flora, as a restricted vegetation type and/or representing a potential GDE (Table 5-11). Three vegetation types were designated as locally significant as their extent within the study area was less than 1% of the native vegetated portion. These vegetation types comprised shrublands over sedgelands (AmBsHc (also TEC), ClcVj, and MpXpHfSs).

Two other vegetation types (CcTlXpAp and EmmTpGoMtPu) represent less than 1% of the native vegetated cover in the study area, and are entirely within the RIA; however, they were not considered as locally significant because aerial interpretation of the vegetation beyond these intersections indicates that the vegetation types extend well beyond the boundaries of the survey.

Eleven vegetation types were considered to have local significance as they provided habitat for significant flora (Table 5-11). Two vegetation types were recognised as having high habitat value for supporting several significant species, including those that appear to rely on the assemblages for primary habitat - EmmXpMtDb is habitat for 11 significant taxa, and EmmTpAs habitat for 8 significant taxa.

Most vegetated road verges and remnant vegetation patches supported a reasonable floristic diversity and vegetation structure, despite numerous threatening processes such as weed invasion, fire, road maintenance and adjacent clearing.

The only vegetation type that identified as significant in all 4 categories (TEC, restricted, habitat for significant flora and GDE) was AmBsHc.

6.5 CONCLUSION

Over 80% of the approximately 3,891 ha study area for this survey comprised cleared areas or non-native landscapes. Despite this, a high diversity of vegetation types and high floral diversity were recorded within the approximately 790 ha of native vegetation remnants and roadside vegetation corridors. These support a suite of flora and vegetation values of both regional significance (TEC) and local significance (significant flora, restricted vegetation communities, potential GDEs).

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Appendix 1 Survey site locations

Site name	Sample type	Latitude	Longitude
BEE001	Quadrat	-34.18154	115.27290
BEE002	Quadrat	-34.19907	115.29197
BEE003	Quadrat	-34.19889	115.29234
BEE004	Quadrat	-34.25589	115.30065
BEE005	Quadrat	-34.19608	115.29420
BEE007	Quadrat	-34.21340	115.29862
BEE030	Quadrat	-34.25124	115.28795
BEE032	Quadrat	-34.19892	115.26659
BEE039	Quadrat	-34.20166	115.26718
BEE044	Quadrat	-34.24693	115.30490
BEE046	Quadrat	-34.23277	115.29994
BEE048	Quadrat	-34.24844	115.26932
BEE051	Quadrat	-34.25014	115.26921
BEE053	Quadrat	-34.25036	115.26971
BEE054	Quadrat	-34.25049	115.27402
BEE055	Quadrat	-34.25071	115.27574
BEE056	Quadrat	-34.25090	115.27734
BEE057	Quadrat	-34.22076	115.30765
BEE058	Quadrat	-34.25126	115.28015
BEE059	Quadrat	-34.25143	115.28122
BEE060	Quadrat	-34.25166	115.28382
BEE061	Quadrat	-34.25144	115.28598
BEE062	Quadrat	-34.18771	115.28733
BEE063	Quadrat	-34.25127	115.28981
BEE066	Quadrat	-34.17564	115.29328
BEE067	Quadrat	-34.17504	115.28007
BEE068	Quadrat	-34.17444	115.28662
BEE070	Quadrat	-34.17970	115.28383
BEE080	Quadrat	-34.17684	115.29260
BEE082	Quadrat	-34.23910	115.30622
BEE083	Quadrat	[redacted]	[redacted]
BEE084	Quadrat	-34.23958	115.30649
BEE100	Quadrat	-34.19105	115.27310
BEE101	Quadrat	-34.19769	115.28845
BEE102	Quadrat	-34.19614	115.28875
BEE104	Quadrat	-34.20132	115.29241
BEE106	Quadrat	-34.17598	115.27045
BEE107	Quadrat	-34.20597	115.29394
BEE112	Quadrat	-34.25159	115.28287
BEE113	Quadrat	-34.25014	115.27189
BEE114	Quadrat	[redacted]	[redacted]

Site name	Sample type	Latitude	Longitude
BEE118	Quadrat	-34.19058	115.27270
BEE119	Quadrat	-34.17444	115.27042
BEE122	Quadrat	-34.20109	115.29710
BEE201	Quadrat	-34.20072	115.29788
BEE203	Quadrat	-34.19969	115.31446
BEE251	Quadrat	-34.22597	115.30810
BEE252	Quadrat	-34.22565	115.30689
BEE256	Quadrat	-34.23026	115.30628
BEE259	Quadrat	-34.22936	115.31107
BEE262	Quadrat	-34.23063	115.30576
BEE264	Quadrat	-34.23370	115.30796
BEE265	Quadrat	-34.23312	115.30802
BEE266	Quadrat	-34.23342	115.30710
BEE271	Quadrat	-34.22661	115.31232
BEE274	Quadrat	-34.21902	115.30824
BEE275	Quadrat	-34.21955	115.30216
BEE276	Quadrat	-34.21942	115.30260
BEE282	Quadrat	-34.24547	115.32091
BEE286	Quadrat	-34.19062	115.27884
BEE293	Quadrat	-34.15887	115.27867
BEE294	Quadrat	-34.15879	115.27777
BEE304	Quadrat	-34.24057	115.30640
BEE312	Quadrat	-34.24173	115.31326
BEE374	Quadrat	-34.16081	115.31282
BEE375	Quadrat	-34.16017	115.31238
BEE376	Quadrat	-34.22095	115.26883
BEE377	Quadrat	-34.19892	115.31385
BEE378	Quadrat	-34.15604	115.40140
BEE379	Quadrat	-34.15615	115.40218
BEE380	Quadrat	-34.15667	115.40151
BEE381	Quadrat	-34.15674	115.40208
BEE033R	Relevé	-34.19963	115.26632
BEE069R	Relevé	-34.18033	115.28403
BEE071R	Relevé	-34.21145	115.28398
BEE073R	Relevé	-34.24548	115.28650
BEE075R	Relevé	-34.24627	115.28571
BEE085R	Relevé	-34.23958	115.30623
BEE115R	Relevé	-34.21471	115.26866
BEE200R	Relevé	-34.22870	115.26897
BEE202R	Relevé	-34.20565	115.31543
BEE254R	Relevé	-34.16073	115.31242

Site name	Sample type	Latitude	Longitude
BEE283R	Relevé	-34.18425	115.27253
BEE287R	Relevé	-34.18775	115.28703
BEE302R	Relevé	-34.24003	115.30789
BEE313R	Relevé	-34.24097	115.31335
BEE318R	Relevé	-34.18156	115.27164
BEE321R	Relevé	-34.19859	115.26706
BEE324R	Relevé	-34.19428	115.26732
BEE327R	Relevé	-34.20155	115.26763
BEE329R	Relevé	-34.20479	115.26831
BEE331R	Relevé	-34.24993	115.26984

Site name	Sample type	Latitude	Longitude
BEE332R	Relevé	-34.20757	115.29361
BEE366R	Relevé	-34.19996	115.26649
BEE371R	Relevé	-34.24021	115.30676
BEE373R	Relevé	-34.24310	115.30700
BEE382R	Relevé	-34.25206	115.28386
BEE383R	Relevé	-34.25203	115.28416
BEE387R	Relevé	-34.22783	115.32304
BEE388R	Relevé	-34.24027	115.32343
BEE389R	Relevé	-34.17897	115.28139
BEE390R	Relevé	-34.17510	115.28277

Appendix 2 Flora survey site descriptions

Site details			
Site	**BEE001**	**Position (WGS84)**	115.27290749374336, -34.1815379681384
Slope	gentle	**Topography**	seasonally wet area
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Agonis flexuosa* var. *flexuosa* low open woodland over *Astartea scoparia* and *Callistachys lanceolata* tall shrubland over *Leptocarpus scariosus* tall open rushland.
Habitat	shrubland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	65.0	**Grass cover (%)**	10.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Andrew Perkins

Species (8)	Status	Cover (%)	Height (m)
Astartea scoparia		35.0	4.0
Callistachys lanceolata		25.0	5.0
Leptocarpus scariosus		10.0	1.2
Agonis flexuosa var. *flexuosa*		5.0	4.0
Microtis media subsp. *media*		0.1	0.2
Thelymitra flexuosa		0.1	0.1
Aphelia cyperoides		0.1	0.1
Drosera pulchella		0.1	0.02

Site details			
Site	**BEE002**	**Position (WGS84)**	115.29199831842045, -34.19906136743356
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Loamy sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (23 Oct 2023)

Site description	*Melaleuca rhaphiophylla*, and *Callistachys lanceolata* low open forest over *Lepidosperma striatum*, and *Cyathochaeta clandestina* tall open sedgeland.
Habitat	waterhole
Disturbance	evidence of feral animals, grazing-low, large-scale clearing

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	72.0
Shrub cover (%)	0.0	**Grass cover (%)**	15.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	23 Oct 2023	10m x 10m	Brody Loneragan

Species (6)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		22.0	12.0
Callistachys lanceolata		15.0	5.0
Lepidosperma striatum		8.0	1.3
Cyathochaeta clandestina		7.0	1.3
Anigozanthos flavidus		0.1	0.8
Pteridium esculentum subsp. *esculentum*		0.1	0.8

Site details			
Site	**BEE003**	**Position (WGS84)**	115.29234220480589, -34.19888182026963
Slope	gentle	**Topography**	seasonally wet area
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (23 Oct 2023)

Site description	*Taxandria inundata, Astartea scoparia* and tall closed shrubland over *Hakea lasianthoides, Bossiaea rufa* and *Calothamnus lateralis* var. *crassus* mid sparse shrubland over *Leptocarpus scariosus* tall rushland.
Habitat	shrubland
Disturbance	large-scale clearing, grazing-low

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95.0	**Tree cover (%)**	0.0
Shrub cover (%)	95.0	**Grass cover (%)**	0.0
Herb cover (%)			



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	23 Oct 2023	10m x 10m	Brody Loneragan

Species (6)	Status	Cover (%)	Height (m)
Taxandria inundata		70.0	3.5
Leptocarpus scariosus		60.0	2.0
Bossiaea rufa		3.0	2.0
Astartea scoparia		2.0	3.0
Hakea lasianthoides		2.0	1.2
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.5	2.0

Site details			
Site	**BEE004**	**Position (WGS84)**	115.3007, -34.2559
Slope	gentle	**Topography**	sandy rise
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (27 Oct 2023)

Site description	*Agonis flexuosa* mid woodland over grassland of **Lollium perenne, *Hordium leporinum* and **Ehrhartia longiflora,* over **Geranium purpureum, Gernanium solanderi* and **Trifolium repens.*
Habitat	woodland
Disturbance	evidence of feral animals, grazing-high, historic clearing, livestock tracks, weed infestation

Vegetation condition	Degraded	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	50.0
Shrub cover (%)	0.0	**Grass cover (%)**	43.0
Herb cover (%)	1.5		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	27 Oct 2023	10m x 10m	Andrew Perkins

Species (10)	Status	Cover (%)	Height (m)
Agonis flexuosa var. *flexuosa*		50.0	10.0
**Lolium rigidum*	Weed	15.0	0.4
**Hordeum leporinum*	Weed	15.0	0.4
**Ehrharta longiflora*	Weed	7.0	0.4
**Bromus diandrus*	Weed	5.0	0.5
Geranium solanderi		0.5	0.3
**Geranium purpureum*	Weed	0.5	0.2
**Trifolium repens*	Weed	0.2	0.1
**Rumex crispus*	Weed	0.1	0.1
**Sonchus oleraceus*	Weed	0.1	0.1

Site details			
Site	**BEE005**	**Position (WGS84)**	115.29419970709392, -34.19608283325489
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Astartea scoparia, Taxandria inundata* and *Hakea linearis* tall shrubland over *Machaerina rubiginosa* and *Leptocarpus scariosus* tall open rushland over **Mentha pulegium, *Rumex conglomeratus* and **Glyceria declinata* mid forbland.

Habitat	shrubland		
Disturbance	weed infestation		
Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	50.0	**Grass cover (%)**	15.0
Herb cover (%)	10.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Andrew Perkins

Species (12)	Status	Cover (%)	Height (m)
Astartea scoparia		28.0	3.5
Taxandria inundata		15.0	3.5
Machaerina rubiginosa		11.0	1.2
**Mentha pulegium*	Weed	8.0	0.8
Hakea linearis		5.0	0.6
**Rumex conglomeratus*	Weed	2.0	1.7
Leptocarpus scariosus		2.0	1.2
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	1.0	1.5
**Glyceria declinata*	Weed	1.0	0.2
Alternanthera nodiflora		0.2	0.4
Hakea ceratophylla		0.1	1.0
**Symphyotrichum squamatum*	Weed	0.1	0.7

Site details			
Site	**BEE007**	**Position (WGS84)**	115.29859651638694, -34.21338941371955
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina* and *Melaleuca rhaphiophylla* low open forest over *Cycnogeton huegelii, Microtis media* subsp. *media* and *Pterostylis vittata* low isolated forbs.
Habitat	waterhole
Disturbance	large-scale clearing, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	40.0	**Tree cover (%)**	0.0
Shrub cover (%)	40.0	**Grass cover (%)**	1.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (10)	Status	Cover (%)	Height (m)
Taxandria juniperina		32.0	15.0
Melaleuca rhaphiophylla		8.0	10.0
Cycnogeton huegelii		1.0	0.4
Microtis media subsp. *media*		0.1	0.4
Pterostylis vittata		0.1	0.3
**Cerastium glomeratum*	Weed	0.1	0.1
Pterostylis erubescens		0.1	0.1
Senecio picridioides		0.1	0.1
Poaceae sp.		0.1	0.1
Caladenia flava		0.1	0.1

Site details			
Site	**BEE030**	**Position (WGS84)**	115.2879436, -34.25124771
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (13 Nov 2023)

Site description	*Banksia nivea* subsp. *nivea*, *Grevillea manglesioides* subsp. *ferricola* and *Acacia myrtifolia* low shrubland over **Juncus articulatus* mid sparse rushland over *Hypolaena exsulca*, *H. pubescens* and *Dasypogon bromeliifolius* mid isolated forbs.

Habitat	shrubland		
Disturbance	weed infestation		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	70.0	**Tree cover (%)**	0.0
Shrub cover (%)	60.0	**Grass cover (%)**	10.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	13 Nov 2023	10m x 10m	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
Banksia nivea subsp. *nivea*		15.0	0.7
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	4.0	0.7
**Juncus articulatus*	Weed	4.0	0.5
Hypolaena exsulca		3.0	0.6
Acacia myrtifolia		2.0	0.9
Hakea sulcata		2.0	0.8
Dasypogon bromeliifolius		2.0	0.7
Hypolaena pubescens		1.0	0.7
Lyginia imberbis		1.0	0.5

Site details			
Site	**BEE032**	**Position (WGS84)**	115.26658753133377, -34.1989163908561
Slope	gentle	**Topography**	drainage line
Soil colour	white	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Homalospermum firmum, Astartea scoparia* and *Beaufortia sparsa* tall open shrubland over *Leptocarpus laxus* and *L. scariosus* tall open rushland over **Hypochaeris glabra*, *Melanostachya ustulata* and *Hypolaena caespitosa* mid open forbland.

Habitat	shrubland		
Disturbance	historic clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	50.0	**Tree cover (%)**	0.0
Shrub cover (%)	12.0	**Grass cover (%)**	25.0
Herb cover (%)	10.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	5 x 20 m	Brody Loneragan

Species (23)	Status	Cover (%)	Height (m)
Homalospermum firmum		8.0	2.0
Astartea scoparia		5.0	2.0
Leptocarpus laxus		5.0	1.0
Beaufortia sparsa		4.0	2.0
Leptocarpus scariosus		4.0	1.4
Melanostachya ustulata		4.0	0.8
**Hypochaeris glabra*	Weed	4.0	0.05
Sporadanthus strictus		3.0	1.0
Hypolaena caespitosa		3.0	0.8
Evandra aristata		2.0	1.0
**Vulpia myuros*	Weed	2.0	0.1
**Ursinia anthemoides* subsp. *anthemoides*	Weed	1.0	0.5
Xanthorrhoea preissii		1.0	0.4
**Briza maxima*	Weed	1.0	0.4
**Lolium perenne*	Weed	0.5	0.5
Trachymene pilosa		0.5	0.5
Rhodanthe citrina		0.5	0.2
Centrolepis aristata		0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.05
Cassytha racemosa forma *pilosa*		0.01	1.0
Levenhookia pusilla		0.01	0.03
**Cotula turbinata*	Weed	0.01	0.01
Aphelia cyperoides		0.01	0.01

Site details			
Site	**BEE039**	**Position (WGS84)**	115.2671628102489, -34.201619864719795
Slope	gentle	**Topography**	sandy rise
Soil colour	grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* low open forest over *Adenanthos meisneri*, *Melaleuca thymoides* and *Acacia pulchella* var. *pulchella* low sparse shrubland over *Anarthria scabra, Lyginia imberbis* and *Anarthria prolifera* mid tall closed sedgeland over *Dasypogon bromeliifolius* low sparse forbland.
Habitat	forest
Disturbance	vehicle tracks, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	35.0
Shrub cover (%)	8.0	**Grass cover (%)**	80.0
Herb cover (%)	8.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Brody Loneragan

Species (20)	Status	Cover (%)	Height (m)
Anarthria scabra		80.0	1.0
Eucalyptus marginata subsp. *marginata*		35.0	8.0
Dasypogon bromeliifolius		10.0	0.2
Agonis flexuosa var. *flexuosa*		5.0	8.0
Adenanthos meisneri		3.0	0.4
Melaleuca thymoides		2.0	0.6
Lyginia imberbis		2.0	0.6
Adenanthos obovatus		1.0	1.5
Jacksonia horrida		1.0	1.5
Acacia pulchella var. *pulchella*		1.0	1.0
Bossiaea praetermissa		0.5	0.1
Anarthria prolifera		0.1	3.0
Taxandria parviceps		0.1	0.4
Opercularia hispidula		0.1	0.4
Thysanotus manglesianus		0.1	0.3
Gompholobium scabrum		0.1	0.3
**Briza maxima*	Weed	0.1	0.2
Dampiera leptoclada		0.1	0.2
Stylidium caespitosum		0.1	0.1
Phlebocarya ciliata		0.01	0.2

Site details			
Site	**BEE044**	**Position (WGS84)**	115.3048934229792, -34.246907760421045
Slope	negligible	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (27 Oct 2023)

Site description	*Melaleuca preissiana* and *M. rhaphiophylla* low open forest over *Astartea scoparia* tall isolated shrubs over *Lepidosperma longitudinale* tall isolated sedges over *Thelymitra mucida* low isolated forbs.
Habitat	forest
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	45.0
Shrub cover (%)	0.1	**Grass cover (%)**	5.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	27 Oct 2023	10m x 10m	Andrew Perkins

Species (5)	Status	Cover (%)	Height (m)
Melaleuca preissiana		25.0	15.0
Melaleuca rhaphiophylla		20.0	15.0
Lepidosperma longitudinale		15.0	2.2
Astartea scoparia		0.1	3.5
Thelymitra mucida		0.1	0.2

Site details			
Site	**BEE046**	**Position (WGS84)**	115.29994048117102, -34.23280101034713
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina, Callistachys lanceolata* and *Melaleuca rhaphiophylla* low closed forest over *Leptocarpus scariosus* and *Isolepis hookeriana* mid isolated sedges over **Anthoxanthum odoratum, *Rumex acetosella* and *Lolium rigidum* low isolated forbs.

Habitat	waterhole		
Disturbance	grazing-low, large-scale clearing, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	2.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	5 x 20 m	Brody Loneragan

Species (11)	Status	Cover (%)	Height (m)
Taxandria juniperina		72.0	13.0
Callistachys lanceolata		40.0	4.0
Leptocarpus scariosus		5.0	1.2
Melaleuca rhaphiophylla		4.0	8.0
**Anthoxanthum odoratum*	Weed	2.0	0.2
**Rumex acetosella*	Weed	2.0	0.2
**Solanum nigrum*	Weed	0.1	0.2
**Lolium rigidum*	Weed	0.1	0.2
**Lotus subbiflorus*	Weed	0.1	0.1
**Vulpia bromoides*	Weed	0.1	0.1
Isolepis hookeriana		0.1	0.1

Site details			
Site	**BEE048**	**Position (WGS84)**	115.269338, -34.24843006
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Taxandria juniperina* and *Agonis flexuosa* var. *flexuosa* low forest over *Jacksonia horrida, Acacia pulchella* var. *pulchella* and *Melaleuca thymoides* mid isolated shrubs over *Pteridium esculentum* subsp. *esculentum* mid open fernland over *Anarthria scabra, Lepidosperma squamatum* and *Anarthria prolifera* sedgeland.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	75.0
Shrub cover (%)	0.5	**Grass cover (%)**	35.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Andrew Perkins

Species (20)	Status	Cover (%)	Height (m)
Taxandria juniperina		60.0	16.0
Agonis flexuosa var. *flexuosa*		25.0	12.0
Anarthria scabra		20.0	0.7
Pteridium esculentum subsp. *esculentum*		10.0	1.4
Jacksonia horrida		0.5	1.6
Lepidosperma squamatum		0.5	0.8
Xanthorrhoea preissii		0.3	0.8
Anarthria prolifera		0.3	0.3
Phlebocarya ciliata		0.3	0.2
Melaleuca thymoides		0.2	1.2
Acacia pulchella var. *pulchella*		0.2	1.0
**Anthoxanthum odoratum*	Weed	0.2	0.7
Lyginia imberbis		0.2	0.6
Hypolaena viridis		0.2	0.4
Dasypogon bromeliifolius		0.2	0.2
Billardiera floribunda		0.1	0.8
**Sonchus asper*	Weed	0.1	0.8
Hypocalymma ericifolium		0.1	0.6
**Briza maxima*	Weed	0.1	0.6
**Lotus subbiflorus*	Weed	0.1	0.2

Site details			
Site	**BEE051**	**Position (WGS84)**	115.2691977, -34.25016445
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Nuytsia floribunda, Agonis flexuosa* var. *flexuosa* and *Banksia attenuata* low open forest over *Jacksonia horrida* and *Melaleuca thymoides* mid isolated shrubs over *Anarthria scabra* and *A. prolifera* mid sedgeland over *Dasypogon bromeliifolius*, *Phlebocarya ciliata* and *Melanostachya ustulata* mid isolated forbs.

Habitat	forest
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	35.0
Shrub cover (%)	5.0	**Grass cover (%)**	60.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Andrew Perkins

Species (24)	Status	Cover (%)	Height (m)
Anarthria scabra		45.0	0.6
Nuytsia floribunda		25.0	6.0
Agonis flexuosa var. *flexuosa*		10.0	14.0
Banksia attenuata		5.0	4.0
Anarthria prolifera		1.0	0.5
Dasypogon bromeliifolius		0.5	0.6
Phlebocarya ciliata		0.3	0.2
Jacksonia horrida		0.2	1.5
Melaleuca thymoides		0.2	1.2
Eucalyptus marginata subsp. *marginata*		0.2	1.1
Melanostachya ustulata		0.2	0.6
Anigozanthos flavidus		0.1	1.9
Billardiera fusiformis		0.1	1.1
**Avena barbata*	Weed	0.1	0.9
Evandra aristata		0.1	0.8
**Anthoxanthum odoratum*	Weed	0.1	0.7
**Briza maxima*	Weed	0.1	0.7
Johnsonia lupulina		0.1	0.6
**Holcus lanatus*	Weed	0.1	0.6
Adenanthos obovatus		0.1	0.5
**Sonchus oleraceus*	Weed	0.1	0.2
**Lysimachia arvensis*	Weed	0.1	0.1
**Briza minor*	Weed	0.1	0.1
Homalospermum firmum		0.0	1.6

Site details			
Site	**BEE053**	**Position (WGS84)**	115.269708, -34.2503363
Slope	gentle	**Topography**	sandy rise
Soil colour	white, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Melaleuca thymoides, Jacksonia horrida* and *Kunzea recurva* mid sparse shrubland over *Anarthria scabra* and *Evandra aristata* mid closed sedgeland over *Dasypogon bromeliifolius, Melanostachya ustulata* and *Phlebocarya ciliata* mid isolated forbs.
Habitat	shrubland
Disturbance	evidence of feral animals, weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	90.0	**Tree cover (%)**	0.0
Shrub cover (%)	7.0	**Grass cover (%)**	90.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Andrew Perkins

Species (25)	Status	Cover (%)	Height (m)
Anarthria scabra		90.0	0.9
Melaleuca thymoides		6.0	1.4
Jacksonia horrida		1.0	1.4
Evandra aristata		0.5	1.5
Kunzea recurva		0.5	1.2
Dasypogon bromeliifolius		0.5	0.5
Beaufortia sparsa		0.3	1.8
Melanostachya ustulata		0.3	1.0
Euchilopsis linearis		0.3	0.3
Phlebocarya ciliata		0.3	0.2
Acacia uliginosa		0.2	1.0
Adenanthos obovatus		0.2	0.7
Hypocalymma ericifolium		0.2	0.6
Xanthorrhoea preissii		0.2	0.6
Anarthria prolifera		0.2	0.4
Hypolaena viridis		0.2	0.4
Dampiera pedunculata		0.2	0.3
Bossiaea praetermissa		0.1	0.6
Johnsonia lupulina		0.1	0.6
Pimelea longiflora		0.1	0.6
Cassytha racemosa forma *pilosa*		0.1	0.6
Petrophile linearis		0.1	0.5
**Briza minor*	Weed	0.1	0.1
Acacia pulchella var. *pulchella*		0.0	1.3
Patersonia occidentalis		0.0	0.5

Site details			
Site	**BEE054**	**Position (WGS84)**	115.2740348, -34.25047755
Slope	gentle	**Topography**	
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* low open forest over *Melaleuca thymoides, Taxandria parviceps* and *Xanthorrhoea preissii* mid isolated shrubs over *Anarthria scabra* and *Lyginia imberbis* mid sedgeland.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	25.0
Shrub cover (%)	5.0	**Grass cover (%)**	65.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Andrew Perkins

Species (23)	Status	Cover (%)	Height (m)
Anarthria scabra		65.0	0.7
Eucalyptus marginata subsp. *marginata*		25.0	12.0
Agonis flexuosa var. *flexuosa*		6.0	14.0
Dasypogon bromeliifolius		5.0	0.5
Melaleuca thymoides		4.0	1.1
Phlebocarya ciliata		3.0	0.2
Taxandria parviceps		2.0	2.0
Jacksonia horrida		1.0	2.2
Xanthorrhoea preissii		1.0	0.7
Lyginia imberbis		1.0	0.6
Hypocalymma ericifolium		0.5	0.5
Anarthria prolifera		0.5	0.2
Johnsonia lupulina		0.2	0.6
Patersonia occidentalis		0.2	0.6
Billardiera sp.		0.1	0.5
Burchardia congesta		0.1	0.4
Adenanthos obovatus		0.1	0.4
Bossiaea praetermissa		0.1	0.4
Chamaescilla corymbosa var. *corymbosa*		0.1	0.2
**Briza maxima*	Weed	0.1	0.2
Lechenaultia expansa		0.1	0.2
Actinotus glomeratus		0.1	0.1
Gompholobium capitatum		0.0	0.3

Site details			
Site	**BEE055**	**Position (WGS84)**	115.2757403, -34.25071511
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* mid woodland over *Melaleuca thymoides, Agonis flexuosa* var. *flexuosa* and *Xanthorrhoea preissii* tall open shrubland over *Anarthria scabra* and *Lyginia imberbis* mid sedgeland.

Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	15.0
Shrub cover (%)	15.0	**Grass cover (%)**	60.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (15)	Status	Cover (%)	Height (m)
Anarthria scabra		65.0	0.7
Eucalyptus marginata subsp. *marginata*		15.0	15.0
Melaleuca thymoides		15.0	1.3
Agonis flexuosa var. *flexuosa*		2.0	2.3
Lyginia imberbis		2.0	0.6
Xanthorrhoea preissii		1.0	0.8
Jacksonia horrida		0.5	1.5
Dasypogon bromeliifolius		0.2	0.5
Opercularia hispidula		0.2	0.5
Phlebocarya ciliata		0.2	0.2
Adenanthos obovatus		0.1	0.6
Burchardia congesta		0.1	0.6
Dampiera pedunculata		0.1	0.5
**Briza maxima*	Weed	0.1	0.2
Taxandria parviceps		0.0	3.5

Site details			
Site	**BEE056**	**Position (WGS84)**	115.277328, -34.25092956
Slope	gentle	**Topography**	plain
Soil colour	brown, brown-grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Nuytsia floribunda* mid open forest over *Xanthorrhoea preissii* mid isolated shrubs over *Anarthria scabra* and *Hypolaena pubescens* mid closed sedgeland.
Habitat	forest
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	60.0
Shrub cover (%)	1.0	**Grass cover (%)**	80.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (17)	Status	Cover (%)	Height (m)
Anarthria scabra		75.0	0.5
Eucalyptus marginata subsp. *marginata*		60.0	15.0
Nuytsia floribunda		15.0	14.0
Xanthorrhoea preissii		1.0	1.1
Hypolaena pubescens		1.0	0.6
Dasypogon bromeliifolius		0.5	0.5
**Briza maxima*	Weed	0.2	0.7
**Hypochaeris glabra*	Weed	0.2	0.6
Opercularia hispidula		0.2	0.5
Phlebocarya ciliata		0.2	0.2
Anigozanthos flavidus		0.1	1.2
Leucopogon australis		0.1	1.0
Johnsonia lupulina		0.1	0.7
**Bromus diandrus*	Weed	0.1	0.7
Hypolaena viridis		0.1	0.6
**Holcus lanatus*	Weed	0.1	0.6
**Briza minor*	Weed	0.1	0.1

Site details			
Site	**BEE057**	**Position (WGS84)**	115.30765367115198, -34.22076744766934
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Melaleuca rhaphiophylla* and *Taxandria juniperina* low closed forest over *Juncus pallidus* tall isolated sedges over *Lemna disperma, Cycnogeton huegelii* and *Senecio picridioides* closed aquatic forbland.
Habitat	waterhole
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	2.0
Herb cover (%)	75.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (6)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		75.0	10.0
Lemna disperma		75.0	0.05
Taxandria juniperina		5.0	15.0
Juncus pallidus		2.0	1.2
Cycnogeton huegelii		1.0	0.3
Senecio picridioides		0.1	0.1

Site details			
Site	**BEE058**	**Position (WGS84)**	115.2801255, -34.25127965
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Melaleuca preissiana* tall sparse shrubland over *Xanthorrhoea preissii, Hakea varia* and *Acacia myrtifolia* mid sparse shrubland over *Chordifex isomorphus, Loxocarya magna* and *Platychorda applanata* tall closed grassland.
Habitat	shrubland
Disturbance	weed infestation, excavation

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	0.0
Shrub cover (%)	8.0	**Grass cover (%)**	80.0
Herb cover (%)	10.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (34)	Status	Cover (%)	Height (m)
Loxocarya magna	P3 (DBCA list)	30.0	1.1
Chordifex isomorphus		30.0	0.7
Xanthorrhoea preissii		4.0	1.2
Melaleuca preissiana		3.0	3.5
Platychorda applanata		3.0	0.7
Hakea varia		2.0	2.2
Hypolaena pubescens		2.0	0.7
Acacia myrtifolia		1.0	2.1
**Holcus lanatus*	Weed	0.3	0.6
Pimelea rosea subsp. *rosea*		0.2	0.6
**Sonchus oleraceus*	Weed	0.2	0.5
**Lotus subbiflorus*	Weed	0.2	0.5
**Geranium purpureum*	Weed	0.2	0.5
**Anthoxanthum odoratum*	Weed	0.2	0.5
Microtis media subsp. *media*		0.2	0.4
**Juncus articulatus*	Weed	0.2	0.4
Lyginia barbata		0.2	0.4
**Hypochaeris glabra*	Weed	0.2	0.4
**Bellardia viscosa*	Weed	0.2	0.3
**Sonchus asper*	Weed	0.1	0.9
Sphaerolobium vimineum		0.1	0.9
**Polypogon monspeliensis*	Weed	0.1	0.8
Dampiera pedunculata		0.1	0.7
**Lolium perenne*	Weed	0.1	0.6
Mesomelaena tetragona		0.1	0.6
Dasypogon bromeliifolius		0.1	0.5
Patersonia occidentalis		0.1	0.5
Lachnagrostis filiformis		0.1	0.5
**Briza maxima*	Weed	0.1	0.4
**Briza minor*	Weed	0.1	0.4
Thysanotus multiflorus		0.1	0.4
Conostylis aculeata subsp. *aculeata*		0.1	0.2
**Aira caryophyllea*	Weed	0.1	0.1
**Mentha pulegium*	Weed	0.1	0.1

Site details			
Site	**BEE059**	**Position (WGS84)**	115.2812201, -34.2514313
Slope	gentle	**Topography**	plain
Soil colour	brown, brown, grey	**Soil texture**	Clay loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Agonis flexuosa* var. *flexuosa, Melaleuca preissiana* and *Eucalyptus marginata* subsp. *marginata* mid open forest over *Taxandria linearifolia, T. parviceps* and *Acacia myrtifolia* tall open shrubland over *Machaerina juncea, Lepidosperma* sp. Blackwood (R. Davis 7696) and *Empodisma gracillimum* tall sedgeland.
Habitat	forest
Disturbance	Excavation, weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	40.0
Shrub cover (%)	15.0	**Grass cover (%)**	60.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (29)	Status	Cover (%)	Height (m)
Machaerina juncea		50.0	1.1
Melaleuca preissiana		15.0	12.0
Agonis flexuosa var. *flexuosa*		15.0	10.0
Taxandria parviceps		10.0	12.0
Taxandria linearifolia		10.0	3.5
Eucalyptus marginata subsp. *marginata*		5.0	10.0
Acacia myrtifolia		4.0	2.4
Dasypogon bromeliifolius		3.0	0.7
Lepidosperma sp. Blackwood (R. Davis 7696)		2.0	0.8
Empodisma gracillimum		2.0	0.6
Xanthorrhoea preissii		1.0	0.8
Hypolaena pubescens		1.0	0.7
Astartea scoparia		0.5	2.5
Anigozanthos flavidus		0.4	2.1
**Briza maxima*	Weed	0.4	0.4
Banksia littoralis		0.3	1.0
Hakea linearis		0.2	1.0
Hakea ceratophylla		0.2	0.7
Beaufortia sparsa		0.1	0.8
Hakea varia		0.1	0.6
Leucopogon australis		0.1	0.6
Mesomelaena tetragona		0.1	0.6
**Sonchus asper*	Weed	0.1	0.5
Hibbertia amplexicaulis		0.1	0.5
**Lolium perenne*	Weed	0.1	0.4
Opercularia vaginata		0.1	0.4
Billardiera laxiflora		0.1	0.3
**Briza minor*	Weed	0.1	0.3
Conostylis aculeata subsp. *aculeata*		0.1	0.2

Site details			
Site	**BEE060**	**Position (WGS84)**	115.283822, -34.25165957
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Xanthorrhoea preissii, Hakea varia* and *Acacia myrtifolia* mid sparse shrubland over *Loxocarya magna, Leptocarpus scoparius* and *Mesomelaena tetragona* tall closed sedgeland over **Briza maxima*, **B. minor* and **Bromus hordeaceus* low sparse grassland.
Habitat	shrubland
Disturbance	weed infestation, excavation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	90.0	**Tree cover (%)**	0.0
Shrub cover (%)	8.0	**Grass cover (%)**	90.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (27)	Status	Cover (%)	Height (m)
Loxocarya magna	P3 (DBCA list)	50.0	1.4
Xanthorrhoea preissii		5.0	1.2
Leptocarpus scoparius		5.0	0.6
Hakea varia		3.0	1.6
Hypolaena pubescens		3.0	0.7
Lyginia barbata		1.0	0.7
Acacia myrtifolia		0.5	1.4
Kunzea recurva		0.5	0.8
Mesomelaena tetragona		0.2	0.8
Pimelea rosea subsp. *rosea*		0.2	0.7
Synaphea petiolaris subsp. *triloba*		0.2	0.5
Cyathochaeta avenacea		0.1	0.8
**Sonchus asper*	Weed	0.1	0.7
Lepidosperma pubisquameum		0.1	0.7
Acacia browniana var. *browniana*		0.1	0.7
Hibbertia amplexicaulis		0.1	0.5
Desmocladus fasciculatus		0.1	0.5
**Bromus hordeaceus*	Weed	0.1	0.3
**Juncus articulatus*	Weed	0.1	0.3
**Briza maxima*	Weed	0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.2
Hibbertia stellaris		0.1	0.2
**Lysimachia arvensis*	Weed	0.1	0.1
**Briza minor*	Weed	0.1	0.1
**Cyperus tenellus*	Weed	0.1	0.1
Centrolepis aristata		0.1	0.1
**Lotus subbiflorus*	Weed	0.1	0.1

Site details			
Site	**BEE061**	**Position (WGS84)**	115.2859762, -34.25143899
Slope	negligible	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Nuytsia floribunda* (outside) isolated tall shrubs over *Kunzea recurva, Hakea sulcata* and *Xanthorrhoea preissii* mid open shrubland over *Platychorda applanata* mid sedgeland.
Habitat	shrubland
Disturbance	weed infestation, excavation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	10.0	**Grass cover (%)**	70.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (38)	Status	Cover (%)	Height (m)
Platychorda applanata		55.0	0.7
Kunzea recurva		5.0	1.5
Hakea sulcata		3.0	1.2
Xanthorrhoea preissii		3.0	1.2
Johnsonia lupulina		1.0	1.2
Synaphea petiolaris subsp. *triloba*		1.0	0.5
Stackhousia monogyna		0.5	0.6
Agrostocrinum scabrum subsp. *scabrum*		0.3	0.6
Conostylis aculeata subsp. *gracilis*		0.3	0.1
Cyathochaeta avenacea		0.2	0.8
Acacia browniana var. *browniana*		0.2	0.6
Banksia nivea subsp. *nivea*		0.2	0.5
Conostylis aculeata subsp. *aculeata*		0.2	0.4
Hypolaena pubescens		0.2	0.4
Patersonia occidentalis		0.2	0.2
Deyeuxia quadriseta		0.1	0.7
Haemodorum laxum		0.1	0.7
Cassytha racemosa forma *pilosa*		0.1	0.7
Prasophyllum brownii		0.1	0.6
Anigozanthos flavidus		0.1	0.6
**Briza maxima*	Weed	0.1	0.6
Anigozanthos flavidus		0.1	0.5
Mesomelaena tetragona		0.1	0.5
Microtis media subsp. *media*		0.1	0.4
Hibbertia amplexicaulis		0.1	0.3
Pimelea longiflora		0.1	0.3
Anarthria prolifera		0.1	0.2
**Briza minor*	Weed	0.1	0.2
Amphipogon laguroides subsp. *laguroides*		0.1	0.2
Desmocladus fasciculatus		0.1	0.2
**Lotus subbiflorus*	Weed	0.1	0.1
**Hypochaeris glabra*	Weed	0.1	0.1
Actinotus glomeratus		0.1	0.1
**Aira caryophyllea*	Weed	0.1	0.1
Chamaescilla corymbosa var. *corymbosa*		0.1	0.1
Stylidium megacarpum		0.1	0.1
Centrolepis aristata		0.1	0.1
Nuytsia floribunda		0.0	3.0

Site details			
Site	**BEE062**	**Position (WGS84)**	115.28733987148243, -34.18770505499435
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Astartea scoparia* tall closed shrubland over *Leptocarpus scariosus* tall open rushland and *Cycnogeton huegelii* sparse aquatic herbland.
Habitat	waterhole
Disturbance	grazing-high

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	28.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Brody Loneragan

Species (4)	Status	Cover (%)	Height (m)
Astartea scoparia		75.0	6.0
Leptocarpus scariosus		28.0	2.0
Cycnogeton huegelii		5.0	0.3
Cyathochaeta clandestina		1.0	2.0

Site details			
Site	**BEE063**	**Position (WGS84)**	115.2898234880402, -34.25129132457724
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (13 Nov 2023)

Site description	*Melaleuca densa, Grevillea manglesioides* subsp. *ferricola* and *Acacia myrtifolia* tall shrubland over *Leptocarpus scoparius, Loxocarya magna* and *Hypolaena pubescens* tall sparse grassland.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	60.0	**Tree cover (%)**	0.0
Shrub cover (%)	55.0	**Grass cover (%)**	6.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	13 Nov 2023	10m x 10m	Andrew Perkins

Species (29)	Status	Cover (%)	Height (m)
Melaleuca densa		50.0	2.5
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	7.0	1.6
Loxocarya magna	P3 (DBCA list)	5.0	1.1
Leptocarpus scoparius		5.0	0.8
Xanthorrhoea preissii		4.0	2.1
Acacia myrtifolia		2.0	1.5
Hypolaena pubescens		2.0	1.0
Hakea varia		1.0	1.0
Hibbertia perfoliata		0.3	1.1
Opercularia vaginata		0.3	0.7
Cassytha sp.		0.2	1.2
**Briza maxima*	Weed	0.2	0.3
**Briza minor*	Weed	0.2	0.2
Pimelea rosea subsp. *rosea*		0.1	0.8
Sphaerolobium vimineum		0.1	0.6
**Hypochaeris glabra*	Weed	0.1	0.6
Lepidosperma pubisquameum		0.1	0.6
**Sonchus asper*	Weed	0.1	0.5
**Bromus hordeaceus*	Weed	0.1	0.5
**Juncus microcephalus*	Weed	0.1	0.5
**Lolium perenne*	Weed	0.1	0.4
**Bellardia viscosa*	Weed	0.1	0.4
**Anthoxanthum odoratum*	Weed	0.1	0.3
**Sonchus oleraceus*	Weed	0.1	0.2
Patersonia occidentalis		0.1	0.2
**Polypogon monspeliensis*	Weed	0.1	0.2
**Lysimachia arvensis*	Weed	0.1	0.1
**Romulea rosea* var. *australis*	Weed	0.1	0.1
Stylidium megacarpum		0.0	0.15

Site details			
Site	**BEE066**	**Position (WGS84)**	115.293236, -34.17559671
Slope	gentle	**Topography**	plain
Soil colour	grey, brown	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana* and *Agonis flexuosa* var. *flexuosa* mid open forest over *Banksia ilicifolia* and *Xanthorrhoea preissii* isolated shrubs over *Anarthria scabra* and *A. prolifera* sedgeland.

Habitat	woodland		
Disturbance	grazing-low		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	60.0
Shrub cover (%)	0.1	**Grass cover (%)**	40.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	02 Sep 2023	10m x 10m	Tim Morald

Species (17)	Status	Cover (%)	Height (m)
Anarthria scabra		40.0	1.0
Eucalyptus marginata subsp. *marginata*		25.0	15.0
Allocasuarina fraseriana		20.0	15.0
Agonis flexuosa var. *flexuosa*		10.0	10.0
Banksia ilicifolia		7.0	10.0
Xanthorrhoea preissii		1.0	1.0
Anarthria prolifera		0.3	0.4
Thysanotus patersonii		0.2	0.5
Drosera pallida		0.1	0.8
Lyginia imberbis		0.1	0.6
Bossiaea praetermissa		0.1	0.5
Hibbertia racemosa		0.1	0.3
Dasypogon bromeliifolius		0.1	0.2
Hydrocotyle callicarpa		0.1	0.1
Drosera erythrorhiza		0.1	0.1
Chamaescilla corymbosa var. *corymbosa*		0.1	0.1
Persoonia longifolia		0.0	5.0

Site details			
Site	**BEE067**	**Position (WGS84)**	115.2800938, -34.17503863
Slope	gentle	**Topography**	dune
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Allocasuarina fraseriana, Eucalyptus marginata* subsp. *marginata* and *Banksia ilicifolia* low woodland over *Taxandria parviceps* tall sparse shrubland over *Anarthria scabra* sedgeland.
Habitat	woodland
Disturbance	weed infestation, grazing-high, livestock tracks

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	20.0
Shrub cover (%)	5.0	**Grass cover (%)**	45.0
Herb cover (%)	3.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	02 Sep 2023	10m x 10m	Brody Loneragan

Species (30)	Status	Cover (%)	Height (m)
Anarthria scabra		35.0	0.8
Allocasuarina fraseriana		20.0	8.0
Taxandria parviceps		8.0	3.0
Eucalyptus marginata subsp. *marginata*		6.0	7.0
Xanthorrhoea preissii		6.0	1.0
Dasypogon bromeliifolius		5.0	0.3
Phlebocarya ciliata		5.0	0.1
Banksia ilicifolia		2.0	4.0
**Cerastium glomeratum*	Weed	1.1	0.4
Banksia attenuata		1.0	6.0
Pultenaea reticulata		1.0	1.5
Jacksonia horrida		1.0	1.5
**Cotula turbinata*	Weed	1.0	0.1
Chamaescilla corymbosa var. *corymbosa*		0.5	0.2
Melaleuca thymoides		0.2	1.0
Drosera menziesii		0.1	0.3
Acacia uliginosa		0.1	0.3
Hypocalymma strictum		0.1	0.3
Bossiaea praetermissa		0.1	0.2
Eragrostis brownii		0.1	0.2
Pterostylis vittata		0.1	0.2
Caladenia sp.		0.1	0.1
**Hypochaeris glabra*	Weed	0.1	0.1
Opercularia hispidula		0.1	0.1
**Trifolium repens* var. *repens*	Weed	0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.1
**Arctotheca calendula*	Weed	0.1	0.1
Actinodium cunninghamii		0.1	0.1
Drosera erythrorhiza		0.1	0.1
**Vulpia myuros*	Weed	0.1	0.1

Site details			
Site	**BEE068**	**Position (WGS84)**	115.2865872, -34.17443363
Slope	gentle	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	
Rock cover (%)	0	**Rock type**	

Observation details - visit 1 (02 Sep 2023)

Site description	*Taxandria inundata* and *Petrophile squamata* subsp. *squamata* tall shrubland over *Leptocarpus scariosus* and *Juncus pallidus* tall rushland.
Habitat	shrubland
Disturbance	livestock tracks, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	65.0	**Tree cover (%)**	0.0
Shrub cover (%)	60.0	**Grass cover (%)**	50.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	02 Sep 2023	10m x 10m	Brody Loneragan

Species (15)	Status	Cover (%)	Height (m)
Taxandria inundata		60.0	4.0
Leptocarpus scariosus		20.0	1.5
Juncus pallidus		4.0	1.6
Petrophile squamata subsp. *squamata*		1.0	1.5
Machaerina articulata		0.1	1.8
Pimelea lanata		0.1	1.6
Cyathochaeta clandestina		0.1	1.4
Poaceae sp.		0.1	0.3
Indeterminate		0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.1
**Rumex* sp.		0.1	0.1
**Sonchus asper*	Weed	0.1	0.1
Geranium retrorsum		0.1	0.1
**Mentha pulegium*	Weed	0.1	0.1

Site details			
Site	**BEE070**	**Position (WGS84)**	115.2838322, -34.17970822
Slope	gentle	**Topography**	depression
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Nuytsia floribunda* low isolated trees over *Taxandria parviceps* and *Beaufortia sparsa* tall open shrubland over *Anarthria scabra, Dasypogon bromeliifolius* and *Xanthorrhoea preissii* low sedgeland.
Habitat	shrubland
Disturbance	livestock tracks, grazing-low, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70.0	**Tree cover (%)**	1.0
Shrub cover (%)	11.0	**Grass cover (%)**	65.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	02 Sep 2023	10m x 10m	Brody Loneragan

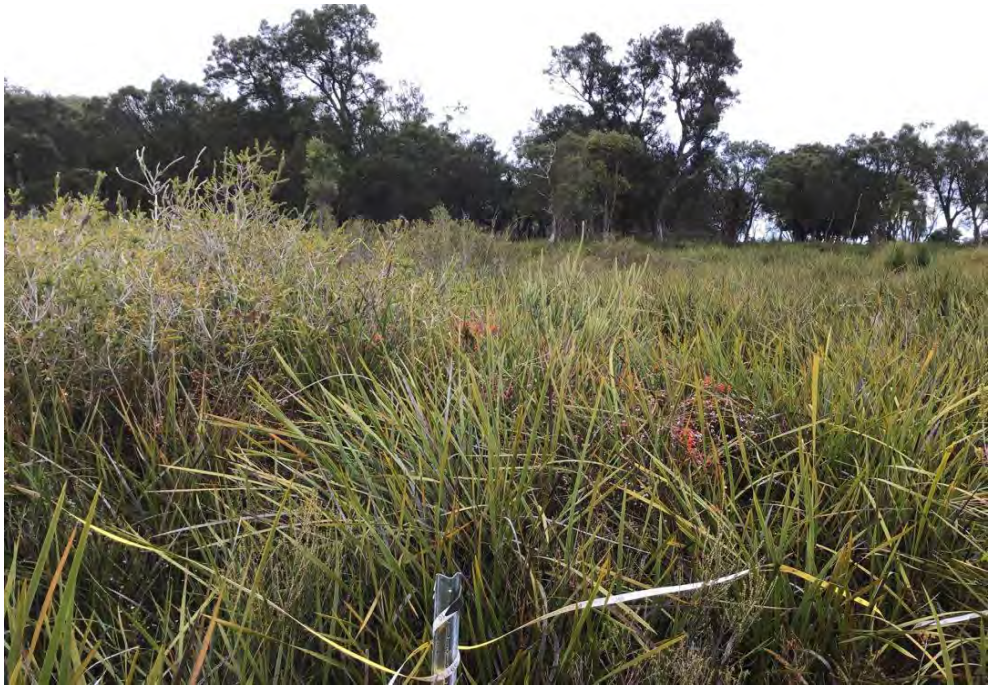
Species (24)	Status	Cover (%)	Height (m)
Anarthria scabra		65.0	1.0
Beaufortia sparsa		10.0	3.0
Nuytsia floribunda		5.0	5.0
Taxandria parviceps		5.0	3.0
Xanthorrhoea gracilis		3.0	1.5
Xanthorrhoea preissii		2.0	1.2
Dasypogon bromeliifolius		2.0	0.4
Acacia uliginosa		1.0	0.8
**Cotula turbinata*	Weed	0.2	0.2
**Ornithopus pinnatus*	Weed	0.2	0.1
Evandra aristata		0.1	1.8
Homalospermum firmum		0.1	1.6
Aotus carinata	P4 (DBCA list)	0.1	0.8
Johnsonia lupulina		0.1	0.6
Hypocalymma ericifolium		0.1	0.6
Adenanthos obovatus		0.1	0.4
Dampiera linearis		0.1	0.2
Dasypogon bromeliifolius		0.1	0.2
**Rumex acetosella*	Weed	0.1	0.1
**Monopsis debilis* var. *depressa*	Weed	0.1	0.1
Juncus planifolius		0.1	0.1
Centrolepis aristata		0.1	0.1
Hypolaena caespitosa		0.1	0.1
**Hypochaeris glabra*	Weed	0.1	0.1

Site details			
Site	**BEE080**	**Position (WGS84)**	115.2926024, -34.17685676
Slope	gentle	**Topography**	depression
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Beaufortia sparsa, Leucopogon alternifolius* and *Adenanthos obovatus* mid shrubland over isolated *Xanthorrhoea preissii* over *Anarthria scabra* and *Dasypogon bromeliifolius* closed sedgeland.
Habitat	heathland
Disturbance	grazing-low

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	0.0
Shrub cover (%)	10.0	**Grass cover (%)**	75.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	02 Sep 2023	10m x 10m	Tim Morald

Species (17)	Status	Cover (%)	Height (m)
Anarthria scabra		75.0	1.2
Beaufortia sparsa		10.0	1.8
Leucopogon alternifolius	P3 (DBCA list)	2.0	1.2
Dasypogon bromeliifolius		2.0	0.3
Adenanthos obovatus		1.0	1.1
Sphaerolobium grandiflorum		0.5	1.5
Aotus carinata	P4 (DBCA list)	0.3	1.9
Hypocalymma ericifolium		0.3	0.6
Evandra aristata		0.2	1.7
Schoenus efoliatus		0.2	1.1
Sphenotoma gracilis		0.2	0.8
Leucopogon tenuicaulis		0.2	0.5
Xanthorrhoea preissii		0.2	0.4
Pimelea longiflora		0.1	0.6
Dampiera leptoclada		0.1	0.6
Euchilopsis linearis		0.1	0.4
Hypolaena exsulca		0.1	0.2

Site details			
Site	**BEE082**	**Position (WGS84)**	115.3061636, -34.2390811
Slope	gentle	**Topography**	depression
Soil colour	black, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (04 Sep 2023)

Site description	*Calothamnus lateralis* var. *crassus, Adenanthos detmoldii* and *Grevillea manglesioides* subsp. *ferricola* tall shrubland over *Leptocarpus laxus* and *L. scoparius* tall rushland.
Habitat	shrubland
Disturbance	grazing-low, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70.0	**Tree cover (%)**	0.0
Shrub cover (%)	35.0	**Grass cover (%)**	30.0
Herb cover (%)	4.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	04 Sep 2023	10m x 10m	Brody Loneragan

Species (36)	Status	Cover (%)	Height (m)
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	20.0	1.8
Adenanthos detmoldii	P4 (DBCA list)	12.0	2.5
Leptocarpus laxus		10.0	2.0
Leptocarpus scoparius		5.0	0.7
Poaceae sp.		3.0	0.1
Dasypogon bromeliifolius		2.0	0.3
Hakea varia		1.0	2.2
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	1.0	2.0
Melanostachya ustulata		1.0	1.1
Dampiera heteroptera	P3 (DBCA list)	1.0	0.6
Conostylis laxiflora		1.0	0.4
**Ornithopus pinnatus*	Weed	1.0	0.1
Sporadanthus strictus		0.5	1.3
Mesomelaena tetragona		0.5	0.8
Xanthorrhoea preissii		0.5	0.7
Platychorda applanata		0.5	0.7
Pericalymma ellipticum var. *ellipticum*		0.5	0.6
Kunzea recurva		0.5	0.6
Hypolaena caespitosa		0.5	0.3
**Hypochaeris glabra*	Weed	0.25	0.1
Desmocladus flexuosus		0.2	0.6
Adenanthos obovatus		0.2	0.3
Comesperma virgatum		0.1	1.2
Pericalymma crassipes		0.1	0.4
Hibbertia stellaris		0.1	0.3
Lepidosperma pubisquameum		0.1	0.3
Machaerina articulata		0.1	0.2
Boronia anceps	P3 (DBCA list)	0.1	0.2
Lindsaea linearis		0.1	0.2
Stylidium scandens		0.1	0.2
**Arctotheca calendula*	Weed	0.1	0.1
**Cotula turbinata*	Weed	0.1	0.1
?*Centipeda cunninghamii*		0.1	0.1
Patersonia occidentalis var. *occidentalis*		0.1	0.1
**Trifolium campestre* var. *campestre*	Weed	0.1	0.1
**Sparaxis pillansii*	Weed	0.1	0.1

Site details			
Site	**BEE083**	**Position (WGS84)**	[redacted]
Slope	gentle	**Topography**	sandy rise
Soil colour	grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (04 Sep 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* low woodland over *Xanthorrhoea preissii*, *Taxandria parviceps* and *Acacia browniana* var. *browniana* mid open shrubland over *Anarthria scabra* and *Melanostachya ustulata* tall rushland.
Habitat	woodland
Disturbance	grazing-low, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	25.0
Shrub cover (%)	20.0	**Grass cover (%)**	30.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	04 Sep 2023	10m x 10m	Brody Loneragan

Species (36)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		15.0	6.0
Xanthorrhoea preissii		5.0	1.5
Anarthria scabra		5.0	1.5
Melanostachya ustulata		4.0	0.7
Taxandria parviceps		2.0	2.0
[redacted]	[redacted]	[redacted]	[redacted]
Nuytsia floribunda		1.0	3.0
Hakea ceratophylla		1.0	0.8
Gompholobium tomentosum		1.0	0.6
Acacia browniana var. *browniana*		1.0	0.6
Dasypogon bromeliifolius		1.0	0.2
Anarthria prolifera		1.0	0.1
Comesperma virgatum		0.5	1.0
Mesomelaena tetragona		0.5	0.7
Dampiera heteroptera	P3 (DBCA list)	0.5	0.6
Desmocladus castaneus		0.5	0.2
Leptocarpus trisepalus		0.5	0.2
**Hypochaeris glabra*	Weed	0.5	0.1
**Ornithopus pinnatus*	Weed	0.5	0.1
Poaceae sp.		0.5	0.1
Drosera pallida		0.1	1.6
Evandra aristata		0.1	1.2
Pimelea longiflora		0.1	1.2
Sphaerolobium grandiflorum		0.1	1.0
Johnsonia lupulina		0.1	0.7
Schoenus efoliatus		0.1	0.3
Lechenaultia expansa		0.1	0.3
Lindsaea linearis		0.1	0.2
Leptomeria cunninghamii		0.1	0.2
Desmocladus flexuosus		0.1	0.2
Xanthosia huegelii		0.1	0.2
Conostylis laxiflora		0.1	0.1
**Trifolium campestre* var. *campestre*	Weed	0.1	0.1
Banksia dallanneyi subsp. *dallanneyi*		0.1	0.1
Stylidium amoenum		0.1	0.1
Conostylis aculeata subsp. *gracilis*		0.1	0.1

Site details			
Site	**BEE084**	**Position (WGS84)**	115.3065487, -34.23956992
Slope	negligible	**Topography**	depression
Soil colour	grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (04 Sep 2023)

Site description	*Acacia myrtifolia, Banksia occidentalis* and *Hakea sulcata* tall closed shrubland over low closed mixed rushland.
Habitat	shrubland
Disturbance	grazing-low

Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	98.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	95.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	04 Sep 2023	10m x 10m	Brody Loneragan

Species (17)	Status	Cover (%)	Height (m)
Acacia myrtifolia		40.0	2.5
Hypolaena caespitosa		40.0	0.3
Banksia occidentalis		30.0	2.5
Melanostachya ustulata		10.0	0.8
Lepidosperma sp.		10.0	0.5
Hakea sulcata		3.0	1.4
Melaleuca incana subsp. *incana*		3.0	1.1
Juncus kraussii subsp. *australiensis*		2.0	1.5
Boronia anceps	P3 (DBCA list)	2.0	0.5
Cytogonidium leptocarpoides		2.0	0.3
Beaufortia sparsa		1.0	1.2
Sphenotoma gracilis		1.0	0.3
Hakea ceratophylla		0.5	0.6
Sphaerolobium vimineum		0.1	0.5
Banksia dallanneyi subsp. *dallanneyi*		0.1	0.3
Philotheca spicata		0.1	0.3
Actinodium cunninghamii		0.1	0.2

Site details			
Site	**BEE100**	**Position (WGS84)**	115.2731196485559, -34.191066729142214
Slope	negligible	**Topography**	sandy rise
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* mid open forest over *Persoonia longifolia, Podocarpus drouynianus* and *Xanthorrhoea preissii* tall open shrubland over *Anarthria scabra* closed sedgeland.
Habitat	forest
Disturbance	livestock tracks

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	45.0
Shrub cover (%)	12.0	**Grass cover (%)**	73.0
Herb cover (%)	3.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Brody Loneragan

Species (15)	Status	Cover (%)	Height (m)
Anarthria scabra		72.0	1.5
Corymbia calophylla		25.0	13.0
Eucalyptus marginata subsp. *marginata*		20.0	10.0
Xanthorrhoea preissii		11.0	3.0
Podocarpus drouynianus		8.0	1.5
Persoonia longifolia		3.0	2.0
Pteridium esculentum subsp. *esculentum*		2.0	1.0
Banksia attenuata		1.0	8.0
Opercularia hispidula		1.0	0.4
Acacia myrtifolia		0.1	1.5
Patersonia occidentalis var. *latifolia*		0.1	1.0
Taxandria parviceps		0.1	0.5
Dasypogon bromeliifolius		0.1	0.3
Lindsaea linearis		0.1	0.2
Corysanthes recurva		0.1	0.01

Site details			
Site	**BEE101**	**Position (WGS84)**	115.28844720694728, -34.19767501767184
Slope	negligible	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Taxandria inundata, Astartea scoparia* and *Calothamnus lateralis* var. *crassus* tall shrubland over *Leptocarpus scariosus* tall open rushland over *Alternanthera nodiflora* low isolated forbs.
Habitat	shrubland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	0.0
Shrub cover (%)	58.0	**Grass cover (%)**	20.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Andrew Perkins

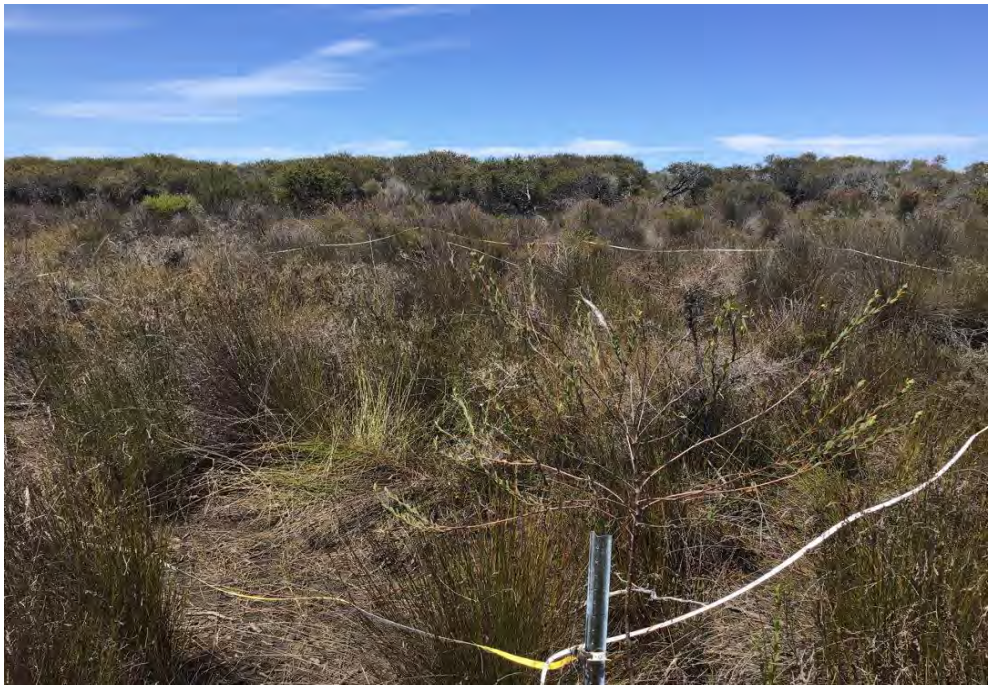
Species (7)	Status	Cover (%)	Height (m)
Taxandria inundata		50.0	3.5
Leptocarpus scariosus		20.0	2.2
Astartea scoparia		5.0	2.5
Alternanthera nodiflora		5.0	0.3
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	2.0	3.0
Grevillea diversifolia subsp. *subtersericata*		1.0	1.6
Bossiaea rufa		0.2	2.5

Site details			
Site	**BEE102**	**Position (WGS84)**	115.28872548613258, -34.19613132256474
Slope	negligible	**Topography**	seasonally wet area
Soil colour	Brown, grey, light-brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Grevillea diversifolia* subsp. *subtersericata, Pimelea lanata* and *Pericalymma ellipticum* var. *ellipticum* mid open shrubland over *Leptocarpus scariosus, Chordifex amblycoleus* and *Xyris roycei* mid rushland.
Habitat	tussock grassland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	50.0	**Tree cover (%)**	0.0
Shrub cover (%)	15.0	**Grass cover (%)**	35.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Andrew Perkins

Species (8)	Status	Cover (%)	Height (m)
Leptocarpus scariosus		25.0	1.3
Chordifex amblycoleus		10.0	1.5
Pericalymma ellipticum var. *ellipticum*		10.0	1.2
Grevillea diversifolia subsp. *subtersericata*		5.0	1.1
Xyris roycei		1.0	0.8
Pimelea lanata		0.2	1.5
Hakea linearis		0.1	1.3
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.1	1.0

Site details			
Site	**BEE104**	**Position (WGS84)**	115.29238452214308, -34.2013547988927
Slope	gentle	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (23 Oct 2023)

Site description	*Taxandria inundata, Astartea scoparia* and *Hakea linearis* tall closed shrubland over *Leptocarpus scariosus* tall open sedgeland.
Habitat	shrubland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90.0	**Tree cover (%)**	0.0
Shrub cover (%)	70.0	**Grass cover (%)**	20.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	23 Oct 2023	10m x 10m	Andrew Perkins

Species (6)	Status	Cover (%)	Height (m)
Taxandria inundata		70.0	4.5
Leptocarpus scariosus		20.0	1.6
Astartea scoparia		1.0	1.9
Hakea linearis		0.5	2.5
Grevillea diversifolia subsp. *subtersericata*		0.2	3.0
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.1	2.5

Site details			
Site	**BEE106**	**Position (WGS84)**	115.27044036436385, -34.17597879658842
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	Loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Astartea scoparia* and *Taxandria parviceps* tall closed shrubland over *Leptocarpus scariosus* tall open rushland over **Holcus lanatus* and **Anthoxanthum odoratum* tall open grassland over isolated herbs of **Rumex acetosella*.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	95.0	**Tree cover (%)**	0.0
Shrub cover (%)	85.0	**Grass cover (%)**	10.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
Astartea scoparia		80.0	4.5
Taxandria parviceps		5.0	2.8
**Holcus lanatus*	Weed	5.0	1.5
**Anthoxanthum odoratum*	Weed	5.0	1.0
Leptocarpus scariosus		2.0	1.3
**Rumex acetosella*	Weed	2.0	0.3
**Briza maxima*	Weed	0.4	0.5
Homalospermum firmum		0.1	2.0
Microtis media subsp. *media*		0.1	0.3

Site details			
Site	**BEE107**	**Position (WGS84)**	115.29394028719076, -34.20597410764005
Slope	gentle	**Topography**	seasonally wet area
Soil colour	black, brown, grey	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Melaleuca preissiana* and *Taxandria juniperina* mid open forest over *Astartea scoparia* and *Melaleuca rhaphiophylla* tall isolated shrubs over *Leptocarpus scariosus* tall rushland.
Habitat	forest
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	55.0
Shrub cover (%)	5.0	**Grass cover (%)**	15.0
Herb cover (%)	0.2		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	NR

Species (8)	Status	Cover (%)	Height (m)
Taxandria juniperina		25.0	18.0
Melaleuca preissiana		25.0	12.0
Leptocarpus scariosus		15.0	1.3
Melaleuca rhaphiophylla		5.0	15.0
Astartea scoparia		5.0	4.5
Cycnogeton huegelii		0.2	0.2
Callistachys lanceolata		0.1	5.0
Microtis media subsp. *media*		0.1	0.3

Site details			
Site	**BEE112**	**Position (WGS84)**	115.2828315, -34.25157663
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* mid closed forest over *Taxandria parviceps, Xanthorrhoea preissii* and *Taxandria linearifolia* tall open shrubland over *Anarthria scabra* tall sedgeland.
Habitat	forest
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	75.0
Shrub cover (%)	10.0	**Grass cover (%)**	60.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Andrew Perkins

Species (41)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		65.0	14.0
Corymbia calophylla		15.0	14.0
Taxandria parviceps		10.0	3.0
Anarthria scabra		8.0	1.1
Xanthorrhoea preissii		6.0	1.3
Taxandria linearifolia		5.0	3.0
Acacia myrtifolia		4.0	1.7
Lepidosperma sp. Blackwood (R. Davis 7696)		3.0	0.5
Hypolaena pubescens		2.0	0.7
Petrophile squamata subsp. *squamata*		1.0	1.3
Dasypogon bromeliifolius		1.0	1.1
Leptocarpus laxus		1.0	0.7
Empodisma gracillimum		1.0	0.6
Anarthria prolifera		1.0	0.6
Opercularia hispidula		0.5	0.6
Agrostocrinum scabrum subsp. *scabrum*		0.3	0.6
Desmocladus fasciculatus		0.3	0.6
Johnsonia lupulina		0.2	0.9
Conospermum flexuosum subsp. *laevigatum*		0.2	0.6
Pimelea rosea subsp. *rosea*		0.2	0.6
Hypolaena caespitosa		0.2	0.6
Anigozanthos flavidus		0.1	1.5
Mesomelaena tetragona		0.1	1.2
Lomandra purpurea		0.1	1.0
Acacia browniana var. *browniana*		0.1	0.9
Cassytha sp.		0.1	0.7
Billardiera laxiflora		0.1	0.7
**Briza maxima*	Weed	0.1	0.7
Hibbertia amplexicaulis		0.1	0.7
Synaphea petiolaris subsp. *triloba*		0.1	0.7
Amphipogon setaceus		0.1	0.6
Sphenotoma gracilis		0.1	0.6
Hakea ruscifolia		0.1	0.6
Leucopogon australis		0.1	0.6
Dampiera heteroptera	P3 (DBCA list)	0.1	0.6
**Holcus lanatus*	Weed	0.1	0.6
Amphipogon setaceus		0.1	0.5
Conostylis aculeata subsp. *aculeata*		0.1	0.4
Stylidium scandens		0.1	0.3
Phlebocarya ciliata		0.1	0.3
**Hypochaeris glabra*	Weed	0.1	0.2

Site details			
Site	**BEE113**	**Position (WGS84)**	115.2719058, -34.25012833
Slope	gentle	**Topography**	sandy rise
Soil colour	light-brown, brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Agonis flexuosa* var. *flexuosa*, *Banksia attenuata* and *Allocasuarina fraseriana* low open forest over *Melaleuca thymoides* and *Banksia ilicifolia* isolated tall shrubs over *Anarthria scabra* mid sedgeland.
Habitat	forest
Disturbance	weed infestation

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	65.0	**Tree cover (%)**	50.0
Shrub cover (%)	4.0	**Grass cover (%)**	45.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Andrew Perkins

Species (18)	Status	Cover (%)	Height (m)
Anarthria scabra		45.0	0.7
Agonis flexuosa var. *flexuosa*		15.0	7.0
Banksia attenuata		15.0	6.0
Allocasuarina fraseriana		10.0	5.0
Phlebocarya ciliata		5.0	0.4
Melaleuca thymoides		2.0	1.1
Lyginia imberbis		2.0	0.6
Dasypogon bromeliifolius		2.0	0.5
Banksia ilicifolia		1.0	3.0
Nuytsia floribunda		0.5	3.0
Patersonia occidentalis		0.5	0.5
Acacia pulchella var. *pulchella*		0.3	1.1
Hypocalymma ericifolium		0.2	0.4
Burchardia congesta		0.1	0.8
Bossiaea praetermissa		0.1	0.2
**Briza maxima*	Weed	0.1	0.2
Gompholobium scabrum		0.0	1.4
Hibbertia cuneiformis		0.0	1.1

Site details			
Site	**BEE114**	**Position (WGS84)**	[redacted]
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Allocasuarina fraseriana, Agonis flexuosa* var. *flexuosa* and *Eucalyptus marginata* subsp. *marginata* low open forest over *Xanthorrhoea preissii, Gastrolobium formosum* and *Acacia browniana* var. *browniana* mid isolated shrubs over *Anarthria scabra* mixed mid sedgeland.
Habitat	forest
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	50.0
Shrub cover (%)	2.0	**Grass cover (%)**	45.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	16 Nov 2023	10m x 10m	Andrew Perkins

Species (31)	Status	Cover (%)	Height (m)
Anarthria scabra		40.0	0.8
Eucalyptus marginata subsp. *marginata*		15.0	15.0
Allocasuarina fraseriana		15.0	12.0
Gastrolobium formosum	P3 (DBCA list)	15.0	1.8
Agonis flexuosa var. *flexuosa*		7.0	9.0
Xanthorrhoea preissii		2.0	1.1
Acacia browniana var. *browniana*		0.4	0.7
Hakea ruscifolia		0.3	2.1
**Anthoxanthum odoratum*	Weed	0.2	0.6
Hypolaena caespitosa		0.2	0.5
Hypolaena pubescens		0.2	0.5
Dasypogon bromeliifolius		0.2	0.5
Cytogonidium leptocarpoides		0.2	0.4
[redacted]	[redacted]	[redacted]	[redacted]
Conostylis aculeata subsp. *aculeata*		0.2	0.4
Desmocladus fasciculatus		0.2	0.3
Phlebocarya ciliata		0.2	0.2
Abutilon sp.		0.1	1.3
Lomandra purpurea		0.1	0.7
Drosera sp.		0.1	0.6
Microtis media subsp. *media*		0.1	0.5
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.5
Burchardia congesta		0.1	0.5
Mesomelaena tetragona		0.1	0.5
Gompholobium scabrum		0.1	0.4
Gompholobium polymorphum		0.1	0.4
**Briza maxima*	Weed	0.1	0.2
Banksia nivea subsp. *nivea*		0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.1
Tricoryne humilis		0.1	0.1
Grevillea papillosa	P3 (DBCA list)	0.0	0.8

Site details			
Site	**BEE118**	**Position (WGS84)**	115.27271009501136, -34.19061042004739
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Taxandria parviceps, Acacia myrtifolia* and *Xanthorrhoea preissii* tall shrubland over *Cyathochaeta equitans, Mesomelaena tetragona* and *Patersonia occidentalis* tall open sedgeland/rushland.
Habitat	shrubland
Disturbance	historic clearing, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	60.0	**Tree cover (%)**	0.0
Shrub cover (%)	35.0	**Grass cover (%)**	32.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Brody Loneragan

Species (30)	Status	Cover (%)	Height (m)
Taxandria parviceps		32.0	8.0
Cyathochaeta equitans		20.0	0.8
Acacia myrtifolia		4.0	1.5
Xanthorrhoea preissii		4.0	1.4
Patersonia occidentalis var. *latifolia*		3.0	1.0
Mesomelaena tetragona		3.0	1.0
Opercularia hispidula		2.0	0.4
Callistachys lanceolata		1.0	4.0
Leucopogon verticillatus		1.0	2.0
Acacia extensa		1.0	1.5
Beaufortia sparsa		1.0	1.0
**Briza maxima*	Weed	1.0	0.4
**Anthoxanthum odoratum*	Weed	1.0	0.3
**Hypochaeris glabra*	Weed	1.0	0.1
Acacia hastulata		0.5	1.0
Comesperma virgatum		0.5	0.5
Taxandria linearifolia		0.5	0.5
Scaevola calliptera		0.2	0.4
Viminaria juncea		0.1	2.0
Prasophyllum brownii		0.1	1.0
Billardiera floribunda		0.1	0.8
Johnsonia lupulina		0.1	0.8
Pterostylis vittata		0.1	0.4
Hypolaena caespitosa		0.1	0.4
Dampiera trigona		0.1	0.3
Dampiera heteroptera	P3 (DBCA list)	0.1	0.3
Drosera menziesii		0.1	0.3
**Holcus lanatus*	Weed	0.1	0.3
**Lotus subbiflorus*	Weed	0.1	0.1
Xanthosia tasmanica		0.1	0.1

Site details			
Site	**BEE119**	**Position (WGS84)**	115.2704136260927, -34.174440046804186
Slope	gentle	**Topography**	sandy rise
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Agonis flexuosa* var. *flexuosa* low open forest over *Astartea scoparia* tall sparse shrubland over *Leptocarpus scariosus, Astartea scoparia* and *Xyris lanata* tall rushland over **Briza maxima* and **B. minor* low grassland.
Habitat	woodland
Disturbance	weed infestation, historic clearing

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	55.0	**Tree cover (%)**	40.0
Shrub cover (%)	7.0	**Grass cover (%)**	15.0
Herb cover (%)	0.2		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Andrew Perkins

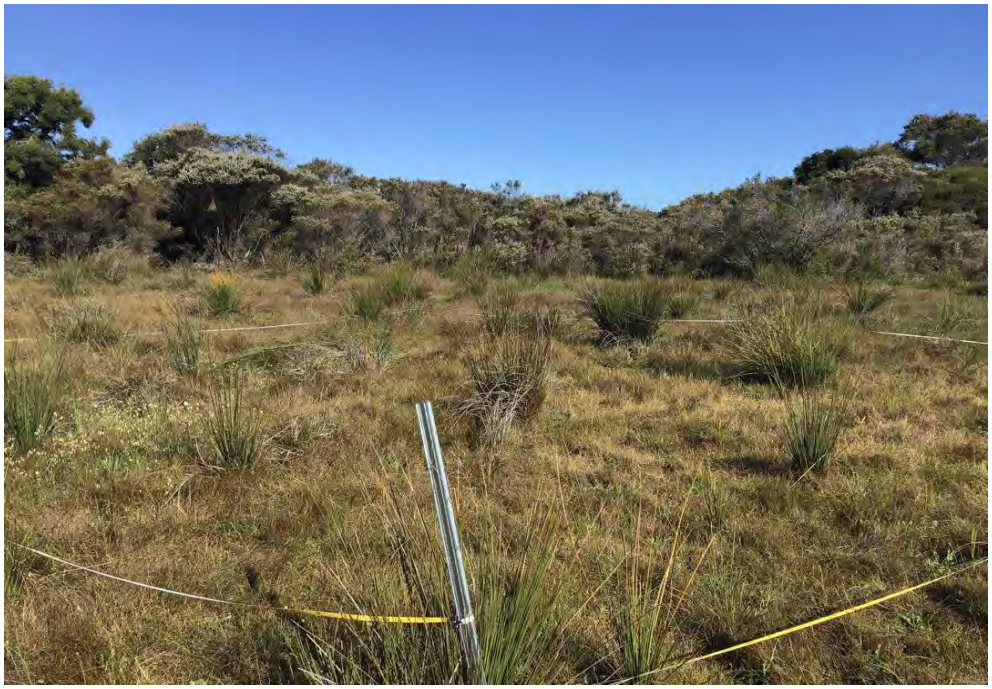
Species (25)	Status	Cover (%)	Height (m)
Agonis flexuosa var. *flexuosa*		40.0	6.0
Leptocarpus scariosus		10.0	1.5
Astartea scoparia		7.0	2.5
Evandra aristata		3.0	1.4
**Briza maxima*	Weed	2.5	0.5
Xyris lanata		0.5	0.8
Xanthorrhoea preissii		0.2	2.0
Caladenia attingens subsp. *attingens*		0.2	0.4
**Hypochaeris glabra*	Weed	0.2	0.1
Adenanthos obovatus		0.1	0.9
**Anthoxanthum odoratum*	Weed	0.1	0.5
Thelymitra flexuosa		0.1	0.3
**Disa bracteata*	Weed	0.1	0.3
Microtis media subsp. *media*		0.1	0.3
**Juncus articulatus*	Weed	0.1	0.3
**Rumex acetosella*	Weed	0.1	0.3
**Trifolium subterraneum*	Weed	0.1	0.2
**Lagurus ovatus*	Weed	0.1	0.2
**Briza minor*	Weed	0.1	0.1
**Geranium dissectum*	Weed	0.1	0.1
**Lotus subbiflorus*	Weed	0.1	0.1
Aphelia cyperoides		0.1	0.1
**Romulea rosea* var. *australis*	Weed	0.1	0.1
**Trifolium campestre* var. *campestre*	Weed	0.1	0.1
**Lysimachia arvensis*	Weed	0.1	0.02

Site details			
Site	**BEE122**	**Position (WGS84)**	115.2970974986583, -34.201085739800895
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Xanthorrhoea preissii* and *Dasypogon bromeliifolius* mid sparse grassland over *Hypolaena caespitosa, Anarthria scabra* and *A. prolifera* low closed rushland/ grassland over **Hypochaeris glabra* and *Microtis media* subsp. *media* low isolated forbs.
Habitat	grassland
Disturbance	weed infestation

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	99.0	**Tree cover (%)**	0.0
Shrub cover (%)	0.0	**Grass cover (%)**	90.0
Herb cover (%)	10.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	NLR

Species (22)	Status	Cover (%)	Height (m)
Hypolaena caespitosa		75.0	0.3
Xanthorrhoea preissii		10.0	1.5
Dasypogon bromeliifolius		5.0	0.6
Anarthria scabra		1.0	0.5
Anarthria prolifera		1.0	0.3
**Hypochaeris glabra*	Weed	0.5	0.5
**Briza maxima*	Weed	0.5	0.4
Melanostachya ustulata		0.5	0.3
Microtis media subsp. *media*		0.3	0.4
Thelymitra graminea		0.2	0.8
Dampiera leptoclada		0.2	0.2
Boronia crenulata subsp. *crenulata*		0.1	1.1
Acacia pulchella var. *pulchella*		0.1	0.5
Drosera menziesii		0.1	0.15
Sphaerolobium drummondii		0.1	0.15
**Briza minor*	Weed	0.1	0.1
Chamaescilla corymbosa var. *corymbosa*		0.1	0.1
Stylidium megacarpum		0.1	0.1
**Romulea rosea* var. *australis*	Weed	0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.1
Philydrella pygmaea subsp. *pygmaea*		0.1	0.05
Burchardia multiflora		0.0	0.2

Site details			
Site	**BEE201**	**Position (WGS84)**	115.29788045223364, -34.20071668460425
Slope	negligible	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Melaleuca preissiana* tall forest over *Taxandria parviceps* and *Xanthorrhoea preissii* tall open shrubland over *Anarthria scabra, A. prolifera* and *Hypolaena caespitosa* mid sparse grassland over *Lindsaea linearis* low isolated forbs.

Habitat	forest
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	60.0	**Tree cover (%)**	55.0
Shrub cover (%)	10.0	**Grass cover (%)**	5.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Andrew Perkins

Species (9)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		50.0	15.0
Taxandria parviceps		5.0	3.5
Melaleuca preissiana		2.5	6.0
Anarthria scabra		2.0	1.5
Hypolaena caespitosa		1.0	0.3
Opercularia hispidula		0.5	0.5
Xanthorrhoea preissii		0.1	3.5
Anarthria prolifera		0.1	0.4
Lindsaea linearis		0.1	0.1

Site details			
Site	**BEE203**	**Position (WGS84)**	115.3144557495744, -34.199694218145865
Slope	gentle	**Topography**	sandy rise
Soil colour	brown	**Soil texture**	Loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* tall woodland over *Taxandria parviceps* and *Acacia pulchella* var. *pulchella* mid isolated shrubs over *Pteridium esculentum* subsp. *esculentum, Patersonia occidentalis* var. *latifolia* and *Cyathochaeta equitans* mid grassland over *Hibbertia cunninghamii*, *Opercularia hispidula* and *Cryptostylis ovata* low isolated forbs.
Habitat	woodland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70.0	**Tree cover (%)**	50.0
Shrub cover (%)	0.2	**Grass cover (%)**	17.0
Herb cover (%)	4.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Andrew Perkins

Species (14)	Status	Cover (%)	Height (m)
Corymbia calophylla		35.0	28.0
Eucalyptus marginata subsp. *marginata*		15.0	25.0
Cyathochaeta equitans		10.0	0.5
Patersonia occidentalis var. *latifolia*		5.0	0.8
Opercularia hispidula		3.0	0.5
Pteridium esculentum subsp. *esculentum*		2.0	1.5
Hibbertia cunninghamii		1.0	0.3
Hypolaena caespitosa		0.2	0.4
Macrozamia riedlei		0.1	1.0
Taxandria parviceps		0.1	1.0
Hovea elliptica		0.1	1.0
Acacia pulchella var. *pulchella*		0.1	0.9
Cryptostylis ovata		0.1	0.4
Amphipogon amphipogonoides		0.1	0.1

Site details			
Site	**BEE251**	**Position (WGS84)**	115.3080925845444, -34.225968822035085
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Taxandria inundata* and *Astartea scoparia* tall closed shrubland over *Calothamnus lateralis* var. *crassus* scattered shrubs over *Leptocarpus scariosus, Machaerina juncea* and *Juncus pallidus* tall rushland.
Habitat	shrubland
Disturbance	grazing-medium, evidence of feral animals, large-scale clearing, weed infestation

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	50.0
Herb cover (%)	3.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (10)	Status	Cover (%)	Height (m)
Taxandria inundata		75.0	3.0
Leptocarpus scariosus		35.0	1.2
Machaerina juncea		10.0	0.4
Juncus pallidus		5.0	1.0
**Epilobium ciliatum*	Weed	3.0	0.2
Astartea scoparia		2.0	2.5
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.5	2.0
Machaerina articulata		0.5	0.6
Hakea linearis		0.1	1.0
Liparophyllum lasiospermum		0.1	0.1

Site details			
Site	**BEE252**	**Position (WGS84)**	115.3068829561135, -34.225670513167465
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Taxandria juniperina* low forest over *Leptocarpus scariosus, Machaerina juncea* and *Juncus pallidus* tall rushland.
Habitat	shrubland
Disturbance	evidence of feral animals, grazing-low, historic clearing

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (4)	Status	Cover (%)	Height (m)
Taxandria juniperina		75.0	15.0
Leptocarpus scariosus		40.0	1.4
Juncus pallidus		10.0	2.0
Machaerina juncea		5.0	0.8

Site details			
Site	**BEE256**	**Position (WGS84)**	115.30627809933044, -34.23026361048598
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Melaleuca rhaphiophylla* low forest.
Habitat	waterhole
Disturbance	

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	75.0
Shrub cover (%)	0.0	**Grass cover (%)**	0.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (3)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		70.0	12.0
Leptocarpus scariosus		1.0	1.2
Cycnogeton huegelii		1.0	0.3

Site details			
Site	**BEE259**	**Position (WGS84)**	115.31106641135545, -34.22935558603347
Slope	gentle	**Topography**	seasonally wet area
Soil colour	black, whitish	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Melaleuca rhaphiophylla* low closed forest over *Lemna disperma* aquatic forbland.
Habitat	waterhole
Disturbance	grazing-medium, livestock tracks

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	75.0
Shrub cover (%)	0.0	**Grass cover (%)**	0.0
Herb cover (%)	40.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (3)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		75.0	12.0
Lemna disperma		20.0	0.01
Microtis media subsp. *media*		0.1	0.2

Site details			
Site	**BEE262**	**Position (WGS84)**	115.30576319776839, -34.23063834624285
Slope	gentle	**Topography**	depression
Soil colour	black, whitish	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Machaerina juncea* and *Leptocarpus scariosus* tall sedgeland over *Myriophyllum salsugineum* and *Ornduffia albiflora* sparse aquatic forbland.
Habitat	waterhole
Disturbance	grazing-low, evidence of feral animals, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	55.0	**Tree cover (%)**	0.0
Shrub cover (%)	0.0	**Grass cover (%)**	50.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (9)	Status	Cover (%)	Height (m)
Machaerina juncea		30.0	0.6
Leptocarpus scariosus		20.0	1.4
Myriophyllum salsugineum		4.0	0.2
Lepidosperma longitudinale		3.0	0.3
Ornduffia albiflora		2.0	0.3
Juncus pallidus		1.0	1.2
Alternanthera denticulata var. *denticulata*		1.0	0.3
**Epilobium ciliatum*	Weed	1.0	0.2
Cycnogeton huegelii		0.5	0.3

Site details			
Site	**BEE264**	**Position (WGS84)**	115.30796000471834, -34.23370220944731
Slope	gentle	**Topography**	depression
Soil colour	black, whitish	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (24 Oct 2023)

Site description	*Lepidosperma longitudinale, Machaerina juncea* and *Leptocarpus scariosus* tall sedgeland.
Habitat	waterhole
Disturbance	grazing-high, evidence of feral animals, historic clearing

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	0.0
Shrub cover (%)	2.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (7)	Status	Cover (%)	Height (m)
Lepidosperma longitudinale		20.0	0.6
Machaerina juncea		15.0	0.8
Leptocarpus scariosus		10.0	2.0
Hakea linearis		2.0	2.0
Juncus pallidus		1.0	1.5
Myriophyllum salsugineum		1.0	0.3
Alternanthera denticulata var. *denticulata*		0.1	0.2

Site details			
Site	**BEE265**	**Position (WGS84)**	115.30801796072063, -34.23311700200854
Slope	negligible	**Topography**	depression
Soil colour	white, black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Astartea scoparia, Taxandria inundata* and *Melaleuca rhaphiophylla* tall closed shrubland over *Machaerina juncea* and *Leptocarpus scariosus* tall rushland.
Habitat	waterhole
Disturbance	grazing-low

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	90.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	40.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (7)	Status	Cover (%)	Height (m)
Taxandria inundata		30.0	3.0
Astartea scoparia		30.0	3.0
Machaerina juncea		25.0	1.0
Leptocarpus scariosus		15.0	2.0
Melaleuca rhaphiophylla		10.0	4.0
Hakea linearis		1.0	1.0
Juncus pallidus		0.1	1.0

Site details			
Site	**BEE266**	**Position (WGS84)**	115.3070876388045, -34.233437624612435
Slope	gentle	**Topography**	depression
Soil colour	black, white	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (24 Oct 2023)

Site description	*Melaleuca rhaphiophylla* low closed forest over *Lepidosperma longitudinale* and *Machaerina rubiginosa* mid sparse sedgeland.
Habitat	forest
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	80.0
Shrub cover (%)	0.1	**Grass cover (%)**	5.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	24 Oct 2023	10m x 10m	Brody Loneragan

Species (3)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		80.0	8.0
Lepidosperma longitudinale		3.0	1.2
Machaerina rubiginosa		2.0	1.5

Site details			
Site	**BEE271**	**Position (WGS84)**	115.31233154839157, -34.22661362245133
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina* low woodland over *Leptocarpus scariosus* and *Isolepis hookeriana* tall open rushland over **Briza minor* scattered mixed grasses.
Habitat	waterhole
Disturbance	evidence of feral animals, grazing-low, large-scale clearing, weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	55.0	**Tree cover (%)**	0.0
Shrub cover (%)	50.0	**Grass cover (%)**	28.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (11)	Status	Cover (%)	Height (m)
Taxandria juniperina		50.0	12.0
Leptocarpus scariosus		28.0	1.4
Isolepis hookeriana		0.2	0.1
**Solanum nigrum*	Weed	0.1	0.5
**Ehrharta longiflora*	Weed	0.1	0.5
**Holcus lanatus*	Weed	0.1	0.2
Cycnogeton huegelii		0.1	0.2
Microtis media subsp. *media*		0.1	0.2
**Briza minor*	Weed	0.1	0.2
Pterostylis erubescens		0.1	0.1
**Lotus subbiflorus*	Weed	0.1	0.1

Site details			
Site	**BEE274**	**Position (WGS84)**	115.3082427242041, -34.219017793375414
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Melaleuca rhaphiophylla* low closed forest over *Astartea scoparia* isolated tall shrubs over *Juncus pallidus* isolated clumps of rushes.
Habitat	waterhole
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	75.0	**Grass cover (%)**	5.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (5)	Status	Cover (%)	Height (m)
Melaleuca rhaphiophylla		75.0	10.0
Juncus pallidus		5.0	1.4
Astartea scoparia		2.0	3.0
Leptocarpus scariosus		1.0	1.2
Cycnogeton huegelii		1.0	0.3

Site details			
Site	**BEE275**	**Position (WGS84)**	115.3022438301996, -34.219559482365646
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina* and *Melaleuca rhaphiophylla* low woodland over *Cycnogeton huegelii* and *Leptocarpus scariosus* open aquatic herbland.
Habitat	waterhole
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	45.0	**Tree cover (%)**	0.0
Shrub cover (%)	45.0	**Grass cover (%)**	5.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (5)	Status	Cover (%)	Height (m)
Taxandria juniperina		30.0	15.0
Melaleuca rhaphiophylla		25.0	12.0
Leptocarpus scariosus		5.0	14.0
Cycnogeton huegelii		5.0	0.4
Microtis media subsp. *media*		0.1	0.2

Site details			
Site	**BEE276**	**Position (WGS84)**	115.30260397981489, -34.21942475167927
Slope	negligible	**Topography**	depression
Soil colour	brown	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina* and *Melaleuca preissiana* low woodland over *Kunzea spathulata* sparse tall shrubland over *Hibbertia cuneiformis* isolated low shrubs.
Habitat	waterhole
Disturbance	grazing-medium, historic clearing, weed infestation

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	60.0	**Tree cover (%)**	0.0
Shrub cover (%)	60.0	**Grass cover (%)**	1.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (14)	Status	Cover (%)	Height (m)
Taxandria juniperina		50.0	15.0
Kunzea spathulata		5.0	4.0
Melaleuca preissiana		4.0	10.0
Hibbertia cuneiformis		3.0	2.2
Astartea scoparia		1.0	1.0
**Hypochaeris glabra*	Weed	0.1	0.05
Senecio picridioides		0.1	0.2
**Anthoxanthum odoratum*	Weed	0.1	0.2
**Vulpia bromoides*	Weed	0.1	0.2
**Aira caryophyllea*	Weed	0.1	0.1
Phyllangium divergens		0.1	0.1
Rhodanthe citrina		0.01	0.1
**Solanum nigrum*	Weed	0.01	0.1
Microtis media subsp. *media*		0.0	0.2

Site details			
Site	**BEE282**	**Position (WGS84)**	115.32094641465565, -34.24552530477984
Slope	gentle	**Topography**	creek
Soil colour	orange, brown	**Soil texture**	Loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Corymbia calophylla* and *Agonis flexuosa* var. *flexuosa* open forest over *Cyathochaeta equitans* closed sedgeland and *Opercularia hispidula* sparse herbland.
Habitat	forest
Disturbance	grazing-low, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	71.0
Shrub cover (%)	0.0	**Grass cover (%)**	80.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	Brody Loneragan

Species (15)	Status	Cover (%)	Height (m)
Cyathochaeta equitans		80.0	0.4
Corymbia calophylla		25.0	14.0
Eucalyptus marginata subsp. *marginata*		25.0	14.0
Agonis flexuosa var. *flexuosa*		20.0	12.0
Opercularia hispidula		5.0	0.4
Machaerina articulata		2.0	0.4
Hypolaena pubescens		1.0	0.3
**Holcus lanatus*	Weed	1.0	0.2
**Hypochaeris glabra*	Weed	1.0	0.2
**Geranium purpureum*	Weed	1.0	0.1
Melaleuca preissiana		0.2	10.0
Hibbertia cunninghamii		0.1	0.5
Dasypogon bromeliifolius		0.1	0.4
Caesia micrantha		0.1	0.3
**Briza maxima*	Weed	0.1	0.3

Site details			
Site	**BEE286**	**Position (WGS84)**	115.2788294041181, -34.19061556349582
Slope	gentle	**Topography**	depression
Soil colour	black, white	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Astartea scoparia* tall open shrubland over *Machaerina rubiginosa* and *Leptocarpus scariosus* tall rushland over **Mentha pulegium* and *Cyathochaeta clandestina* open forbland.
Habitat	waterhole
Disturbance	grazing-high, large-scale clearing, weed infestation

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	68.0	**Tree cover (%)**	0.0
Shrub cover (%)	20.0	**Grass cover (%)**	32.0
Herb cover (%)	25.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	26 Oct 2023	10m x 10m	Brody Loneragan

Species (9)	Status	Cover (%)	Height (m)
Astartea scoparia		15.0	4.0
Machaerina rubiginosa		10.0	1.5
Leptocarpus scariosus		6.0	2.0
**Mentha pulegium*	Weed	5.0	0.2
Cyathochaeta clandestina		4.0	1.8
Alternanthera denticulata var. *denticulata*		1.0	0.2
?*Billardiera variifolia*		0.1	1.0
**Rumex crispus*	Weed	0.1	0.2
Xyris lacera		0.0	1.8

Site details			
Site	**BEE293**	**Position (WGS84)**	115.2786783582500, -34.158882636646126
Slope	gentle	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (27 Oct 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* woodland over *Xanthorrhoea preissii, Hibbertia hypericoides* subsp. *hypericoides* and *Acacia extensa* low open shrubland over *Anarthria scabra, A. prolifera* and *Mesomelaena tetragona* mid sedgeland.
Habitat	woodland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	85.0	**Tree cover (%)**	25.0
Shrub cover (%)	8.0	**Grass cover (%)**	65.0
Herb cover (%)	4.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	27 Oct 2023	10m x 10m	Brody Loneragan

Species (47)	Status	Cover (%)	Height (m)
Anarthria scabra		63.0	1.0
Eucalyptus marginata subsp. *marginata*		23.0	14.0
Hibbertia hypericoides subsp. *hypericoides*		8.0	0.5
Corymbia calophylla		4.0	10.0
Xanthorrhoea preissii		3.0	2.0
Mesomelaena tetragona		3.0	0.5
Anarthria prolifera		3.0	0.4
Allocasuarina fraseriana		2.0	3.0
Banksia grandis		1.0	3.0
Acacia extensa		1.0	1.2
Schoenus efoliatus		1.0	1.0
Leucopogon australis		1.0	1.0
Morelotia octandra		1.0	0.5
Dasypogon bromeliifolius		1.0	0.5
Andersonia sprengelioides		1.0	0.2
Gompholobium ovatum		1.0	0.2
Orianthera serpyllifolia		1.0	0.2
Gompholobium tomentosum		0.5	3.0
Patersonia occidentalis var. *latifolia*		0.5	0.5
Grevillea manglesioides subsp. *manglesioides*		0.1	1.5
Patersonia umbrosa var. *xanthina*		0.1	0.9
Adenanthos obovatus		0.1	0.5
Stylidium scandens		0.1	0.3
Macrozamia riedlei		0.1	0.3
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.3
Styphelia sp. Nannup (R.D. Royce 3978)		0.1	0.3
Thelymitra graminea		0.1	0.3
Dampiera leptoclada		0.1	0.2
Scaevola calliptera		0.1	0.2
Hovea trisperma var. *trisperma*		0.1	0.2
Actinotus glomeratus		0.1	0.1
Gompholobium knightianum		0.1	0.1
Acacia uliginosa		0.1	0.1
Kunzea spathulata		0.01	2.0
Platysace filiformis		0.01	0.5
Drosera pallida		0.01	0.5
Burchardia congesta		0.01	0.4
Lomandra preissii		0.01	0.3
Lomandra caespitosa		0.01	0.3
Philotheca spicata		0.01	0.3
Stackhousia monogyna		0.01	0.3
Billardiera laxiflora		0.01	0.2
Thelymitra crinita		0.01	0.2
Lyperanthus serratus		0.01	0.2
Lindsaea linearis		0.01	0.1
Hypolaena caespitosa		0.01	0.1

Pentapeltis peltigera	0.01	0.1

Site details			
Site	**BEE294**	**Position (WGS84)**	115.2777696684146, -34.158794465829516
Slope	gentle	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (27 Oct 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* mid woodland over *Taxandria parviceps, Agonis flexuosa* var. *flexuosa* and *Xanthorrhoea preissii* tall sparse shrubland over *Anarthria scabra, A. prolifera* and *Dasypogon bromeliifolius* mid sedgeland.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	60.0	**Tree cover (%)**	20.0
Shrub cover (%)	3.0	**Grass cover (%)**	50.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	27 Oct 2023	10m x 10m	Brody Loneragan

Species (39)	Status	Cover (%)	Height (m)
Anarthria scabra		55.0	1.0
Eucalyptus marginata subsp. *marginata*		15.0	14.0
Corymbia calophylla		8.0	12.0
Xanthorrhoea preissii		7.0	2.0
Anarthria prolifera		5.0	0.4
Taxandria parviceps		2.0	2.0
Hibbertia hypericoides subsp. *hypericoides*		2.0	0.2
Agonis flexuosa var. *flexuosa*		1.0	2.0
Mirbelia dilatata		1.0	1.3
Xanthorrhoea gracilis		1.0	0.8
Dasypogon bromeliifolius		1.0	0.5
Hypolaena viridis		0.5	0.5
Acacia myrtifolia		0.1	1.5
Acacia extensa		0.1	1.0
Schoenus efoliatus		0.1	0.6
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.5
Stackhousia monogyna		0.1	0.4
Styphelia sp. Nannup (R.D. Royce 3978)		0.1	0.4
Platysace filiformis		0.1	0.3
Pericalymma ellipticum var. *ellipticum*		0.1	0.3
Philotheca spicata		0.1	0.3
Gompholobium tomentosum		0.1	0.2
Acacia uliginosa		0.1	0.2
Gompholobium scabrum		0.1	0.2
Hovea trisperma var. *trisperma*		0.1	0.2
Dampiera leptoclada		0.1	0.2
**Disa bracteata*	Weed	0.1	0.2
Siloxerus humifusus		0.1	0.1
Actinotus glomeratus		0.1	0.1
Bossiaea praetermissa		0.1	0.1
Scaevola calliptera		0.1	0.1
Philotheca spicata		0.02	0.2
Bossiaea rufa		0.01	0.5
Burchardia congesta		0.01	0.3
Drosera pallida		0.01	0.3
**Briza maxima*	Weed	0.01	0.2
Stylidium scandens		0.01	0.2
Billardiera laxiflora		0.01	0.2
Lindsaea linearis		0.01	0.1

Site details			
Site	**BEE304**	**Position (WGS84)**	115.3063727366052, -34.24056066109263
Slope	gentle	**Topography**	sandy rise
Soil colour	grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* low open woodland over *Melaleuca thymoides* and *Jacksonia horrida* open shrubland over *Phlebocarya ciliata* open herbland and *Anarthria scabra* sparse grassland.
Habitat	woodland
Disturbance	grazing-medium, weed infestation

Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	35.0	**Tree cover (%)**	5.0
Shrub cover (%)	15.0	**Grass cover (%)**	12.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Beth Arbery

Species (18)	Status	Cover (%)	Height (m)
Melaleuca thymoides		10.0	1.1
Phlebocarya ciliata		8.0	0.3
Anarthria scabra		5.0	0.8
Agonis flexuosa var. *flexuosa*		4.0	4.0
Dasypogon bromeliifolius		4.0	0.5
**Anthoxanthum odoratum*	Weed	3.0	0.5
Eucalyptus marginata subsp. *marginata*		2.0	5.0
Nuytsia floribunda		2.0	5.0
Jacksonia horrida		2.0	2.0
**Briza maxima*	Weed	1.0	5.0
Lyginia imberbis		1.0	0.5
Adenanthos obovatus		0.5	0.6
Lechenaultia expansa		0.5	0.3
Dampiera pedunculata		0.1	0.5
Burchardia congesta		0.1	0.5
Bossiaea praetermissa		0.1	0.5
Scaevola calliptera		0.1	0.3
Stylidium repens		0.01	0.1

Site details			
Site	**BEE312**	**Position (WGS84)**	115.3132601322184, -34.241734516050386
Slope	gentle	**Topography**	sandy rise
Soil colour	grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Melaleuca thymoides* and *Jacksonia horrida* open shrubland over *Phlebocarya ciliata* open herbland and *Anarthria scabra* and *A. prolifera* open grassland.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	31.0	**Grass cover (%)**	12.0
Herb cover (%)	15.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	16 Nov 2023	10m x 10m	Beth Arbery

Species (15)	Status	Cover (%)	Height (m)
Melaleuca thymoides		15.0	1.2
Phlebocarya ciliata		10.0	0.5
Anarthria scabra		5.0	1.0
Anarthria prolifera		5.0	0.4
Jacksonia horrida		3.0	2.0
Lyginia imberbis		2.0	0.5
Sphenotoma gracilis		1.0	1.0
Adenanthos obovatus		1.0	1.0
Johnsonia lupulina		1.0	1.0
**Briza maxima*	Weed	1.0	0.5
Hypocalymma ericifolium		0.5	0.4
Dampiera pedunculata		0.5	0.3
Pimelea longiflora		0.1	1.2
Stylidium repens		0.1	0.2
Lechenaultia expansa		0.1	0.1

Site details			
Site	**BEE374**	**Position (WGS84)**	115.31278860124927, -34.16083027118758
Slope	gentle	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* open forest over *Acacia myrtifolia, A. divergens* and *Taxandria linearifolia* tall shrubland over *Anarthria prolifera* tall rushland.
Habitat	forest
Disturbance	vehicle tracks

Vegetation condition	Pristine	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	85.0	**Tree cover (%)**	45.0
Shrub cover (%)	66.0	**Grass cover (%)**	45.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Beth Arbery

Species (38)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		32.0	25.0
Anarthria prolifera		25.0	5.0
Corymbia calophylla		18.0	25.0
Lindsaea linearis		15.0	0.2
Acacia myrtifolia		10.0	2.5
Xanthorrhoea preissii		10.0	2.0
Acacia divergens		10.0	1.2
Taxandria linearifolia		8.0	2.2
Mesomelaena tetragona		5.0	1.0
Dampiera leptoclada		5.0	0.5
Mirbelia dilatata		4.0	2.1
Lepidosperma sp. Blackwood (R. Davis 7696)		2.0	1.0
Tyrbastes glaucescens		2.0	0.4
Amphipogon laguroides subsp. *laguroides*		1.0	6.0
Comesperma virgatum		1.0	1.5
Petrophile diversifolia		1.0	1.0
Sphaerolobium medium		1.0	1.0
Boronia fastigiata		1.0	0.7
Styphelia sp. Nannup (R.D. Royce 3978)		1.0	0.5
Lomandra pauciflora		1.0	0.5
Stylidium scandens		0.5	1.0
Viminaria juncea		0.5	1.0
Grevillea manglesioides subsp. *manglesioides*		0.5	1.0
Pimelea rosea subsp. *rosea*		0.5	0.5
Hovea trisperma var. *trisperma*		0.5	0.4
Thysanotus arenarius		0.1	1.0
Johnsonia lupulina		0.1	1.0
Thysanotus dichotomus		0.1	1.0
Stylidium amoenum		0.1	0.7
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.7
Adenanthos obovatus		0.1	0.5
Poranthera huegelii		0.1	0.4
Hibbertia cunninghamii		0.1	0.2
Hypocalymma minus		0.1	0.2
Kennedia carinata		0.1	0.1
Scaevola calliptera		0.1	0.1
Billardiera variifolia		0.01	0.7
Cassytha racemosa forma *pilosa*		0.01	0.5

Site details			
Site	**BEE375**	**Position (WGS84)**	115.3124305828615, -34.16015811518499
Slope	gentle	**Topography**	drainage line
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Corymbia calophylla* mid woodland over *Taxandria parviceps, Xanthorrhoea preissii* and *Hakea lasianthoides* tall closed shrubland over *Anarthria prolifera, Lepidosperma* sp. Blackwood (R. Davis 7696) and *Lomandra pauciflora* tall closed rushland.
Habitat	shrubland
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95.0	**Tree cover (%)**	20.0
Shrub cover (%)	75.0	**Grass cover (%)**	95.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	15 Nov 2023	10m x 10m	Beth Arbery

Species (29)	Status	Cover (%)	Height (m)
Anarthria prolifera		45.0	0.5
Corymbia calophylla		20.0	25.0
Taxandria parviceps		12.0	3.0
Lepidosperma sp. Blackwood (R. Davis 7696)		10.0	1.0
Xanthorrhoea preissii		7.0	2.0
Lomandra pauciflora		5.0	5.0
Hakea lasianthoides		5.0	4.0
Mesomelaena tetragona		3.0	0.5
Aotus gracillima		2.0	3.0
Hypocalymma minus		2.0	0.4
Hakea tuberculata		1.0	1.5
Taxandria linearifolia		1.0	1.3
Conospermum flexuosum subsp. *laevigatum*		1.0	1.0
Pimelea rosea subsp. *rosea*		1.0	1.0
Boronia fastigiata		1.0	1.0
Amphipogon laguroides subsp. *laguroides*		1.0	0.8
Hypolaena grandiuscula		1.0	0.7
Adenanthos obovatus		1.0	0.5
Cassytha racemosa forma *pilosa*		0.1	2.0
Petrophile diversifolia		0.1	1.5
Sporadanthus strictus		0.1	1.2
Dampiera heteroptera	P3 (DBCA list)	0.1	1.0
Scaevola calliptera		0.1	0.1
Stylidium squamosotuberosum		0.1	0.1
Grevillea manglesioides subsp. *manglesioides*		0.0	2.1
Indeterminate		0.0	1.5
Patersonia occidentalis		0.0	1.2
Tyrbastes glaucescens		0.0	0.4
Liparophyllum lasiospermum		0.0	0.2

Site details			
Site	**BEE376**	**Position (WGS84)**	115.26882255628013, -34.22094754018116
Slope	gentle	**Topography**	depression
Soil colour	grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Taxandria juniperina* low woodland over *Astartea scoparia, Hakea ceratophylla* and *Grevillea papillosa* mid closed shrubland over *Hypolaena pubescens* and *Melanostachya ustulata* mid sparse rushland.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	90.0	**Tree cover (%)**	15.0
Shrub cover (%)	85.0	**Grass cover (%)**	10.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	16 Nov 2023	10m x 10m	Jenifer Alford

Species (38)	Status	Cover (%)	Height (m)
Taxandria juniperina		35.0	4.0
Astartea scoparia		35.0	1.8
Hypolaena pubescens		5.0	0.6
Hakea ceratophylla		4.0	1.1
Melanostachya ustulata		3.0	1.1
Grevillea papillosa	P3 (DBCA list)	3.0	1.0
Acacia myrtifolia		2.0	2.3
Xanthorrhoea preissii		2.0	0.6
Kunzea recurva		0.5	2.1
Dasypogon bromeliifolius		0.5	0.6
Desmocladus fasciculatus		0.5	0.5
Chaetanthus leptocarpoides		0.4	0.6
Mirbelia dilatata		0.2	2.4
Leptocarpus tenax		0.2	0.7
Platychorda applanata		0.2	0.7
Synaphea nexosa	P1 (DBCA list)	0.2	0.5
Dampiera pedunculata		0.2	0.5
Hypolaena caespitosa		0.2	0.5
Cytogonidium leptocarpoides		0.2	0.5
Phlebocarya ciliata		0.2	0.3
Eutaxia virgata		0.1	1.2
Xyris roycei		0.1	1.1
Cassytha sp.		0.1	1.1
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.1	1.0
Acacia browniana var. *browniana*		0.1	0.8
Mesomelaena tetragona		0.1	0.7
Leptocarpus coangustatus		0.1	0.6
Hibbertia amplexicaulis		0.1	0.6
Chordifex amblycoleus		0.1	0.5
Boronia spathulata		0.1	0.4
Microtis media subsp. *media*		0.1	0.3
**Juncus microcephalus*	Weed	0.1	0.3
**Hypochaeris glabra*	Weed	0.1	0.2
Conostylis aculeata subsp. *aculeata*		0.1	0.2
Stylidium scandens		0.1	0.2
Actinotus glomeratus		0.1	0.1
**Briza maxima*	Weed	0.1	0.1
Callistachys lanceolata		0.0	3.0

Site details			
Site	**BEE377**	**Position (WGS84)**	115.3138493188799, -34.198926100539225
Slope	gentle	**Topography**	seasonally wet area
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Taxandria juniperina* mid open forest over *Astartea scoparia* tall sparse shrubland over *Leptocarpus scoparius* tall rushland.
Habitat	forest
Disturbance	weed infestation

Vegetation condition	Pristine	**Fire age**	not evident
Total veg. cover (%)	65.0	**Tree cover (%)**	40.0
Shrub cover (%)	5.0	**Grass cover (%)**	20.0
Herb cover (%)	0.2		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	25 Oct 2023	10m x 10m	NLR

Species (10)	Status	Cover (%)	Height (m)
Taxandria juniperina		40.0	20.0
Leptocarpus scariosus		20.0	1.5
Astartea scoparia		5.0	5.0
Isolepis cyperoides		0.2	0.2
**Poa annua*	Weed	0.1	0.2
**Briza minor*	Weed	0.1	0.1
**Cotula turbinata*	Weed	0.1	0.1
Aphelia cyperoides		0.1	0.1
Isolepis congrua		0.1	0.1
**Lotus subbiflorus*	Weed	0.1	0.1

Site details			
Site	**BEE378**	**Position (WGS84)**	115.401441769331, -34.15599651330463
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	Loam
Rock cover (%)	0	**Rock type**	laterite

Observation details - visit 1 (13 Nov 2023)

Site description	*Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* tall open forest over *Podocarpus drouynianus, Hovea elliptica* and *Gompholobium ovatum* tall open shrubland over *Lepidosperma leptostachyum* and *Netrostylis* sp. Blackwood River (A.R. Annels 3043) mid sedgeland.
Habitat	forest
Disturbance	none evident

Vegetation condition	Pristine	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70.0	**Tree cover (%)**	32.0
Shrub cover (%)	15.0	**Grass cover (%)**	45.0
Herb cover (%)	6.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	13 Nov 2023	10m x 10m	Beth Arbery

Species (57)	Status	Cover (%)	Height (m)
Lepidosperma leptostachyum		50.0	1.0
Corymbia calophylla		18.0	32.0
Eucalyptus marginata subsp. *marginata*		15.0	32.0
Podocarpus drouynianus		10.0	2.0
Netrostylis sp. Blackwood River (A.R. Annels 3043)	P3 (DBCA list)	5.0	1.0
Opercularia hispidula		3.0	0.5
Hovea elliptica		2.0	1.2
Gompholobium ovatum		2.0	0.3
Orianthera serpyllifolia		2.0	0.1
Patersonia umbrosa var. *xanthina*		1.0	1.0
Hibbertia cunninghamii		1.0	1.0
Leucopogon verticillatus		1.0	1.0
Acacia browniana var. *browniana*		1.0	0.8
Mesomelaena tetragona		1.0	0.3
Pentapeltis peltigera		1.0	0.1
Taxandria parviceps		0.5	1.0
Hibbertia hypericoides subsp. *hypericoides*		0.5	0.7
Xanthorrhoea gracilis		0.2	1.0
Johnsonia lupulina		0.1	5.0
Boronia tenuior		0.1	4.0
Grevillea manglesioides subsp. *manglesioides*		0.1	3.0
Anarthria prolifera		0.1	2.0
Hakea falcata		0.1	2.0
Comesperma virgatum		0.1	1.3
Bossiaea eriocarpa		0.1	1.0
Pimelea rosea subsp. *rosea*		0.1	1.0
Austrostipa semibarbata		0.1	1.0
Gompholobium polymorphum		0.1	0.5
Hakea lissocarpha		0.1	0.3
Thysanotus arenarius		0.1	0.3
Chorizema carinatum	(P3 DBCA list)	0.1	0.3
Dampiera leptoclada		0.1	0.3
Adenanthos obovatus		0.1	0.3
Petrophile diversifolia		0.1	0.2
Leucopogon interstans		0.1	0.2
Leucopogon capitellatus		0.1	0.2
Styphelia sp. Nannup (R.D. Royce 3978)		0.1	0.2
Acacia alata		0.1	0.2
Lomandra pauciflora		0.1	0.2
Billardiera variifolia		0.1	0.2
Bossiaea praetermissa		0.1	0.1
Scaevola calliptera		0.1	0.1
Lindsaea linearis		0.1	0.1
Tetrarrhena laevis		0.1	0.1
Goodenia eatoniana		0.1	0.05
Cassytha racemosa forma *pilosa*		0.01	1.0

Caesia micrantha	0.01	1.0
Thelymitra crinita	0.01	0.5
Stylidium amoenum var. *caulescens*	0.01	0.3
Stackhousia huegelii	0.01	0.3
Drosera huegelii	0.01	0.2
Lomandra integra	0.01	0.2
Hypolaena viridis	0.01	0.2
Centrolepis aristata	0.01	0.1
Goodenia micrantha	0.01	0.01
Levenhookia pusilla	0.01	0.01
Siloxerus humifusus	0.01	0.01

Site details			
Site	**BEE379**	**Position (WGS84)**	115.40218823289692, -34.15618188365698
Slope	gentle	**Topography**	seasonally wet area
Soil colour	grey	**Soil texture**	Clay loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (13 Nov 2023)

Site description	*Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata* mid woodland over *Kingia australis, Taxandria parviceps* and *Acacia extensa* tall open shrubland over *Mesomelaena tetragona* and *Anarthria prolifera* mid rushland/herbland.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Pristine	**Fire age**	moderate (>5 years)
Total veg. cover (%)	68.0	**Tree cover (%)**	15.0
Shrub cover (%)	25.0	**Grass cover (%)**	40.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	13 Nov 2023	10m x 10m	Beth Arbery

Species (73)	Status	Cover (%)	Height (m)
Kingia australis		15.0	3.5
Corymbia calophylla		14.0	25.0
Eucalyptus marginata subsp. *marginata*		10.0	25.0
Taxandria parviceps		8.0	3.0
Mesomelaena tetragona		8.0	1.0
Xanthorrhoea preissii		5.0	1.9
Patersonia umbrosa var. *xanthina*		5.0	0.7
Anarthria prolifera		5.0	0.3
Lindsaea linearis		3.0	0.1
Acacia extensa		2.0	2.0
Hakea ceratophylla		1.0	1.0
Bossiaea eriocarpa		1.0	1.0
Hibbertia cunninghamii		1.0	1.0
Grevillea quercifolia		1.0	0.3
Styphelia sp. Nannup (R.D. Royce 3978)		0.6	0.3
Gompholobium ovatum		0.5	0.7
Lomandra pauciflora		0.5	0.4
Chorizema carinatum	(P3 DBCA list)	0.2	0.2
Lysiandra calycina		0.1	5.0
Viminaria juncea		0.1	2.0
Hovea elliptica		0.1	1.4
Grevillea manglesioides subsp. *manglesioides*		0.1	1.0
Leucopogon verticillatus		0.1	1.0
Cyathochaeta avenacea		0.1	0.6
Tetrarrhena laevis		0.1	0.5
Gompholobium scabrum		0.1	0.3
Pimelea rosea subsp. *rosea*		0.1	0.3
Leucopogon interstans		0.1	0.3
Sphenotoma capitata		0.1	0.3
Boronia tenuior		0.1	0.3
Tyrbastes glaucescens		0.1	0.3
Pericalymma ellipticum var. *ellipticum*		0.1	0.2
Synaphea obtusata		0.1	0.2
Hakea lissocarpha		0.1	0.2
Pentapeltis peltigera		0.1	0.1
Lepidosperma leptostachyum		0.01	1.0
Xyris roycei		0.01	0.6
Stylidium amoenum var. *caulescens*		0.01	0.5
Amphipogon laguroides subsp. *laguroides*		0.01	0.5
Billardiera variifolia		0.01	0.5
Thysanotus arenarius		0.01	0.3
Lomandra nigricans		0.01	0.3
Johnsonia lupulina		0.01	0.3
Petrophile diversifolia		0.01	0.2
Stackhousia huegelii		0.01	0.2
Banksia dallanneyi subsp. *dallanneyi*		0.01	0.2

Dampiera leptoclada		0.01	0.2
Acacia browniana var. *browniana*		0.01	0.2
?*Scaevola striata* var. *striata*		0.01	0.2
Scaevola calliptera		0.01	0.1
Lechenaultia expansa		0.01	0.1
Indeterminate		0.01	0.05
**Juncus microcephalus*	Weed	0.0	3.0
Calothamnus lehmannii		0.0	1.2
Agrostocrinum scabrum subsp. *scabrum*		0.0	0.6
Sphaerolobium racemulosum		0.0	0.4
Acacia pulchella var. *pulchella*		0.0	0.4
Haemodorum laxum		0.0	0.4
**Briza minor*	Weed	0.0	0.3
Lyperanthus serratus		0.0	0.3
Acacia mooreana		0.0	0.3
Goodenia eatoniana		0.0	0.2
Hypocalymma angustifolium		0.0	0.2
Conostylis aculeata subsp. *aculeata*		0.0	0.2
Eutaxia myrtifolia		0.0	0.2
Hypolaena viridis		0.0	0.2
Xanthosia tasmanica		0.0	0.1
Poranthera huegelii		0.0	0.1
Stylidium androsaceum		0.0	0.1
Actinotus glomeratus		0.0	0.1
**Aira cupaniana*	Weed	0.0	0.05
Drosera nitidula		0.0	0.01
Levenhookia pusilla		0.0	0.01

Site details			
Site	**BEE380**	**Position (WGS84)**	115.4015289452098, -34.156682660363444
Slope	gentle	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* tall open forest over *Kingia australis, Taxandria parviceps* and *Gompholobium ovatum* tall shrubland over *Anarthria prolifera* mid open rushland.

Habitat	forest
Disturbance	vehicle tracks

Vegetation condition	Pristine	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	95.0	**Tree cover (%)**	31.0
Shrub cover (%)	65.0	**Grass cover (%)**	15.0
Herb cover (%)	3.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Beth Arbery

Species (52)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		20.0	25.0
Gompholobium ovatum		15.0	1.1
Corymbia calophylla		11.0	25.0
Kingia australis		8.0	3.5
Taxandria parviceps		8.0	1.8
Dasypogon hookeri		5.0	2.0
Lomandra pauciflora		5.0	0.3
Mesomelaena graciliceps		3.0	0.5
Lindsaea linearis		3.0	0.1
Banksia attenuata		2.0	2.5
Gompholobium scabrum		2.0	0.8
Anarthria prolifera		2.0	0.5
Chorizema carinatum	(P3 DBCA list)	2.0	0.4
Patersonia umbrosa var. *xanthina*		1.0	1.0
Grevillea manglesioides subsp. *manglesioides*		1.0	1.0
Hakea ceratophylla		1.0	1.0
Leptomeria squarrulosa		1.0	0.5
Dampiera leptoclada		1.0	0.5
Netrostylis sp. Jarrah Forest (R. Davis 7391)		1.0	0.5
Eutaxia myrtifolia		1.0	0.5
Sphaerolobium racemulosum		1.0	0.4
Hypolaena grandiuscula		1.0	0.4
Hibbertia cunninghamii		1.0	0.2
Pentapeltis peltigera		1.0	0.1
Stackhousia huegelii		0.5	4.0
Persoonia longifolia		0.5	1.3
Daviesia inflata		0.5	0.9
Acacia browniana var. *browniana*		0.5	0.8
Grevillea quercifolia		0.5	0.4
Styphelia sp. Nannup (R.D. Royce 3978)		0.5	0.3
Adenanthos obovatus		0.5	0.3
Thysanotus arenarius		0.2	0.25
Drosera huegelii		0.1	3.0
Leucopogon verticillatus		0.1	1.4
Comesperma virgatum		0.1	1.0
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.6
Johnsonia lupulina		0.1	0.5
Boronia tenuior		0.1	0.4
Billardiera variifolia		0.1	0.4
Leucopogon interstans		0.1	0.4
Pimelea rosea subsp. *rosea*		0.1	0.4
Acacia mooreana		0.1	0.3
Hovea trisperma var. *trisperma*		0.1	0.3
Stylidium amoenum var. *caulescens*		0.1	0.3
Scaevola calliptera		0.1	0.2
Sphenotoma capitata		0.1	0.2

Amphipogon laguroides subsp. *laguroides*	0.1	0.2
Orianthera serpyllifolia	0.1	0.1
Acanthocarpus preissii	0.1	0.1
Kennedia carinata	0.1	0.1
Petrophile diversifolia	0.0	0.2
Goodenia pulchella	0.0	0.1

Site details			
Site	**BEE381**	**Position (WGS84)**	115.40207537220304, -34.15673628682006
Slope	gentle	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	laterite

Observation details - visit 1 (14 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* mid open forest over *Hovea elliptica, Acacia browniana* var. *browniana* and *Xanthorrhoea preissii* tall shrubland over *Gompholobium ovatum, G. scabrum* and *Boronia tenuior* low shrubland.

Habitat	forest		
Disturbance	none evident		
Vegetation condition	Pristine	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	90.0	**Tree cover (%)**	40.0
Shrub cover (%)	65.0	**Grass cover (%)**	11.0
Herb cover (%)	6.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Quadrat	1	14 Nov 2023	10m x 10m	Beth Arbery

Species (53)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		31.0	25.0
Corymbia calophylla		30.0	25.0
Gompholobium ovatum		18.0	0.85
Hovea elliptica		6.0	3.0
Gompholobium scabrum		4.0	1.0
Acacia browniana var. *browniana*		3.0	2.0
Patersonia umbrosa var. *xanthina*		3.0	0.6
Tetrarrhena laevis		3.0	0.5
Hibbertia hypericoides subsp. *hypericoides*		3.0	0.5
Xanthorrhoea preissii		2.0	3.0
Hakea lissocarpha		2.0	1.2
Mesomelaena tetragona		2.0	0.7
Grevillea quercifolia		2.0	0.5
Lomandra pauciflora		2.0	0.4
Boronia tenuior		2.0	0.4
Lindsaea linearis		2.0	0.1
Hibbertia cunninghamii		1.5	1.0
Dasypogon hookeri		1.0	3.5
Leucopogon verticillatus		1.0	1.0
Taxandria parviceps		1.0	0.8
Acacia mooreana		1.0	0.5
Styphelia sp. Nannup (R.D. Royce 3978)		1.0	0.4
Pimelea rosea subsp. *rosea*		1.0	0.4
Anarthria prolifera		1.0	0.4
Leptomeria squarrulosa		1.0	0.3
Acacia extensa		0.5	1.0
Comesperma virgatum		0.5	1.0
Morelotia octandra		0.5	0.5
Thelymitra crinita		0.5	0.5
Amphipogon laguroides subsp. *laguroides*		0.5	0.5
Goodenia eatoniana		0.5	0.5
Hypocalymma angustifolium		0.5	0.5
Dampiera leptoclada		0.5	0.4
Pentapeltis peltigera		0.5	0.2
Sphaerolobium racemulosum		0.5	0.2
Leucopogon interstans		0.5	0.2
Scaevola calliptera		0.5	0.1
Thysanotus arenarius		0.2	0.5
Drosera huegelii		0.2	0.3
Billardiera variifolia		0.1	2.0
Cassytha racemosa forma *pilosa*		0.1	1.0
Petrophile diversifolia		0.1	0.8
Acacia alata		0.1	0.8
Johnsonia lupulina		0.1	0.6
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.5
Chorizema carinatum	(P3 DBCA list)	0.1	0.5

Lomandra purpurea	0.1	0.5
Stylidium amoenum	0.1	0.4
Hovea chorizemifolia	0.1	0.3
Sphenotoma capitata	0.1	0.3
Adenanthos obovatus	0.1	0.2
Netrostylis sp. Jarrah Forest (R. Davis 7391)	0.1	0.1
Orianthera serpyllifolia	0.1	0.1

Site details			
Site	**BEE033R**	**Position (WGS84)**	115.26634365727195, -34.19963680775423
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana* and *Nuytsia floribunda* mid open forest over *Adenanthos obovata, Acacia pulchella* var. *pulchella* and *Dasypogon bromeliifolius* low isolated shrubs over *Anarthria scabra*, *A. prolifera* and *Hypolaena exsulca* tall sedgeland/rushland.
Habitat	forest
Disturbance	None evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	60.0	**Tree cover (%)**	35.0
Shrub cover (%)	2.0	**Grass cover (%)**	45.0
Herb cover (%)	12.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (13)	Status	Cover (%)	Height (m)
Anarthria scabra		45.0	1.0
Eucalyptus marginata subsp. *marginata*		40.0	14.0
Phlebocarya ciliata		10.0	0.4
Agonis flexuosa var. *flexuosa*		5.0	10.0
Nuytsia floribunda		5.0	6.0
Allocasuarina fraseriana		2.0	14.0
Acacia pulchella var. *pulchella*		1.0	1.5
Dasypogon bromeliifolius		1.0	0.5
Adenanthos obovatus		1.0	0.5
Adenanthos meisneri		1.0	0.2
Hypolaena exsulca		0.5	0.4
Anarthria prolifera		0.2	0.4
Bossiaea praetermissa		0.1	0.3

Site details			
Site	**BEE069R**	**Position (WGS84)**	115.2840372, -34.18034836
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Astartea scoparia* tall shrubland.
Habitat	shrubland
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	65.0	**Tree cover (%)**	0.0
Shrub cover (%)	65.0	**Grass cover (%)**	0.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	02 Sep 2023	unbounded	Brody Loneragan

Species (1)	Status	Cover (%)	Height (m)
Astartea scoparia		65.0	2.5

Site details			
Site	**BEE071R**	**Position (WGS84)**	115.2839577, -34.2114733
Slope	gentle	**Topography**	sandy rise
Soil colour	whitish, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Agonis flexuosa* var. *flexuosa* and *Banksia attenuata* low woodland over *Adenanthos meisneri, Melaleuca thymoides* and *Banksia ilicifolia* mid sparse shrubland over *Anarthria scabra, Dasypogon bromeliifolius* and *Lyginia imberbis* mid sedgeland.
Habitat	woodland
Disturbance	livestock tracks, weed infestation

Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	20.0
Shrub cover (%)	5.0	**Grass cover (%)**	35.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	02 Sep 2023	unbounded	Brody Loneragan

Species (27)	Status	Cover (%)	Height (m)
Anarthria scabra		40.0	1.0
Agonis flexuosa var. *flexuosa*		14.0	6.0
Eucalyptus marginata subsp. *marginata*		9.0	5.0
Adenanthos meisneri		3.0	0.5
Banksia attenuata		2.0	6.0
Nuytsia floribunda		1.0	5.0
Dasypogon bromeliifolius		0.5	0.3
Banksia ilicifolia		0.2	1.6
Hibbertia racemosa		0.2	0.3
Lyginia imberbis		0.2	0.3
Melaleuca thymoides		0.1	1.8
Jacksonia horrida		0.1	1.2
Drosera pallida		0.1	1.0
Leucopogon glabellus		0.1	0.4
Boronia crenulata subsp. *crenulata*		0.1	0.3
Philotheca spicata		0.1	0.2
Thysanotus patersonii		0.1	0.1
**Briza maxima*	Weed	0.1	0.1
Caladenia flava		0.1	0.1
Chamaescilla corymbosa var. *corymbosa*		0.1	0.1
Phlebocarya ciliata		0.1	0.1
Dampiera linearis		0.1	0.1
Caladenia sp.		0.1	0.1
Drosera sp.		0.1	0.1
Isotropis cuneifolia subsp. *cuneifolia*		0.1	0.1
Bossiaea praetermissa		0.1	0.1
Phyllangium paradoxum		0.1	0.1

Site details			
Site	**BEE073R**	**Position (WGS84)**	115.2864969, -34.24547208
Slope	gentle	**Topography**	sandy rise
Soil colour	grey, black, whitish	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (03 Sep 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Agonis flexuosa* var. *flexuosa*, and *Banksia ilicifolia* low open woodland over *Xanthorrhoea preissii, Melaleuca thymoides*, and *Adenanthos obovatus* mid sparse shrubland over **Anthoxanthum odoratum*, **Cotula turbinata* and **Arctotheca calendula* low grassland.
Habitat	open woodland
Disturbance	livestock tracks, grazing-high, weed infestation

Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	55.0	**Tree cover (%)**	12.0
Shrub cover (%)	1.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	03 Sep 2023	unbounded	Brody Loneragan

Species (15)	Status	Cover (%)	Height (m)
**Anthoxanthum odoratum*	Weed	45.0	0.2
Agonis flexuosa var. *flexuosa*		5.0	6.0
Eucalyptus marginata subsp. *marginata*		5.0	4.0
**Cotula turbinata*	Weed	5.0	0.1
Quinetia urvillei		5.0	0.1
Nuytsia floribunda		3.0	6.0
Dasypogon bromeliifolius		3.0	0.4
**Arctotheca calendula*	Weed	3.0	0.2
Banksia ilicifolia		2.0	5.0
Xanthorrhoea preissii		2.0	2.0
Melaleuca thymoides		2.0	1.2
Adenanthos obovatus		1.0	0.5
Anarthria scabra		0.1	0.6
**Briza maxima*	Weed	0.1	0.3
Crassula decumbens var. *decumbens*		0.1	0.1

Site details			
Site	**BEE075R**	**Position (WGS84)**	115.2857062, -34.24627062
Slope	gentle	**Topography**	depression
Soil colour	black, grey	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (03 Sep 2023)

Site description	*Melaleuca preissiana* low woodland over *Xanthorrhoea preissii* and *Acacia myrtifolia* mid sparse shrubland over *Haemodorum sparsiflorum, Loxocarya cinerea* and *Morelotia octandra* tall low open rushland and **Anthoxanthum odoratum* and sterile Poaceae sp. low open grassland.
Habitat	waterhole
Disturbance	grazing-low, weed infestation

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	10.0	**Tree cover (%)**	10.0
Shrub cover (%)	5.0	**Grass cover (%)**	45.0
Herb cover (%)	15.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	03 Sep 2023	unbounded	Brody Loneragan

Species (22)	Status	Cover (%)	Height (m)
Loxocarya cinerea		11.0	0.3
Melaleuca preissiana		5.0	5.0
Xanthorrhoea preissii		5.0	1.7
**Anthoxanthum odoratum*	Weed	5.0	0.1
Morelotia octandra		4.0	0.6
Acacia myrtifolia		1.0	1.8
Sporadanthus strictus		1.0	0.3
Goodenia trinervis		1.0	0.2
Liparophyllum lasiospermum		0.5	0.2
**Hypochaeris glabra*	Weed	0.4	0.1
Haemodorum sparsiflorum		0.2	1.5
Burchardia multiflora		0.2	0.2
Patersonia occidentalis var. *occidentalis*		0.1	0.4
Chamaescilla corymbosa var. *corymbosa*		0.1	0.2
Drosera pallida		0.1	0.2
Tribonanthes variabilis		0.1	0.2
Pauridia occidentalis		0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.1
Poaceae sp.		0.1	0.1
**Cotula turbinata*	Weed	0.1	0.1
**Sonchus oleraceus*	Weed	0.1	0.1
Drosera glanduligera		0.1	0.1

Site details			
Site	**BEE085R**	**Position (WGS84)**	115.3062326, -34.23958134
Slope	negligible	**Topography**	depression
Soil colour	grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (04 Sep 2023)

Site description	*Hypocalymma ericifolium, Dasypogon bromeliifolius* and *Pericalymma crassipes* mid open shrubland over *Hypolaena caespitosa, Melanostachya ustulata* and *Leptocarpus denmarkicus* low closed forbland.
Habitat	shrubland
Disturbance	grazing-low, evidence of feral animals, weed infestation

Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	30.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	04 Sep 2023	unbounded	Brody Loneragan

Species (35)	Status	Cover (%)	Height (m)
Hypolaena caespitosa		40.0	0.2
Hypocalymma ericifolium		10.0	0.6
Melanostachya ustulata		10.0	0.5
Dasypogon bromeliifolius		5.0	0.3
Leptocarpus denmarkicus		5.0	0.1
Pericalymma crassipes		4.0	0.4
Actinodium cunninghamii		3.0	0.1
Xanthorrhoea preissii		2.0	1.2
Leucopogon cordatus		2.0	0.9
Leptocarpus tenax		2.0	0.6
Kunzea recurva		1.0	1.4
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	1.0	1.2
Anarthria scabra		1.0	1.2
Hakea ceratophylla		1.0	0.8
Leucopogon alternifolius	P3 (DBCA list)	1.0	0.7
Anarthria prolifera		1.0	0.4
Leptocarpus trisepalus		1.0	0.3
Sphenotoma gracilis		1.0	0.2
Adenanthos obovatus		0.5	0.7
Gompholobium tomentosum		0.5	0.6
Jacksonia horrida		0.1	1.1
Philotheca spicata		0.1	0.3
Sphaerolobium vimineum		0.1	0.3
Burchardia congesta		0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.1
**Arctotheca calendula*	Weed	0.1	0.1
Centrolepis aristata		0.1	0.1
Chamaescilla corymbosa var. *corymbosa*		0.1	0.1
**Romulea rosea* var. *australis*	Weed	0.1	0.1
**Cotula turbinata*	Weed	0.1	0.1
**Ornithopus pinnatus*	Weed	0.1	0.1
Isolepis congrua		0.1	0.1
Drosera enodes		0.1	0.1
Drosera glanduligera		0.1	0.1
Drosera erythrorhiza		0.1	0.1

Site details			
Site	**BEE115R**	**Position (WGS84)**	115.26867095605833, -34.21471469749967
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* mid isolated trees over *Agonis flexuosa* var. *flexuosa* low woodland over *Xanthorrhoea preissii, Adenanthos detmoldii* and *Hakea ceratophylla* mid sparse shrubland over *Dasypogon bromeliifolius*, *Banksia nivea* subsp. *nivea* and *Adenanthos obovatus* low shrubland over *Mesomelaena tetragona* mid isolated sedges.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	50.0
Shrub cover (%)	15.0	**Grass cover (%)**	50.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Andrew Perkins

Species (13)	Status	Cover (%)	Height (m)
Dasypogon bromeliifolius		35.0	0.4
Agonis flexuosa var. *flexuosa*		15.0	7.0
Eucalyptus marginata subsp. *marginata*		5.0	15.0
Xanthorrhoea preissii		5.0	1.5
Banksia nivea subsp. *nivea*		2.0	0.3
Adenanthos detmoldii	P4 (DBCA list)	1.0	1.2
Grevillea papillosa	P3 (DBCA list)	1.0	1.0
Hakea ceratophylla		1.0	1.0
Mesomelaena tetragona		0.5	0.6
Adenanthos obovatus		0.1	0.6
Philotheca spicata		0.1	0.3
Boronia anceps	P3 (DBCA list)	0.1	0.2
Hypocalymma minus		0.1	0.1

Site details			
Site	**BEE200R**	**Position (WGS84)**	115.26897564900156, -34.22870459823085
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (16 Nov 2023)

Site description	*Allocasuarina fraseriana, Eucalyptus marginata* subsp. *marginata* and *Melaleuca preissiana* mid open forest over *Astartea scoparia, Hakea ceratophylla* and *Acacia myrtifolia* tall open shrubland over *Anarthria scabra, Melanostachya ustulata* and *Hypolaena caespitosa* mid sedgeland.
Habitat	woodland
Disturbance	weed infestation, historic clearing

Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	75.0	**Tree cover (%)**	50.0
Shrub cover (%)	15.0	**Grass cover (%)**	30.0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Andrew Perkins

Species (32)	Status	Cover (%)	Height (m)
Allocasuarina fraseriana		25.0	12.0
Eucalyptus marginata subsp. *marginata*		15.0	12.0
Melaleuca preissiana		10.0	10.0
Astartea scoparia		7.0	2.2
Hakea ceratophylla		5.0	2.0
Anarthria scabra		5.0	0.6
Melanostachya ustulata		5.0	0.6
Hypolaena caespitosa		4.0	0.4
Leptocarpus scariosus		2.0	1.2
Acacia myrtifolia		1.0	2.5
Xanthorrhoea preissii		1.0	0.7
Mesomelaena tetragona		1.0	0.6
Hypolaena pubescens		1.0	0.5
Evandra aristata		0.2	1.8
Xyris roycei		0.2	0.7
Dasypogon bromeliifolius		0.2	0.6
Johnsonia lupulina		0.1	0.7
**Anthoxanthum odoratum*	Weed	0.1	0.7
Pimelea rosea subsp. *rosea*		0.1	0.6
Gompholobium confertum		0.1	0.6
Acacia browniana var. *browniana*		0.1	0.6
Lepidosperma squamatum		0.1	0.5
Drosera sp.		0.1	0.5
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.5
Thysanotus multiflorus		0.1	0.3
Anarthria prolifera		0.1	0.3
**Briza maxima*	Weed	0.1	0.2
Microtis media subsp. *media*		0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.2
**Juncus microcephalus*	Weed	0.1	0.1
Agonis flexuosa var. *flexuosa*		0.0	6.0
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.0	2.1

Site details			
Site	**BEE202R**	**Position (WGS84)**	115.31542109336267, -34.20562671966311
Slope	gentle	**Topography**	seasonally wet area
Soil colour	Brown, grey	**Soil texture**	Clay loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Melaleuca preissiana, Taxandria juniperina* and *T. linearifolia* low open forest over *Taxandria parviceps, Melaleuca rhaphiophylla* and *Astartea scoparia* mid open shrubland over *Leptocarpus scariosus*, *Juncus microcephalus* and *Anthoxanthum odoratum* mid open tussock grassland.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	10.0
Shrub cover (%)	30.0	**Grass cover (%)**	20.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	25 Oct 2023	unbounded	Andrew Perkins

Species (16)	Status	Cover (%)	Height (m)
Taxandria inundata		20.0	3.0
**Anthoxanthum odoratum*	Weed	10.0	0.3
Taxandria juniperina		5.0	5.0
Taxandria parviceps		5.0	3.5
Taxandria linearifolia		4.0	7.0
Melaleuca preissiana		3.0	7.0
Aphelia cyperoides		3.0	0.04
**Lotus subbiflorus*	Weed	3.0	0.02
Melaleuca rhaphiophylla		2.0	5.0
Astartea scoparia		1.0	2.5
Leptocarpus scariosus		1.0	1.0
Drosera enodes		0.5	0.02
**Juncus articulatus*	Weed	0.3	1.0
**Briza minor*	Weed	0.2	0.3
Microtis media subsp. *media*		0.1	0.2
Stylidium perpusillum		0.1	0.05

Site details			
Site	**BEE254R**	**Position (WGS84)**	115.31242079032512, -34.16073494449275
Slope	gentle	**Topography**	drainage line
Soil colour	grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Corymbia calophylla* mid open forest over *Xanthorrhoea preissii, Taxandria linearifolia* and *Viminaria juncea* mid open shrubland over *Ficinia nodosa, Mesomelaena tetragona* and *Chordifex amblycoleus* mid isolated rushes/sedges.

Habitat	woodland
Disturbance	grazing-low, vehicle tracks

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	40.0	**Tree cover (%)**	40.0
Shrub cover (%)	15.0	**Grass cover (%)**	5.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Brody Loneragan

Species (25)	Status	Cover (%)	Height (m)
Corymbia calophylla		65.0	20.0
Xanthorrhoea preissii		7.0	3.0
Taxandria linearifolia		4.0	2.0
Ornduffia albiflora		2.0	0.8
Ficinia nodosa		2.0	0.8
Tyrbastes glaucescens		2.0	0.3
Thysanotus dichotomus		1.0	5.0
Viminaria juncea		1.0	4.0
Grevillea manglesioides subsp. *manglesioides*		1.0	2.0
Chordifex amblycoleus		1.0	1.0
Lepidosperma sp. Blackwood (R. Davis 7696)		1.0	1.0
Hakea lasianthoides		1.0	1.0
Patersonia occidentalis		1.0	0.7
Mesomelaena tetragona		1.0	0.6
Hypocalymma minus		1.0	0.5
Leucopogon verticillatus		1.0	0.5
Lomandra pauciflora		1.0	0.4
Billardiera floribunda		0.5	0.6
Billardiera variifolia		0.5	0.5
Hibbertia cunninghamii		0.1	1.0
Agrostocrinum scabrum subsp. *scabrum*		0.1	0.6
Hypolaena grandiuscula		0.1	0.4
Leucopogon interstans		0.1	0.4
Adenanthos obovatus		0.1	0.3
Dampiera leptoclada		0.1	0.3

Site details			
Site	**BEE283R**	**Position (WGS84)**	115.2725257479597, -34.184248102232345
Slope	gentle	**Topography**	depression
Soil colour	black, white	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Astartea scoparia* tall closed shrubland over *Leptocarpus scariosus* tall rushland
Habitat	shrubland
Disturbance	historic clearing, current operations

Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80.0	**Tree cover (%)**	0.0
Shrub cover (%)	72.0	**Grass cover (%)**	50.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	26 Oct 2023	unbounded	Brody Loneragan

Species (2)	Status	Cover (%)	Height (m)
Astartea scoparia		72.0	3.0
Leptocarpus scariosus		50.0	1.2

Site details			
Site	**BEE287R**	**Position (WGS84)**	115.2870206647754, -34.187752142810766
Slope	gentle	**Topography**	depression
Soil colour	black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Taxandria inundata, Astartea scoparia* and *Calothamnus lateralis* var. *crassus* tall closed shrubland over *Leptocarpus scariosus, Cyathochaeta clandestina* and *Juncus pallidus* open rushland over *Alternanthera denticulata* var. *denticulata* mid isolated forbs.
Habitat	waterhole
Disturbance	grazing-high

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75.0	**Tree cover (%)**	0.0
Shrub cover (%)	71.0	**Grass cover (%)**	28.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	26 Oct 2023	unbounded	Brody Loneragan

Species (9)	Status	Cover (%)	Height (m)
Taxandria inundata		60.0	4.0
Leptocarpus scariosus		28.0	1.5
Astartea scoparia		15.0	5.0
Cyathochaeta clandestina		2.0	1.2
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	1.0	1.2
Alternanthera denticulata var. *denticulata*		1.0	0.3
Juncus pallidus		0.2	1.5
?*Billardiera variifolia*		0.1	1.8
Juncus pauciflorus		0.1	0.5

Site details			
Site	**BEE302R**	**Position (WGS84)**	115.30789464732206, -34.24002541908988
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (15 Nov 2023)

Site description	*Acacia myrtifolia, Viminaria juncea* and *Grevillea manglesioides* subsp. *ferricola* tall closed shrubland over *Calothamnus lateralis* var. *crassus, Comesperma virgatum* and *Boronia anceps* mid closed shrubland over *Tyrbastes glaucescens, Dampiera leptoclada* and *Cassytha racemosa* forma *pilosa* mid isolated forbs.
Habitat	shrubland
Disturbance	grazing-low

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	95.0	**Tree cover (%)**	0.0
Shrub cover (%)	95.0	**Grass cover (%)**	0.0
Herb cover (%)	0.5		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Beth Arbery

Species (13)	Status	Cover (%)	Height (m)
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	95.0	1.4
Acacia myrtifolia		25.0	2.5
Viminaria juncea		11.0	5.0
Adenanthos detmoldii	P4 (DBCA list)	5.0	2.5
Comesperma virgatum		4.0	2.0
Taxandria parviceps		3.0	2.4
Boronia anceps	P3 (DBCA list)	3.0	1.0
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	2.0	3.0
Eutaxia virgata		0.5	1.3
Stylidium scandens		0.1	1.3
Tyrbastes glaucescens		0.1	0.7
Dampiera leptoclada		0.1	0.5
Cassytha racemosa forma *pilosa*		0.1	0.4

Site details			
Site	**BEE313R**	**Position (WGS84)**	115.3133696710878, -34.240988952810525
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	Clay loam
Rock cover (%)	0	**Rock type**	

Observation details - visit 1 (16 Nov 2023)

Site description	*Melaleuca preissiana* low scattered trees over *Taxandria linearifolia*, *Acacia myrtifolia* and *Melaleuca incana* subsp. *incana* tall open shrubland over *Machaerina articulata, Leptocarpus scariosus* and *Lyginia imberbis* tall sedge/rushland.

Habitat	riparian zone
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	50.0	**Tree cover (%)**	3.0
Shrub cover (%)	25.0	**Grass cover (%)**	32.0
Herb cover (%)	9.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (14)	Status	Cover (%)	Height (m)
Lyginia imberbis		15.0	1.0
Astartea scoparia		10.0	1.5
Machaerina articulata		5.0	2.0
Melaleuca preissiana		3.0	4.0
Leptocarpus scariosus		3.0	2.0
Grevillea papillosa	P3 (DBCA list)	3.0	1.1
Anigozanthos flavidus		2.0	3.0
Taxandria linearifolia		2.0	3.0
Melaleuca incana subsp. *incana*		2.0	2.0
**Mentha pulegium*	Weed	2.0	0.2
Acacia myrtifolia		1.0	2.5
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	1.0	1.0
Ornduffia parnassifolia		1.0	0.2
Comesperma virgatum		0.5	2.0

Site details			
Site	**BEE318R**	**Position (WGS84)**	115.27164082053608, -34.18156076691503
Slope	gentle	**Topography**	sandy rise
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	**Eucalyptus globulus* subsp. *globulus* tall open woodland over **Lolium perenne* and **Bromus diandrus* low isolated grasses over **Disa bracteata*, *Caladenia attingens* subsp. *attingens* and *Microtis media* subsp. *media* low isolated herbs.

Habitat	woodland
Disturbance	historic clearing, weed infestation, large-scale clearing, revegetation

Vegetation condition	Completely Degraded	**Fire age**	not evident
Total veg. cover (%)	40.0	**Tree cover (%)**	40.0
Shrub cover (%)	0.0	**Grass cover (%)**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	26 Oct 2023	unbounded	Brody Loneragan

Species (8)	Status	Cover (%)	Height (m)
**Eucalyptus globulus* subsp. *globulus*	Weed	40.0	15.0
Caladenia attingens subsp. *attingens*		0.1	0.4
Microtis media subsp. *media*		0.1	0.3
**Disa bracteata*	Weed	0.1	0.2
**Bromus diandrus*	Weed	0.1	0.2
**Lolium perenne*	Weed	0.1	0.2
**Cotula turbinata*	Weed	0.1	0.1
**Trifolium campestre* var. *campestre*	Weed	0.1	0.1

Site details			
Site	**BEE321R**	**Position (WGS84)**	115.26706044973318, -34.19858137549602
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Agonis flexuosa* var. *flexuosa* low woodland over *Acacia pulchella* var. *pulchella*, *Taxandria parviceps* and *Jacksonia horrida* mid open shrubland over *Anarthria scabra, Johnsonia lupulina* and *Juncus pallidus* mid open rushland.
Habitat	woodland
Disturbance	historic clearing

Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	30.0	**Tree cover (%)**	12.0
Shrub cover (%)	5.0	**Grass cover (%)**	10.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (13)	Status	Cover (%)	Height (m)
Agonis flexuosa var. *flexuosa*		12.0	4.0
Juncus pallidus		10.0	0.9
Anarthria scabra		2.0	1.0
Acacia pulchella var. *pulchella*		2.0	1.0
Jacksonia horrida		1.0	1.5
Taxandria parviceps		1.0	1.0
Billardiera fusiformis		1.0	1.0
Johnsonia lupulina		1.0	1.0
Hypolaena exsulca		1.0	0.7
Dampiera leptoclada		1.0	0.3
Adenanthos meisneri		1.0	0.2
Melanostachya ustulata		0.5	0.9
Stylidium repens		0.1	0.1

Site details			
Site	**BEE324R**	**Position (WGS84)**	115.2673144855271, -34.194292246015024
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (16 Nov 2023)

Site description	*Agonis flexuosa* var. *flexuosa* low woodland over *Xanthorrhoea preissii*, *Kunzea recurva* and *Adenanthos meisneri* mid open shrubland over *Mesomelaena tetragona* mid sparse rushland over *Melanostachya ustulata, Chaetanthus leptocarpoides* and *Xyris roycei* mid sparse forbland.
Habitat	woodland
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	45.0	**Tree cover (%)**	15.0
Shrub cover (%)	15.0	**Grass cover (%)**	10.0
Herb cover (%)	10.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (21)	Status	Cover (%)	Height (m)
Agonis flexuosa var. *flexuosa*		15.0	6.0
Mesomelaena tetragona		8.0	1.0
Xanthorrhoea preissii		5.0	2.0
Melanostachya ustulata		5.0	0.7
Kunzea recurva		4.0	2.0
Chaetanthus leptocarpoides		2.0	0.5
Adenanthos meisneri		2.0	0.3
Homalospermum firmum		1.0	2.0
Adenanthos x pamela	P4 (DBCA list)	1.0	0.6
Banksia littoralis		0.2	2.0
Adenanthos detmoldii	P4 (DBCA list)	0.1	1.2
Grevillea papillosa	P3 (DBCA list)	0.1	1.2
Xyris roycei		0.1	0.8
Pimelea rosea subsp. *rosea*		0.1	0.6
Eutaxia virgata		0.1	0.4
Conostylis aculeata subsp. *aculeata*		0.1	0.3
Hodgsoniola junciformis		0.1	0.3
Boronia anceps	P3 (DBCA list)	0.1	0.2
Xanthosia huegelii		0.1	0.2
Stylidium scandens		0.1	0.1
Stylidium squamosotuberosum		0.1	0.1

Site details			
Site	**BEE327R**	**Position (WGS84)**	115.26762847148335, -34.20154273465379
Slope	gentle	**Topography**	drainage line
Soil colour	Brown, grey	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Agonis flexuosa* var. *flexuosa* and *Melaleuca preissiana* low woodland over *Taxandria parviceps, Adenanthos detmoldii and Calothamnus lateralis* var. *crassus* tall shrubland over *Machaerina articulata, Anarthria scabra* and *Evandra aristata* tall open rushland.
Habitat	woodland
Disturbance	evidence of feral animals, grazing-medium, litter

Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	60.0	**Tree cover (%)**	15.0
Shrub cover (%)	25.0	**Grass cover (%)**	20.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (10)	Status	Cover (%)	Height (m)
Taxandria parviceps		20.0	4.0
Agonis flexuosa var. *flexuosa*		12.0	5.0
Machaerina articulata		10.0	1.1
Adenanthos detmoldii	P4 (DBCA list)	5.0	1.2
Anarthria scabra		5.0	1.0
Melaleuca preissiana		2.0	4.0
Evandra aristata		2.0	1.3
Leptocarpus scariosus		1.0	1.5
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	0.1	1.0
Desmocladus fasciculatus		0.1	0.3

Site details			
Site	**BEE329R**	**Position (WGS84)**	115.2683062933908, -34.20479669081314
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Melaleuca preissiana* and *Agonis flexuosa* var. *flexuosa* mid woodland over *Kunzea recurva* and *Xanthorrhoea preissii* tall open shrubland over **Anthoxanthum odoratum, *Avena fatua* and *Briza maxima* mid closed grassland.
Habitat	open woodland
Disturbance	weed infestation, grazing-medium

Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	55.0	**Tree cover (%)**	20.0
Shrub cover (%)	17.0	**Grass cover (%)**	90.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (9)	Status	Cover (%)	Height (m)
Melaleuca preissiana		10.0	8.0
Eucalyptus marginata subsp. *marginata*		5.0	12.0
Agonis flexuosa var. *flexuosa*		5.0	8.0
**Anthoxanthum odoratum*	Weed	5.0	0.4
Xanthorrhoea preissii		2.0	2.0
Kunzea recurva		2.0	2.0
**Avena fatua*	Weed	0.2	0.8
**Briza maxima*	Weed	0.1	0.2
**Vulpia bromoides*	Weed	0.1	0.1

Site details			
Site	**BEE331R**	**Position (WGS84)**	115.2698299, -34.24992753
Slope	gentle	**Topography**	sandy rise
Soil colour	whitish	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* low-mid woodland over *Melaleuca thymoides, Jacksonia horrida* and *Gompholobium scabrum* mid open shrubland over *Anarthria scabra, Dasypogon bromeliifolius* and *Patersonia occidentalis* low open forbland.

Habitat	woodland
Disturbance	grazing-high

Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	60.0	**Tree cover (%)**	30.0
Shrub cover (%)	30.0	**Grass cover (%)**	0.0
Herb cover (%)	20.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Jenifer Alford

Species (9)	Status	Cover (%)	Height (m)
Banksia attenuata		15.0	6.0
Allocasuarina fraseriana		15.0	5.0
Melaleuca thymoides		15.0	1.3
Anarthria scabra		15.0	0.5
Eucalyptus marginata subsp. *marginata*		10.0	12.0
Dasypogon bromeliifolius		10.0	0.4
Jacksonia horrida		2.0	1.4
Gompholobium scabrum		1.0	1.2
Patersonia occidentalis		0.4	0.4

Site details			
Site	**BEE332R**	**Position (WGS84)**	115.2936055139781, -34.20756914190408
Slope	gentle	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	Silt
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (25 Oct 2023)

Site description	*Melaleuca preissiana, Taxandria juniperina* and *Callistachys lanceolata* tall woodland over *Astartea scoparia* tall isolated shrubs over *Machaerina rubiginosa* tall isolated rushes over **Solanum nigrum, Microtis media* subsp. *media* and *Rhodanthe citrina* low isolated forbs.
Habitat	woodland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	50.0	**Tree cover (%)**	45.0
Shrub cover (%)	3.0	**Grass cover (%)**	2.0
Herb cover (%)	0.5		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	25 Oct 2023	unbounded	Natasha Rogers

Species (10)	Status	Cover (%)	Height (m)
Taxandria juniperina		20.0	18.0
Melaleuca preissiana		20.0	15.0
Callistachys lanceolata		5.0	8.0
Astartea scoparia		3.0	4.5
Machaerina rubiginosa		2.0	1.5
Thelymitra graminea		0.1	0.3
**Rumex conglomeratus*	Weed	0.1	0.3
Microtis media subsp. *media*		0.1	0.2
**Solanum nigrum*	Weed	0.1	0.1
Rhodanthe citrina		0.1	0.08

Site details			
Site	**BEE366R**	**Position (WGS84)**	115.2664817920990, -34.199977572313706
Slope	gentle	**Topography**	plain
Soil colour	Brown	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (26 Oct 2023)

Site description	*Taxandria inundata, Hakea lasianthoides* and *Beaufortia sparsa* mid closed shrubland over *Cyathochaeta clandestina* and *Juncus pallidus* tall open rushland over **Hypochaeris glabra, *Briza maxima* and **Briza minor* low isolated forbs.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	80.0	**Tree cover (%)**	0.0
Shrub cover (%)	70.0	**Grass cover (%)**	25.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	26 Oct 2023	unbounded	Brody Loneragan

Species (10)	Status	Cover (%)	Height (m)
Cyathochaeta clandestina		30.0	0.4
Taxandria inundata		20.0	2.0
Hakea lasianthoides		15.0	1.0
Juncus pallidus		10.0	1.2
Beaufortia sparsa		5.0	1.5
Homalospermum firmum		0.1	2.5
**Briza maxima*	Weed	0.1	0.2
**Briza minor*	Weed	0.1	0.2
Liparophyllum lasiospermum		0.1	0.2
**Hypochaeris glabra*	Weed	0.1	0.1

Site details			
Site	**BEE371R**	**Position (WGS84)**	115.30676132590433, -34.24017790403157
Slope	gentle	**Topography**	depression
Soil colour	Brown, grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (15 Nov 2023)

Site description	*Grevillea papillosa, Pericalymma ellipticum* var. *ellipticum* and *Taxandria inundata* mid open shrubland over *Leptocarpus scariosus* and *Juncus planifolius* open sedgeland over *Stylidium guttatum* and *Microtis media* subsp. *media* low isolated forbs.

Habitat	shrubland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	60.0	**Tree cover (%)**	0.0
Shrub cover (%)	40.0	**Grass cover (%)**	15.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Beth Arbery

Species (7)	Status	Cover (%)	Height (m)
Leptocarpus scariosus		35.0	1.8
Grevillea papillosa	P3 (DBCA list)	15.0	0.8
Stylidium guttatum		5.0	0.2
Taxandria inundata		3.0	1.0
Pericalymma ellipticum var. *ellipticum*		3.0	0.8
Juncus planifolius		1.0	0.1
Microtis media subsp. *media*		0.1	0.3

Site details			
Site	**BEE373R**	**Position (WGS84)**	115.30701350520462, -34.24309948338292
Slope	negligible	**Topography**	depression
Soil colour	brown	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (15 Nov 2023)

Site description	*Melaleuca preissiana, M. incana* subsp. *incana* and *Astartea scoparia* tall sparse shrubland over *Juncus pallidus* sparse rushland over **Anthoxanthum odoratum* and **Briza maxima* low sparse grassland over *Dasypogon bromeliifolius, *Hypochaeris glabra* and **Juncus oxycarpus* mid forbland.

Habitat	shrubland
Disturbance	historic clearing, revegetation, weed infestation

Vegetation condition	Good	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	0.0
Shrub cover (%)	15.0	**Grass cover (%)**	10.0
Herb cover (%)	35.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Beth Arbery

Species (15)	Status	Cover (%)	Height (m)
**Anthoxanthum odoratum*	Weed	6.0	0.3
Melaleuca incana subsp. *incana*		5.0	2.3
**Briza maxima*	Weed	5.0	0.5
Astartea scoparia		3.0	2.0
Juncus pallidus		3.0	1.2
Melaleuca preissiana		2.0	7.0
Beaufortia sparsa		2.0	2.5
Hakea ceratophylla		2.0	1.5
Dasypogon bromeliifolius		2.0	0.8
**Hypochaeris glabra*	Weed	2.0	0.3
Hakea sulcata		1.0	1.0
**Juncus oxycarpus*	Weed	1.0	0.6
Patersonia occidentalis		0.5	0.4
**Rumex acetosella*	Weed	0.5	0.2
Agonis flexuosa var. *flexuosa*		0.1	0.5

Site details			
Site	**BEE382R**	**Position (WGS84)**	115.2838570010053, -34.25205531855935
Slope	negligible	**Topography**	plain
Soil colour	grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (16 Nov 2023)

Site description	*Melaleuca densa, Astartea scoparia*, and *Kunzea recurva* tall shrubland over *Loxocarya magna, Mesomelaena tetragona* tall open rushland over *Grevillea manglesioides* subsp. *ferricola*, and *Dasypogon bromeliifolius* low isolated shrubs.

Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	95.0	**Tree cover (%)**	1.0
Shrub cover (%)	45.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (18)	Status	Cover (%)	Height (m)
Melaleuca densa		25.0	4.0
Loxocarya magna	P3 (DBCA list)	20.0	2.5
Kunzea recurva		12.0	3.5
Astartea scoparia		6.0	3.5
Agonis flexuosa var. *flexuosa*		3.0	4.0
Mesomelaena tetragona		3.0	1.0
Acacia myrtifolia		2.0	3.0
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	1.0	1.5
Desmocladus fasciculatus		1.0	0.8
Dasypogon bromeliifolius		1.0	0.6
**Mentha pulegium*	Weed	1.0	0.5
**Briza maxima*	Weed	1.0	0.1
Cytogonidium leptocarpoides		0.5	0.5
**Avena fatua*	Weed	0.1	1.5
**Holcus lanatus*	Weed	0.1	0.6
Machaerina articulata		0.1	0.5
**Briza minor*	Weed	0.1	0.3
**Hypochaeris glabra*	Weed	0.1	0.1

Site details			
Site	**BEE383R**	**Position (WGS84)**	115.28410722439804, -34.25211199561292
Slope	gentle	**Topography**	plain
Soil colour	Brown, grey	**Soil texture**	Sandy clay
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (16 Nov 2023)

Site description	*Melaleuca densa, Kunzea recurva*, and *Acacia myrtifolia* tall shrubland over *Loxocarya magna, Mesomelaena tetragona*, and *Lepidosperma* sp. Blackwood (R. Davis 7696) tall rushland over *Desmocladus fasciculatus, Cytogonidium leptocarpoides*, and *Machaerina articulata* mid sparse rushland.
Habitat	shrubland
Disturbance	weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	95.0	**Tree cover (%)**	1.0
Shrub cover (%)	45.0	**Grass cover (%)**	50.0
Herb cover (%)	1.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (19)	Status	Cover (%)	Height (m)
Loxocarya magna	P3 (DBCA list)	20.0	1.5
Melaleuca densa		10.0	3.0
Xanthorrhoea preissii		5.0	2.0
Mesomelaena tetragona		4.0	1.0
Anigozanthos flavidus		3.0	3.0
Kunzea recurva		3.0	2.0
Lepidosperma sp. Blackwood (R. Davis 7696)		3.0	1.0
Acacia myrtifolia		2.0	2.0
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA list)	2.0	1.5
Tyrbastes glaucescens		2.0	1.0
Hakea sulcata		2.0	1.0
Viminaria juncea		1.0	4.0
Agonis flexuosa var. *flexuosa*		1.0	4.0
Hibbertia cunninghamii		1.0	0.4
Comesperma virgatum		0.1	1.5
**Avena fatua*	Weed	0.1	1.0
Machaerina articulata		0.1	0.5
**Briza maxima*	Weed	0.1	0.4
Hibbertia stellaris		0.1	0.3

Site details			
Site	**BEE387R**	**Position (WGS84)**	115.3229264405101, -34.22737341608674
Slope	gentle	**Topography**	plain
Soil colour	Orange, brown	**Soil texture**	Sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (16 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata, Agonis flexuosa* var. *flexuosa* and *Nuytsia floribunda* open forest over *Taxandria parviceps, Xanthorrhoea preissii* and *Hakea ruscifolia* mid isolated shrubs over *Hypolaena caespitosa, Anarthria scabra* and *Juncus pallidus* sparse rushland.
Habitat	forest
Disturbance	evidence of feral animals, grazing-low

Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	85.0	**Tree cover (%)**	15.0
Shrub cover (%)	5.0	**Grass cover (%)**	80.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	16 Nov 2023	unbounded	Beth Arbery

Species (31)	Status	Cover (%)	Height (m)
Eucalyptus marginata subsp. *marginata*		20.0	6.0
Agonis flexuosa var. *flexuosa*		10.0	4.0
Nuytsia floribunda		2.0	6.0
Taxandria parviceps		1.0	1.8
Xanthorrhoea preissii		1.0	1.6
Hypolaena caespitosa		1.0	1.1
Juncus pallidus		1.0	1.0
Anarthria scabra		1.0	1.0
Leptocarpus coangustatus		1.0	0.7
Lyginia imberbis		1.0	0.6
Ficinia nodosa		1.0	0.5
Dasypogon bromeliifolius		0.2	0.4
Hakea ruscifolia		0.1	2.1
Isopogon axillaris		0.1	2.1
Hakea varia		0.1	1.8
Hakea ceratophylla		0.1	1.5
Jacksonia horrida		0.1	1.5
Hakea sulcata		0.1	1.5
Loxocarya magna	P3 (DBCA list)	0.1	1.5
Cyathochaeta avenacea		0.1	1.3
Anigozanthos flavidus		0.1	1.2
Beaufortia sparsa		0.1	1.2
Acacia pulchella var. *pulchella*		0.1	1.1
Gymnoschoenus anceps		0.1	0.9
Machaerina articulata		0.1	0.7
Patersonia occidentalis		0.1	0.6
Netrostylis sp. Jarrah Forest (R. Davis 7391)		0.1	0.5
Adenanthos obovatus		0.1	0.5
Melaleuca preissiana		0.1	0.4
Desmocladus fasciculatus		0.1	0.2
Indeterminate		0.0	0.8

Site details			
Site	**BEE388R**	**Position (WGS84)**	115.32342356655647, -34.24026708672999
Slope	gentle	**Topography**	plain
Soil colour	brown	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (15 Nov 2023)

Site description	*Eucalyptus marginata* subsp. *marginata* mid woodland over *Adenanthos detmoldii, Xanthorrhoea preissii* and *Kunzea recurva* mid shrubland over *Chaetanthus leptocarpoides, Melanostachya ustulata* and *Boronia anceps* mid isolated forbs.
Habitat	woodland
Disturbance	vehicle tracks, weed infestation

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	90.0	**Tree cover (%)**	10.0
Shrub cover (%)	65.0	**Grass cover (%)**	40.0
Herb cover (%)	5.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15 Nov 2023	unbounded	Beth Arbery

Species (20)	Status	Cover (%)	Height (m)
Adenanthos detmoldii	P4 (DBCA list)	20.0	4.0
Chaetanthus leptocarpoides		10.0	0.5
Melanostachya ustulata		5.0	0.7
Xanthorrhoea preissii		3.0	2.0
Kunzea recurva		2.0	1.8
Calothamnus lateralis var. *crassus*	P3 (DBCA list)	2.0	1.0
Boronia anceps	P3 (DBCA list)	2.0	0.9
Hakea ceratophylla		1.5	1.4
Eucalyptus marginata subsp. *marginata*		1.0	14.0
Hakea sulcata		1.0	2.1
Evandra aristata		1.0	0.8
Acacia myrtifolia		0.5	2.1
Schoenus efoliatus		0.1	1.1
**Briza maxima*	Weed	0.1	0.5
Microtis media subsp. *media*		0.1	0.4
**Briza minor*	Weed	0.1	0.3
Muehlenbeckia adpressa		0.1	0.3
Machaerina articulata		0.1	0.3
**Mentha pulegium*	Weed	0.1	0.2
**Lotus subbiflorus*	Weed	0.1	0.05

Site details			
Site	**BEE389R**	**Position (WGS84)**	115.2814025, -34.17896451
Slope	gentle	**Topography**	dune
Soil colour	Brown, grey	**Soil texture**	Sand
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Allocasuarina fraseriana, Eucalyptus marginata* subsp. *marginata*, and *Agonis flexuosa* var. *flexuosa* low open woodland over *Anarthria scabra* mid open sedgeland over **Rumex acetosella, Caladenia flava* and **Ornithopus pinnatus* low isolated forbs.
Habitat	woodland
Disturbance	livestock tracks, grazing-high, weed infestation

Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50.0	**Tree cover (%)**	28.0
Shrub cover (%)	2.0	**Grass cover (%)**	35.0
Herb cover (%)	2.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	02 Sep 2023	unbounded	Brody Loneragan

Species (10)	Status	Cover (%)	Height (m)
Anarthria scabra		25.0	1.0
Allocasuarina fraseriana		20.0	10.0
Eucalyptus marginata subsp. *marginata*		12.5	15.0
Agonis flexuosa var. *flexuosa*		7.5	8.0
Nuytsia floribunda		1.0	4.0
**Rumex acetosella*	Weed	0.2	0.1
Caladenia flava		0.1	0.2
**Ornithopus pinnatus*	Weed	0.1	0.1
Crassula decumbens var. *decumbens*		0.1	0.1
Banksia sp.		0.0	3.0

Site details			
Site	**BEE390R**	**Position (WGS84)**	115.2828602, -34.17505535
Slope	gentle	**Topography**	depression
Soil colour	Brown, black	**Soil texture**	Peat
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (02 Sep 2023)

Site description	*Melaleuca preissiana* low isolated trees over *Astartea scoparia, Kunzea spathulata* and *Beaufortia sparsa* tall shrubland over *Leptocarpus scariosus* mid open rushland.
Habitat	waterhole
Disturbance	none evident

Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	35.0	**Tree cover (%)**	2.0
Shrub cover (%)	20.0	**Grass cover (%)**	10.0
Herb cover (%)	0.0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	02 Sep 2023	unbounded	Brody Loneragan

Species (5)	Status	Cover (%)	Height (m)
Astartea scoparia		15.0	1.8
Leptocarpus scariosus		10.0	1.2
Kunzea spathulata		5.0	2.0
Melaleuca preissiana		2.0	3.5
Beaufortia sparsa		2.0	1.8

Appendix 3 NVIS hierarchy

Western Australia current practice			National standard		
Hierarchy of terms	**Brief description in WA**	**Indicative scale**	**NVIS Level**	**Description**	**NVIS structural/floristic components required**
Vegetation formation	Structure and growth form – e.g. Forest, Woodland.	1:5 000 000	I	Class	Dominant growth form for the ecologically or structurally dominant stratum.
Vegetation sub-formation	Structural and dominant vegetation layer - Eucalypt Forest, Banksia Woodland.	1:2 500 000 I	II	Structural Formation	Dominant growth form, cover and height for the ecologically or structurally dominant stratum.
Vegetation association	Structural form and dominant species – e.g. Medium woodland; York gum (*Eucalyptus loxophleba*) & Wandoo.	1:1 000 000 to 1:250 000	III	Broad Floristic Formation	Dominant growth form, cover, height and dominant land cover genus for the uppermost or dominant stratum.
Vegetation complex	Structural and floristic description linked to geomorphology – e.g. Quindalup Complex.	1:250 000 to 1:100 000	IV	Sub-Formation	Dominant growth form, cover, height and dominant genus and Family for the 3 traditional strata. (i.e. Upper, Mid and Ground).
Vegetation type	Floristic definition by strata with structural detail. Often represented with a code and floristic description.	1:100 000 to 1:10 000	V	Association	Dominant growth form, height, cover and up to 3 species for the 3 traditional strata. (i.e. Upper, Mid and Ground).
Plant community	Basic unit of vegetation classification, site-specific and highly localised with detailed floristics for each stratum.	1:10 000	VI	Sub-Association	Dominant growth form, height, cover and up to 5 species for all layers/ strata.
Floristic Community Type	Floristic composition definition; e.g. Northern Banksia woodlands over herb rich shrublands on the Swan Coastal Plain.	No absolute scale			

Appendix 4 Introduced flora identified in the desktop review

Family	Species
Asteraceae	**Senecio elegans*
Asteraceae	**Carduus pycnocephalus*
Asteraceae	**Cotula turbinata*
Asteraceae	**Leontodon saxatilis*
Asteraceae	**Logfia gallica*
Asteraceae	**Pseudognaphalium luteoalbum*
Asteraceae	**Sigesbeckia orientalis*
Asteraceae	**Sonchus oleraceus*
Asteraceae	**Symphyotrichum squamatum*
Asteraceae	**Vellereophyton dealbatum*
Brassicaceae	**Cakile maritima*
Brassicaceae	**Heliophila pusilla*
Brassicaceae	**Lepidium didymum*
Campanulaceae	**Grammatotheca bergiana* var. *bergiana*
Campanulaceae	**Monopsis debilis* var. *depressa*
Caryophyllaceae	**Cerastium glomeratum*
Caryophyllaceae	**Cerastium pumilum*
Caryophyllaceae	**Corrigiola litoralis*
Caryophyllaceae	**Silene gallica* var. *gallica*
Chenopodiaceae	**Chenopodium glaucum*
Chenopodiaceae	**Dysphania multifida*
Cyperaceae	**Cyperus congestus*
Cyperaceae	**Cyperus tenellus*
Cyperaceae	**Cyperus tenuiflorus*
Cyperaceae	**Isolepis prolifera*
Dicranaceae	**Campylopus introflexus*
Dilleniaceae	**Hibbertia cuneiformis*
Fabaceae	**Genista monspessulana* (WoNS)
Fabaceae	**Lotus angustissimus*
Fabaceae	**Lotus subbiflorus*
Fabaceae	**Lotus uliginosus*
Fabaceae	**Ornithopus compressus*
Fabaceae	**Ornithopus pinnatus*
Fabaceae	**Podalyria sericea*
Fabaceae	**Trifolium campestre*
Fabaceae	**Trifolium campestre* var. *campestre*
Fabaceae	**Trifolium cernuum*
Fabaceae	**Trifolium dubium*
Fabaceae	**Trifolium hirtum*

Family	Species
Fabaceae	**Trifolium repens*
Fabaceae	**Trifolium resupinatum* var. *resupinatum*
Gentianaceae	**Centaurium tenuiflorum*
Gentianaceae	**Cicendia filiformis*
Geraniaceae	**Geranium purpureum*
Goodeniaceae	**Lechenaultia biloba*
Hypericaceae	**Hypericum perforatum*
Juncaceae	**Juncus articulatus*
Juncaceae	**Juncus bufonius*
Juncaceae	**Juncus capitatus*
Juncaceae	**Juncus microcephalus*
Lamiaceae	**Mentha pulegium*
Lythraceae	**Lythrum hyssopifolia*
Myrtaceae	**Leptospermum laevigatum*
Orchidaceae	**Disa bracteata*
Oxalidaceae	**Oxalis pes-caprae*
Passifloraceae	**Passiflora filamentosa*
Poaceae	**Aira cupaniana*
Poaceae	**Aira praecox*
Poaceae	**Briza maxima*
Poaceae	**Briza minor*
Poaceae	**Catapodium rigidum*
Poaceae	**Dactylis glomerata*
Poaceae	**Glyceria declinata*
Poaceae	**Holcus lanatus*
Poaceae	**Hyparrhenia hirta*
Poaceae	**Lolium rigidum*
Poaceae	**Poa annua*
Poaceae	**Polypogon monspeliensis*
Polygonaceae	**Rumex conglomeratus*
Polygonaceae	**Rumex crispus*
Polygonaceae	**Rumex x muretii*
Polygonaceae	**Rumex x pseudopulcher*
Polygonaceae	**Rumex x schultzei*
Primulaceae	**Lysimachia arvensis*
Primulaceae	**Samolus valerandi*
Rosaceae	**Rubus anglocandicans* (Declared Pest)
Rubiaceae	**Sherardia arvensis*
Sapindaceae	**Dodonaea viscosa*
Scrophulariaceae	**Dischisma arenarium*

Family	Species
Solanaceae	**Solanum linnaeanum* (Declared Pest)
Tropaeolaceae	**Tropaeolum majus*
Vitaceae	**Vitis vinifera*

Appendix 5 Flora species inventory from the survey

Family	Species	Status
Amaranthaceae	*Alternanthera denticulata* var. *denticulata*	
Amaranthaceae	*Alternanthera nodiflora*	
Anarthriaceae	*Anarthria gracilis*	
Anarthriaceae	*Anarthria prolifera*	
Anarthriaceae	*Anarthria scabra*	
Anarthriaceae	*Lyginia barbata*	
Anarthriaceae	*Lyginia imberbis*	
Apiaceae	*Actinotus glomeratus*	
Apiaceae	*Pentapeltis peltigera*	
Apiaceae	*Platysace filiformis*	
Apiaceae	*Xanthosia candida*	
Apiaceae	*Xanthosia huegelii*	
Apiaceae	*Xanthosia tasmanica*	
Araceae	*Lemna disperma*	
Araliaceae	*Hydrocotyle callicarpa*	
Araliaceae	*Trachymene pilosa*	
Asparagaceae	*Acanthocarpus preissii*	
Asparagaceae	*Chamaescilla corymbosa* var. *corymbosa*	
Asparagaceae	*Lomandra caespitosa*	
Asparagaceae	*Lomandra integra*	
Asparagaceae	*Lomandra nigricans*	
Asparagaceae	*Lomandra pauciflora*	
Asparagaceae	*Lomandra preissii*	
Asparagaceae	*Lomandra purpurea*	
Asparagaceae	*Thysanotus arenarius*	
Asparagaceae	*Thysanotus dichotomus*	
Asparagaceae	*Thysanotus manglesianus*	
Asparagaceae	*Thysanotus multiflorus*	
Asparagaceae	*Thysanotus patersonii*	
Asteraceae	**Arctotheca calendula*	Weed
Asteraceae	**Cotula coronopifolia*	Weed
Asteraceae	**Cotula turbinata*	Weed
Asteraceae	**Hypochaeris glabra*	Weed
Asteraceae	**Hypochaeris radicata*	Weed
Asteraceae	**Sonchus asper*	Weed
Asteraceae	**Sonchus oleraceus*	Weed
Asteraceae	**Symphyotrichum squamatum*	Weed
Asteraceae	**Ursinia anthemoides* subsp. *anthemoides*	Weed
Asteraceae	**Vellereophyton dealbatum*	Weed
Asteraceae	?*Centipeda cunninghamii*	
Asteraceae	*Quinetia urvillei*	

Family	Species	Status
Asteraceae	*Rhodanthe citrina*	
Asteraceae	*Senecio picridioides*	
Asteraceae	*Siloxerus humifusus*	
Campanulaceae	**Monopsis debilis* var. *depressa*	Weed
Caryophyllaceae	**Cerastium glomeratum*	Weed
Caryophyllaceae	**Silene gallica* var. *gallica*	Weed
Casuarinaceae	*Allocasuarina fraseriana*	
Celastraceae	*Stackhousia huegelii*	
Celastraceae	*Stackhousia monogyna*	
Centrolepidaceae	*Aphelia cyperoides*	
Centrolepidaceae	*Centrolepis aristata*	
Centrolepidaceae	*Centrolepis pilosa*	
Centrolepidaceae	*Centrolepis polygyna*	
Centrolepidaceae	*Centrolepis strigosa* subsp. *strigosa*	RE
Colchicaceae	*Burchardia congesta*	
Colchicaceae	*Burchardia multiflora*	
Colchicaceae	*Caladenia sp.*	
Crassulaceae	*Crassula decumbens* var. *decumbens*	
Cyperaceae	**Cyperus tenellus*	Weed
Cyperaceae	*Cyathochaeta avenacea*	
Cyperaceae	*Cyathochaeta clandestina*	
Cyperaceae	*Cyathochaeta equitans*	
Cyperaceae	*Evandra aristata*	
Cyperaceae	*Ficinia nodosa*	
Cyperaceae	*Gymnoschoenus anceps*	
Cyperaceae	*Isolepis congrua*	
Cyperaceae	*Isolepis cyperoides*	
Cyperaceae	*Isolepis hookeriana*	
Cyperaceae	*Lepidosperma leptostachyum*	
Cyperaceae	*Lepidosperma longitudinale*	
Cyperaceae	*Lepidosperma pubisquameum*	
Cyperaceae	*Lepidosperma sp.*	
Cyperaceae	*Lepidosperma sp. Blackwood (R. Davis 7696)*	
Cyperaceae	*Lepidosperma squamatum*	
Cyperaceae	*Lepidosperma striatum*	
Cyperaceae	*Machaerina articulata*	
Cyperaceae	*Machaerina juncea*	
Cyperaceae	*Machaerina rubiginosa*	
Cyperaceae	*Mesomelaena graciliceps*	
Cyperaceae	*Mesomelaena tetragona*	
Cyperaceae	*Morelotia octandra*	
Cyperaceae	*Netrostylis sp. Blackwood River (A.R. Annels 3043)*	P3 (DBCA list)
Cyperaceae	*Netrostylis sp. Jarrah Forest (R. Davis 7391)*	

Family	Species	Status
Cyperaceae	*Schoenus efoliatus*	
Dasypogonaceae	*Dasypogon bromeliifolius*	
Dasypogonaceae	*Dasypogon hookeri*	
Dasypogonaceae	*Kingia australis*	
Dennstaedtiaceae	*Pteridium esculentum* subsp. *esculentum*	
Dilleniaceae	*Hibbertia amplexicaulis*	
Dilleniaceae	*Hibbertia cuneiformis*	
Dilleniaceae	*Hibbertia cunninghamii*	
Dilleniaceae	*Hibbertia hypericoides* subsp. *hypericoides*	
Dilleniaceae	*Hibbertia perfoliata*	
Dilleniaceae	*Hibbertia racemosa*	
Dilleniaceae	*Hibbertia stellaris*	
Dilleniaceae	*Hibbertia trichocalyx*	
Droseraceae	*Drosera enodes*	
Droseraceae	*Drosera erythrorhiza*	
Droseraceae	*Drosera glanduligera*	
Droseraceae	*Drosera huegelii*	
Droseraceae	*Drosera menziesii*	
Droseraceae	*Drosera nitidula*	
Droseraceae	*Drosera pallida*	
Droseraceae	*Drosera pulchella*	
Droseraceae	*Drosera sp.*	
Ericaceae	*Andersonia sprengelioides*	
Ericaceae	*Leucopogon alternifolius*	P3 (DBCA list)
Ericaceae	*Leucopogon australis*	
Ericaceae	*Leucopogon capitellatus*	
Ericaceae	*Leucopogon cordatus*	
Ericaceae	*Leucopogon glabellus*	
Ericaceae	*Leucopogon interstans*	
Ericaceae	*Leucopogon tenuicaulis*	
Ericaceae	*Leucopogon verticillatus*	
Ericaceae	*Sphenotoma capitata*	
Ericaceae	*Sphenotoma gracilis*	
Ericaceae	*Styphelia sp. Nannup (R.D. Royce 3978)*	
Fabaceae	**Lotus subbiflorus*	Weed
Fabaceae	**Ornithopus pinnatus*	Weed
Fabaceae	**Trifolium campestre* var. *campestre*	Weed
Fabaceae	**Trifolium dubium*	Weed
Fabaceae	**Trifolium repens*	Weed
Fabaceae	**Trifolium repens* var. *repens*	Weed
Fabaceae	**Trifolium subterraneum*	Weed
Fabaceae	*Acacia alata*	
Fabaceae	*Acacia browniana* var. *browniana*	

Family	Species	Status
Fabaceae	*Acacia divergens*	
Fabaceae	*Acacia extensa*	
Fabaceae	*Acacia hastulata*	
Fabaceae	*Acacia mooreana*	
Fabaceae	*Acacia myrtifolia*	
Fabaceae	*Acacia pulchella* var. *pulchella*	
Fabaceae	*Acacia uliginosa*	
Fabaceae	*Aotus carinata*	P4 (DBCA list)
Fabaceae	*Aotus gracillima*	
Fabaceae	*Bossiaea eriocarpa*	
Fabaceae	*Bossiaea praetermissa*	
Fabaceae	*Bossiaea rufa*	
Fabaceae	*Callistachys lanceolata*	
Fabaceae	*Chorizema carinatum*	P3 (DBCA list)
Fabaceae	*Daviesia flexuosa*	
Fabaceae	*Daviesia inflata*	
Fabaceae	*Euchilopsis linearis*	
Fabaceae	*Eutaxia myrtifolia*	
Fabaceae	*Eutaxia virgata*	
Fabaceae	*Gastrolobium formosum*	P3 (DBCA list)
Fabaceae	*Gompholobium capitatum*	
Fabaceae	*Gompholobium confertum*	
Fabaceae	*Gompholobium knightianum*	
Fabaceae	*Gompholobium ovatum*	
Fabaceae	*Gompholobium polymorphum*	
Fabaceae	*Gompholobium scabrum*	
Fabaceae	*Gompholobium tomentosum*	
Fabaceae	*Hovea chorizemifolia*	
Fabaceae	*Hovea elliptica*	
Fabaceae	*Hovea trisperma* var. *trisperma*	
Fabaceae	*Isotropis cuneifolia* subsp. *cuneifolia*	
Fabaceae	*Jacksonia furcellata*	
Fabaceae	*Jacksonia horrida*	
Fabaceae	*Kennedia carinata*	
Fabaceae	*Mirbelia dilatata*	
Fabaceae	*Pultenaea reticulata*	
Fabaceae	*Sphaerolobium drummondii*	
Fabaceae	*Sphaerolobium grandiflorum*	
Fabaceae	*Sphaerolobium medium*	
Fabaceae	*Sphaerolobium racemulosum*	
Fabaceae	*Sphaerolobium vimineum*	
Fabaceae	*Viminaria juncea*	
Geraniaceae	**Geranium dissectum*	Weed

Family	Species	Status
Geraniaceae	**Geranium purpureum*	Weed
Geraniaceae	*Geranium retrorsum*	
Geraniaceae	*Geranium solanderi*	
Goodeniaceae	?*Scaevola striata* var. *striata*	
Goodeniaceae	*Dampiera heteroptera*	P3 (DBCA list)
Goodeniaceae	*Dampiera leptoclada*	
Goodeniaceae	*Dampiera linearis*	
Goodeniaceae	*Dampiera pedunculata*	
Goodeniaceae	*Dampiera trigona*	
Goodeniaceae	*Goodenia eatoniana*	
Goodeniaceae	*Goodenia micrantha*	
Goodeniaceae	*Goodenia pulchella*	
Goodeniaceae	*Goodenia trinervis*	
Goodeniaceae	*Lechenaultia expansa*	
Goodeniaceae	*Scaevola calliptera*	
Haemodoraceae	*Anigozanthos flavidus*	
Haemodoraceae	*Conostylis aculeata* subsp. *aculeata*	
Haemodoraceae	*Conostylis aculeata* subsp. *gracilis*	
Haemodoraceae	*Conostylis laxiflora*	
Haemodoraceae	*Haemodorum laxum*	
Haemodoraceae	*Haemodorum sparsiflorum*	
Haemodoraceae	*Phlebocarya ciliata*	
Haemodoraceae	*Tribonanthes variabilis*	
Haloragaceae	*Myriophyllum salsugineum*	
Hemerocallidaceae	*Agrostocrinum scabrum* subsp. *scabrum*	
Hemerocallidaceae	*Caesia micrantha*	
Hemerocallidaceae	*Hodgsoniola junciformis*	
Hemerocallidaceae	*Johnsonia lupulina*	
Hemerocallidaceae	*Tricoryne humilis*	
Hypoxidaceae	*Pauridia occidentalis*	
Iridaceae	**Romulea rosea* var. *australis*	Weed
Iridaceae	**Sparaxis pillansii*	Weed
Iridaceae	*Patersonia occidentalis*	
Iridaceae	*Patersonia occidentalis* var. *latifolia*	
Iridaceae	*Patersonia occidentalis* var. *occidentalis*	
Iridaceae	*Patersonia umbrosa* var. *xanthina*	
Juncaceae	**Juncus articulatus*	Weed
Juncaceae	**Juncus capitatus*	Weed
Juncaceae	**Juncus microcephalus*	Weed
Juncaceae	**Juncus oxycarpus*	Weed
Juncaceae	*Juncus kraussii* subsp. *australiensis*	
Juncaceae	*Juncus pallidus*	
Juncaceae	*Juncus pauciflorus*	

Family	Species	Status
Juncaceae	*Juncus planifolius*	
Juncaginaceae	*Cycnogeton huegelii*	
Lamiaceae	**Mentha pulegium*	Weed
Lauraceae	*Cassytha racemosa* forma *pilosa*	
Lauraceae	*Cassytha sp.*	
Linaceae	**Linum trigynum*	Weed
Lindsaeaceae	*Lindsaea linearis*	
Loganiaceae	*Orianthera serpyllifolia*	
Loganiaceae	*Phyllangium divergens*	
Loganiaceae	*Phyllangium paradoxum*	
Loranthaceae	*Nuytsia floribunda*	
Malvaceae	**Malva parviflora*	Weed
Malvaceae	*Abutilon sp.*	
Menyanthaceae	*Liparophyllum lasiospermum*	
Menyanthaceae	*Ornduffia albiflora*	
Menyanthaceae	*Ornduffia parnassifolia*	
Myrtaceae	**Eucalyptus globulus* subsp. *globulus*	Weed
Myrtaceae	**Gaudium laevigatum*	Weed
Myrtaceae	*Actinodium cunninghamii*	
Myrtaceae	*Agonis flexuosa* var. *flexuosa*	
Myrtaceae	*Astartea scoparia*	
Myrtaceae	*Beaufortia sparsa*	
Myrtaceae	*Calothamnus lateralis* var. *crassus*	P3 (DBCA list)
Myrtaceae	*Calothamnus lehmannii*	
Myrtaceae	*Corymbia calophylla*	
Myrtaceae	*Eucalyptus marginata* subsp. *marginata*	
Myrtaceae	*Homalospermum firmum*	
Myrtaceae	*Hypocalymma angustifolium*	
Myrtaceae	*Hypocalymma ericifolium*	
Myrtaceae	*Hypocalymma minus*	
Myrtaceae	*Hypocalymma strictum*	
Myrtaceae	*Kunzea recurva*	
Myrtaceae	*Kunzea spathulata*	
Myrtaceae	*Melaleuca basicephala*	P4 (DBCA list)
Myrtaceae	*Melaleuca densa*	
Myrtaceae	*Melaleuca incana* subsp. *incana*	
Myrtaceae	*Melaleuca preissiana*	
Myrtaceae	*Melaleuca rhaphiophylla*	
Myrtaceae	*Melaleuca thymoides*	
Myrtaceae	*Pericalymma crassipes*	
Myrtaceae	*Pericalymma ellipticum* var. *ellipticum*	
Myrtaceae	*Taxandria inundata*	
Myrtaceae	*Taxandria juniperina*	

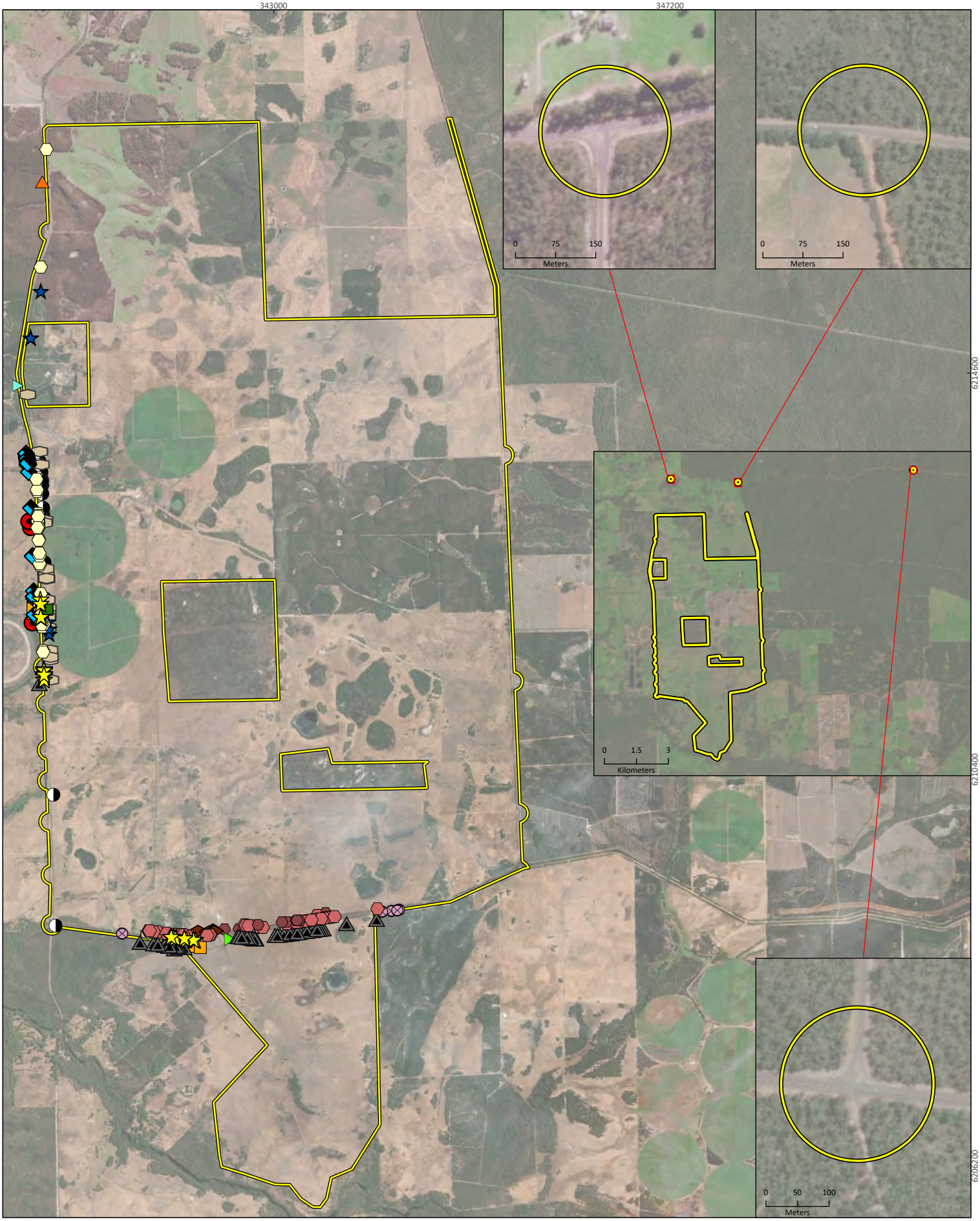
Family	Species	Status
Myrtaceae	*Taxandria linearifolia*	
Myrtaceae	*Taxandria parviceps*	
Myrtaceae	*Verticordia plumosa* var. *vassensis*	EN (EPBC & BC Acts)
Onagraceae	**Epilobium ciliatum*	Weed
Onagraceae	**Oenothera stricta* subsp. *stricta*	Weed
Orchidaceae	**Disa bracteata*	Weed
Orchidaceae	*Caladenia attingens* subsp. *attingens*	
Orchidaceae	*Caladenia brownii*	
Orchidaceae	*Caladenia flava*	
Orchidaceae	*Corysanthes recurva*	
Orchidaceae	*Cryptostylis ovata*	
Orchidaceae	*Lyperanthus serratus*	
Orchidaceae	*Microtis media* subsp. *media*	
Orchidaceae	*Prasophyllum brownii*	
Orchidaceae	*Pterostylis ectypha*	
Orchidaceae	*Pterostylis erubescens*	
Orchidaceae	*Pterostylis vittata*	
Orchidaceae	*Pyrorchis nigricans*	
Orchidaceae	*Thelymitra crinita*	
Orchidaceae	*Thelymitra flexuosa*	
Orchidaceae	*Thelymitra graminea*	
Orchidaceae	*Thelymitra mucida*	
Philydraceae	*Philydrella pygmaea* subsp. *pygmaea*	
Phyllanthaceae	*Lysiandra calycina*	
Phyllanthaceae	*Poranthera huegelii*	
Pinaceae	**Pinus sp.*	Weed
Pittosporaceae	?*Billardiera variifolia*	
Pittosporaceae	*Billardiera floribunda*	
Pittosporaceae	*Billardiera fusiformis*	
Pittosporaceae	*Billardiera laxiflora*	
Pittosporaceae	*Billardiera sp.*	
Pittosporaceae	*Billardiera variifolia*	
Plantaginaceae	**Callitriche stagnalis*	Weed
Plantaginaceae	**Plantago lanceolata*	Weed
Poaceae	**Aira caryophyllea*	Weed
Poaceae	**Aira cupaniana*	Weed
Poaceae	**Aira praecox*	Weed
Poaceae	**Anthoxanthum odoratum*	Weed
Poaceae	**Avena barbata*	Weed
Poaceae	**Avena fatua*	Weed
Poaceae	**Avena sativa*	Weed
Poaceae	**Briza maxima*	Weed
Poaceae	**Briza minor*	Weed

Family	Species	Status
Poaceae	**Bromus diandrus*	Weed
Poaceae	**Bromus hordeaceus*	Weed
Poaceae	**Ehrharta longiflora*	Weed
Poaceae	**Eragrostis curvula*	Weed
Poaceae	**Glyceria declinata*	Weed
Poaceae	**Holcus lanatus*	Weed
Poaceae	**Hordeum leporinum*	Weed
Poaceae	**Lagurus ovatus*	Weed
Poaceae	**Lolium perenne*	Weed
Poaceae	**Lolium rigidum*	Weed
Poaceae	**Poa annua*	Weed
Poaceae	**Polypogon monspeliensis*	Weed
Poaceae	**Vulpia bromoides*	Weed
Poaceae	**Vulpia myuros*	Weed
Poaceae	*Amphipogon amphipogonoides*	
Poaceae	*Amphipogon laguroides* subsp. *laguroides*	
Poaceae	*Amphipogon setaceus*	
Poaceae	*Austrostipa semibarbata*	
Poaceae	*Deyeuxia quadriseta*	
Poaceae	*Eragrostis brownii*	
Poaceae	*Lachnagrostis filiformis*	
Poaceae	*Poaceae sp.*	
Poaceae	*Tetrarrhena laevis*	
Podocarpaceae	*Podocarpus drouynianus*	
Polygalaceae	*Comesperma virgatum*	
Polygonaceae	**Rumex acetosella*	Weed
Polygonaceae	**Rumex conglomeratus*	Weed
Polygonaceae	**Rumex crispus*	Weed
Polygonaceae	**Rumex sp.*	Weed
Polygonaceae	*Muehlenbeckia adpressa*	
Primulaceae	**Lysimachia arvensis*	Weed
Proteaceae	*Adenanthos detmoldii*	P4 (DBCA list)
Proteaceae	*Adenanthos meisneri*	
Proteaceae	*Adenanthos obovatus*	
Proteaceae	*Adenanthos x pamela*	P4 (DBCA list)
Proteaceae	*Banksia attenuata*	
Proteaceae	*Banksia dallanneyi* subsp. *dallanneyi*	
Proteaceae	*Banksia grandis*	
Proteaceae	*Banksia ilicifolia*	
Proteaceae	*Banksia littoralis*	
Proteaceae	*Banksia nivea* subsp. *nivea*	
Proteaceae	*Banksia occidentalis*	
Proteaceae	*Banksia sp.*	

Family	Species	Status
Proteaceae	*Conospermum flexuosum* subsp. *laevigatum*	
Proteaceae	*Grevillea brachystylis* subsp. *australis*	VU/EN (EPBC Act; BC Act)
Proteaceae	*Grevillea diversifolia* subsp. *subtersericata*	
Proteaceae	*Grevillea manglesioides* subsp. *ferricola*	P3 (DBCA list)
Proteaceae	*Grevillea manglesioides* subsp. *manglesioides*	
Proteaceae	*Grevillea papillosa*	P3 (DBCA list)
Proteaceae	*Grevillea quercifolia*	
Proteaceae	*Hakea ceratophylla*	
Proteaceae	*Hakea falcata*	
Proteaceae	*Hakea lasianthoides*	
Proteaceae	*Hakea linearis*	
Proteaceae	*Hakea lissocarpha*	
Proteaceae	*Hakea ruscifolia*	
Proteaceae	*Hakea sulcata*	
Proteaceae	*Hakea tuberculata*	
Proteaceae	*Hakea varia*	
Proteaceae	*Isopogon axillaris*	
Proteaceae	*Isopogon formosus* subsp. *dasylepis*	P3 (DBCA list)
Proteaceae	*Lambertia orbifolia* subsp. *vespera*	EN (BC Act)
Proteaceae	*Persoonia graminea*	
Proteaceae	*Persoonia longifolia*	
Proteaceae	*Petrophile diversifolia*	
Proteaceae	*Petrophile linearis*	
Proteaceae	*Petrophile squamata* subsp. *squamata*	
Proteaceae	*Synaphea nexosa*	P1 (DBCA list)
Proteaceae	*Synaphea obtusata*	
Proteaceae	*Synaphea petiolaris* subsp. *triloba*	
Proteaceae	*Xylomelum occidentale*	
Ranunculaceae	**Ranunculus muricatus*	Weed
Restionaceae	*Chaetanthus leptocarpoides*	
Restionaceae	*Chordifex amblycoleus*	
Restionaceae	*Chordifex isomorphus*	
Restionaceae	*Cytogonidium leptocarpoides*	
Restionaceae	*Desmocladus castaneus*	
Restionaceae	*Desmocladus fasciculatus*	
Restionaceae	*Desmocladus flexuosus*	
Restionaceae	*Empodisma gracillimum*	
Restionaceae	*Hypolaena caespitosa*	
Restionaceae	*Hypolaena exsulca*	
Restionaceae	*Hypolaena grandiuscula*	
Restionaceae	*Hypolaena pubescens*	
Restionaceae	*Hypolaena viridis*	

Family	Species	Status
Restionaceae	*Leptocarpus coangustatus*	
Restionaceae	*Leptocarpus denmarkicus*	
Restionaceae	*Leptocarpus laxus*	
Restionaceae	*Leptocarpus roycei*	
Restionaceae	*Leptocarpus scariosus*	
Restionaceae	*Leptocarpus scoparius*	
Restionaceae	*Leptocarpus tenax*	
Restionaceae	*Leptocarpus trisepalus*	
Restionaceae	*Loxocarya cinerea*	
Restionaceae	*Loxocarya magna*	P3 (DBCA list)
Restionaceae	*Melanostachya ustulata*	
Restionaceae	*Platychorda applanata*	
Restionaceae	*Sporadanthus strictus*	
Restionaceae	*Tyrbastes glaucescens*	
Rhamnaceae	*Trymalium odoratissimum* subsp. *trifidum*	
Rubiaceae	*Opercularia hispidula*	
Rubiaceae	*Opercularia vaginata*	
Rutaceae	*Boronia anceps*	P3 (DBCA list)
Rutaceae	*Boronia crenulata* subsp. *crenulata*	
Rutaceae	*Boronia fastigiata*	
Rutaceae	*Boronia sp.*	
Rutaceae	*Boronia spathulata*	
Rutaceae	*Boronia tenuior*	
Rutaceae	*Philotheca spicata*	
Santalaceae	*Leptomeria cunninghamii*	
Santalaceae	*Leptomeria squarrulosa*	
Scrophulariaceae	**Bellardia viscosa*	Weed
Scrophulariaceae	**Verbascum virgatum*	Weed
Solanaceae	**Solanum nigrum*	Weed
Stylidiaceae	*Levenhookia pusilla*	
Stylidiaceae	*Stylidium amoenum*	
Stylidiaceae	*Stylidium amoenum* var. *caulescens*	
Stylidiaceae	*Stylidium androsaceum*	
Stylidiaceae	*Stylidium caespitosum*	
Stylidiaceae	*Stylidium guttatum*	
Stylidiaceae	*Stylidium inundatum*	
Stylidiaceae	*Stylidium megacarpum*	
Stylidiaceae	*Stylidium perpusillum*	
Stylidiaceae	*Stylidium repens*	
Stylidiaceae	*Stylidium scandens*	
Stylidiaceae	*Stylidium squamosotuberosum*	
Thymelaeaceae	*Pimelea ciliata*	
Thymelaeaceae	*Pimelea hispida*	

Family	Species	Status
Thymelaeaceae	*Pimelea lanata*	
Thymelaeaceae	*Pimelea longiflora*	
Thymelaeaceae	*Pimelea rosea* subsp. *rosea*	
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	
Xyridaceae	*Xyris lacera*	
Xyridaceae	*Xyris lanata*	
Xyridaceae	*Xyris laxiflora*	
Xyridaceae	*Xyris roycei*	
Zamiaceae	*Macrozamia riedlei*	





SynergyRED
Proposed Wind Farm in Scott River

Project No	1582
Date	11/02/2025
Drawn by	BK
Map author	NR

0 1 2
Kilometers

1:51,800(at A4) GDA 1994 MGA Zone 50

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Study area

Species, status

- *Adenanthos detmoldii*, P4 (DBCA list)
- *Banksia meisneri* subsp. *ascendens*, P4 (DBCA list)
- *Banksia nivea* subsp. *uliginosa*,EN (EPBC and BC Acts)
- *Boronia anceps*, P3 (DBCA list)
- *Calothamnus lateralis* var. *crassus*, P3 (DBCA list)
- *Conospermum quadripetalum*, CR (BC Act)
- *Darwinia ferricola*, EN (EPBC and BC Acts)
- *Drosera fimbriata*, P4 (DBCA list)
- *Gastrolobium formosum*, P3 (DBCA list)
- *Grevillea brachystylis* subsp. *australis*, VU/EN (EPBC Act; BC Act)
- *Grevillea manglesioides* subsp. *ferricola*, P3 (DBCA list)
- *Grevillea papillosa*, P3 (DBCA list)
- *Leucopogon wheelerae*, P3 (DBCA list)
- *Loxocarya magna*, P3 (DBCA list)
- *Stylidium leeuwinense*, P4 (DBCA list)
- *Synaphea nexosa*, P1 (DBCA list)
- *Verticordia plumosa* var. *vassensis*, EN (EPBC and BC Acts)

Appendix 6
Unconfirmed desktop significant flora

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Appendix 7 Unconfirmed desktop significant flora populations within study area

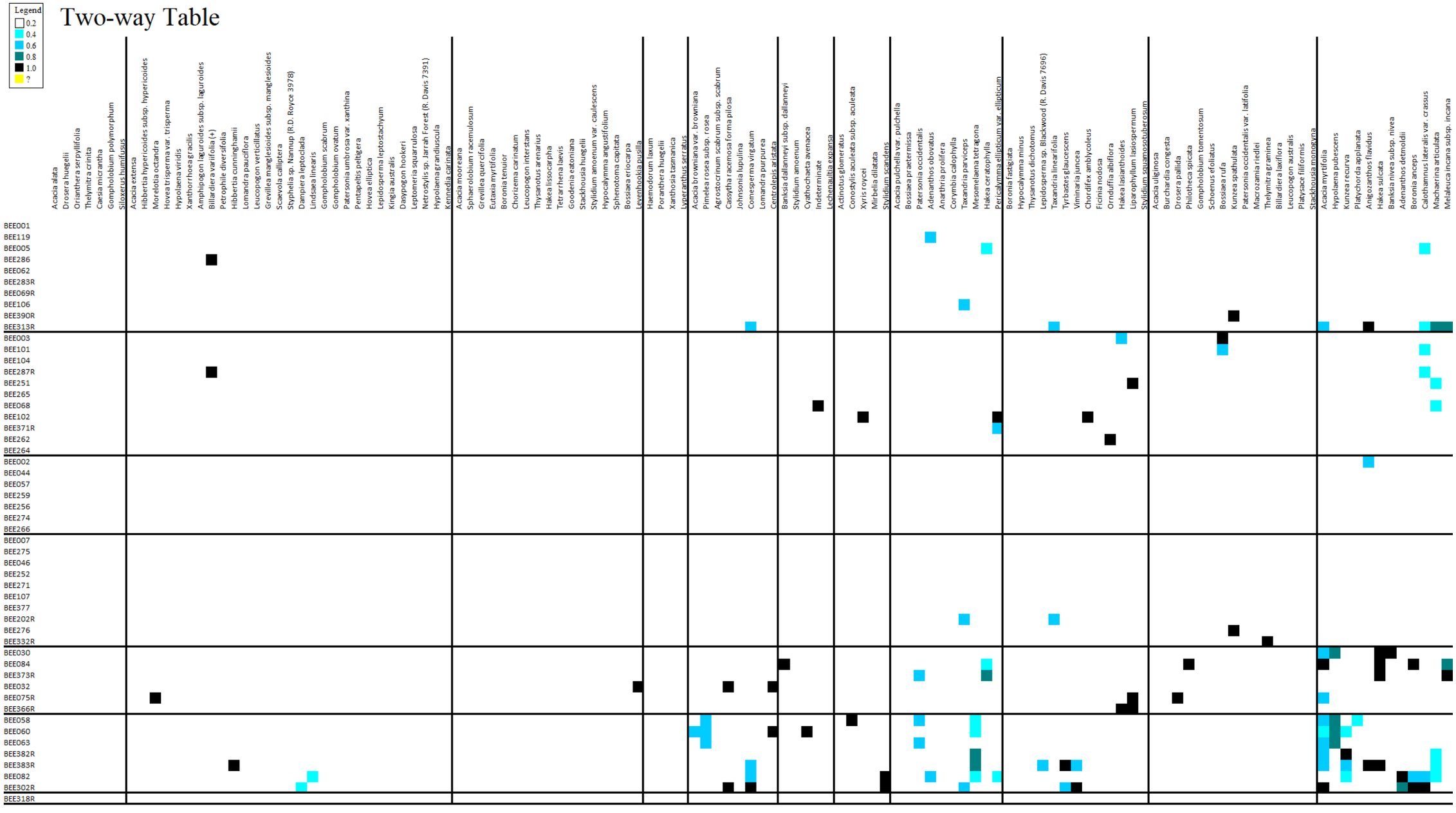
Species	Status	Unconfirmed desktop populations
Darwinia ferricola	T (EN EPBC & BC Acts)	3
Banksia nivea subsp. *uliginosa*	T (EN EPBC & BC Acts)	1
Conospermum quadripetalum	T (CR BC Act)	3
Synaphea nexosa	P1 (DBCA)	1
Leucopogon wheelerae	P3 (DBCA)	1
Gastrolobium formosum	P3 (DBCA)	1
Boronia anceps	P3 (DBCA)	1
Grevillea manglesioides subsp. *ferricola*	P3 (DBCA)	1
Grevillea papillosa	P3 (DBCA)	2
Calothamnus lateralis var. *crassus*	P3 (DBCA)	1
Adenanthos detmoldii	P4 (DBCA)	2
Banksia meisneri subsp. *ascendens*	P4 (DBCA)	1
Stylidium leeuwinense	P4 (DBCA)	1
Drosera fimbriata	P4 (DBCA)	1

Appendix 8 Introduced flora recorded in the field survey

Family	Species	Declared Pest	WoNS
Asteraceae	**Arctotheca calendula*	-	-
Asteraceae	**Cotula coronopifolia*	-	-
Asteraceae	**Cotula turbinata*	-	-
Asteraceae	**Hypochaeris glabra*	-	-
Asteraceae	**Hypochaeris radicata*	-	-
Asteraceae	**Sonchus asper*	-	-
Asteraceae	**Sonchus oleraceus*	-	-
Asteraceae	**Symphyotrichum squamatum*	-	-
Asteraceae	**Ursinia anthemoides* subsp. *anthemoides*	-	-
Asteraceae	**Vellereophyton dealbatum*	-	-
Campanulaceae	**Monopsis debilis* var. *depressa*	-	-
Caryophyllaceae	**Cerastium glomeratum*	-	-
Caryophyllaceae	**Silene gallica* var. *gallica*	-	-
Cyperaceae	**Cyperus tenellus*	-	-
Fabaceae	**Lotus subbiflorus*	-	-
Fabaceae	**Ornithopus pinnatus*	-	-
Fabaceae	**Trifolium campestre* var. *campestre*	-	-
Fabaceae	**Trifolium dubium*	-	-
Fabaceae	**Trifolium repens*	-	-
Fabaceae	**Trifolium repens* var. *repens*	-	-
Fabaceae	**Trifolium subterraneum*	-	-
Geraniaceae	**Geranium dissectum*	-	-
Geraniaceae	**Geranium purpureum*		-
Iridaceae	**Romulea rosea* var. *australis*	-	-
Iridaceae	**Sparaxis pillansii*	-	-
Juncaceae	**Juncus articulatus*	-	-
Juncaceae	**Juncus capitatus*	-	-
Juncaceae	**Juncus microcephalus*	-	-
Juncaceae	**Juncus oxycarpus*	-	-
Lamiaceae	**Mentha pulegium*	-	-
Linaceae	**Linum trigynum*	-	-
Malvaceae	**Malva parviflora*	-	-
Myrtaceae	**Eucalyptus globulus* subsp. *globulus*	-	-
Myrtaceae	*Gaudium laevigatum*		
Onagraceae	**Epilobium ciliatum*	-	-
Onagraceae	**Oenothera stricta* subsp. *stricta*	-	-
Orchidaceae	**Disa bracteata*	-	-
Plantaginaceae	**Callitriche stagnalis*	-	-
Plantaginaceae	**Plantago lanceolata*	-	-
Poaceae	**Aira caryophyllea*	-	-
Poaceae	**Aira cupaniana*	-	-
Poaceae	**Aira praecox*	-	-

Family	Species	Declared Pest	WoNS
Poaceae	**Anthoxanthum odoratum*	-	-
Poaceae	**Avena barbata*	-	-
Poaceae	**Avena fatua*	-	-
Poaceae	**Avena sativa*	-	-
Poaceae	**Briza maxima*	-	-
Poaceae	**Briza minor*	-	-
Poaceae	**Bromus diandrus*	-	-
Poaceae	**Bromus hordeaceus*	-	-
Poaceae	**Ehrharta longiflora*	-	-
Poaceae	**Eragrostis curvula*	-	-
Poaceae	**Glyceria declinata*	-	-
Poaceae	**Holcus lanatus*	-	-
Poaceae	**Hordeum leporinum*	-	-
Poaceae	**Lagurus ovatus*	-	-
Poaceae	**Lolium perenne*	-	-
Poaceae	**Lolium rigidum*	-	-
Poaceae	**Poa annua*	-	-
Poaceae	**Polypogon monspeliensis*	-	-
Poaceae	**Vulpia bromoides*	-	-
Poaceae	**Vulpia myuros*	-	-
Polygonaceae	**Rumex acetosella*	-	-
Polygonaceae	**Rumex conglomeratus*	-	-
Polygonaceae	**Rumex crispus*	-	-
Primulaceae	**Lysimachia arvensis*	-	-
Ranunculaceae	**Ranunculus muricatus*	-	-
Scrophulariaceae	**Bellardia viscosa*	Not listed (DPIRD 2023)	-
Scrophulariaceae	**Verbascum virgatum*	-	-
Solanaceae	**Solanum nigrum*	-	-

Appendix 9 Flora species by site matrix



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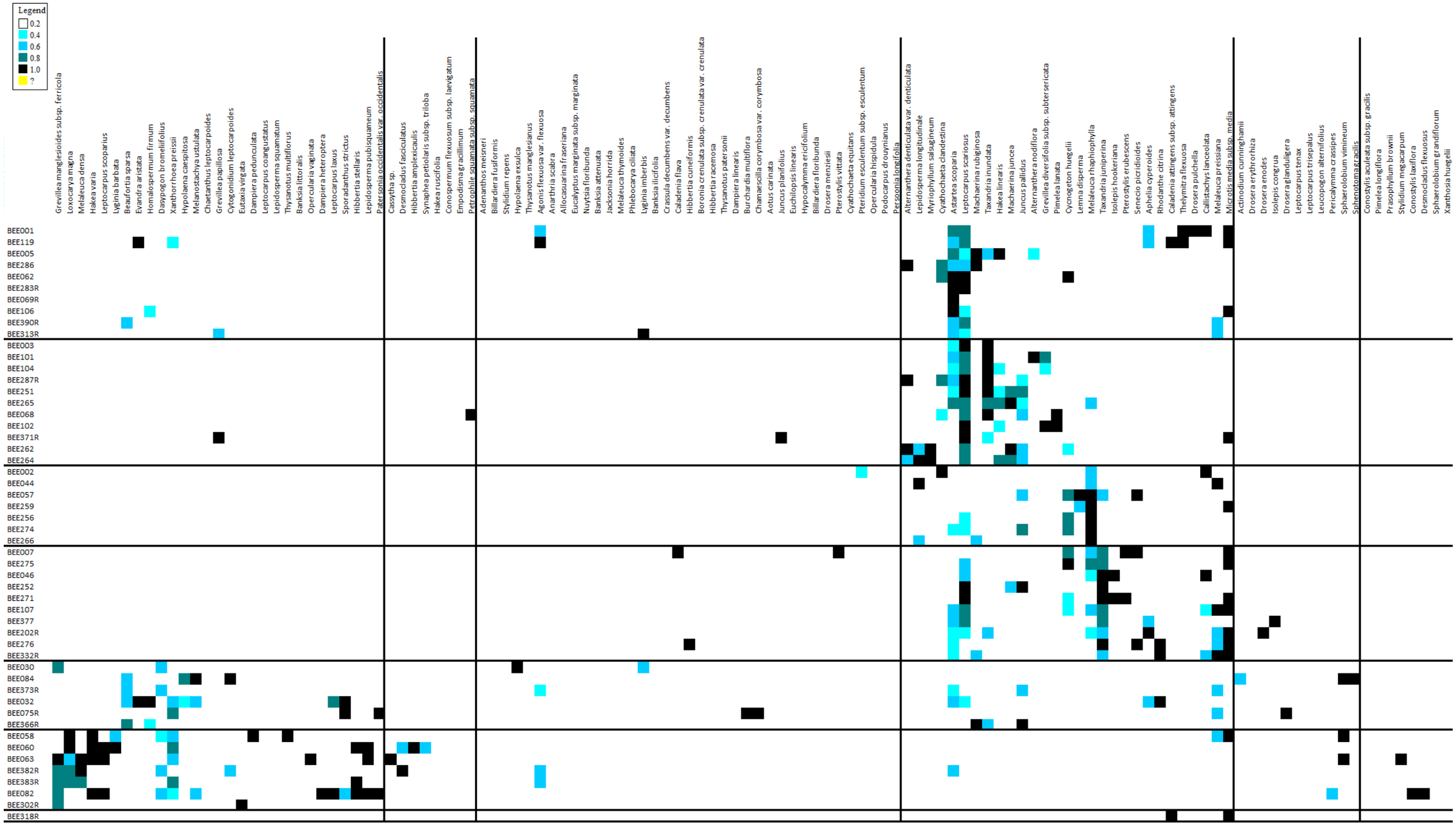

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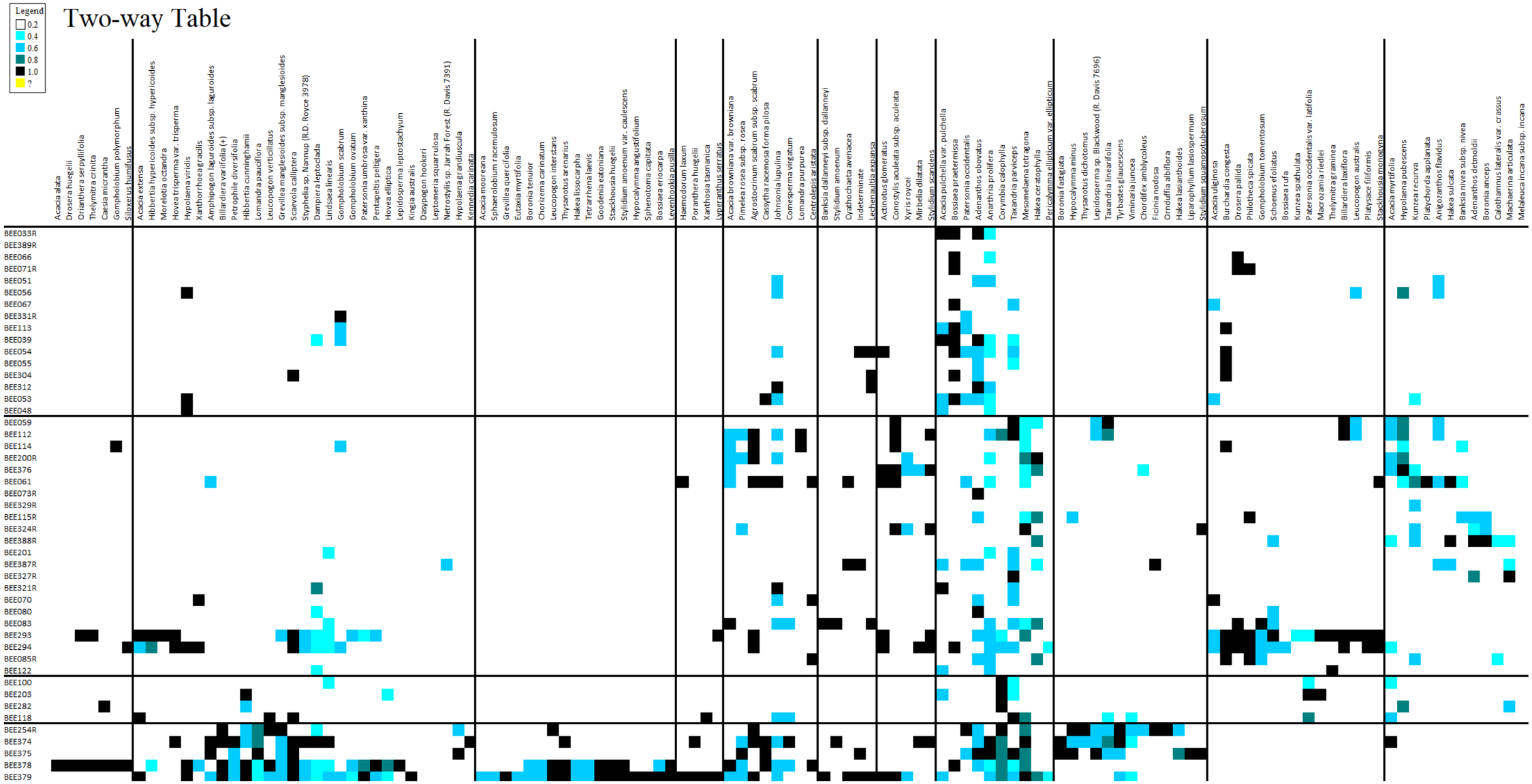

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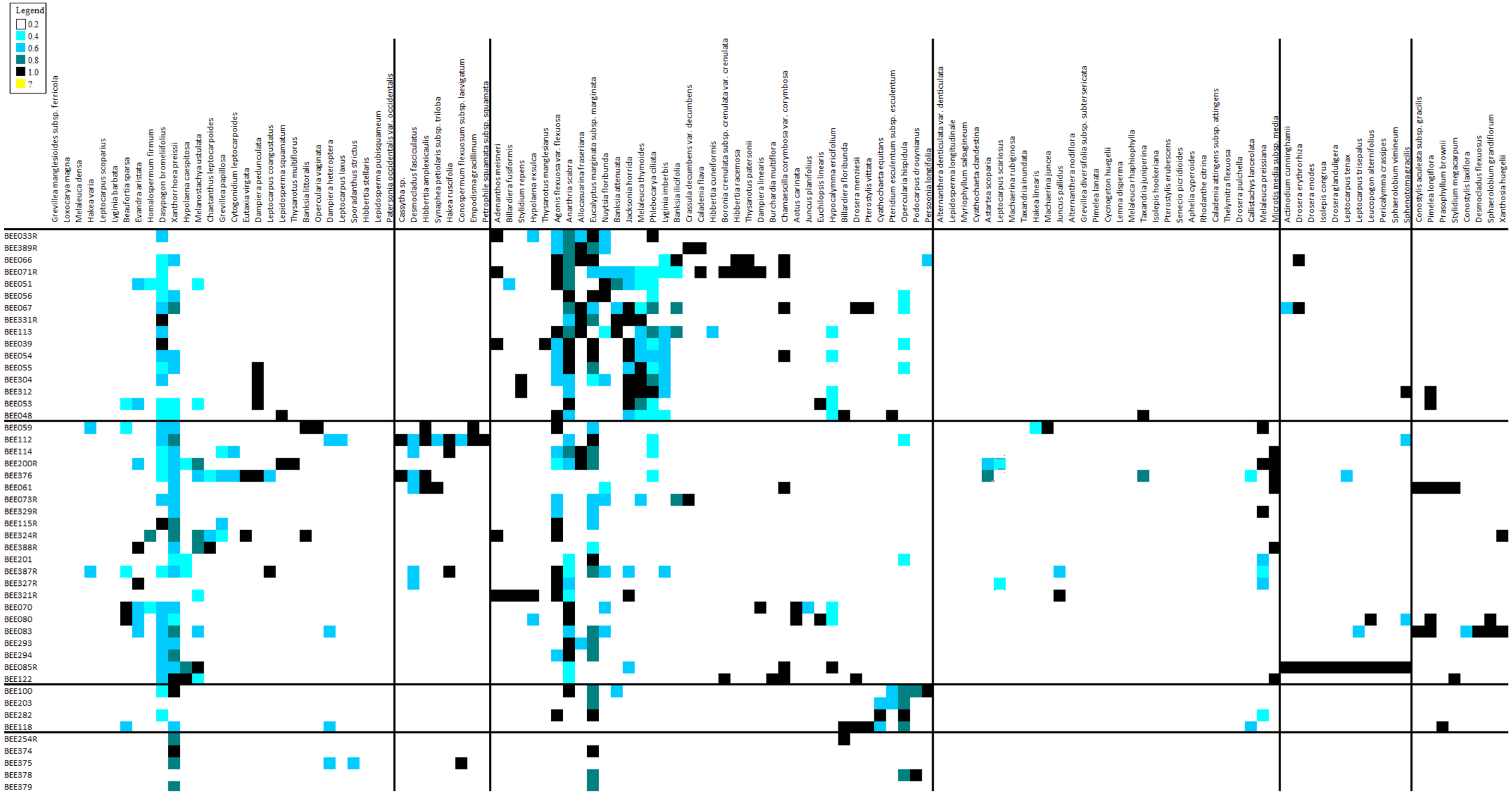

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Attachment 4 (RSD) - Appendix J

Ecological Gap Survey

REDACTED ON REQUEST EPA

Wind Farm in Scott River

Ecological Gap Survey

Synergy Renewable Energy Developments Pty Ltd

ecological AUSTRALIA
A TETRA TECH COMPANY

Document Tracking

Project Name: Wind Farm in Scott River

Project Number: 24PER7886

Project Manager: Anna Bowley

Version	Prepared by	Reviewed by	Approved by	Status	Date
V1	Liv Sinclair	Dr Jeff Cargill	Anna Bowley	Draft	24/07/2025
V2	Liv Sinclair	Dr Jeff Cargill	Anna Bowley	Final	11/08/2025

This report should be cited as 'Eco Logical Australia 2025. Wind Farm in Scott River Ecological Gap Survey. Prepared for Synergy Renewable Energy Developments Pty Ltd.'

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Abbreviations

Abbreviation	Description
BAM	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
Bureau of Meteorology	BoM
CD	Conservation Dependent
DBH	Diameter at Breast Height
DPIRD	Department of Primary Industries and Regional Development
ELA	Eco Logical Australia
EN	Endangered
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESAs	Environmentally Sensitive Areas
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
kV	kilovolt
MW	Megawatts
NVIS	National Vegetation Information System
OS	Other specially protected species
P	Priority
PECs	Priority Ecological Communities
Phoenix	Phoenix Environmental Sciences
RiWi Act	*Rights in Water and Irrigation Act 1914*
SPRAT	Species Profile and Threats Database
SWIS	South West Interconnected System
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
TECs	Threatened Ecological Communities
VU	Vulnerable
WAR01	Warren subregion
WAH	Western Australian Herbarium
WAM	Western Australian Museum
WoNS	Weeds of National Significance

Executive Summary

Eco Logical Australia (ELA) was engaged by Synergy Renewable Energy Developments Pty Ltd (SynergyRED) to undertake a Reconnaissance flora and vegetation assessment, Basic fauna survey, Targeted Black Cockatoo habitat assessment and Targeted Western Ringtail Possum survey and habitat assessment for a Proposed Wind Farm in Scott River (the Project). The survey area for the Project is 1.7 ha and is located in the Scott River Region, approximately 15 km northeast of the town of Augusta, in the South West of Western Australia. The survey was undertaken to fill a gap in survey effort conducted by Phoenix Environmental Sciences (Phoenix 2025a; 2025b) for the Project.

A desktop review of the Phoenix flora report (2025a) and Phoenix fauna report (2025b) was undertaken to assess the potential presence of conservation-significant flora, fauna, and ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act) and the WA *Biodiversity Conservation Act 2016* (BC Act); and as Priority by the WA Department of Biodiversity, Conservation, and Attractions (DBCA). Prior to the field survey, 66 conservation-significant flora were identified from the desktop review of the reports (Phoenix 2025a; Phoenix 2025b), with all of these considered as having Potential to occur in the survey area. In addition, 25 conservation-significant fauna species were identified during the desktop assessment with all of these considered as having Potential to occur in the survey area. Furthermore, the pre-survey desktop assessment identified nine conservation-significant ecological communities, with one of these considered as having Potential to occur in the survey area.

The field survey was conducted by Glenn Harris-Maslen (Senior Ecologist) and Liv Sinclair (Environmental Consultant) on the 26th of June 2025. The survey was conducted in accordance with the Environmental Protection Authority (EPA) *Technical Guidance: Flora and Vegetation surveys for Environmental Impact Assessment* (EPA 2016). Vegetation types were described from three relevés and sought to expand upon mapping completed by Phoenix (2025a). Vegetation types were assigned based on the closest matching description of vegetation by Phoenix (2025a). The Basic fauna, black cockatoo and Western Ringtail Possum habitat assessment were conducted concurrently with the Reconnaissance flora and vegetation assessment. The Basic fauna survey was conducted in accordance with the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020), and the Targeted black cockatoo habitat assessment was conducted in accordance with the *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo, and the Forest Red-tailed Black cockatoo* (DAWE 2022), with consideration for the *Survey guidelines for Australia's threatened birds* (DEWHA 2010). The Targeted Western Ringtail Possum survey was conducted in accordance with the methodology outlined within the *Survey guidelines for Australia's threatened mammals* (DSEWPaC 2011).

In total, 24 species from 15 families and 23 genera were recorded within the survey area. No species listed as Threatened under the EPBC Act or BC act, or as Priority by DBCA were recorded during the survey. A total of five introduced (weed) species were recorded in the survey area. None of these species were listed as a Declared Pest – s22(2) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) or Weeds of National Significance (WoNS). Following the field survey, a total of nine flora species were listed as having Potential to occur, comprising two Threatened flora (*Darwinia ferricola;* listed as Vulnerable [VU] under the EPBC Act and Endangered [EN] under the BC Act, and *Conospermum quadripetalum*; listed as Critically Endangered [CR] under the BC Act) and seven species listed as Priority by DBCA.

Two vegetation types were described and mapped within the survey area. The most widespread of these was the CcTpCeOh vegetation type comprising 12% of the survey area. Meanwhile, the XpAs vegetation type covered 12% of the survey area, whilst the remainder of the survey area was cleared of vegetation.

None of the vegetation types mapped within the survey area are considered to represent any Threatened Ecological Communities (TECs) listed under the EPBC Act or BC Act or Priority Ecological Communities (PECs) listed by DBCA.

The condition of intact native vegetation ranged from Excellent to Degraded, based on the vegetation condition scale of Keighery (1994) provided in EPA (2016) for the South-west Botanical Province. The CcTpCeOh vegetation type was in Very Good to Excellent condition, whilst the XpAs vegetation type was in Degraded condition. Cleared areas accounted for 1.3 ha (76%) of the survey area.

In total, ten vertebrate fauna species (including one introduced species) were recorded within the survey area, comprising nine birds and one mammal. No direct (observations) or indirect (scats, tracks, diggings) evidence of Threatened fauna species listed under the EPBC Act or the BC Act, or Priority fauna species as listed by DBCA were recorded within the survey area. Following the field survey, three species were considered Likely to occur within the survey area, including three Threatened fauna, comprising Baudin's Cockatoo (*Zanda baudinii*; listed as EN under the EPBC Act and BC Act), Carnaby's Cockatoo, (*Zanda latirostris*, listed as EN under the EPBC Act and BC Act) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*; listed as VU under the EPBC Act and BC Act). A further seven fauna species were considered with the Potential to occur, comprising two Threatened fauna (Western Ringtail Possum [*Pseudocheirus occidentalis]*; listed as CR under the EPBC Act and BC Act, and Chuditch [*Dasyurus geoffroii*] listed as VU under the EPBC Act and BC Act) and five species listed as Priority by DBCA.

One introduced fauna species was recorded in the survey area, namely Laughing Kookaburra (*Dacelo novaeguineae*). This species is listed as Permitted (s11) under the State BAM Act (DPIRD 2025).

A total of two fauna habitats were recorded within the survey area, namely Marri-Jarrah-Peppermint woodland and Cleared – Degraded Sumpland. The most widespread of these was the Marri-Jarrah-Peppermint woodland fauna habitat, comprising 12% of the survey area (0.2 ha). Meanwhile, the Cleared – Degraded Sumpland fauna habitat covered 12% of the survey area (0.2 ha), whilst the remainder of the survey area was mapped as Cleared (1.3 ha).

No primary or secondary evidence (i.e. foraging evidence) of Black Cockatoos was recorded in the survey area. An assessment of the fauna habitat types against the DAWE (2022) scoring tool found the Marri-Jarrah Peppermint woodland to represent High quality foraging habitat for Baudin's Cockatoo and Forest Red-tailed Black Cockatoo and Moderate quality habitat for Carnaby's Cockatoo. The Cleared-Degraded Sumpland fauna habitat was considered High quality for Baudin's Cockatoo and Moderate quality for Carnaby's Cockatoo, given the presence of foraging species *Xanthorrhoea preissii*; this habitat provides no value to Forest Red-tailed Black Cockatoo and was assigned a score of 0. Based on Bamford methodology (2021), most of the survey area was mapped as High quality foraging habitat for all three Black Cockatoo species due to the presence of foraging species within the Marri-Jarrah-Peppermint woodland habitat type. The Cleared-Degraded Sumpland fauna habitat was considered to have Moderate foraging value for Baudin's Cockatoo and Carnaby's Cockatoo, given the high density of foraging species *Xanthorrhoea preissii*. However, no suitable foraging species for Forest Red-tailed Black Cockatoo were present within the Cleared-Degraded Sumpland fauna habitat.

The survey area contains ten potentially suitable breeding trees (>500 mm DBH). Five of these trees contained hollows, although all of these were considered unsuitable for breeding due to their insufficient size (< 10 cm) or orientation.

Given the presence of tall trees and the proximity to water sources nearby, the Marri-Jarrah Peppermint woodland fauna habitat was considered to represent potential night-roosting habitat in the survey area for Black Cockatoos.

No primary or secondary evidence (i.e dreys) of Western Ringtail Possums were made during the Targeted Western Ringtail Possum survey. A total of 0.2 ha (12% of the survey area) of Moderate quality habitat was recorded and comprised solely of the Marri-Jarrah Peppermint woodland fauna habitat type. The remainder of the survey area provides no habitat value to Western Ringtail Possum due to a lack of continuous canopy.

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1. Introduction

1.1. Project Background

Eco Logical Australia (ELA) was engaged by Synergy Renewable Energy Developments Pty Ltd (SynergyRED) to undertake a Reconnaissance flora and vegetation assessment, Basic fauna survey, Targeted Black Cockatoo habitat assessment and Targeted Western Ringtail Possum survey (the survey) for the Proposed Wind Farm in Scott River (the Project).

The Project proposes the development of an onshore wind farm in the Scott River region, approximately 15 km northeast of the town of Augusta, in the South West of Western Australia. The Project will involve the construction and operation of up to 20 wind turbines, generating up to 100 megawatts (MW), with associated infrastructure including monitoring and communication towers, operation and maintenance building, substation and transmission infrastructure and other supporting infrastructure. The substation will connect the Proposal to the South West Interconnected System (SWIS) via the existing 132 kilovolt (kV) Beenup to Manjimup transmission line. The Project is proposed to be developed within a 3,597 ha Development Envelope.

In support of connecting the Project to the SWIS, Western Power recently identified a need to run a new transmission line from an existing transmission pole to the existing Beenup substation which may require native vegetation clearing within this area (herein, referred to as the 'survey area'). Therefore, ecological surveys are required within this extent to support environmental and planning approvals. The survey area includes a 1.7 ha extent between the substation and existing transmission pole (Figure 1). This area was not included in previous ecological surveys conducted by Phoenix Environmental Sciences (Phoenix 2025a; 2025b). This survey serves to fill this gap in survey effort to ensure that the entire Development Envelope has been surveyed for flora and fauna values to an adequate extent, in accordance with relevant guidelines.

This technical report summarises the results of this survey and defines the flora, vegetation, Black Cockatoo and Western Ringtail Possum habitat, as well as the conservation significance of these values within the survey area. The habitat and vegetation assessments conducted have sought to align outcomes with those adjacent to the survey area by Phoenix (2025a; 2025b).

1.2. Scope of Works

The purpose of the survey was to provide an assessment of the environmental values of the survey area to support the environmental assessment, approvals and planning process. The scope of works specifically includes:

- Undertaking an initial desktop assessment to determine environmental values and conservation significant flora, fauna, habitat, vegetation or other environmental features (such as riparian areas or wetlands) relating to the survey area
- Undertaking a field survey of the survey area, including the following tasks:
    - A Reconnaissance flora and vegetation assessment
    - A Basic fauna survey
    - A Targeted Black Cockatoo habitat assessment
    - A Targeted Western Ringtail Possum survey and habitat assessment

- Preparing a technical report for the Project that describes the flora, vegetation, and fauna values within the survey area
- Providing all spatial mapping/data collected during the survey separately for the Project.



Figure 1: Survey area location

Survey area

Local distributor road

N

0 100 200 400

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 8/08/2025

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2. Environmental Setting

2.1. Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) currently classifies 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; DAWE 2012). These bioregions are further divided into 419 sub-regions representing more localised and homogenous geomorphological units in each bioregion. IBRA divides Western Australia into 26 biogeographic regions and 53 subregions based on dominant landscape characteristics of climate, lithology, geology, landform, and vegetation.

The survey area is located within the Warren bioregion and subregion of the same name (WAR01). The Warren bioregion is made up of 'Dissected undulating country of the Leeuwin Complex and Albany Orogen with loamy soils supporting Karri Forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting paperbark/sedge swamps, and Holocene marine dunes with *Agonis flexuosa* woodlands.'

2.2. Climate

The Warren bioregion is described as a moderate mediterranean climate. Climate data was taken from the Bureau of Meteorology (BoM) Cape Leeuwin weather station (station number 9518, rainfall and temperature data 1897 – 2025), located 21 km south of the survey area (BoM 2025). Based on this data, the survey area receives an annual average rainfall of 948.6 mm, with most of the rainfall occurring during the winter months of June, July, and August (BoM 2025; Figure 2). Mean maximum air temperatures range from 23.4°C in February to 16.5°C in July and August and mean minimum air temperatures range from 18.6°C in February to 11.3°C in July.

In the 12 months preceding the field survey (June 2024 to May 2025), Cape Leeuwin weather station received a total of 781.0 mm of rainfall, which is below the long-term average for the area (948.6 mm). A total of 110.6 mm was recorded in the three months prior to the field survey (February, March and April 2025), which is also below the long-term average for the same period (221.5 mm; Figure 2).

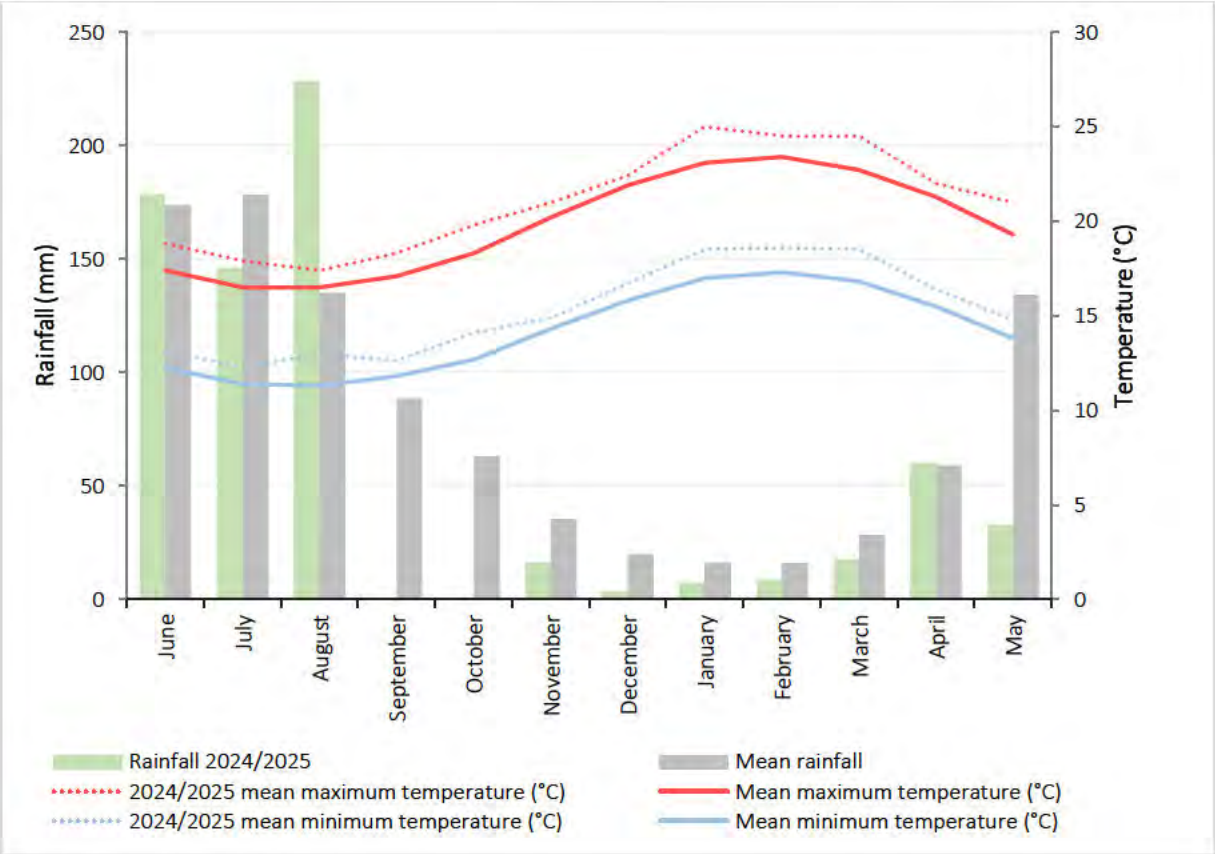

Figure 2: Climate data for the survey area

*Short term (2024-2025) and long term (1897-2025) average rainfall and temperature data from Cape Leeuwin Weather Station (station #9518). Rainfall and temperature data 2024/2025 are from June 2024 to May 2025.

2.3. Geology, Landform and Soils

Soil-landscape mapping prepared by the Department of Primary Industries and Regional Development (DPIRD) provides an inventory and condition survey of lands at a 1:250,000 scale (DPIRD 2022). The survey area is located entirely within the Scott River Plain System (Figure 3). The Scott River Plain System is described as a "poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and Jarrah-Marri-paperbark woodland."

According to the Surface Geology of Australia 1:1,000,000 scale, WA database (Stewart *et al.* 2008), the survey area intersects one geological formation, namely Estuarine, lagoonal and lacustrine deposits 74394 (Cze). This surface geology type is described as "Estuarine, lagoonal and lacustrine deposits. Numerous small lakes and swamps. Linear dunes common".



Figure 3: Land systems of the survey area

2.4. Regional Vegetation

Vegetation type and extent have been mapped at a regional scale by Beard (1979) who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:250,000, DPIRD has compiled a list of vegetation extent ant types across Western Australia (DPIRD 2019; Shepherd *et al.* 2002). Two system-vegetation associations occur within the survey area, namely Scott River 3 and Scott River 27 (DPIRD 2019; Table 1; Figure 4). These vegetation associations have approximately 78% and 74% of their total Pre-European extents remaining within the Warren bioregion, respectively.

Table 1: Beard's (1979) vegetation associations of the survey area

Vegetation association	Vegetation description	Pre-European extent in Warren Bioregion (ha)	Current extent in Warren Bioregion (ha)	% Remaining in Warren Bioregion
3	Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*	250,262.10	195,318.18	78.05
27	Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., *Banksia* spp., *Agonis flexuosa*, *Callitris* spp., *Allocasuarina spp.*, *Eucalyptus loxophleba*.	70,203.73	52,262.13	74.44

Source: DBCA Statewide Vegetation Statistics (DBCA 2019)

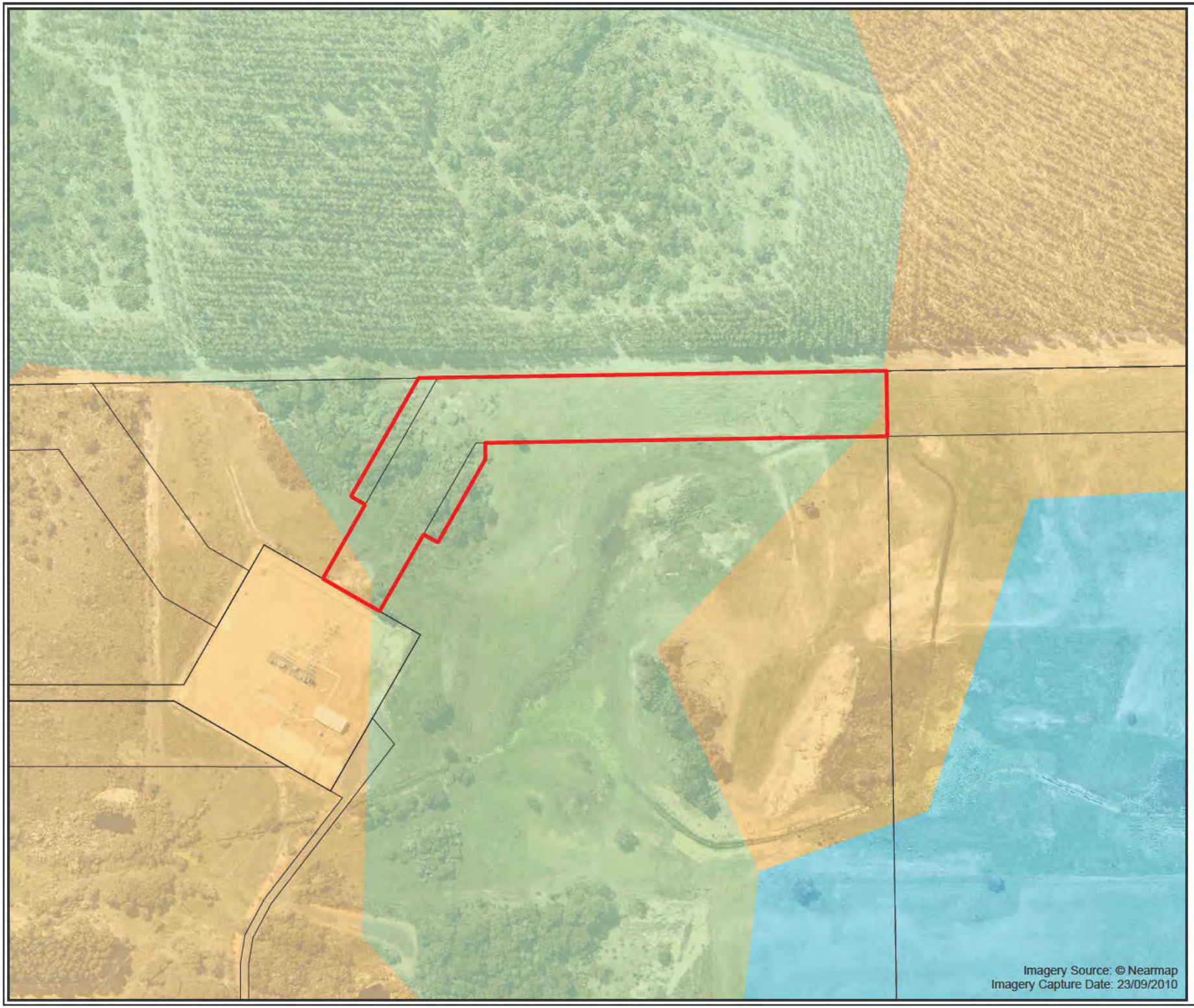

Figure 4: Beard vegetation associations of the survey area

0 25 50 100
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 18/07/2025

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2.5. Hydrology

The survey area is located within the Lower Blackwood subcatchment and Blackwood River catchment. The Blackwood River catchment spans 22,594 km^2, extending 300 km inland from the river mouth of the Blackwood River at the Hardy Inlet, located approximately 10 km south of the survey area (DWER 2018). Key surface water features in the region consist of historically modified catchments, where artificial drains have been constructed to facilitate agricultural and plantation activities (Stantec 2025).

The Scott River and Blackwood River are the main surface water drainages in the region. The Scott River acts as a tributary to the Blackwood River and the confluence of the rivers is located approximately 10.5 km southwest. A minor perennial watercourse that drains to the Blackwood River occurs approximately 200 m south of the survey area.

Wetlands have been mapped by the Department of Biodiversity, Conservation and Attractions (DBCA) across the south west to be used for the purposes of land-use, planning, and management (DBCA 2017). This dataset, namely the Geomorphic Wetlands, Augusta to Walpole, does not have assigned management categories; however, it does categorise wetlands into types based on physical characteristics. The survey area intersects one wetland mapped under the Geomorphic Wetlands, Augusta to Walpole dataset (DBCA 2017). This wetland is classified as Palusplain (seasonally waterlogged flat).

The survey area occurs within the Blackwood Groundwater Area, which is proclaimed under the *Rights in Water and Irrigation Act 1914* (RiWi Act) and does not occur in close proximity to any drinking water source protection areas (DWER 2024; DWER 2025).

2.6. Areas of Conservation Significance

Environmentally Sensitive Areas (ESAs) are defined in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* under s51b of the *Environmental Protection Act 1986* (EP Act). ESAs include areas declared as World Heritage areas, areas included on the Register of the National Estate, defined wetlands, Bush Forever sites, vegetation containing rare (Threatened) flora and/or Threatened Ecological Communities (TECs).

The survey area overlaps one ESA (Figure 6). This is likely to be associated with buffers of TECs and geomorphic wetlands. Therefore, the extent of the actual ESA may not actually intersect the survey area. The DBCA Threatened and Priority Communities database search conducted by Phoenix (2025a) identified a series of occurrences of Scott River Ironstone Association TEC that were buffered by 500 – 2000 m.

The survey area does not intersect any conservation reserves. However, several conservation reserves, national parks and state forest (Figure 6) occur in proximity to the survey area, including:

- Scott National Park (4.4 km)
- Chapman Brook National Park (11.2 km)
- South Blackwood State Forest (4.0 km)
- Pagett Nature Reserve (4.4 km)
- Chester Nature Reserve (7.3 km)
- Unnamed Nature Reserve (WA42377) (5.0 km).

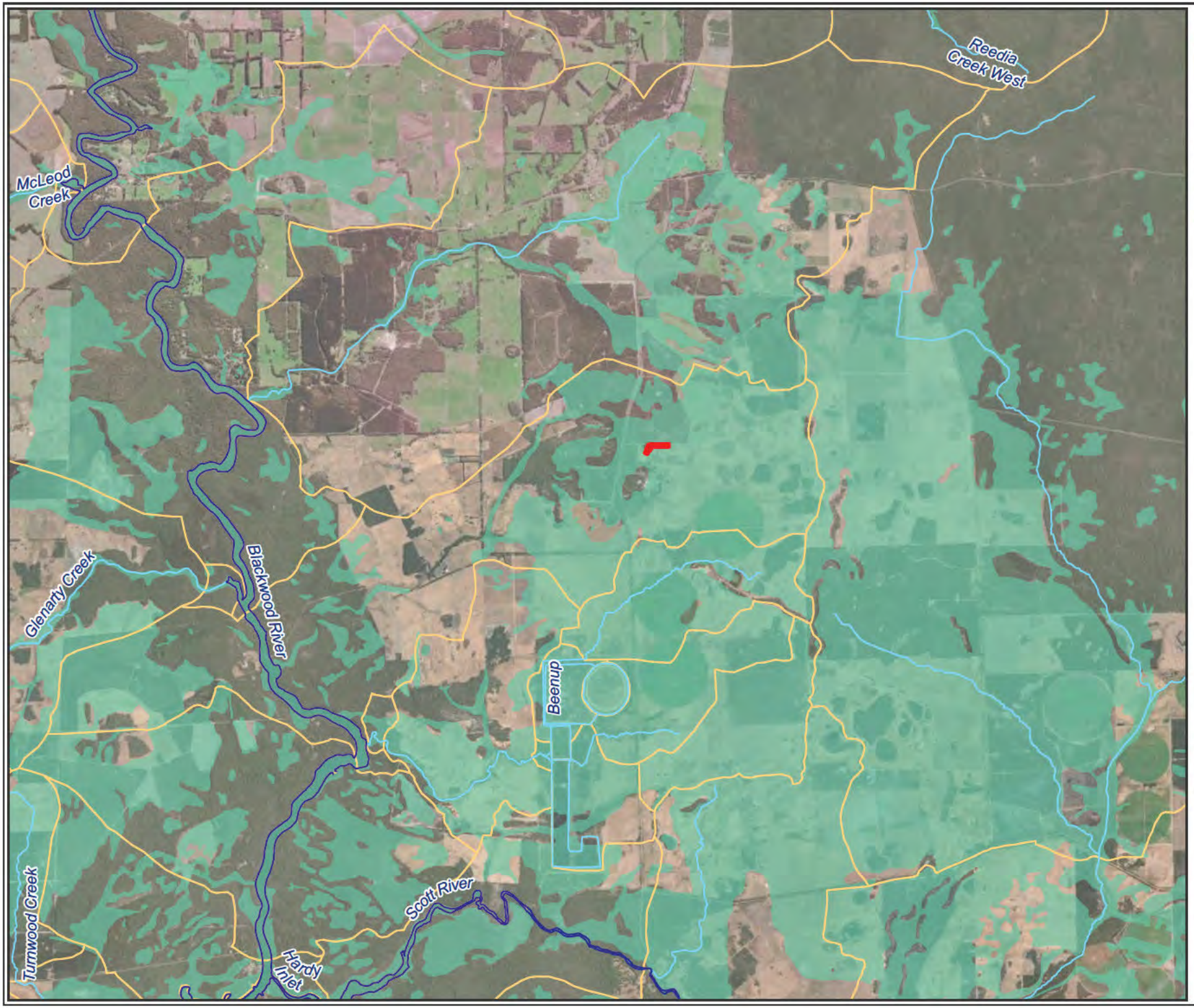

Figure 5: Hydrology of the survey area

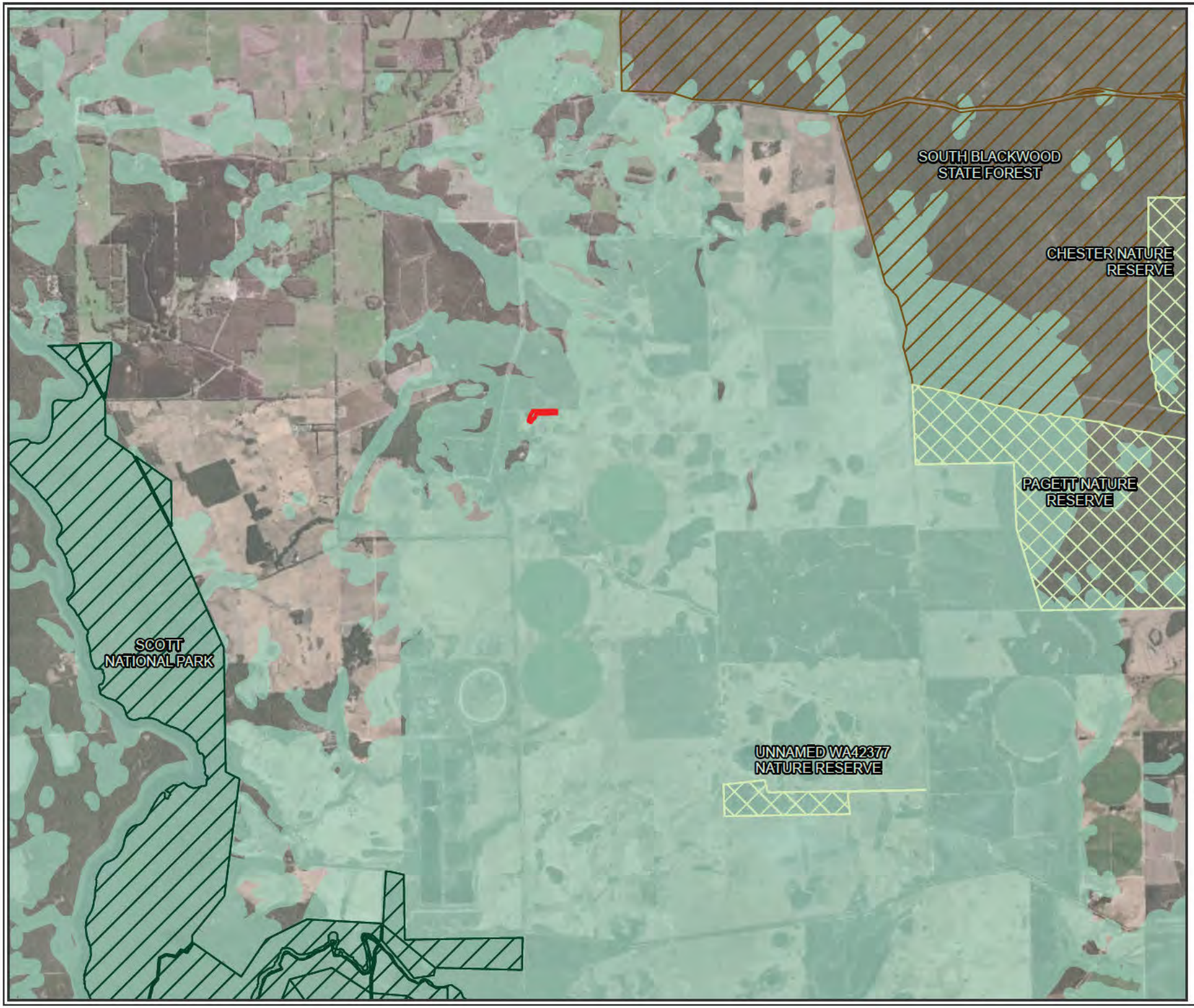

Figure 6: Areas of conservation significance within and in proximity to the survey area

3. Methodology

3.1. Desktop Review

An initial desktop assessment was undertaken by ELA personnel prior to the field survey to determine environmental values and conservation significant flora, fauna, habitat, vegetation, and other environmental features (such as Black Cockatoo and Western Ringtail Possum habitat) relating to the survey area.

The Phoenix flora report (2025a) and Phoenix fauna report (2025b), as well as aerial imagery were reviewed to obtain information relating to conservation significant flora, fauna and ecological communities to inform the field survey. Phoenix (2025a; 2025b) undertook searches of several biological databases and literature to identify and prepare lists of significant flora and vegetation that may occur within the area. Databases interrogated included the Protected Matters Search Tool (DCCEEW 2023), DBCA Threatened and Priority Flora Database (DBCA 2023a), DBCA Threatened and Priority Fauna Database (DBCA 2023b), DBCA Threatened and Ecological Communities Database (DBCA 2023c). Applied search buffers were considered suitable based on flora and fauna assemblages expected to occur within the survey area.

3.1.1. Likelihood of Occurrence Assessment

An assessment of the likelihood of potential conservation significance species (including Threatened and Priority flora and fauna species) and communities being present within the survey area (where relevant) was undertaken. The assessment is based on specific likelihood of occurrence criteria. The criteria include factors such as location of previous records in relation to the survey area, vegetation community, structure and condition, landforms, soils, signs of species presence and the extent and connectivity of bushland for fauna and habitat that appears to be present based on the desktop review and aerial imagery.

Conservation codes, categories, and criteria for flora and fauna protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the State *Biodiversity Conservation Act 2016* (BC Act) are provided in Appendix A (DBCA 2023d, DBCA 2023e). Criteria used for this assessment are presented in Appendix B.

3.2. Field Survey

3.2.1. Survey Team and Timing

The field survey was conducted by Glenn Harris-Maslen (Senior Ecologist) and Liv Sinclair (Environmental Consultant) on the 26th of June 2025. Lead field staff had valid scientific licenses to conduct flora and vegetation surveys and to take Threatened and Priority flora in Western Australia at the time of the survey (Table 2). The survey timing was out of season for undertaking Detailed and Targeted flora and vegetation surveys in the Southern climatic region, therefore only a Reconnaissance survey was conducted. No licenses were required for the Basic fauna survey, Targeted Black Cockatoo habitat survey or Targeted Western Ringtail Possum survey. Survey timing was consistent with the DCCEEW recommendations for undertaking surveys for Black Cockatoos on the Swan Coastal Plain (i.e., foraging habitat and night roosts – any time of the year; DAWE 2022).

Table 2: Survey team

Staff	Role	Flora license/s
Glenn Harris-Maslen	Senior Ecologist, Field lead, Field survey	Flora taking license: FB62000376-2 Threatened Flora License: 2324-0100
Liv Sinclair	Environmental Consultant, Field survey	N/A

3.2.2. Reconnaissance Survey

The Reconnaissance flora and vegetation survey was conducted in accordance with the Environmental Protection Authority (EPA) *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). A total of three relevés were established within the survey area to describe and map vegetation types, including a vegetation condition assessment. The location of the relevés is shown in Figure 7.

At each relevé, the following information was recorded:

- A colour photograph of representative vegetation
- Location of vegetation type
- Description of vegetation associations in accordance with Level V of the National Vegetation Information System (NVIS) and Aplin's (1979) modification of vegetation classification adapted from Specht (1970). For each stratum, this included:
  - Dominant growth form
  - Height
  - Cover
  - Three dominant genera
- Description of vegetation condition classification according to Keighery (1994; EPA 2016)
- Average % cover of leaf litter and bare ground
- Disturbance details including:
  - Fire history (time since last fire)
  - Physical disturbance including evidence of erosion
  - Evidence of grazing
  - Weed invasion.

Mapping of vegetation sought to expand upon mapping completed by Phoenix (2025a) within the survey area by comparing flora species assemblages recorded within the survey area and characterising vegetation types based on existing mapped vegetation communities. Vegetation types were assigned based on the closest matching description of vegetation by Phoenix (2025a).

Flora specimen identification following the field survey was undertaken by taxonomic specialists at the Western Australian Herbarium (WAH). Suitable material that meets WAH specimen lodgement requirements, such as flowering material and range extensions, was submitted along with Threatened and Priority Report forms to DBCA, as required by conditions of collection licences issued under the BC Act.

Nomenclature used for the flora species within this report follows the WA Plant Census as available on FloraBase (WAH 1998-).

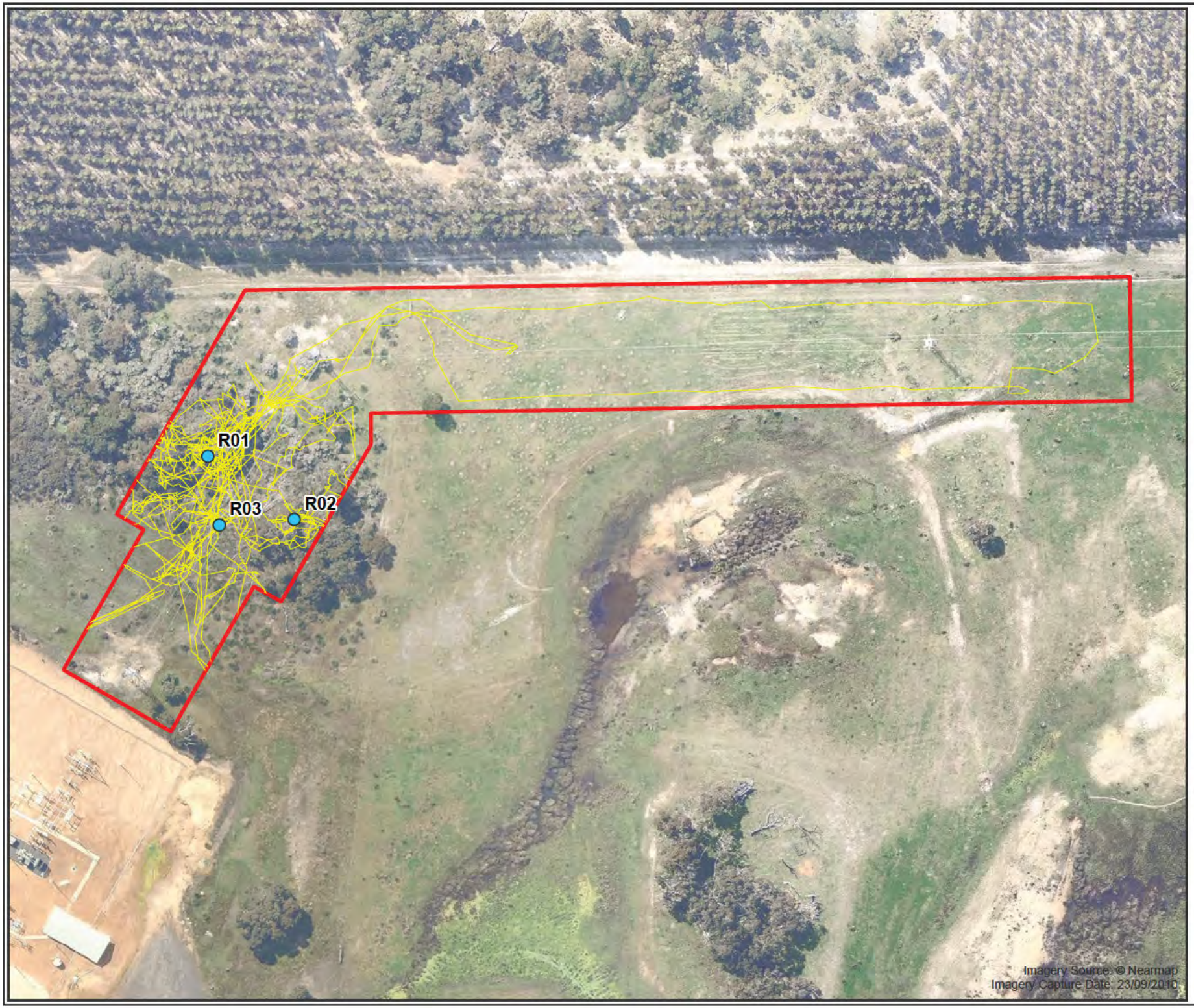

Figure 7: Survey effort

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 8/08/2025

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3.2.3. Basic Fauna Survey

The Basic fauna survey was conducted in accordance with the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020). The survey involved personnel walking traverses through the survey area, describing and mapping fauna habitats and recording opportunistic sightings of fauna. Fauna habitats were assessed for their ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation significant fauna species.

Opportunistic recordings of fauna species were made at all times during the field survey. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats, and any other signs of fauna activity. Nomenclature used for the vertebrate fauna species within this report follows the Western Australian Museum (WAM) Checklist of the Vertebrates of Western Australia (WAM 2024).

3.2.4. Targeted Black Cockatoo Habitat Assessment

A Targeted black cockatoo habitat assessment was conducted in accordance with the *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo, and the Forest Red-tailed Black cockatoo* (DAWE 2022). Consideration was also given to the *Survey guidelines for Australia's threatened birds* (DEWHA 2010) when designing the survey methodology.

Three species of black cockatoo occur in the south-west of Western Australia:

- Baudin's Cockatoo (*Zanda baudinii*; listed as Endangered [EN] under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris*; listed as Endangered [EN] under the EPBC Act and BC Act)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*; listed as Vulnerable [VU] under the EPBC Act and BC Act).

Broad scale maps are available for the modelled distribution of all three species of black cockatoo (DAWE 2022). The survey area occurs within the Likely to occur range of the Forest Red-tailed Black Cockatoo and Carnaby's Cockatoo, as well as the predicted breeding range of Baudin's Cockatoo. The survey therefore focused on assessing the habitat values for all three species. Any individuals of Carnaby's Cockatoo, Baudin's Cockatoo, and/or Forest Red-tailed Black Cockatoo observed in the survey area were recorded, including the number of individuals.

The Targeted survey involved personnel walking transects across the survey area and mapping black cockatoo habitat. Black cockatoo habitat is conventionally separated into foraging, potential breeding, and potential night roosting categories, as defined in Appendix C. Foraging, potential breeding and potential roosting habitat was assessed within the survey area. The field methodology for each of these is defined below.

3.2.4.1. Foraging Habitat

Foraging habitat is defined for each species of black cockatoo in Appendix C. The foraging value (i.e. quality) of vegetation to black cockatoos depends upon several factors including the foraging plant species present, the extent and density (including projected foliage cover) of those foraging species, and the overall structure and condition of foraging species present. In addition, connectivity, proximity to known breeding and roosting sites, and the presence of weeds and/or tree deaths (i.e. disease or drought) is also to be considered.

In accordance with Phoenix (2025b), the assessment of foraging habitat quality for each black cockatoo species was undertaken based on two scoring methods; The DAWE (2022) foraging quality scoring tool

and Bamford (2021) scoring tool. The DAWE (2022) scoring tool starts at a score of 10 and subtracts points for the following attributes: foraging potential, connectivity, proximity to breeding and/or roosting, and impact from plant disease. Meanwhile, the Bamford (2021) method provides a more detailed and accurate analysis of foraging quality by calculating quality based on the following functional aspects:

- Site condition
- Site context
- Species stocking rate.

Fauna habitat described and mapped within the survey area was assigned a foraging quality (i.e. None, Low, Moderate, or High) in accordance with the Bamford (2021) method criteria outlined in Appendix D. The DAWE (2022) foraging quality scoring template is provided in Appendix E.

Evidence of black cockatoo foraging (i.e. branch clippings and/or chewed fruit) was also searched for to identify if the vegetation within the survey area has previously been or is currently being used by black cockatoos for feeding.

3.2.4.2. Potential Breeding Habitat

Potential breeding habitat is defined in Appendix C. Potential breeding trees 'diameter at breast height' (DBH) were recorded in the following ranges:

- Small; approximately 500-600 mm
- Medium; between 600 and 1000 mm
- Large; over 1000 mm.

All potential breeding trees encountered within the black cockatoo survey area were recorded with a Global Positioning System (GPS). Each potential breeding tree was also visually assessed from the ground for the presence of suitable nest hollows (defined in Appendix C) and allocated a breeding and/or hollow rank (Table 3).

Table 3: Potential breeding tree and/or hollow ranking

Rank	Description of potential breeding tree and/or hollows
1	Active nest observed (adult bird seen entering or emerging from hollow, their eggs, fledglings or other evidence of recent breeding activity present); known active nest (as described by Birdlife 2022).
2	Hollow of suitable size and angle (i.e., near-vertical) observed with chew marks around entrance.
3	Potentially suitable hollow observed but no chew marks present.
4	Tree lacking suitable hollows or broken branches that might have large hollows, a tree with mainly intact branches and a spreading crown.

[1]ELA takes a precautionary approach and identifies potentially suitable hollows as those with an entrance diameter over 10 cm that could potentially accommodate Forest Red-tailed Black Cockatoo, which requires a diameter opening range of 12 – 41 cm.

3.2.4.3. Potential roosting habitat

Potential night roosting habitat is defined in Appendix C. Potential night roosting habitat was described by mapping tall trees in proximity to water (i.e., within 12 km). A 5 m buffer was applied around each of these trees to depict projected foliage cover to estimate potential roosting habitat as hectares.

3.2.5. Targeted Western Ringtail Possum Survey and Assessment

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is listed as Critically Endangered (CR) under the EPBC Act and BC Act. Broad scale mapping of the modelled distribution of Western Ringtail Possum is available on the Commonwealth Species Profile and Threats Database (SPRAT) and in the Recovery Plan for the species (DCCEEW 2025; DPaW 2017). The Recovery Plan for the Western Ringtail Possum lists three key management zones known to support large numbers of Western Ringtail Possums, with these zones considered the most important extant populations at present. The survey area is located directly adjacent to the Swan Coastal Plain management zone. Therefore, given the close proximity and in accordance with the Recovery Plan, it is assumed that the characteristics of this management zone are applicable to the survey area. The Swan Coastal Plain zone consists of peppermint woodlands and peppermint/tuart forests on the southern extremity of the Swan Coastal Plain, extending from north of Bunbury to Augusta, but principally around Busselton.

Given Phoenix (2025b) identified a substantial amount of Western Ringtail Possum habitat in proximity to the survey area, it assumed to be Likely to contain Western Ringtail Possums prior to the assessment. A Targeted Western Ringtail Possum survey was conducted across one night on 26 June 2024. Nocturnal searching (spotlighting) was conducted throughout the survey area to identify Western Ringtail Possum individuals. The Targeted survey was conducted in accordance with the methodology outlined within the *Survey guidelines for Australia's threatened mammals* (DSEWPaC 2011).

In accordance with Phoenix (2025b), the Western Ringtail Possum habitat assessment was undertaken in using the DCCEEW scoring tool (2024), which is provided in Appendix F. The scoring tool considers the following three elements:

- Habitat quality: all elements indicative of suitable habitat for the species, i.e. evidence of occupation, nests/dreys and hollows, canopy cover, ground cover for shelter, fire history, and evidence of predators
- Site context: connectivity of habitat in the study area and surrounding landscape, management tenure of site
- Species stocking rate: records of species on site.

The scores were categorised into High (8 or above), Moderate (5 – 7.5) and Low (0.5 – 4.5) quality ratings to indicate where the higher value habitat was present in the survey area.

3.2.6. Limitations

The EPA Technical Guidance documents (EPA 2016, 2020) recommend including a discussion of the constraints and limitations of the survey methods used. An assessment of potential limitations of this survey are summarised in Table 5 below. One potential survey constraint was identified.

Table 4: Survey limitations

Constraint	Limitations
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a constraint**. Broad-scale vegetation mapping (Beard 1979) at a scale of 1:1,000,000 was available. Land system mapping at a scale of 1:2,000,000 and soil and landform mapping was also available. Available information was sufficient to provide context at varying scales and therefore were not considered a limitation.
Scope (i.e. what life forms, etc., were sampled).	**Not a constraint**. As per the requirements of the scope, a Reconnaissance flora and vegetation survey Targeted Black Cockatoo habitat assessment, Targeted Western Ringtail Possum habitat assessment and a Basic fauna survey were conducted in accordance with

Constraint	Limitations
	relevant State and Federal legislation and EPA guidance documents and was adequately met.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a constraint**. Proportion of flora species collected was adequate to meet the requirements of the level of survey undertaken (Reconnaissance level). Foot traverses were undertaken across the survey area to compile a species list in order to meet the objectives of the survey.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a constraint**. The survey area was fully covered to meet requirements outlined in the scope of works. Relevé locations were selected using high resolution aerial photography, and ground-truthed in the field, to ensure all apparent vegetation types identified were sampled. Site selection was considered adequate to accurately analyse and discriminate sites based on species composition and subsequently delineate vegetation type boundaries.
Mapping reliability.	**Not a constraint**. Delineation and mapping of vegetation types was adequate based on requirements of a Reconnaissance level survey.
Timing, weather, season, cycle.	**Potential constraint**. The survey area is located within the Southwest botanical province of Western Australia. Recommended survey timing for this region is during spring (September – November). The flora and vegetation survey was undertaken out of season (June). Detectability of species for the requirement of a Reconnaissance flora and vegetation survey and a Basic fauna survey was not considered to be a constraint; a post survey flora and fauna likelihood assessment was undertaken in view of survey timing. Rainy conditions encountered during the targeted Western Ringtail Possum survey may have impacted the ability to detect Western Ringtail Possum individuals, representing a potential constraint.
Disturbances (fire, flood, accidental human intervention, etc.).	**Not a constraint**. Disturbances recorded within the survey area included the presence of weeds, clearing and grazing.
Intensity (in retrospect, was the intensity adequate).	**Not a constraint**. The survey effort was adequately met. The number of relevés established was sufficient to determine the vegetation types present and to identify any vegetation of conservation significance.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a constraint**. The number of personnel conducting this field survey in the given time was adequate to undertake the required level of survey. Additional resources, including equipment available, additional support and personnel were adequate.
Access problems (i.e. ability to access survey area).	**Not a constraint**. All relevant areas within the survey area were able to be accessed and surveyed.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a constraint**. The personnel conducting this field survey were both suitably qualified to undertake the ecological surveys.

4. Results

4.1. Desktop Assessment

4.1.1. Conservation Significant Flora Species

Conservation significant flora species previously recorded within and in proximity to the survey area by Phoenix (2025a) are presented in Figure 8. The pre-survey flora likelihood of occurrence assessment is provided in Appendix G. No previous records of conservation significant flora were identified within the survey area. Prior to the field survey, all 66 conservation significant flora species identified from the desktop review of the Phoenix (2025a) report were considered as having Potential to occur, due to the proximity of the nearby records and possible presence of suitable supporting habitat.

4.1.2. Conservation Significant Fauna Species

Conservation significant fauna species previously recorded within and in proximity to the survey area by Phoenix (2025b) are presented in Figure 9. The pre-survey fauna likelihood of occurrence is provided in Appendix H. Prior to the field survey, all 25 conservation significant fauna species identified from the desktop review of the Phoenix (2025b) report were considered as having Potential to occur, due to the proximity of the nearby records and possible presence of suitable supporting habitat.

4.1.3. Conservation Significant Ecological Communities

Conservation significant ecological communities previously recorded within and in proximity to the survey area by Phoenix (2025a) are presented in Figure 10. The pre-survey ecological communities' likelihood of occurrence assessment is provided in Appendix I. Prior to the field survey one of the eight conservation significant ecological communities' identified from the desktop assessment were considered as having Potential to occur in the survey area, namely the Scott River Ironstone Association (listed as EN under the EPBC Act and BC Act).

The seven remaining conservation significant ecological communities identified from the pre-survey desktop assessment were considered Unlikely to occur in the survey area.

4.1.4. Black Cockatoo Habitat

A total of 96 records of Black Cockatoos were identified during the Phoenix (2025b) survey comprising 36 records of Carnaby's Cockatoo, 7 records of Baudin's Cockatoo and 53 records of Forest Red-tailed Black Cockatoo.

According to Phoenix (2025b), no known breeding sites are located within 14 km of the survey area. In total 756 potential breeding trees were identified during the survey. Potential breeding trees were defined by Phoenix (2025b) as any tree with a DBH >500 mm that do not currently contain a suitable breeding hollow. In addition, four suitable breeding trees were identified (Phoenix 2025b; Figure 12; Figure 13). Suitable breeding trees were defined as having a suitable DBH >500 mm and a suitable hollow, but with no evidence of usage (Phoenix 2025b).

No evidence of roosting by Black Cockatoos was recorded by Phoenix (2025b). However, known roosting sites are present within 15 km, and tree species that are known to provide roosting habitat (*Eucalyptus* spp., *Corymbia calophylla* and *Pinus* sp.) were present within the study area (Phoenix 2025b).

Phoenix (2025b) assessed the foraging values for Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo (collectively referred to as Black Cockatoos) using the Bamford (2021) method. The extent of each foraging habitat quality within the Phoenix (2025b) study area is presented in Table 5 and presented in Figure 11, Figure 12 and Figure 13.

Table 5: Quality and Extent of Black Cockatoo foraging habitat in proximity to the survey area (Phoenix 2025b)

Habitat quality score	Extent identified by Phoenix (2025b) (ha)		
	Carnaby's	Baudin's	Forest Red-tailed
None (0)	1.7	3,191.6	3,443.6
Low (1-4)	3190.0	261.8	15.9
Moderate (5-7)	620.6	392.1	261.6
High (8-10)	79.3	46.1	170.5
Total	3,891.6	3,891.6	3,891.6

4.1.5. Western Ringtail Possum Habitat

Nine records of Western Ringtail Possum were identified during the Phoenix (2025b) survey. The closest records are located approximately 1.8 km northwest of the survey area within Marri-Jarrah-Peppermint woodlands. The habitat quality for Western Ringtail Possum habitat was assessed based on habitat suitability, site context and species stocking rate and aligned with the methodologies used in this survey (Phoenix 2025b). A total of 201 ha of Moderate to High value Western Ringtail Possum habitat was identified within the Phoenix (2025b) study area (Figure 14). Higher value habitat in the area was generally associated with Marri-Jarrah Peppermint woodlands with high canopy continuity (Phoenix 2025b).



Figure 8: Conservation significant flora recorded in the vicinity of the survey area (Phoenix 2025a)

Survey area
Phoenix (2025a) Study Area

Conservation significant flora

- *Adenanthos detmoldii* — P4
- *Adenanthos x pamela* — P4
- *Aotus carinata* — P4
- *Banksia meisneri subsp. ascendens* — P4
- *Banksia nivea subsp. uliginosa* — EN (EPBC and BC Acts)
- *Boronia anceps* — P3
- *Calothamnus lateralis var. crassus* — P3
- *Chorizema carinatum* — P3
- *Conospermum quadripetalum* — CR (BC Act)
- *Dampiera heteroptera* — P3
- *Darwinia ferricola* — EN (EPBC and BC Acts)
- *Drosera fimbriata* — P4
- *Gastrolobium formosum* — P3
- *Grevillea brachystylis subsp. australis* — VU/EN (EPBC and BC Acts)
- *Grevillea manglesioides subsp. ferricola* — P3
- *Grevillea papillosa* — P3
- *Isopogon formosus subsp. dasylepis* — P3
- *Lambertia orbifolia subsp. vespera* — EN (EPBC andBC Acts)
- *Leucopogon alternifolius* — P3
- *Leucopogon wheelerae* — P3
- *Loxocarya magna* — P3
- *Melaleuca basicephala* — P4
- *Netrostylis sp. Blackwood River (A.R. Annels 3043)* — P3
- *Stylidium leeuwinense* — P4
- *Synaphea nexosa* — P1
- *Verticordia plumosa var. vassensis* — EN (EPBC and BC Acts)

0 0.5 1 2
Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 24/07/2025

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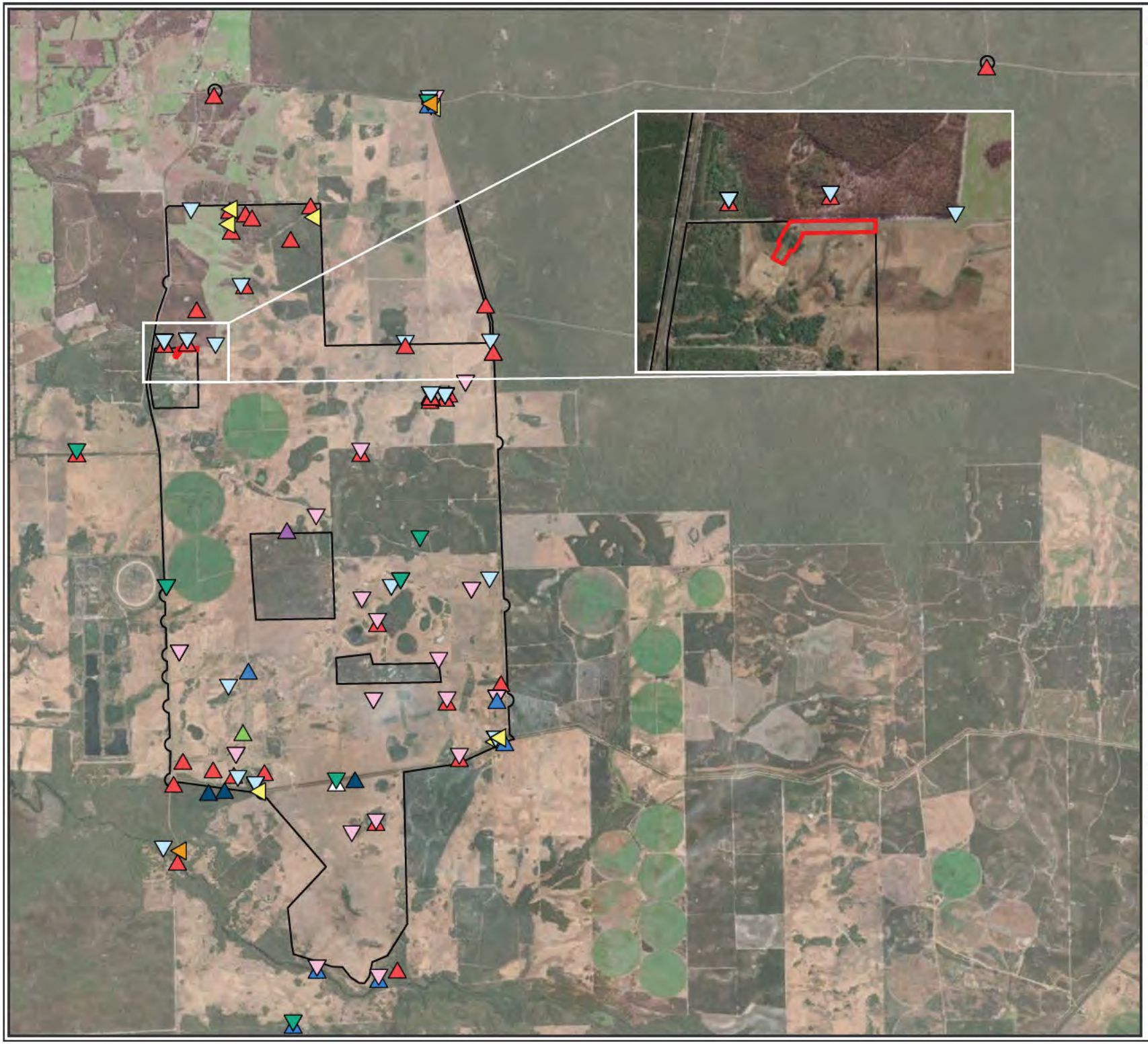

Figure 9: Conservation significant fauna recorded in the vicinity of the survey area (Phoenix 2025b)

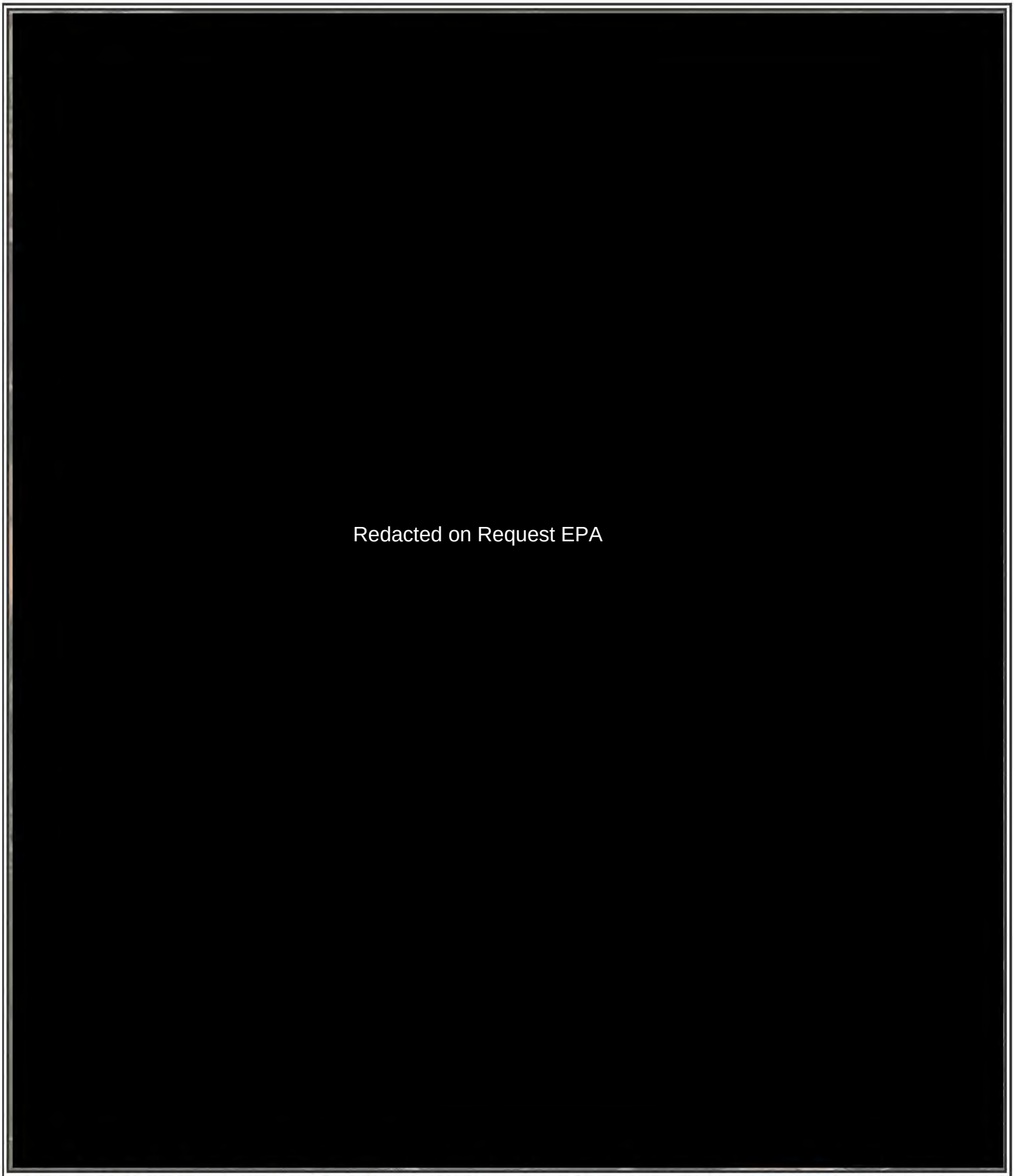

Figure 10: Conservation significant ecological communities previously recorded in the vicinity of the survey area (Phoenix 2025a)

Survey area

Phoenix (2025a) Study Area

Conservation significant ecological communities (Phoenix 2025a)

Scott River Ironstone Association — EN (EPBC & BC Acts)

0 0.5 1 2

Kilometres

Datum/Projection:
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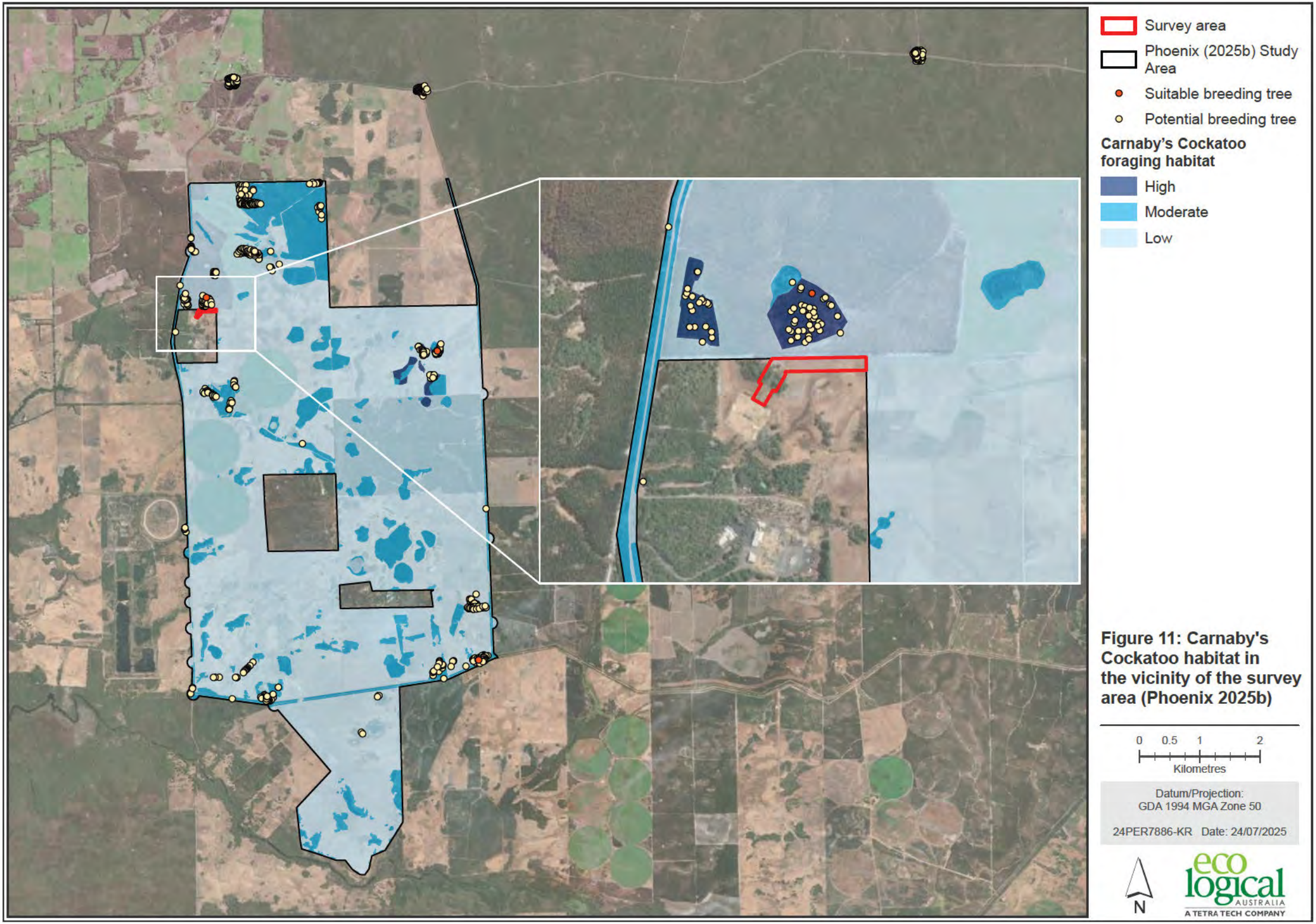

Figure 11: Carnaby's Cockatoo habitat in the vicinity of the survey area (Phoenix 2025b)

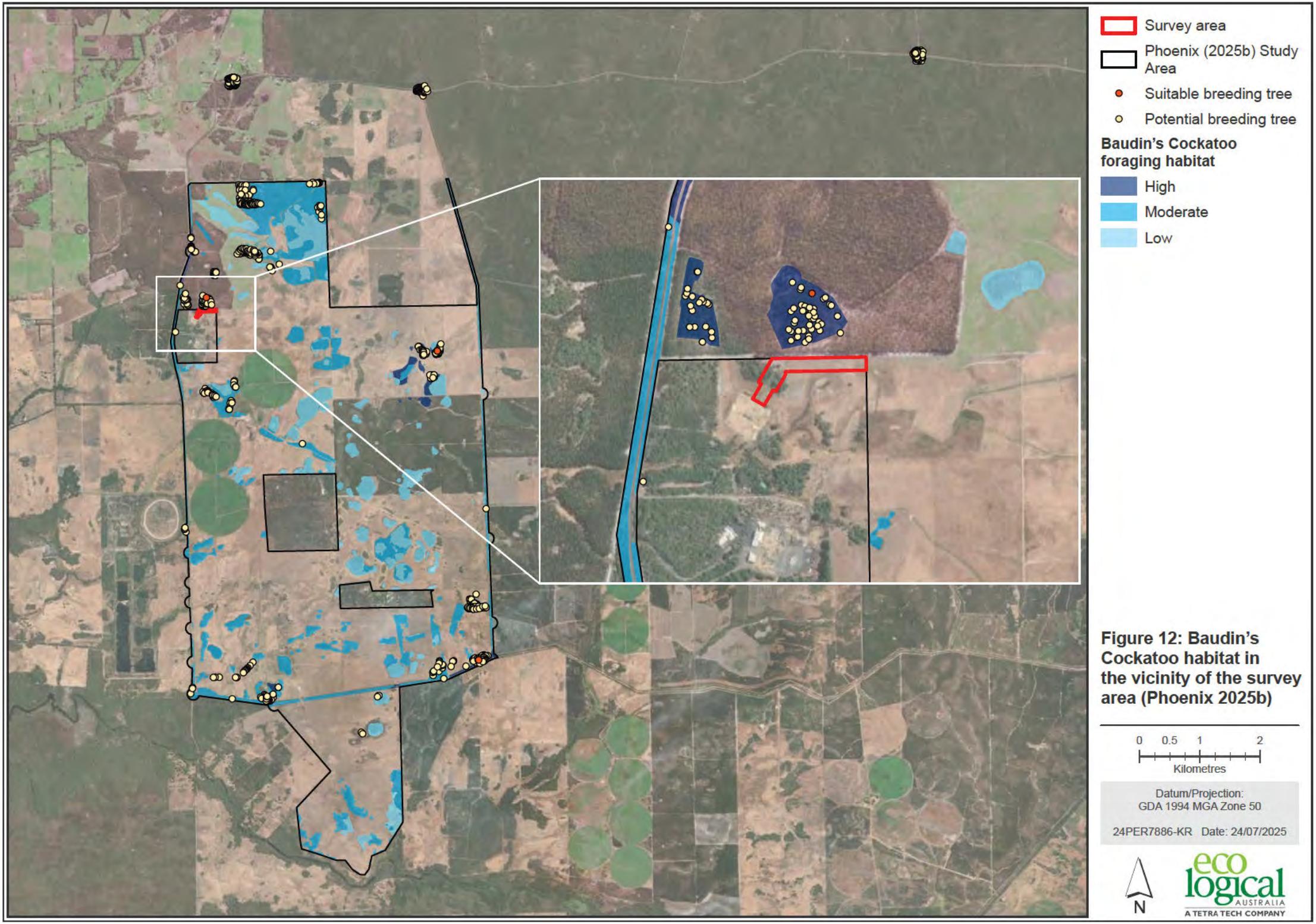

Figure 12: Baudin's Cockatoo habitat in the vicinity of the survey area (Phoenix 2025b)

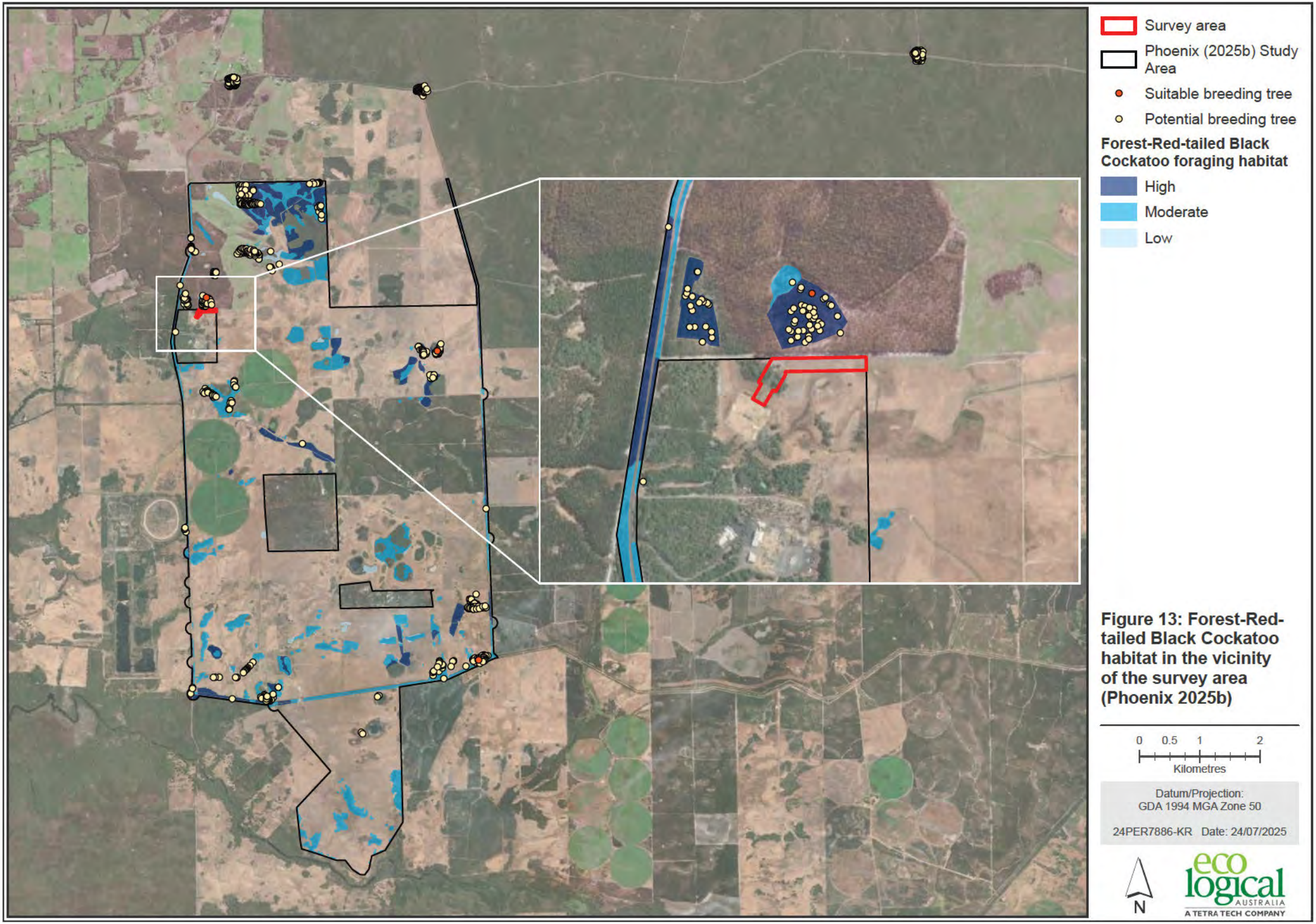

Figure 13: Forest-Red-tailed Black Cockatoo habitat in the vicinity of the survey area (Phoenix 2025b)

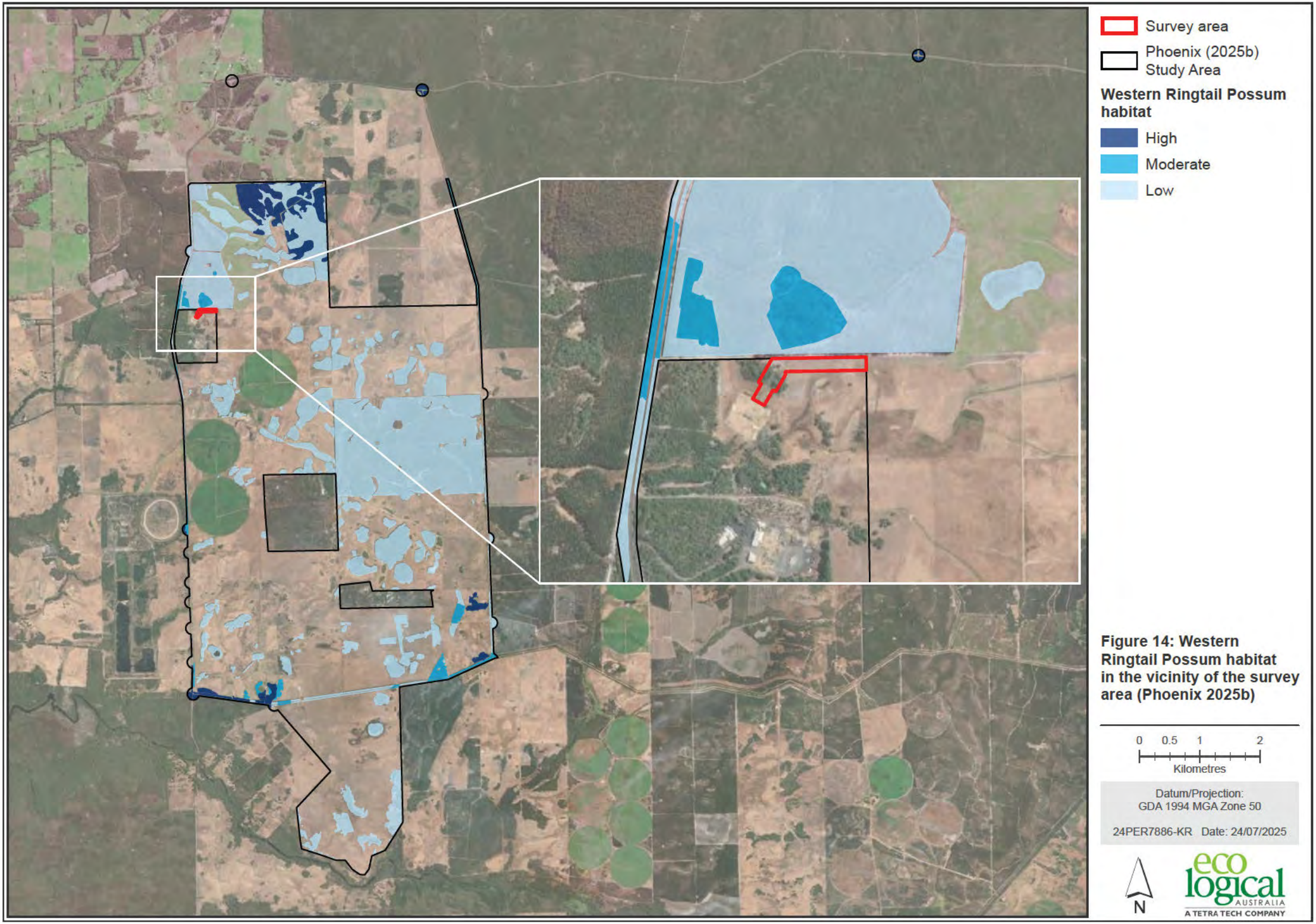

Figure 14: Western Ringtail Possum habitat in the vicinity of the survey area (Phoenix 2025b)

4.2. Flora and Vegetation Survey

4.2.1. Flora Overview

A total of 24 species (19 native and five introduced) from 15 families and 23 genera were recorded across the three relevés. Average species richness per relevé was 14 species, ranging from 13 species at REL01 and REL02 to 15 species at REL03. The families with the greatest number of species were Asteraceae and Myrtaceae (four species each). *Xanthorrhoea* was the best represented genus throughout the survey with two taxa recorded. A full flora list is provided in Appendix J and ELA relevé data is provided in Appendix K.

4.2.2. Conservation Significant Flora

No Threatened flora species listed under the EPBC Act or the BC Act, or Priority species listed by DBCA were recorded within the survey area. Of the 66 conservation listed flora species identified from the desktop assessment as possibly occurring, a post-survey likelihood of occurrence assessment determined that nine flora species have the Potential to occur within the survey area, namely:

- *Darwinia ferricola* (listed as VU under the EPBC Act and EN under the BC Act)
- *Conospermum quadripetalum* (listed as CR under the BC Act)
- *Stylidium* sp. Scott River Plain (N.G. Marchant 74/23) (listed as Priority 1 [P1] by DBCA)
- *Philydrella pygmaea subsp. minima* (listed as P1 by DBCA)
- *Hemigenia* sp. Nillup (R.D. Royce 98) (listed as P2 by DBCA)
- *Leucopogon incisus* (listed as P2 by DBCA)
- *Acacia lateriticola* glabrous variant (B.R. Maslin 6765) (listed as P3 by DBCA)
- *Synaphea petiolaris* subsp. *simplex* (listed as P3 by DBCA)
- *Chorizema carinatum* (listed as P3 by DBCA).

This assessment is based on the presence of suitable habitat for these species within the survey area and the proximity of nearby records. Some species may also be cryptic and therefore not detectable during the out of season field survey. The remaining 57 species were considered Unlikely to occur within the survey area based on either the lack of suitable habitat, the distance of previous records and the conspicuity of the species. The flora likelihood of occurrence assessment is presented in Appendix G.

4.2.3. Introduced Flora

A total of five introduced (weed) species were recorded in the survey area, namely **Arctotheca calendula* (Capeweed), **Hypochaeris glabra* (Flatweed), **Ursinia anthemoides* (South African marigold), **Romulea rosea* (Onion grass) and **Briza maxima* (Quaking grass). None of these species are listed as a Declared Pest – s22(2) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) or Weeds of National Significance (WoNS). All of these species are listed as Permitted (s11) species, indicating that no specific management of these species is required.

4.2.4. Vegetation Types

A total of two vegetation types were described and mapped in the survey area, namely CcTpCeOh (0.2 ha; 13% of the survey area) and XpAs (0.2 ha; 10% of the survey area). These vegetation types were

aligned with those originally mapped by Phoenix (2025a). Descriptions of and the extent of these vegetation types within the survey area is provided in Table 6.

Table 6: Vegetation types recorded within the survey area

Photo	Vegetation Type	Description*	Relevés	Extent within survey area (ha) (%)
	CcTpCeOh	Mid woodland to open forest of *Corymbia calophylla*, *Eucalyptus marginata subsp. marginata*, and occasionally *Agonis flexuosa var. flexuosa*, over variable mid to tall sparse shrubland to shrubland of *Taxandria parviceps*, *Xanthorrhoea preissii*, and *Acacia myrtifolia*, over tall sedgeland of *Cyathochaeta equitans*, *Anarthria scabra*, and *Hypolaena caespitosa*, over low sparse forbland of *Opercularia hispidula*, *Patersonia occidentalis* var. *latifolia*, and *Dasypogon bromeliifolius*.	REL01, REL02	0.2 (12%)
	XpAs	Mid sparse to open shrubland of *Xanthorrhoea preissii*, *Gompholobium tomentosum*, and *Taxandria parviceps*, over tall open to closed sedgeland of *Anarthria scabra*, *A. prolifera*, and *Hypolaena caespitosa*.	REL03	0.2 (12%)
	Cleared	Cleared areas.	-	1.3 (76%)
Total				1.7 (100%)

*Descriptions of the vegetation types have been adopted from Phoenix (2025a)



Figure 15: Vegetation types within the survey area

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

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4.2.5. Vegetation of Conservation Significance

No vegetation types described and mapped within the survey area are considered to represent any TECs listed under the EPBC Act or BC Act or Priority Ecological Communities (PECs) listed by DBCA (Appendix I).

Vegetation within the survey area was assessed against the key diagnostic characteristics outlined in the Scott River Ironstone Association approved conservation advice (DSEWPaC 2013) to determine the presence of the TEC in the survey area. The primary defining features of the Scott River Ironstone Association TEC include location, substrates, species assemblages and condition. Based on the assessment, it was determined that the Scott River Ironstone Association was not present within the survey area. This was due to the absence of key floristic components such as *Melaleuca preissiana*, *Hakea tuberculata*, *Kunzea micrantha* or *Melaleuca incana* subsp. Gingilup (N.Gibson & M.Lyons 593) (grey honey-myrtle) and a lack of suitable landform characteristics including shallow reddish loamy sands and ironstone substrate. The Scott River Ironstone Association TEC is also defined as a shrubland or heathland with an open to closed structure. The vegetation types within the survey area, particularly CcTpCeOh, do not align with this structure type.

The assessment of vegetation against the key diagnostic characteristics for this TEC is presented in Appendix L.

4.2.6. Vegetation Condition

The condition of intact native vegetation within the survey area ranged from Degraded to Excellent (Table 7; Figure 14), based on the vegetation condition scale of Keighery (1994) provided in EPA (2016) for the South West Botanical Province. Most of the vegetated part of the survey area was classed as being in Degraded condition and were mostly located in proximity to the existing power line. Disturbances within the survey area included grazing, weeds and clearing.

Table 7: Vegetation Condition within the survey area

Vegetation condition	Relevés	Extent within survey area (ha) (%)
Excellent	REL01	0.1 (6%)
Very Good	REL02	0.1 (6%)
Degraded	REL03	0.2 (12%)
Cleared	-	1.3 (76%)
Total		1.7 (100%)



Figure 16: Vegetation condition within the survey area

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 18/07/2025

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4.3. Basic Fauna Survey

4.3.1. Fauna Overview

A total of ten vertebrate fauna species (including one introduced species) were recorded within the survey area, comprising nine birds and one mammal. A complete fauna list is presented in Appendix M.

4.3.2. Conservation Significant Fauna

No direct (observations) or indirect (scats, tracks, diggings) evidence of Threatened fauna species listed under the EPBC Act or the BC Act, or Priority fauna species as listed by DBCA were recorded within the survey area.

Of the 25 conservation significant fauna species identified from the desktop assessment as potentially occurring within the survey area, a post-survey likelihood of occurrence assessment determined that three species are considered Likely to occur within the survey area, namely:

- Baudin's Cockatoo (*Zanda baudinii*; listed as EN under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris*; listed as EN under the EPBC Act and BC Act)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*; listed as VU under the EPBC Act and BC Act).

An additional seven fauna species were considered to have the Potential to occur, including:

- Western Ringtail Possum (*Pseudocheirus occidentalis;* listed as CR under the EPBC Act and BC Act)
- Chuditch (*Dasyurus geoffroii*; listed as VU under the EPBC Act and BC Act)
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*; listed as Conservation Dependent [CD] under the BC Act)
- Peregrine Falcon (*Falco peregrinus*; listed as Other specially protected species [OS] under the BC Act)
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; listed as P3 by DBCA)
- Western False Pipistrelle (*Falsistrellus mackenziei;* listed as P4 by DBCA)
- Quenda (*Isoodon fusciventer*; listed as P4 by DBCA).

This assessment is based on the availability of suitable habitat for these species within the survey area, as well as the location of previous records. The remaining 15 species were considered Unlikely to occur within the survey area, based on lack of suitable habitat present.

4.3.3. Introduced Fauna

One introduced fauna species was recorded within the survey area, namely the Laughing Kookaburra (**Dacelo novaeguineae*). This species is listed as Permitted (s11) under the State BAM Act (DPIRD 2025).

4.3.4. Fauna Habitat

A total of two fauna habitats were recorded within the survey area, namely Marri-Jarrah-Peppermint Woodland (0.2 ha; 12% of the survey area) and Cleared – Degraded Sumpland (0.2 ha; 12% of the survey area). Like the mapped vegetation types, these fauna habitats were aligned with those mapped in the

survey undertaken by Phoenix (2025b). Descriptions of and the extent of these vegetation types is provided in Table 8.

Table 8: Fauna habitat recorded within the survey area

Photo	Fauna habitat	Relevés	Total (ha) (%)
	Marri-Jarrah-Peppermint Woodland	REL01, REL02	0.2 (12%)
	Cleared – Degraded Sumpland	REL03	0.2 (12%)
	Cleared	-	1.3 (76%)
Total			1.7 (100%)



Figure 17: Fauna habitat recorded within the survey area

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 18/07/2025

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4.4. Black Cockatoo Habitat Assessment

A targeted assessment of potential foraging, breeding and roosting habitat for Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and Baudin's Cockatoo (*Zanda baudinii)* was undertaken within the survey area. Only foraging and roosting habitat was assessed for Carnaby's Cockatoo (*Zanda latirostris)* given the survey area does not overlap with its breeding range. No secondary evidence (i.e. foraging evidence) was recorded in the survey area during the assessment. Potential foraging, breeding, and roosting habitat within the survey area is described in the sections below.

4.4.1. Foraging Habitat

Foraging habitat quality was assessed using two methods, DAWE (2022) and Bamford (2021).

In accordance with the DAWE (2022) scoring tool the Marri-Jarrah-Peppermint woodland fauna habitat was considered High quality foraging habitat for Baudin's Cockatoo and Forest Red-tailed Black Cockatoo and Moderate for Carnaby's Cockatoo (Table 10). The Cleared-Degraded Sumpland fauna habitat was considered High quality for Baudin's Cockatoo and Moderate quality for Carnaby's Cockatoo, given the presence of foraging species *Xanthorrhoea preissii*. However, this habitat provides no value to Forest Red-tailed Black Cockatoo and was assigned a score of 0.

Table 9: DAWE (2022) foraging habitat scores per habitat type

Fauna Habitat	Extent of habitat type (ha)	Foraging Habitat Score		
		Baudin's Cockatoo	Carnaby's Cockatoo	FRTBC
Marri-Jarrah-Peppermint woodland	0.2	8 (High)	6 (Moderate)	8 (High)
Cleared-Degraded Sumpland	0.2	8 (High)	6 (Moderate)	0 (None)

In accordance with the Bamford (2021) scoring tool a total of 0.2 ha of vegetation within the survey area was mapped as High quality foraging habitat for all three Black Cockatoo species (Table 9), given the density of suitable foraging species within the Marri-Jarrah-Peppermint woodland fauna habitat type (Figure 18; Figure 19). The Cleared-Degraded Sumpland fauna habitat was considered to have Moderate foraging value for Baudin's Cockatoo and Carnaby's Cockatoo, given the high density of foraging species *Xanthorrhoea preissii*. However, no suitable foraging species for Forest Red-tailed Black Cockatoo were present within the Cleared-Degraded Sumpland fauna habitat; therefore, a score of 0 was assigned.

Table 10: Bamford (2021) Black Cockatoo foraging habitat scores per habitat type

Fauna Habitat	Extent of Habitat Type (ha)	Foraging Habitat Score		
		Baudin's Cockatoo	Carnaby's Cockatoo	FRTBC
Marri-Jarrah-Peppermint woodland	0.2	8 (High)	8 (High)	8 (High)
Cleared-Degraded Sumpland	0.2	5 (Moderate)	5 (Moderate)	0 (None)

4.4.2. Potential Breeding and Roosting Habitat

A total of ten potentially suitable breeding trees were recorded within the survey area (Figure 20). These trees all had a hollow rank of four (i.e. tree lacking suitable hollows or broken branches that might have large hollows; a tree with mainly intact branches and a spreading crown). Five of these trees contained

hollows, although all of these were considered unsuitable for breeding due to their insufficient size (< 10 cm) or orientation. The Marri-Jarrah-Peppermint Woodland fauna habitat where the suitable breeding trees are located was considered potentially suitable roosting habitat given the presence of tall Eucalypt trees and proximity to water sources.



Figure 18: Foraging habitat for Carnaby's and Baudin's Cockatoo within the survey area (Bamford 2021)



Figure 19: Foraging habitat for Forest Red-tailed Black Cockatoo within the survey area (Bamford 2021)

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 8/08/2025

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Figure 20: Potential breeding and roosting habitat within the survey area

4.5. Western Ringtail Possum Habitat Assessment

No primary observations of Western Ringtail Possums were made during the Targeted survey. In addition, no secondary evidence (i.e. dreys) was encountered.

A total of 0.2 ha (12% of the survey area) of Moderate quality habitat was recorded during the survey (Figure 21) and comprised solely of the Marri-Jarrah Peppermint woodland fauna habitat type. The remainder of the survey area was assessed as providing no habitat value to Western Ringtail Possum due to a lack of continuous canopy.



Figure 21: Western Ringtail Possum habitat within the survey area

0 12.5 25 50
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

24PER7886-KR Date: 18/07/2025

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5. Discussion

5.1. Flora and Vegetation

5.1.1. Flora

Flora species recorded generally aligned with those encountered during the Phoenix (2025a) survey and were typical of the Warren bioregion (WAH 1998). No Threatened flora species listed under the EPBC Act or BC Act, or as Priority by DBCA were recorded within the survey area.

Of the 66 conservation listed flora species identified from the desktop assessment as possibly occurring, a post-survey likelihood of occurrence assessment determined that nine flora species are considered as having the Potential to occur within the survey area, including *Darwinia ferricola* (listed as VU under the EPBC Act and EN under the BC Act), *Conospermum quadripetalum* (listed as CR under the BC Act), *Stylidium* sp. Scott River Plain (listed as P1 by DBCA), *Philydrella pygmaea subsp. minima* (listed as P1 by DBCA), *Hemigenia* sp. (listed as P2 by DBCA), *Leucopogon incisus* (listed as P2 by DBCA), *Acacia lateriticola* glabrous variant (listed as P3 by DBCA), *Synaphea petiolaris* subsp. *simplex* (listed as P3 by DBCA) and *Chorizema carinatum* (listed as P3 by DBCA). Within the survey area, potentially suitable habitat for these species may be present to varying degree, within the CcTpCeOh and XpAs vegetation types. To confirm the presence or absence of these species, targeted flora surveys will need to be conducted within the appropriate flowering period for each species.

Approximately 21% of all flora species recorded during the current survey were introduced species. This is reflective of the location of the survey area within a highly modified and fragmented landscape. No Declared Pests or WoNS were recorded during the survey.

5.1.2. Vegetation

A total of two vegetation types (CcTpCeOh and XpAs) were described and mapped during the current survey, accounting for 0.39 ha of the total survey area. The assessment of vegetation types sought to expand on the mapping completed by Phoenix (2025a) and have been assigned as closely as possible. While the floristic composition of vegetation within the survey area and the vegetation types described by Phoenix (2025a) did not completely align (due to factors such as scale and survey type), vegetation types were considered to be representative of mapping by Phoenix (2025a).

Vegetation condition within the survey area ranged from Degraded to Excellent, based on the vegetation scale adapted from Keighery (1994) as outlined in the *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). Majority of vegetation within the survey area was classed as being in Degraded condition. The patch of CcTpCeOh in the western portion of the survey area (associated with REL01) represented vegetation with the highest condition in the survey area, and the entire patch was mapped as Excellent. Meanwhile, the patch of CcTpCeOh in the eastern portion of the survey area (associated with REL02) was mapped as Very Good. The XpAs community was of the lowest condition within the survey area and was mapped as Degraded. Cleared areas comprised 1.3 ha (78%) of the survey area.

The vegetation types do not represent the Scott River Ironstone Association TEC based on an assessment against the key diagnostic characteristics described by DSEWPaC (2013) as it does not contain any of the key indicator species of the TEC and does not occur on ironstone overlain by shallow reddish soils. A key indicator of Scott River Ironstone Association TEC is that its structure comprises a shrubland or heathland with an open to closed structure. The vegetation types within the survey area, particularly

CcTpCeOh, do not align with this structure type. This aligns with the conclusion made by Phoenix (2025a), that CcTpCeOh and XpAs vegetation types were not representative of this TEC.

5.2. Fauna

A total of two fauna habitat types (Marri-Jarrah-Peppermint woodland and Cleared-Degraded Sumpland) were described and mapped within the survey area. These two fauna habitats are considered to provide suitable habitat for several terrestrial and avian fauna species, with habitats providing a mix of suitable vegetation, substrate, and microhabitats.

A total of ten vertebrate fauna species were recorded during the Basic fauna survey, comprising nine birds and one mammal. The species recorded represent a snapshot of the fauna occurring within the survey area at the time of field survey, and it is therefore likely that more species occur than were observed. Of the species recorded - Laughing Kookaburra (**Dacelo novaeguineae*) - is listed as Permitted (s11) under the State BAM Act (DPIRD 2025).

No direct (observations) or indirect (scats, tracks, diggings, dreys, nests) evidence of Threatened fauna species listed under the EPBC Act or the BC Act, or Priority fauna species listed by DBCA were recorded within the survey area. Of the 25 conservation significant fauna species identified from the desktop assessment as possibly occurring within the survey area, it was assessed that all three species of Black Cockatoo were considered Likely to occur following the field survey, given the presence of high value habitat within the survey area. These are discussed further in Section 5.2.1. A further seven species had Potential to occur following the field survey, comprising five mammals and two birds.

5.2.1. Black Cockatoos

The survey area is located in the 'Likely to occur' modelled distribution for the Carnaby's, Baudin's and Forest Red-tailed Black Cockatoos and as such each of these species were the focus of this assessment (DAWE 2022). The survey area occurs within the known breeding range of Baudin's and Forest Red-tailed Black Cockatoo; however is outside the breeding range of Carnaby's Cockatoo. Phoenix (2025b) recorded a total of 96 records of Black Cockatoo adjacent to the survey area, comprising 36 records of Carnaby's Cockatoo, 7 records of Baudin's Cockatoo and 53 records of Forest Red-tailed Black Cockatoo.

The *Carnaby's Cockatoo Recovery Plan* defines critical non-breeding habitat for Carnaby's Cockatoo as vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources (DPaW 2013). Habitat critical to the survival of the Forest Red-tailed Black Cockatoo and Baudin's Cockatoo includes all Marri (*Corymbia calophylla*), Karri (*Eucalyptus diversicolor*), and Jarrah (*Eucalyptus marginata*) forests, woodlands, and remnants in the south-west of Western Australia receiving more than 600 mm of annual average rainfall (DAWE 2022).

No primary or secondary evidence (i.e. foraging evidence) of Black Cockatoos was recorded in the survey area. A total of 0.2 ha (12% of the survey area) was mapped as High value foraging habitat for all three Black Cockatoo species, as there was a high density and condition of suitable foraging species within the Marri-Jarrah-Peppermint woodland fauna habitat, including Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and *Xanthorrhoea preissii*. An assessment of this fauna habitat type against the DAWE (2022) scoring tool also found the vegetation present to represent High quality foraging habitat, with a score of 8 assigned for Baudin's Cockatoo and Forest Red-tailed Black Cockatoo, and 6 assigned for Carnaby's Cockatoo.

The Cleared-Degraded Sumpland fauna habitat was mapped as Moderate quality for Baudin's Cockatoo and Carnaby's Cockatoo, given the high foliage cover of *Xanthorrhoea preissii* throughout this habitat's

extent. This fauna habitat provides no value for Forest Red-tailed Black Cockatoo as no known primary or secondary food plants were present. An assessment of this fauna habitat type against the DAWE (2022) scoring tool found the vegetation present to represent High quality foraging habitat for Baudin's Cockatoo and moderate quality foraging habitat for Carnaby's Cockatoo. However, this fauna habitat provided no value for Forest Red-tailed Black Cockatoo given that the vegetation present does not align with the description of habitat for the species (i.e. Jarrah/Marri woodland, edges of Karri forest, forest containing Wandoo or Blackbutt; DAWE 2022).

The Black Cockatoo habitat assessment closely aligns with the conclusions made by Phoenix (2025b), where the Marri-Jarrah-Peppermint woodland fauna habitat type was generally mapped as Moderate to High quality habitat and habitat patches containing high foliage cover of *Xanthorrhoea preissii* as Moderate quality habitat.

The survey area contains ten potentially suitable breeding trees (>500 mm DBH). All trees lacked hollows suitable for Black Cockatoo breeding, and no evidence of use by Black Cockatoos was recorded.

Given the presence of tall trees and the proximity to water sources nearby (i.e., within 12 km of the survey area, namely the Blackwood River and Scott River) the Marri-Jarrah-Peppermint woodland fauna habitat was considered to represent potential night-roosting habitat for black cockatoos.

5.2.2. Western Ringtail Possum

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is listed as CR under the EPBC Act and the BC Act. Once widely distributed, the current distribution of the Western Ringtail Possum has contracted with extensive local declines in the northern and inland fragments of the species' original range because of clearing and subsequent fragmentation during agricultural development in south-western WA (DEWHA 2009). Critical habitat is defined as 'any habitat where Western Ringtail Possums occur naturally', which generally comprises *'long unburnt mature remnants of peppermint (Agonis flexuosa) woodlands with high canopy continuity and high foliage nutrients (high in nitrogen and low toxin levels); jarrah (Eucalyptus marginata)/marri (Corymbia calophylla) forests and woodlands'* (DPaW 2017). Linkages between suitable habitat patches are also considered critical to the species survival (DPaW 2017). Tree hollows are important as diurnal resting sites (refuges) and nests (dreys). Other suitable refuges include platforms, hollow logs, balga (*Xanthorrhoea* spp.) skirts, under sedges, forest debris and disused rabbit warrens (DEWHA 2009). The Recovery Plan has identified three key management zones for Western Ringtail Possum within Western Australia, namely the Swan Coastal Plain, Southern Forest and South Coast zone. The survey area is not located within a management zone; however, the Swan Coastal Plain Management Zone occurs directly to the east. Average home ranges in peppermint-dominated habitat are generally less than 2 ha and average 0.4 ha and 0.3 ha for females and males, respectively (DPaW 2017).

Phoenix (2025b) recorded nine individuals of Western Ringtail Possums and mapped 201 ha of Moderate to High value Western Ringtail Possum habitat in proximity to the survey area. Based on their field records, occurrences of Western Ringtail Possum in the general area were typically restricted to large remnants of Moderate to High quality Marri-Jarrah-Peppermint woodland, which were deemed of higher quality (Figure 12; Phoenix 2025b). Conversely, small, fragmented remnants of Marri-Jarrah Peppermint Woodland appeared too isolated to support the species, preventing it from traversing across the cleared paddocks towards larger remnants.

A total of 0.2 ha of vegetation in the survey area was mapped as Moderate quality habitat for Western Ringtail Possum and comprised solely of the Marri-Jarrah-Peppermint woodland fauna habitat. A Moderate quality score was considered appropriate given the Very Good to Excellent condition of the vegetation present and mostly continuous canopy cover. A score of High was not considered

appropriate given the patch was isolated from other suitable habitat fragments and that no evidence of Western Ringtail Possum was observed in the patch during the survey. However, to align with Phoenix (2025b), the maximum stocking rate score was still assigned for the entire survey area, given Western Ringtail Possums were recorded in the broader area.

No Western Ringtail Possum individuals or secondary evidence (i.e dreys) were recorded during the Targeted survey. However, survey outcomes may have been influenced by poor weather conditions including heavy rain, which could have inhibited both species activity and the ability of personnel to detect Western Ringtail Possum individuals (DSEWPaC 2011).

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (IA)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threatened species (T)

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Critically Endangered species	CR	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered species	EN	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

Category	Code	Description
Vulnerable species	VU	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild, as follows:

Category	Code	Description
Extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
Extinct in the wild species	EW	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

Categories are detailed below.

Category	Code	Description
Migratory species	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Species of special conservation interest (conservation dependent fauna)	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Other specially protected species	OS	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Definition
Priority 1	P1	*Poorly-known species* Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	*Poorly-known species* Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	*Poorly-known species* Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	P4	*Rare, Near Threatened and other species in need of monitoring* (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix B Likelihood of occurrence assessment criteria

Likelihood rating	Criteria
Recorded	The species has previously been recorded within study area from DBCA database search results and/or from previous surveys of the study area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium.
Likely	The species has not previously been recorded from within the study area. However, (to qualify requires one or more criteria to be met): • the species has been recorded in close proximity to the study area, and occurs in similar habitat to that which occurs within the study area • core habitat and suitable landforms for the species occurs within the study area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present • there is a medium to high probability that a species uses the study area.
Potential	The species has not previously been recorded from within the study area. However, (one or more criteria requires to be met): • targeted surveys may locate the species based on records occurring in proximity to the study area and suitable habitat occurring in the study area • the study area has been assessed as having potentially suitable habitat through habitat modelling • the species is known to be cryptic and may not have been detected despite extensive surveys • the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys The species has been recorded in the study area by a previous consultant survey or there is historic evidence of species occurrence within the study area. However, (one or more criteria requires to be met): • doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution) • coordinates are doubtful.
Unlikely	The species has been recorded locally through DBCA database searches. However, it has not been recorded within the study area and • it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded • it is unlikely to occur due to few historic record/s and no other current collections in the local area. The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the study area through DBCA database searches. The species has not been recorded in the study area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.
Does not occur (one or more criteria requires to be met).	The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the study area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat.

Likelihood rating	Criteria
	The study area lacks important habitat for a species that has highly selective habitat requirements. The species has been historically recorded within study area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.

Appendix C Black Cockatoo habitat definitions

Habitat	Definition
Foraging habitat	Foraging habitat is defined as plant species known to support foraging within the range of each species. The specific foraging requirements differ slightly between the three species as described in DAWE 2022: • **Carnaby's Cockatoo** – mainly feeds in native shrubland, kwongkan heathland, and woodland. Food items include seeds, flowers, and nectar of native proteaceous plant species (i.e. *Banksia* spp., *Hakea* spp., *Grevillea* spp.), as well as *Callistemon* spp., and Marri (*Corymbia calophylla*). Also feeds on the seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds, macadamia, and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons; and liquidambar. • **Baudin's Cockatoo** – mainly feeds in eucalypt woodlands and forest and proteaceous woodlands and heath. Food items primarily include seeds of Marri, rarely Jarrah (*Eucalyptus marginata*), and seeds of native proteaceous plant species (e.g. *Banksia* spp. and *Hakea* spp.). Also feeds on insects and insect larvae; pith of kangaroo paw (*Anigozanthos flavidus*); tips of *Pinus* spp.; *Macadamia* spp.; almonds and pecans; seeds of apples, pears, and persimmons. • **Forest Red-tailed Black Cockatoo** – mainly feeds in Jarrah and Marri woodlands and forest and edges of Karri (*Eucalyptus diversicolor*) forests including Wandoo (*E. wandoo*) and Blackbutt (*E. patens*). Food items primarily include seeds of Marri and Jarrah. Also feeds on *Allocasuarina* cones, fruits of Snottygobble (*Persoonia longifolia*) and Mountain Marri (*Corymbia haematoxylon*). Other less important foods include: Blackbutt, Bullich (*Eucalyptus megacarpa*), *Allocasuarina fraseriana, Hakea* spp., Tuart (*Eucalyptus gomphocephala*), Redheart Moit (*Eucalyptus decipiens*), and Bushy Yate (*Eucalyptus lehmanii*). Also some introduced eucalypts such as river red gum (*E. camaldulensis*) and flooded gum (*E. rudis*).
Night roosting habitat	Habitat that contains one, or a group of potential roosting trees: • **Known roosting tree** – a tree (generally the tallest), native or introduced known to be used for night roosting or which demonstrates evidence of roosting. Usually close to an important water source and within an area of high-quality foraging habitat. During the breeding season, male black cockatoos roost in the vicinity of the breeding trees, therefore a breeding area may also be considered to be night roosting habitat. • **Potential roosting tree** – A tall tree of any species in close proximity to water.
Breeding habitat	Habitat that contains known, suitable, or potential breeding trees: • **Known breeding tree** – Trees (live or dead but still standing) which contain a hollow where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks, or feathers). • **Suitable breeding tree –** Trees with suitable breeding hollows present, although no evidence of use. Note that any species of tree may develop suitable hollows for breeding. • **Suitable breeding hollow –** Any hollow with dimensions suitable for use for breeding by black cockatoos (Carnaby's Cockatoo 23-30 cm [EPA 2019], Baudin's Cockatoo 30-40 cm [Chapman 2008]. Forest Red-tailed Black Cockatoo 12-41cm [Chapman 2008]). Suitable nest hollows are only found in live trees with a diameter at breast height (DBH) of at least 500 mm. Usually this will be a natural hollow, but artificial hollows may also be suitable in some circumstances (for example, where the artificial hollow has been specifically designed for use by black cockatoos). Note that artificial hollows have only been shown to have value for Carnaby's Cockatoos to date. • **Potential breeding trees –** Trees that have a suitable DBH to develop a nest hollow but do not currently have hollows. For most species of trees, suitable nest hollows are only found

Habitat	Definition
	in live trees with a DBH of at least 500 mm. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH. Note that many species of eucalypt may develop suitable hollows for breeding.

References

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Appendix D Bamford (2021) Black Cockatoo Foraging Quality Scoring Tool

Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos. Revised 4th April 2021

Bamford Consulting Ecologists

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has 3 components as detailed above. These 3 components are drawn from the DAWE offsets guide but the scoring approach was developed by BCE and includes a fourth (moderation) component.

Note that the scoring system can only be applied within the range of the species or at least where the species could reasonably be expected to occur based upon existing information.

Calculating the total score (out of 10) requires the following steps:

A. Site condition. Determining a score out of 6 for the vegetation composition, condition and structure; plus
B. Site context. Determining a score out of 3 for the context of the site; plus
C. Species stocking rate. Determining a score out of one for species density.
D. Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

The BCE scoring system places the greatest weight on site condition (scale of 0 to 6) because this has the highest influence on the foraging values of a site, which in turn is the fundamental driver in meeting ecological requirements for continued survival.

Site context has a lower weight (scale of 0 to 3) in recognition of the mobility of the species, which means they can access good foraging habitat even in fragmented landscapes, but allowing for recognition of the extent of available habitat in a region and context in relation to activity (such as breeding and roosting). The application of scoring site context is further discussed below.

Species stocking rate is given a low weight (0 to 1) as it is a means only of recognising that a species may or may not be abundant at a site, but that abundance is dependent upon site condition and context and is thus not an independent variable. The abundance of a species is also sensitive to sampling effort, and to seasonal and annual variation, and is therefore an unreliable indicator of actual importance of a site to a species.

Calculation of scores and the moderation process are described in detail below.

A. Site condition. Vegetation composition, condition and structure scoring

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g., salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes. • Mown grass	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g., dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g., dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits).
1	Negligible to low foraging value. Examples: • Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; • Paddocks that are lightly vegetated with melons or other known food source weeds (e.g., *Erodium* spp.) that represent a short-term and/or seasonal food source; • Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; • Woodland with tree banksias 2-5% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Open eucalypt woodland/mallee of small-fruited species; • Paddocks that are densely vegetated with melons or other known food source weeds (e.g., *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g., Marri and Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered foraging trees.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g., Marri, Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Woodland with <10% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
3	Low to Moderate foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; • Woodland with tree banksias 5-20% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Eucalypt Woodland/Mallee of small-fruited species; • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri and Jarrah; also Pricklybark (Coastal Blackbutt) where it occurs in Banksia Woodlands) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 10-40% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; • Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability); • Orchards with highly desirable food sources (e.g., apples, pears, some stone fruits).	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 40-60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 40-60% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term). • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with > 60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term). • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have >60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).

Vegetation structural class terminology follows Keighery (1994)

A. Site context.

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Black-Cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with the Department of the Environment and Energy (DEE), provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents.	
	'Local' breeding known/likely	'Local' breeding unlikely
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	1 - 5%
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15 km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (e.g. 0.5% of such habitat within 15 km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it.

B. Species density (stocking rate).

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black-cockatoos. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site context. For example, a site with a moderate condition score that is part of a network of such habitat where a black-cockatoo species is

known would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

C. Moderation of scores for the calculation of a value out of 10.

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat ($\geq$3). The approach to calculating a score out of 10 can be summarised as follows:

Vegetation composition, condition and structure score	Context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special circumstances. Such as when very close to a major breeding area or if strategically located along a movement corridor.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available

indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.

- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott and Black 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.
- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black-Cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and 3 times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental', such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.
- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this.
- Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black-Cockatoos are not regularly present.

Appendix E DAWE (2022) scoring tool

Starting score	Carnaby's Cockatoo
10	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**

Attribute	Subtractions	Context adjustor (attributes reducing functionally of foraging habitat)	Evidence from field survey
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	No evidence observed.
Connectivity	0	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	There are multiple patches of Eucalypt forest and woodland within 12 km of the survey area.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	The survey area is outside the breeding range for Carnaby's Cockatoo.
Proximity to roosting	0	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	
Impact from significant plant disease	0	Subtract 1 if your site has disease present (e.g., Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Disease was not observed during the field survey.
Total score			**6**
Appraisal	A total of 0.39 ha is considered to be Moderate quality for Carnaby's Cockatoo.		

Starting score	Baudins Cockatoo
10	**Start at a score of 10** if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size.

Attribute	Subtractions	**Context adjustor** (attributes reducing functionally of foraging habitat)	Evidence from field survey
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	No evidence observed.
Connectivity	0	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	There are multiple patches of Eucalypt forest and woodland within 12 km of the survey area.
Proximity to breeding	-2	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	There is no direct evidence of breeding within 12 km for all 3 species, however there is breeding habitat present for Baudin's Cockatoo within the Phoenix (2025b) study area so undetected breeding cannot be discounted.
Proximity to roosting	0	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	There are known roosting sites within 20 km (DBCA 2023b) one 'white-tailed cockatoo' roost (therefore either Carnaby's or Baudin's) and one unknown taxa (therefore any one of the 3 species). Potentially other roost sites present.
Impact from significant plant disease	0	Subtract 1 if your site has disease present (e.g., Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Disease was not observed during the field survey.
Total score			**8**
Appraisal	A total of 0.39 ha is considered to be High quality for Baudin's Cockatoo.		

Starting score	Forest Red-tailed Black Cockatoo
10	**Start at a score of 10** if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. This tool only applies to sites equal to or larger than 1 hectare in size.

Attribute	Subtractions	**Context adjustor** (attributes reducing functionally of foraging habitat)	Evidence from field survey
Foraging potential	-2	Subtract 2 from your score if there is no evidence of feeding debris on your site.	No evidence observed.
Connectivity	0	Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	There are multiple patches of Eucalypt forest and woodland within 12 km of the survey area.
Proximity to breeding	0	Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat.	There is no direct evidence of breeding within 12 km for all 3 species, however there were potential breeding trees for Forest Red-tailed Black Cockatoo recorded within the survey area so undetected breeding cannot be discounted.
Proximity to roosting	0	Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	There are known roosting sites within 20 km (DBCA 2023b) one 'white-tailed cockatoo' roost (therefore either Carnaby's or Baudin's) and one unknown taxa (therefore any one of the 3 species). Potentially other roost sites present.
Impact from significant plant disease	0	Subtract 1 if your site has disease present (e.g., Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	Disease was not observed during the field survey.
Total score			**8**
Appraisal	A total of 0.2 ha is considered to be High quality for Forest Red-tailed Black Cockatoo.		

Appendix F Habitat Scoring System for Western Ringtail Possum (DCCEEW 2024)

Indicator/s	Score	Description
Site condition (habitat quality)		
Vegetation condition and structure Diversity of habitat species present Habitat features	3	**Very High** – High (90-100%) canopy[1] continuity[2] for movement, ground cover for shelter, fire age >20 years, evidence of many nests/dreys/hollows, limited evidence of predators.
	2.5	**High** – High (70-89%) canopy continuity for movement, ground cover, fire age >15 years, evidence of many nests/dreys/hollows, limited evidence of predators.
	2	**Medium** – High (70-89%) canopy continuity for movement, some ground cover, fire age >10 years, evidence of some nests/dreys/hollows, some evidence of predators.
	1.5	**Low** – Some canopy (50-69%) continuity for movement, some ground cover, fire age <10 years, evidence of few nests/dreys/hollows, substantial evidence of predators.
	1.0	**Very Low** – Little canopy (30-49%) continuity for movement, little ground cover, fire age <5 years, little evidence of nests/dreys/hollows, substantial evidence of predators.
	0.5	**Marginal** – Less than 30% canopy continuity for movement, no ground cover, fire within last 5 years, no evidence of nests/dreys/hollows.
	0	**Absent** – no vegetation and/or suitable habitat on site.
Site context		
Movement patterns Proximity of the site in relation to other areas of suitable habitat Overall population or extent of a species	3	Site is connected by vegetation, including continuous canopy cover, to more than one area of contiguous[3] suitable habitat. Site is within a key management zone.
	2.5	Site is connected by vegetation, including high canopy cover (70-89%), to at least one area of contiguous suitable habitat. Site is within a key management zone.
	2	Site is connected by vegetation, including some level of canopy cover (50-69%), to more than one patch[4] of suitable habitat. Site is within a key management zone.
	1.5	Site is connected by vegetation, including limited canopy cover (30-49%), to at least one patch of suitable habitat. Records on or immediately adjacent (<500 m) to site within last 2 years. Site is located within known species distribution.
	1	Site is separated from other known suitable habitat by cleared areas or linear barrier of up to 25 m. Records on site or immediately adjacent (within 500 m) within last 3 years. Site is located within known distribution of species.
	0.5	Site is separated from other suitable habitat by cleared areas or linear barrier of up to 50 m. Records on site or adjacent (within 1 km) within last 10 years. Site is not located within known distribution of species.
	0	Site is separated from other suitable habitat by cleared areas of more than 50 m. No records on site or adjacent (within 1 km) within last 10 years. Site is not located within known distribution of species.
Species stocking rate		
Usage and/or density of a species Role of the site population regarding overall species population viability	4	Record of species presence on site in last 12 months (WRP observed on site in last 12 months and scats; evidence of nests/dreys/hollows being used; evidence of breeding); site is within 50-100 m of verified/published records in last 12 months.
	3	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 100-150 m of verified/published records in last 12 months.
	2	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 150-200 m of verified/published records in last 2 years.
	1	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 150-200 m of verified/published records in last 2 years.
	0	**No record of species presence on site, or within 500 m in last 3 years.**

[1] - canopy refers to upper and/or mid storey.

[2]continuity means canopy where tree or shrub branches are touching allowing for WRP to move from one tree to another while staying under cover. High canopy continuity means a high percentage of trees or shrubs connect; low canopy continuity means few or no trees or shrubs connect.

[3]Contiguous suitable habitat means multiple patches of native vegetation sharing borders, next to each other in sequence, comprising a larger, continuous area.

[4]A patch of suitable habitat may or may not be connected to other patches of native vegetation. Patch size is not defined and should be considered in relation to site condition and species stocking rate as indicators of patch viability for WRP.

Appendix G Flora likelihood of occurrence assessment

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
Reedia spathacea	CR	EN	Phoenix 2025a	Robust, tufted perennial, grass-like or herb (sedge), 2-4 m high, clumps 1.5-2 m wide. Fl. brown, Nov to Dec or Jan.	Peaty sand. Swamps, river edges.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (peaty sand in swamps and river edges) is present within the survey area.
Lambertia orbifolia subsp. vespera	EN	EN	Phoenix 2025a	Erect shrub or small tree up to 4 m high. Fl. Red. November to May.	Amongst Jarrah, Marri and Banksia woodland. In the Scott River plains is found on sandy ironstone soils or on grey sands over ironstone and winter wet areas.	Potential	Nearby records.	Unlikely	Suitable habitat may be present. However, is a conspicuous species and was not recorded.
Verticordia plumosa var. vassensis	EN	EN	Phoenix 2025a	Shrub, 0.3-1 m high. Fl. pink, Sep to Dec or Jan to Feb.	White/grey sand. Winter-wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., winter wet flats) is present within the survey area.
Banksia nivea subsp. uliginosa	EN	EN	Phoenix 2025a	Dense, erect, non-lignotuberous shrub, 0.2-1.5 m high. Fl. yellow-brown, Aug to Sep.	Sandy clay, gravel.	Potential	Nearby records.	Unlikely	Suitable habitat may be present. However, is a conspicuous species and was not recorded.
Boronia exilis	EN	EN	Phoenix 2025a	Erect, slender-stemmed perennial, herb, c. 1 m high, staminal filaments strongly ciliate. Fl. pink, Sep.	Seasonally wet heath.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally wet heath) is present within the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
Darwinia ferricola	VU	EN	Phoenix 2025a	Densely-branched shrub, up to 1.5 m high. Fl. Green/greenish-red in spring months (Sep to Nov).	Scrubland in sand/clay over ironstone.	Potential	Nearby records.	Potential	Potential. No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.
Grevillea brachystylis subsp. australis	VU	VU	Phoenix 2025a	Prostrate or erect, non-lignotuberous shrub, 0.1-2 m high. Fl. red, Sep to Dec or Jan.	Sand, sandy clay. Swampy situations, stream banks.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., swamps, stream banks) is present within the survey area.
Conospermum quadripetalum	-	CR	Phoenix 2025a	Diffuse, straggly shrub, 0.3-1 m high. Fl. blue/white, Sep to Nov.	Sandy clay, grey sand. Flats behind coastal hills.	Potential	Nearby records.	Potential	Potential. No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.
Andersonia ferricola	-	P1	Phoenix 2025a	Shrub, 0.2-0.5 m high. Fl. purple, Oct.	White sand or red-brown loam over ironstone. Seasonally wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally wet flats) is present within the survey area.
Hemigenia obovata	-	P1	Phoenix 2025a	Erect shrub, to 0.5 m high. Fl. blue-purple, Oct to Nov.	White or black wet sand. Flats.	Potential	Nearby records.	Potential	Potential. No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
Pericalymma megaphyllum	-	P1	Phoenix 2025a	Erect shrub, to 0.35 m high. Fl. white-pink, Nov.	Red-brown lateritic clayey sand. Elevated washed areas.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (red-brown lateritic clayey sand) is present within the survey area.
Philydrella pygmaea subsp. minima	-	P1	Phoenix 2025a	Bulbaceous, perennial, herb, 0.02-0.2 m high. Fl. yellow, Aug to Nov.	Damp sites.	Potential	Nearby records.	Potential	No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.
Schoenus indutus	-	P1	Phoenix 2025a	Perennial, grass-like or herb (sedge), 0.6 m high. Fl. brown, Oct.	Gravelly sand.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (gravelly sand) is present within the survey area.
Stylidium sp. Scott River Plain (N.G. Marchant 74/23)	-	P1	Phoenix 2025a	No description available.	No habitat description available.	Potential	Nearby records.	Potential	No habitat description provided; therefore potentially suitable habitat could be present.
Synaphea macrophylla	-	P1	Phoenix 2025a	Decumbent shrub. Fl. yellow, Oct.	Gravelly loam.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (gravelly loam) is present within the survey area.
Thysanotus formosus	-	P1	Phoenix 2025a	Caespitose perennial, herb, to 0.3 m high. Fl. purple, Nov to Dec or Jan.	Clayey sand, sandy loam. In situations often inundated in winter.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally inundated areas)

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
									is present within the survey area.
Synaphea nexosa	-	P1	Phoenix 2025a	Densely tangled shrub, to 1 m high. Fl. yellow, Oct to Nov.	Clay-loam. Winter-wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., winter wet flats) is present within the survey area.
Diuris heberlei	-	P2	Phoenix 2025a	Tuberous, perennial, herb, 0.2-0.5 m high. Fl. yellow, Dec or Jan to Feb.	Grows in sandy-clay and peaty soils in seasonally damp coastal flats.	Potential	Nearby records.	Unlikely	Suitable habitat (i.e., sandy-clay or peaty soils in seasonally damp areas) is not present within the survey area.
Hemigenia sp. Nillup (R.D. Royce 98)	-	P2	Phoenix 2025a	Perennial shrub to 50cm high. Flowering in November to January.	*Eucalyptus marginata* woodlands over *Xanthorrhoea preissii* shrublands over sedgelands.	Potential	Nearby records.	Potential	No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.
Lepyrodia extensa	-	P2	Phoenix 2025a	Herb (sedge-like), approx. 0.3m high.	Sand & Sandy peat. Seasonally inundated swamps.	Potential	Nearby records.	Unlikely	Suitable habitat (i.e., sand & sandy peat in seasonally inundated swamps) not recorded in survey area.
Leucopogon incisus	-	P2	Phoenix 2025a	Delicate, erect shrub to 40cm high, single-stemmed at ground level. Narrowly ovate or elliptic leaves with recurved margins,	Known from a small area in the far south of the Jarrah Forest bioregion, where it is growing in open Jarrah woodland on a winter-damp sandy flat. Associated	Potential	Nearby records.	Potential	Potentially suitable habitat (i.e. winter-damp, sandy flat Jarrah forest) present in the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
				glabrous branchlets, corolla tube longer than the sepals and strongly compressed fruit with a distinct apical notch (WAH 2015).	species include Anarthria prolifera, Kingia australis, Sphenotoma gracilis and Hypericoides (WAH 2015)				
Machaerina ascendens	-	P2	Phoenix 2025a	Scarmbling or sprawling perennial forming dense clumps through shrubs (Barrett & Wilson 2022)	Water to waterlogged soils toward the edge of swamps that are waterlogged and boggy for most or all of the year in peaty, sandy, or clay soils (Barrett & Wilson 2022)	Potential	Nearby records.	Unlikely	No potentially suitable habitat is present in the survey area.
Pigea volubilis	-	P2	Phoenix 2025a	Twining perennial, herb, 0.3-1(-4) m high. Fl. blue-purple-white, Sep to Dec.	Clay or sandy clay. River banks.	Potential	Nearby records.	Unlikely	No potentially suitable habitat is present in the survey area.
Schoenus loliaceus	-	P2	Phoenix 2025a	Annual, grass-like or herb (sedge) 0.03 - 0.06m high. Fl Aug to Nov.	Sandy soils, winter-wet depressions.	Potential	Nearby records.	Unlikely	No potentially suitable habitat is present in the survey area.
Stenanthemum sublineare	-	P2	Phoenix 2025a	Erect shrub, to 0.1 m high. Fl. green, Oct to Dec.	Recorded in littered white sand, in a woodland dominated by Banksia attenatta on the coastal plain.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e. Banksia-dominated woodlands) within the survey area.
Styphelia intricata	-	P2	Phoenix 2025a	Tangled, spreading shrub to 80cm high, single-stemmed at ground level. Distinguished by leaves linear to narrowly oate, margins strongly recuved. 1 or 2-flowered	Restricted distribution in far south-west of Jarrah Forest and far west of Warren bioregions. Occurs in seasonal wetlands in open woodland or heath, associated with Melaleuca preissiana, Taxandria spp.,	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., seasonal wetlands in open woodland or heaths) is present within the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
				sepals glabrous, acute, often mucronate. Flowers Apr - June, mature fruit Oct - Nov.	Beaufortia sparsa, Aotus intermedia.				
Boronia anceps	-	P3	Phoenix 2025a	Perennial, herb, 0.3-0.6 m high, lacking lignotuber, stem flattened and ancipitous when young. Fl. pink/pink-purple, Sep to Dec or Jan.	White sand, gravelly laterite. Seasonally swampy heaths.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally swampy heaths) is present within the survey area
Calothamnus lateralis var. crassus	-	P3	Phoenix 2025a	Shrub 1 - 2 m tall, without lignotuber. Fl August to October or January or June.	Winter-wet flats, riverbanks, wet depressions, swamps. Clayey peaty sands, often amongst Agonis flexuosa, Hakea spp., Restionaceae spp.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (clayey peaty sands and wet areas) is present within the survey area.
Chorizema carinatum	-	P3	Phoenix 2025a	Erect or spreading shrub, 0.1-0.6 m high. Fl. yellow, Oct to Dec.	Sand, sandy clay.	Potential	Nearby records.	Potential	No targeted survey undertaken during flowering time. Potentially suitable habitat within the survey area.
Dampiera heteroptera	-	P3	Phoenix 2025a	Erect to semi-prostrate perennial, herb or shrub, 0.3-0.6 m high. Fl. blue, Sep to Oct.	Sandy soils. Swampy areas.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (swampy areas) is present within the survey area.
Gastrolobium formosum	-	P3	Phoenix 2025a	Small, trailing shrub, to 1 m high. Fl. red, Nov.	Clay loam. Along river banks or in swamps.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (clay loam soils,

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
									river banks and swamps) is present within the survey area.
Grevillea manglesioides subsp. ferricola	-	P3	Phoenix 2025a	Erect or spreading shrub, 1.5 m high. Fl. red/green/red&green, Oct.	Red sandy clay over ironstone. Winter wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat and is a conspicuous species.
Grevillea papillosa	-	P3	Phoenix 2025a	Spreading shrub, 0.3-1.2 m high. Fl. white/yellow & red, Apr or Sep to Oct.	Brown or peaty sand, sandy clay, loam. Seasonally-wet areas, swamps.	Potential	Nearby records.	Unlikely	No potentially suitable habitat and is a conspicuous species.
Isopogon formosus subsp. dasylepis	-	P3	Phoenix 2025a	Low, bushy or slender, upright, non-lignotuberous shrub, 0.2-2 m high. Fl. pink-purple/red, Jun to Dec.	Sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas.	Potential	Nearby records.	Unlikely	Suitable habitat may present. However, was not recorded despite survey being undertaken during flowering time and conspicuous nature.
Leucopogon alternifolius	-	P3	Phoenix 2025a	Erect or semi-erect, scrambling shrub, 0.1-1(-2) m high. Fl. white/white-pink Aug to Dec.	Grey/white sand. Swampy areas, seasonally wet areas.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally wet and swampy areas) is present within the survey area.
Loxocarya magna	-	P3	Phoenix 2025a	Rhizomatous, perennial, herb (sedge-like), 0.5-1.5 m high. Fl. Sep or Nov.	Sand, loam, clay, ironstone. Seasonally inundated or damp habitats.	Potential	Nearby records.	Unlikely	Suitable habitat may be present in damp areas. However, is a conspicuous

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
									species and was not recorded.
Netrostylis sp. Blackwood River (A.R. Annels 3043)	-	P3	Phoenix 2025a	Sprawling sedge 30 cm–1.7 m high x 50 cm wide. (Phoenix 2025x). Fl Nov.	Drainage lines, creek beds.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (drainage lines, creek beds) is present within the survey area.
Acacia inops	-	P3	Phoenix 2025a	Weak, scrambling, pungent shrub, 0.4-1.1 m high. Fl. white-cream, Sep to Nov.	Black peaty sand, clay. Swamps, creeks.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., black peaty sand, swamps, creeks) is present within the survey area.
Acacia lateriticola glabrous variant (B.R. Maslin 6765)	-	P3	Phoenix 2025a	Shrub, 0.4-0.8 m high. Fl. yellow, Aug or Oct.	Lateritic sand in Jarrah and Marri forest and woodland	Potential	Nearby records.	Potential	Potentially suitable habitat (Jarrah-Marri forest and woodland on sand)
Andersonia sp. Amabile (N. Gibson & M. Lyons 355)	-	P3	Phoenix 2025a	Compact shrub, 0.08-0.3 m high. Fl. pink, Oct to Dec.	Grey or black peaty sand, loam. Creek banks, swamp edges, seasonally wet flats	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e., black peaty sand, swamps, creeks) is present within the survey area.
Blennospora doliiformis	-	P3	Phoenix 2025a	Erect annual, herb, to 0.15 m high. Fl. yellow, Oct to Nov.	Grey or red clay soils over ironstone. Seasonally-wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (i.e. grey or red clay soils over ironstone, seasonally-wet flats) is present in the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
Caladenia abbreviata	-	P3	Phoenix 2025a	Tuberous, perennial, herb, 0.2-0.35 m high. Fl. yellow & brown, Nov to Dec.	Deep sandy soils in coastal woodlands and shrublands.	Potential	Nearby records.	Unlikely	
Chordifex gracilior	-	P3	Phoenix 2025a	Rhizomatous, erect perennial, herb, 0.3-0.5 m high. Fl. brown, Sep to Dec.	Peaty sand. Swamps.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. Peaty sand, swamps) not present in survey area
Chordifex jacksonii	-	P3	Phoenix 2025a	Rhizomatous, erect perennial, herb, 0.4-1 m high. Sand, loamy sand.	Seasonally inundated swamps	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. seasonally inundated swamps) not present in the survey area.
Cyathochaeta stipoides	-	P3	Phoenix 2025a	Rhizomatous, caespitose perennial, grass-like or herb (sedge), (0.25-)0.35-1 m high. Fl. red-brown, Oct to Dec or Jan.	Grey or red-brown sand. Seasonally wet flats. Low heathy sedgelands	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. seasonally wet flats) not present in the survey area.
Cyathochaeta teretifolia	-	P3	Phoenix 2025a	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown.	Grey sand, sandy clay. Swamps, creek edges.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. swamps and creek edges) not present in the survey area.
Lepyrodia heleocharoides	-	P3	Phoenix 2025a	Rhizomatous, slender, tufted perennial, herb (sedge-like), 0.15-0.25 m high. Fl. Dec.	Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps. Moist sedge-heath.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. moist peaty sand) not present in the survey area.
Leucopogon wheelerae	-	P3	Phoenix 2025a	Sprawling shrub to 80cm. Erect white	Restricted to heath or woodland edge on	Potential	Nearby records.	Unlikely	Potentially suitable habitat

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
				inflorescence,fl. Aug - Oct. (WAH 2008)	seasonally wet flats (WAH 2008).				(i.e. seasonally wet flats) not present in the survey area.
Stylidium trudgenii	-	P3	Phoenix 2025a	Caespitose perennial, herb, 0.05-0.5 m high.	Grey sand, dark grey to black sandy peat. Margins of winter-wet swamps, depressions.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. winter-wet swamps and depressions) not present in the survey area.
Synaphea otiostigma	-	P3	Phoenix 2025a	Decumbent to erect small shrub. Fl. yellow, Oct to Nov.	Clayey laterite, gravelly loam, sand.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. clayey laterite) not present in the survey area.
Synaphea petiolaris subsp. simplex	-	P3	Phoenix 2025a	Tufted shrub, 0.1-0.6 m high. Fl. yellow, Sep to Oct.	Sandy soils. Flats, winter-wet areas.	Potential	Nearby records.	Potential	No targeted survey undertaken during flowering time. Potentially suitable habitat identified within the survey area.
Tricostularia davisii	-	P3	Phoenix 2025a	Perennial tufted herb, 0.1 - 0.6m tall. Dense tussocks 0.15-0.7m across. Tufting habit, thin, one or two nodes culms and small. (Barrett et al. 2021)	Mallee woodland and heath on flats, hillsides and valleys in a variety of soils including grey sand, brown sandy clay, swampy peaty sand over clay, lateritic loam, granite, spongelite and soapstone. Often in damp or winter-wet areas (Barrett et al. 2021).	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e mallee woodland) not present in the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
Adenanthos x pamela	-	P4	Phoenix 2025a	Erect, lignotuberous shrub, 0.75-1.7 m high. Fl. orange/red, May or Oct to Dec.	Grey sand, laterite. Damp flats, roadsides.	Potential	Nearby records.	Unlikely	Suitable habitat may be present. However, is a conspicuous species and was not recorded.
Aotus carinata	-	P4	Phoenix 2025a	Erect, slender shrub, 0.6-1.5 m high. Fl. orange/yellow & red, Sep to Nov.	Sandy soils. Seasonally wet flats.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (seasonally wet flats) is present within the survey area.
Adenanthos detmoldii	-	P4	Phoenix 2025a	Erect, diffuse, lignotuberous shrub, 0.9-4 m high. Fl. yellow-orange, Jan or Apr or Jun or Aug to Dec.	Grey or black peaty sand, wet. Swamps, roadsides.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (peaty sand) is present within the survey area.
Melaleuca basicephala	-	P4	Phoenix 2025a	Straggly shrub, 0.3-0.9 m high. Fl. pink-purple, Dec or Jan.	Black peaty sand, clay. Winter-wet flats, swamps.	Potential	Nearby records.	Unlikely	No potentially suitable habitat (black peaty sand in winter-wet flats or swamps) is present within the survey area.
Acacia tayloriana	-	P4	Phoenix 2025a	Prostrate shrub. Fl. cream-white, Jan.	Grey or yellow/orange sandy soils, lateritic gravel, clay loam. Winter-wet areas.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. winter wet areas) not present in the survey area.
Astartea onycis	-	P4	Phoenix 2025a	Shrub 0.2-1.2m tall, spindly, over very slender but up to 1m wide. Flowers 4-7mm diameter, white or pale	Pale grey sand or sandy clay over clay in seasonally wet sedgelands, mainly on plaints not far from the coast such as Scott River plain. Associated species	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. seasonally wet sedgelands) not present in the survey area.

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
				pink in Summer (WAH 2021)	include other myrtaceous species associated with wetlands such as species of *Taxandria*.				
Calothamnus quadrifidus subsp. teretifolius	-	P4	Phoenix 2025a	Shrub to 5m tall, stems glabrous leaves terete 15-35mm long.Fl. Sep - Dec. (WAH 2010)	Clay with ironstone, wet in winter, tall shrubland (WAH 2010)	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. clay with ironstone) not present in the survey area.
Drosera fimbriata	-	P4	Phoenix 2025a	Erect tuberous, perennial, herb, 0.05-0.15 m high. Fl. white, Sep to Oct.	White sand, granite.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. granite) not present in the survey area.
Gonocarpus pusillus	-	P4	Phoenix 2025a	Prostrate annual, herb, 0.05-1.2 m high. Fl. green/yellow-red, Nov to Dec.	Grey sandy clay. Winter-wet swamps	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. winter wet swamps) not present in the survey area.
Gonocarpus simplex	-	P4	Phoenix 2025a	Tufted perennial, herb, 0.2-0.6 m high. Fl. green/red-brown, Nov to Dec.	Peaty sand. Swamps, seasonally inundated areas.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. peaty sand and swamps) not present in the survey area.
Myriophyllum trifidum	-	P4	Phoenix 2025a	Decumbent annual semi-aquatic herb.	Grey sandy clay depressions in winter-wet flats where it grows in very low heath of tea tree and twine rushes.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. depressions in low heath of tea tree) not present in the survey area.
Stylidium leeuwinense	-	P4	Phoenix 2025a	Perennial herb . Flowers sessile, silvery white.	Black sandy soil on swampy heathland (WAH 1997)	Potential	Nearby records.	Unlikely	Potentially suitable habitat

Taxon	EPBC Act	BC Act / DBCA	Source	Description	Habitat	Pre-survey	Justification	Post-survey	Justification
				Corolla reddish purple. Fl. Feb - May. (WAH 1997)					(i.e. black sandy soil on swampy heathland) not present in the survey area.
Tripterococcus sp. *Brachylobus (A.S. George 14234)*	-	P4	Phoenix 2025a	Perennial, herb, to 1 m high. Fl. yellow-green, Oct to Nov.	Grey, black or peaty sand. Winter-wet flats.	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. winter-wet flats) not present in the survey area.
Verticordia lehmannii	-	P4	Phoenix 2025a	Slender shrub, 0.2-1 m high. Fl. pink, Jan or Apr to Jun or Aug or Dec.	Sandy clay. Winter-wet flats	Potential	Nearby records.	Unlikely	Potentially suitable habitat (i.e. winter-wet flats) not present in the survey area.

Appendix H Fauna likelihood of occurrence assessment

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Pseudocheirus occidentalis	Western Ringtail Possum	CR	CR	Phoenix 2025b	Preferred habitat for this species includes Peppermint forests, woodlands, and Eucalyptus forests, usually with a Peppermint understorey, where the species feeds exclusively in the dominant or co-dominant upper and mid-storey (DPaW 2017).	Potential	Nearby records and suitable habitat present.	Potential	Moderate value habitat present in survey area. Recent nearby records. Habitat patch is isolated from other areas of high value habitat, limiting the ability for individuals to move freely throughout the landscape.
Calidris ferruginea	Curlew Sandpiper	CR/MI	CR	Phoenix 2025b	Widespread throughout Australia, both along coastlines and inland (DoE 2015). Abundant on intertidal mudflats, sheltered coastal areas and non-tidal wetlands. Foraging occurs on mudflats and in shallow water nearby. Does not breed in Australia. Breeding occurs in the Russian Arctic.	Potential	Nearby records.	Unlikely	Suitable habitat not recorded.
Zanda baudinii	Baudin's Cockatoo	EN	EN	Phoenix 2025b	The Baudin's Cockatoo typically inhabits the temperate forests and woodlands of the southwest of Western Australia that are dominated by Jarrah, Marri and Karri (Johnstone et al. 2010). Generally, night roosting habitat occurs in or near riparian environments or other permanent water sources, comprising tall trees, but particularly Jarrah, Flooded Gum, Blackbutt, Tuart and introduced eucalypts such as Blue Gum and Lemon Scented Gum (DAWE 2022).	Potential	Nearby records and suitable habitat present.	Likely	High value habitat present in survey area. Recent nearby records.

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Zanda latirostris	Carnaby's Cockatoo	EN	EN	Phoenix 2025b	Carnaby's Cockatoo utilises a variety of forests, shrublands and Banksia woodlands. The species uses native shrubland, kwongan heathland and proteaceous woodland, including Banksia woodland for foraging, where it feeds on mainly the seeds and less often the nectar of Eucalyptus spp., Banksia spp., Hakea spp. and Pinus spp. (DCCEEW 2023). Roosting habitat occurs in or near riparian environments or natural and artificial permanent water sources and comprises any tall trees, but particularly Flat-topped Yate, Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, and introduced Eucalypts and Pines (DAWE 2022). Breeding generally occurs in remnant patches of woodland, forests and individual trees, typically consisting of Eucalypt species such as Wandoo, Tuart, Jarrah, York Gum, Salmon Gum, Flooded Gum, Powderbark, Karri and Marri.	Potential	Nearby records and suitable habitat present.	Likely	High value habitat present in survey area. Recent nearby records.
Botaurus poiciloptilus	Australasian Bittern	EN	EN	Phoenix 2025b	This species typically inhabits freshwater wetlands, and to a lesser extent estuaries or tidal wetlands (Marchant and Higgins 1990). Habitat preferences comprises permanent and seasonal freshwater wetlands with dense vegetation, particularly those dominated by sedges, rushes and/or reeds or cutting grass (Gahnia) growing over a muddy or peaty substrate, as well as rice crops (Marchant and Higgins 1990).	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Tringa nebularia	Common Greenshank	EN/MI	MI	Phoenix 2025b	This species occurs in wetlands throughout Australia (DCCEEW 2023[). Prefers coastal or inland wetlands, in estuaries and mudflats, mangrove swamps and lagoons. Foraging habitat includes mudflats, channels, or the edges of mangroves, sedges and saltmarsh. Breeding occurs in the Palaearctic; it does not breed in Australia.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Dasyurus geoffroii	Chuditch	VU	VU	Phoenix 2025b	This species is known to occur in Jarrah forests and woodlands in the southwest of Western Australia. They are also found in woodlands, mallee shrublands, and heath areas along the south coast. Adequate den resources are crucial for Chuditch, such as hollow logs, burrows, or rock crevices. The species benefits from control of the Red Fox. Riparian Jarrah forests have been found to support the densest populations.	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	VU	Phoenix 2025b	This species roosts in dense forests comprised of most tall trees, but particularly Jarrah, Marri, Blackbutt, Tuart and introduced Eucalypt trees, that on average receive more than 600 mm of annual rainfall (DAWE 2022; Saunders and Ingram 1995). These dense forests are also utilised for foraging, where in small family groups leave the roost at sunrise to feed (Johnstone and Kirkby 1999). It almost exclusively feeds on seeds from Marri and Jarrah, and to a lesser extent Blackbutt, Albany Blackbutt, Forest Sheoak and Snottygobble (Johnstone and Storr 1998; Johnstone and Kirkby 1999). The species is known to nest in the deep hollows of Marri, Wandoo, Blackbutt and Bullich (Johnstone et al. 2013).	Potential	Nearby records and suitable habitat present.	Likely	High value habitat present in survey area. Recent nearby records.
Calidris acuminata	Sharp-tailed Sandpiper	VU/MI	MI	Phoenix 2025b	Records are distributed throughout Australia, mostly to the south-east (DCCEEW 2023). In Western Australia, species records are widespread. The species inhabits several habitats, including saline inland wetlands, damp grasslands, and tidal flats. Forging occurs in wetlands or intertidal mudflats, and the vegetation of saltmarsh, grass or sedges. Spends the non-breeding season in Australia, with breeding occurring in Siberia.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Tringa glareola	Wood Sandpiper	MI	MI	Phoenix 2025b	Recorded in largest numbers in north Western Australia, although also distributed throughout Queensland, Vitoria, New South Wales and South Australia (DCCEEW 2023). The species occurrence in Western Australia is widespread but scattered. Typically inhabits shallow freshwater wetlands well-vegetated with emergent reeds and grass, surrounded by tall plants and dead trees. Foraging occurs in wet or dry mud at the edges of wetlands (Higgins and Davies 1996). Does not breed in Australia, with breeding occurring throughout Eurasia.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Calidris melanotos	Pectoral Sandpiper	MI	MI	Phoenix 2025b	Distributed throughout Australia, although rarely recorded in Western Australia (DCCEEW 2023). In Australia, the species preferred habitat is shallow, fresh to saline wetlands. The species also inhabits grassy edges of shores and tidal marshes, muddy shores. Does not breed in Australia, with breeding occurring in Russia and North America.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Pandion haliaetus	Osprey	MI	MI	Phoenix 2025b	The species is distributed along Australia's northern coastline, from south-west Western Australia to south-east New South Wales (DCCEEW 2023). Habitat includes coastal habitat and terrestrial wetlands of tropical and temperate Australia and offshore islands. Foraging requires the presence of extensive areas of saline, brackish or fresh water. Breeding in Australia occurs from Albany in Western Australia's south and around the northern coastline to southern New South Wales	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Pluvialis fulva	Pacific Golden Plover	MI	MI	Phoenix 2025b	Inhabits coastal habitats like beaches, mudflats and sandflats. Less often recorded in terrestrial habitats, usually wetlands (DCCEEW 2023). Does not breed in Australia. Breeding occurs in northern Siberia, between the Yamal Peninsula, Chukotski Peninsula, and the Gulf of Anadyr.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Tringa stagnatilis	Marsh Sandpiper	MI	MI	Phoenix 2025b	Lives in permanent or ephemeral wetlands of varying salinity (DCCEEW 2023). In Western Australia they prefer freshwater to marine environments. Does not breed in Australia. Breeding occurs in east Europe, southern Siberia and northern China.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Actitis hypoleucos	Common Sandpiper	MI	MI	Phoenix 2025b	Occurs along all Australian coastlines and throughout many inland areas (DCCEEW 2023). Typically found on coastal and inland wetland habitat, mostly on rocky shores and muddy margins. Foraging habitat includes the edges of wetlands, in shallow water and soft mud. Roosting occurs on rocks, roots and vegetation branches, such as mangroves. It does not breed in Australia; the population that migrates to Australia breeds in far east Russia.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Apus pacificus	Fork-tailed Swift	MI	MI	Phoenix 2025b	Recorded in all states and territories of Australia (DCCEEW 2023). In Western Australia, the species has been recorded along most of the coastline. The species is almost exclusively aerial, mostly occurring over inland plains. It is a non-breeding visitor to Australia, with breeding occurring in Siberia.	Potential	Nearby records.	Unlikely	Suitable habitat not recorded.
Calidris ruficollis	Red-necked Stint	MI	MI	Phoenix 2025b	Distributed along the majority of Australia's coastline, with most abundant records on the coast of Tasmania and Victoria (DCCEEW 2023). Most abundant on tidal flats, also occurs on brackish and fresh inland wetlands. Foraging habitat includes intertidal mudflats or sandflats, and in very shallow water. Foraging may occur in non-tidal wetlands during high tide. Does not breed in Australia, with breeding occurring in Alaska and Siberia.	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	-	CD	Phoenix 2025b	This species has been observed in dry sclerophyll forest and open woodlands with hollow-bearing trees (DEC 2012).	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.

Taxon	Common name	Conservation status		Source	Habitat	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA			Pre-survey	Justification	Post-survey	Justification
Falco peregrinus	Peregrine Falcon	-	OS	Phoenix 2025b	This species occurs in most habitats, from the arid zone to rainforests (Birdlife Australia 2023[212]). The Peregrine Falcon prefers open woodlands near water, or coastal and inland cliffs. It is widespread, and hunts over rainforests, estuaries and offshore island seabird colonies.	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.
Tyto novaehollandiae novaehollandiae	Masked Owl (southwest)	-	P3	Phoenix 2025b	This species roosts and nests in heavy forest; hunts over open woodland and farmland (Morcombe and Stewart 2021)	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.
Falsistrellus mackenziei	Western False Pipistrelle	-	P4	Phoenix 2025b	Restricted to area in or adjacent to high rainfall old-growth forest. Wet sclerophyll dominated by Karri and Marri, and in Jarrah and Tuart in higher rainfall areas (Armstrong et al. 2017). Forages in woodland habitats.	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.
Isoodon fusciventer	Quenda	-	P4	Phoenix 2025b	This species typically occurs in dense shrubland and in understorey of adjacent forest. The distribution around Perth is commonly associated with wetlands and woodlands.	Potential	Nearby records and suitable habitat present.	Potential	Suitable habitat present in survey area. Recent nearby records.
Elapognathus minor	Short-nosed Snake	-	P2	Phoenix 2025b	Occurs in heath along the margin of swamps, in sedgeland and in wet sclerophyll forests growing on sandy soil in far south-west of WA. Associated with ephemeral wetlands and shelters in low dense vegetation such as tussocks and sedges (Craig et al. 2017).	Potential	Nearby records.	Unlikely	Suitable habitat not recorded.
Oxyura australis	Blue-billed Duck	-	P4	Phoenix 2025b	This is species is almost entirely aquatic, favouring deep water, and is rarely seen on land (Birdlife Australia 2023).	Potential	Nearby records.	Unlikely	Suitable habitat (wetlands) not recorded.
Notamacropus irma	Western Brush Wallaby	-	P4	Phoenix 2025b	This species is found in some areas of mallee, Banksia woodland and heathland, including dense kwongan. It is also found in tall, open forests that have good grazing areas but some thickets, presumably for shelter (ALA 2023). It is uncommon in wet sclerophyll forest or Karri forest with thick undergrowth.	Potential	Nearby records.	Unlikely	Suitable habitat not recorded.

Appendix I Ecological community likelihood of occurrence assessment

Community Name	Description	Conservation status		Source	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA		Pre-survey	Justification	Post-survey	Justification
Scott River Ironstone Association	The community occurs in a winter-wet habitat on red clay to clay-loam often over massive ironstone on the Scott Coastal Plain. It mainly comprises heaths, shrublands and thickets and is variously dominated by *Melaleuca preissiana* (moonah), *Hakea tuberculata, Kunzea micrantha* or *Melaleuca incana subsp*. Gingilup (P2), depending on the degree of waterlogging. The understorey is generally dominated by *Loxocarya magna* (P3). Most occurrences have very diverse annual flora of *Stylidium* spp. (trigger plants), *Centrolepis* spp., Schoenus spp., Aphelia spp. and other herbs. The community also contains a number of endemic and restricted taxa such as *Darwinia ferricola* (Endangered), *Grevillea manglesioides* subsp. *ferricola* (P3), *Lambertia orbifolia* subsp. Scott River Plains (Endangered) and *Melaleuca incana* subsp. *Gingilup* (P2) (DBCA 2023a). To be considered part of the community, the vegetation must meet the condition of Good or above.	EN	CR	Phoenix 2025a	Potential	Nearby records.	Not recorded	The key diagnostic characteristics of the Scott River Ironstone Association include the presence of a 'shrubland or heathland with an open to closed structure' dominated by *Melaleuca preissiana, Hakea tuberculata, Kunzea micrantha*, or *Melaleuca incana* subsp. Gingilup (N. Gibson & M. Lyons 593) over an understorey of generally *Loxocarya magna*. The two vegetation types recorded in the survey area do not meet this description and as such, the Scott River Ironstone Association was not recorded within the survey area during the assessment.
Empodisma peatlands of southwestern Australia	The Empodisma peatlands of southwestern Australia is the assemblage of native plants, animals and other organisms that comprise a type of seasonally waterlogged freshwater, peat-based wetland. The ecological community predominantly occurs in the Warren Bioregion and the Southern Jarrah Forest subregion of the Jarrah Forest Bioregion. Some occurrences may also occur in high rainfall areas of the Fitzgerald, Northern Jarrah Forest and Perth subregions where climatic, stratigraphic and topographic conditions are suitable for Empodisma peatlands to form. The structure of the ecological community is typically a sedgeland to shrubland vegetation complex on peaty substrates. The undisturbed ground layer of the	EN	-	Phoenix 2025a	Unlikely	Unlikely to be suitable habitat present.	Not recorded	The vegetation community (i.e., a sedgeland to shrubland vegetation complex on peaty substrates dominated by *Empodisma gracillimum*) was not recorded within the survey area during the assessment.

Community Name	Description	Conservation status		Source	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA		Pre-survey	Justification	Post-survey	Justification
	ecological community is often dense and typically comprises a suite of native wetland graminoid and forb species. The ground layer is almost always characterised by the perennial restiad grass-like twig rush Empodisma gracillimum (tanglefoot). Co-dominant or otherwise often occurring Cyperaceae and Restionaceae species include: *Gahnia decomposita, Gymnoschoenus anceps, Lepidosperma striatum, Leptocarpus tenax* (slender twine rush), *Machaerina rubiginosa* (soft twig rush), *Schoenus multiglumis, Sporadanthus rivularis and Reedia spathacea* (reedia). Small trees/woody shrubs within the Empodisma peatlands vary from dense to sparse and may include *Acacia hastulata, Acidonia macrocarpa, Aotus intermedia, Boronia stricta, Callistemon glaucus* (Albany bottlebrush), *Cosmelia rubra* (spindle heath), *Dampiera leptoclada* (slender-shooted dampiera), *Homalospermum firmum, Sphaerolobium fornicatum, Taxandria fragrans, T. linearifolia* and *Tetratheca filiformis*. Trees vary from sparse to absent within the ecological community but may include *Eucalyptus megacarpa* (blue gum of Western Australia, Bullich), *Melaleuca preissiana* (moonah, modong) and *Taxandria juniperina* (watti, native cedar) as emergents or on the edge of the ecological community (DCCEEW 2023).							
Subtropical and Temperate Coastal Saltmarsh (analogous with the Subtropical and Temperate Coastal Saltmarsh EPBC-listed TEC)	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of subtropical and temperate Australia (south of 23oS latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs,	EN	P3	Phoenix 2025a	Unlikely	Unlikely to be suitable habitat present.	Not recorded	The vegetation community (i.e., coastal saltmarsh community along estuaries with tidal influences) was not recorded within the survey area during the assessment.

Community Name	Description	Conservation status		Source	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA		Pre-survey	Justification	Post-survey	Justification
	succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, *Melaleuca, Casuarina* or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community (DCCEEW 2024).							
Reedia spathacea – Empodisma gracillimum - Sporadanthus rivularis dominated floodplains and paluslopes of the Blackwood Plateau.	Diverse closed sedges and rushes to 1.5 m in height of *Reedia spathacea/Empodisma gracillimum/Sporadanthus rivularis* with open low shrubs to open scrub of *Taxandria linearifolia*. Threats: altered fire regimes, weed invasion, clearing (DBCA 2023)	-	P1	Phoenix 2025a	Unlikely	Unlikely to be suitable habitat present.	Not recorded	The vegetation community (i.e., closed sedgeland dominated by *Reedia spathacea, Empodisma gracillimum, Sporadanthus rivularis* with open low shrub layer of *Taxandria linearifolia*) was not recorded within the survey area during the assessment.
Aquatic Root Mat Community Number 1 of Caves of the Leeuwin-Naturaliste Ridge (Easter and Jewel Caves)	The community occurs in the cave system of the Leeuwin-Naturaliste Ridge incorporating Easter and Jewel Caves (DBCA 2023).	EN	CR	Phoenix 2025a	Unlikely	Restricted to the Easter and Jewel Caves of the Leeuwin-Naturaliste Ridge)	Not recorded	This community is restricted to cave environments not present in the survey area.
Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines (Augusta microbialites)	The community occurs along the south-west coast near Augusta and comprises microbialites, which are structures produced through the growth and metabolic activity of benthic microbial communities (DBCA 2023).	-	EN	Phoenix 2025a	Unlikely	Unlikely to be suitable habitat present.	Not recorded	This community is restricted to cave environments not present in the survey area.
Tall closed sedgeland on shallow soils derived from granite gneiss on the Leeuwin-Naturaliste	Tall closed sedgeland of *Juncus kraussii, Baumea juncea*, and *Schoenoplectus validus*; tall closed sedgeland of *Typha orientalis*, over *S. validus, Lepidosperma gladiatum* and *Muehlenbeckia adpressa*; low closed sedgeland of *Ficinia nodosa* and *Baumea juncea* on	-	P1	Phoenix 2025a	Unlikely	Unlikely to be suitable habitat present.	Not recorded	The vegetation community (i.e., tall closed sedgeland dominated by *Juncus krausii, Baumea juncea, Schoenoplectus validus, Typha orientalis, Ficinia nodosa* etc.) was

Community Name	Description	Conservation status		Source	Likelihood of occurrence assessment			
		EPBC Act	BC Act / DBCA		Pre-survey	Justification	Post-survey	Justification
Ridge ('Sedgelands of the Cape Leeuwin Spring')	shallow soils derived from granite gneiss on the Leeuwin-Naturaliste Ridge (DBCA 2023).							not recorded within the survey area during the assessment.
Aquatic Root Mat Community Number 4 of Caves of the Leeuwin-Naturaliste Ridge (Calgardup Cave)	The community occurs in the cave system of the Leeuwin-Naturaliste Ridge incorporating Calgardup Cave (DBCA 2023a).	EN	CR	Phoenix 2025a	Unlikely	Restricted to the Calgardup Cave of the Leeuwin-Naturaliste Ridge)	Not recorded	This community is restricted to cave environments not present in the survey area.

Appendix J Flora Species Matrix

Family	Species name	REL01	REL02	REL03
Anarthriaceae	*Anarthria scabra*	X		X
Asteraceae	**Arctotheca calendula*			X
Asteraceae	**Hypochaeris glabra*			X
Asteraceae	*Lagenophora huegelii*	X	X	
Asteraceae	**Ursinia anthemoides*			X
Cyperaceae	*Lepidosperma gracile*		X	X
Cyperaceae	*Mesomelaena tetragona*	X	X	X
Dasypogonaceae	*Dasypogon bromeliifolius*			X
Droseraceae	*Drosera sp.*	X		X
Iridaceae	**Romulea rosea*			X
Juncaceae	*Juncus pallidus*			X
Lindsaeaceae	*Lindsaea linearis*	X		
Loranthaceae	*Nuytsia floribunda*	X	X	
Myrtaceae	*Beaufortia sparsa*			X
Myrtaceae	*Corymbia calophylla*	X	X	
Myrtaceae	*Eucalyptus marginata subsp. marginata*	X	X	
Myrtaceae	*Taxandria parviceps*	X	X	X
Orchidaceae	*Pterostylis vittata*	X	X	
Poaceae	**Briza maxima*		X	X
Restionaceae	*Desmocladus fasciculatus*			X
Restionaceae	*Hypolaena exsulca*	X	X	
Rubiaceae	*Opercularia hispidula*		X	
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	X	X	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	X	X	X

*Introduced species

Appendix K Relevé Data

Site	Date	Site type	Observer
REL01	26/06/2025	Relevé	GM/LS
Condition	**Disturbances**	**Fire history (years)**	**Soil description**
Excellent	Grazing, weeds	Old (>20)	Grey/white Sand
Outcropping (%)	**Bare ground (%)**	**Leaf litter (%)**	**Coarse woody debris (%)**
0	1	30	5
Landform/rock type	**Vegetation type**	**Easting**	**Northing**
Limestone	CcTpCeOh	340734	6215078



Species	Cover (%)	Stratum (U=Upper, M=Middle, G=Ground)	Sub-Stratum
Corymbia calophylla	40	U	Trees 10 – 30 m
Eucalyptus marginata **subsp.** *marginata*	45	U	Trees 10 – 30 m
Nuytsia floribunda	1.5	U	Trees <10 m
Taxandria parviceps	0.1	M	Shrubs > 2 m
Xanthorrhoea preissii	3	M	Shrubs 1 – 2 m
Mesomelaena tetragona	0.5	M	Shrubs <1 m
Xanthorrhoea gracilis	1	M	Shrubs <1 m
Anarthria scabra	3	G	Sedges
Lagenophora huegelii	0.02	G	Herbs
Drosera **sp.**	0.01	G	Herbs
Lindsaea linearis	0.02	G	Herbs
Pterostylis vittata	0.01	G	Herbs
Hypolaena exsulca	0.1	G	Herbs

Site	Date	Site type	Observer
REL02	26/06/2025	Relevé	GM/LS
Condition	**Disturbances**	**Fire history (years)**	**Soil description**
Very Good	Weeds	Old (>20)	Grey/white sandy loam
Outcropping (%)	**Bare ground (%)**	**Leaf litter (%)**	**Coarse woody debris (%)**
0	2	25	10
Landform/rock type	**Vegetation type**	**Easting**	**Northing**
Limestone	CcTpCeOh	340762	6215058



Species	Cover (%)	Stratum (U=Upper, M=Middle, G=Ground)	Sub-Stratum
Corymbia calophylla	20	U	Trees 10 – 30 m
Eucalyptus marginata **subsp.** *marginata*	40	U	Trees 10 – 30 m
Nuytsia floribunda	5	U	Trees <10 m
Taxandria parviceps	3	M	Shrubs >2 m
Xanthorrhoea preissii	10	M	Shrubs 1 – 2 m
Xanthorrhoea gracilis	5	M	Shrubs <1 m
Mesomelaena tetragona	2	M	Sedges
Lepidosperma gracile	20	M	Sedges
**Briza minor*	0.01	G	Grasses
Lagenophora huegelii	0.1	G	Herbs
Pterostylis vittata	0.01	G	Herbs
Hypolaena exsulca	1	G	Herbs
Opercularia hispidula	0.3	M	Herbs

Site	Date	Site type	Observer
REL03	26/06/2025	Relevé	GM/LS
Condition	**Disturbances**	**Fire history (years)**	**Soil description**
Degraded	Grazing, weeds, clearing	Old (>20)	Grey sandy loam
Outcropping (%)	**Bare ground (%)**	**Leaf litter (%)**	**Coarse woody debris (%)**
0	20	5	2
Landform/rock type	**Vegetation type**	**Easting**	**Northing**
Limestone	XpAs	340738	6215056



Species	Cover (%)	Stratum (U=Upper, M=Middle, G=Ground)	Sub-Stratum
Taxandria parviceps	10	M	Shrubs >2 m
Xanthorrhoea preissii	30	M	Shrubs >2 m
Beaufortia sparsa	0.5	M	Shrubs >2 m
Mesomelaena tetragona	15	M	Shrubs <1 m
Juncus pallidus	0.1	G	Shrubs <1m
Anarthria scabra	0.5	G	Sedges
Lepidosperma gracile	3	M	Sedges
**Briza maxima*	5	G	Grasses
Opercularia hispidula	0.3	M	Herbs
Drosera sp.	0.1	G	Herbs
**Hypochaeris glabra*	0.5	G	Herbs
**Ursinia anthemoides*	1	G	Herbs
Desmocladus fasciculatus	0.5	M	Herbs
**Romulea rosea*	20	G	Herbs
**Arctotheca calendula*	0.5	G	Herbs

Appendix L Scott River Ironstone Association TEC assessment

Key diagnostic characteristics (DSEWPac 2013)	Outcome
Known occurrences of the community are limited to the Warren Bioregion.	The survey area is located within the Warren bioregion and therefore meets this criterion.
Soils are typically shallow, loamy sands above a substrate of ironstone.	The survey area lies on top of non-saline wet soil and pale deep sand. The soils within the relevés were described as grey/white sand occurring over Limestone and therefore did not meet this criterion.
Sites are typically seasonally inundated in winter but some areas may only experience wet/damp soils in winter.	The survey area was not seasonally inundated and although the soil was damp, it was unlikely to be to such an extent to meet this criterion.
Topsoils generally dry out quickly in late spring or summer.	Alignment with this criterion is unable to be determined given this survey was conducted in winter.
Vegetation is shrubland or heathland with an open to closed structure.	The XpAs vegetation type occurs within the survey area occurs as an open shrubland, therefore it meets this criterion.
Dominant species in the overstorey may be *Melaleuca preissiana* (moonah), *Hakea tuberculata*, *Kunzea micrantha* or *Melaleuca incana* subsp. *Gingilup* (N.Gibson & M.Lyons 593) (grey honey-myrtle).	The overstorey for the vegetation within the survey area did not contain either *Melaleuca preissiana* (moonah), *Hakea tuberculata*, *Kunzea micrantha* or *Melaleuca incana* subsp. *Gingilup* (N.Gibson & M.Lyons 593) (grey honey-myrtle).
The understorey is generally dominated by *Loxocarya magna.*	The understorey for the vegetation within the survey area did not contain Loxocarya magna.
An annual herbaceous layer is present in the dry season (Oct–April). All occurrences (except the wetter/swampier or more closed shrublands patches) have a diverse annual flora of *Stylidium* spp. (trigger-plants), *Centrolepis* spp., *Schoenus* spp. (bog-rush) and *Brizula* (now *Aphelia*) spp.	Alignment with this criterion is unable to be determined given this survey was conducted in June.

Appendix M Fauna Species List

Species name	Common name	Sign	Listing
Mammals			
Macropus fuliginosus melanops	Grey Kangaroo	Direct Observation	-
Birds			
Dromaius novaehollandiae	Emu	Direct Observation	-
*Dacelo novaeguinaea**	Laughing Kookaburra	Direct Observation	-
Barnardius zonarius semitorquatus	Australian Ringneck	Direct Observation	-
Platycercus icterotis icterotis	Western Rosella	Direct Observation	-
Malurus splendens	Splendid Fairywren	Direct Observation	-
Gymnorhina tibicen	Australian Magpie	Direct Observation	-
Rhipidura leucophrys	Willie Wagtail	Direct Observation	-
Corvus coronoides perplexus	Australian Raven	Direct Observation	-
Hirundo neoxena	Welcome Swallow	Direct Observation	-

*Introduced species



Attachment 4 (RSD) - Appendix K

Basic and Targeted Vertebrate Fauna Survey

PHOENIX
ENVIRONMENTAL SCIENCES

Basic and Targeted fauna survey for a Proposed Wind Farm in Scott River

Prepared for Synergy Renewable Energy Development Pty Ltd

August 2025

Final



Basic and targeted vertebrate fauna survey for a Proposed Wind Farm in Scott River

Prepared for Synergy Renewable Energy Development Pty Ltd

Version history

Author/s	Reviewer/s	Version	Version number	Date submitted	Submitted to
P. Williams, K. Fox	J. Clark	Draft for client comments	0.1	18-Mar-24	N. Bell
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EXECUTIVE SUMMARY

Synergy Renewable Energy Development Pty Ltd is investigating the feasibility of a Proposed Wind Farm in Scott River, located approximately 15 km north-east of Augusta, Western Australia. Phoenix Environmental Sciences Pty Ltd (Phoenix) has undertaken a Basic and Targeted fauna survey for the Project to identify fauna of conservation significance to inform the feasibility and design layouts. The study area is 3,891.6 ha and comprises the wind farm area ('WFA') and 3 road intersection areas ('RIAs').

A desktop review compiled a list of potentially occurring species, habitats, and environmental attributes relevant to the Project. This information was used to inform the design of the Basic and Targeted fauna survey that was undertaken by experienced zoologists over 3 phases between August 2023 and January 2025. Phoenix also conducted a bird and bat risk assessment survey (BBRAS) for the Project over 2023 to 2025, which is documented in detail in a separate report; however, the species recorded are referenced in this report for a complete list of the fauna assemblage for the study area.

The desktop review identified records of 262 vertebrate taxa, with 256 being native and 6 introduced. The list comprised 12 amphibians, 24 reptiles, 198 birds and 28 mammals. Of these, 71 are conservation significant, with the majority (45) being listed as Migratory (Mig.) species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Biodiversity Conservation Act* 2016 (BC Act). Forty-one species are also listed as Threatened and 9 species are listed as Priority species. Three Threatened species have previously been recorded in the study area based on the desktop records: Baudin's Cockatoo (*Zanda baudinii*; Endangered (EN)), Carnaby's Cockatoo (*Zanda latirostris*; EN), and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; Vulnerable (VU)).

Ten fauna habitat types were identified in the study area: 3 wetland habitats; 2 woodlands; and 5 highly modified habitats, the latter covering approximately 80% of the study area. The native habitat suite comprised many small, isolated (and often degraded) remnants of limited value, as well as several larger patches which are typically in better condition. Many of the large patches have been fenced off to prevent stock access.

The wetlands were a mix of Seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 378 ha (9.7%) of the study area. Nearly all were relatively shallow with water level typically less than 1 m. They dried up through late spring, with a couple of exceptions. The woodlands comprised Marri-Jarrah-Peppermint woodland and Open woodland of Peppermint trees (degraded), together covering 420.9 ha (10.8%). They occurred as remnant vegetation patches and roadside vegetation in the WFA, as well as in the central and eastern RIAs.

The faunal assemblage identified in the surveys was ~58% of the possible richness identified in the desktop species list, with 122 species recorded in this Basic and Targeted fauna survey and additional species recorded in the BBRAS taking the total for the study area to 158 species. This included 12 species that were not identified in the desktop review. With several wetlands present and an abundance of seasonally inundated paddocks, waterbirds were prominent in the fauna assemblage. Raptors were also prevalent (14 species), and 17 mammals were recorded, including 8 bats, 3 marsupials and 6 introduced species. Red Fox was observed on multiple occasions, often during the day in the open.

Ten conservation significant species were recorded in the study area based on the results of the Basic and Targeted fauna survey and the BBRAS:

- Western Ringtail Possum (*Pseudocheirus occidentalis*; Critically Endangered)
- Baudin's Cockatoo (*Zanda baudinii*; EN)
- Carnaby's Cockatoo (*Zanda latirostris*; EN)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU)

- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; Priority (P) 3)
- Quenda (*Isoodon fusciventer*; P4)
- Western False Pipistrelle (*Falsistrellus mackenziei*; P4)
- Wood Sandpiper (*Tringa glareola*; Mig.)
- Osprey (*Pandion haliaetus*; Mig.)
- Peregrine Falcon (*Falco peregrinus*; species otherwise in need of special protection).

Four other significant species were considered likely to occur based on record currency and suitability of available habitat in the study area.

Of the 5 native habitat types, all have some value for significant vertebrate fauna, although this did not apply to the entire extent of each habitat type due to differences in condition, patch size and isolation:

- Marri-Jarrah-Peppermint woodland – records of, and contains suitable habitat for, all 3 black cockatoo species, Western Ringtail Possum, Masked Owl (southwest) and Western False Pipistrelle. Contains suitable habitat for Quenda and Peregrine Falcon. Contains most (88.9%) of the potential nesting trees (PNT) for black cockatoos in the study area and the only high-quality foraging habitat.
- Open woodland of Peppermint trees (degraded) – contains suitable habitat for Baudin's Cockatoo, Forest Red-tailed Black Cockatoo, Western False Pipistrelle, Masked Owl (southwest) and Peregrine Falcon. Degraded nature of the understorey limits the value to most ground-dwelling species, and a lack of tree hollows and tree diversity limits value to nesting birds and arboreal mammals. Few PNTs.
- Seasonally inundated paperbark woodland (wetland) – contains suitable habitat for several Migratory shorebirds, Wood Sandpiper recorded. Contains suitable habitat for all 3 black cockatoo species, Quenda, Peregrine Falcon and Osprey. Few PNTs.
- Seasonally inundated sedgeland (wetland) – contains suitable habitat for all 3 black cockatoo species, several Migratory shorebirds, Western False Pipistrelle, Quenda, Peregrine Falcon and Osprey. Records of Western False Pipistrelle, foraging records of Baudin's Cockatoo and/or Carnaby's Cockatoo.
- Seasonally inundated shrubland (wetland) – records of, and suitable habitat for, Western False Pipistrelle and Quenda. Suitable habitat for all 3 black cockatoo species, several Migratory shorebirds, Peregrine Falcon and Osprey. Contains 7.1% of PNTs in the study area.

Suitable foraging habitat for Migratory shorebirds is mainly restricted to small window between early/mid-spring – early summer, when the birds have arrived in the Southwest and while wetlands remain inundated. Despite repeat sampling over 2 Migratory shorebird seasons, only a single Migratory shorebird has been detected, Wood Sandpiper. No overwintering has been detected. The results of this study therefore strongly suggest that wetlands in the study area do not represent important Migratory shorebird habitat at any time of the year.

All 3 species of black cockatoo were directly observed, with additional detections obtained via the long-term audio recorders deployed in Phase 3. Forest Red-tailed Black Cockatoo was directly observed most, followed by Carnaby's Cockatoo and then Baudin's Cockatoo. All 3 species were most observed moving about and over the study area, rather than actively using it, although several instances of foraging were observed directly, mainly by Forest Red-tail Black Cockatoo. Conversely, the long-term audio recorders detected white-tailed black cockatoos more frequently than Forest Red-tailed Black Cockatoo.

No evidence to suggest any of the 3 species breed or have night roosts in the study area was recorded despite extensive surveillance, which is not surprising given no known nesting trees and only 4 suitable nesting trees were identified from 760 PNTs recorded in the study area. The survey results indicate

the primary value of the habitats in the study area to black cockatoos is in providing foraging resources. Extensive foraging habitat for black cockatoos is present in the vicinity of the study area, with Jarrah Forest occurring directly to the north and east, and proteaceous shrublands and *Banksia* woodlands to the south-west in the Scott National Park.

The study area falls outside the Swan Coastal Plain management zone for the Western Ringtail Possum under the recovery plan for the species, which identifies habitat critical as being associated with Peppermint woodlands. While the study area contains Peppermint woodland, it is highly degraded and occurs in isolated patches and therefore is not considered suitable for Western Ringtail Possum. However, the Marri-Jarrah-Peppermint woodland habitat appears to be of importance to the species, with several direct records made from this habitat type, including females with juveniles. Occurrence in the WFA appears to be restricted to the woodland remnants near its boundaries, where such habitat is contiguous with larger intact remnants outside the WFA. Similarly, the records from the RIA suggest the same, i.e. a direct connection to habitat with a much larger extent outside the study area, in this case the South Blackwood State Forest.

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ACRONYMS AND ABBREVIATIONS

Abbreviation	Description
ARU	Autonomous recording unit
BBRAS	Bird and bat risk assessment survey (Phoenix 2025a)
BCE	Bamford Consulting Ecologists
BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CAMBA	China-Australia Migratory Bird Agreement
CD	Conservation Dependent
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Regional Development
EOO	Extent of occurrence
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority (WA)
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
FRTBC	Forest Red-tailed Black Cockatoo
IBRA	Interim Biogeographic Regionalisation of Australia
IBSA	Index of Biodiversity Surveys for Assessment
IUCN	International Union for the Conservation of Nature
JAMBA	Japan-Australia Migratory Bird Agreement
NES	National Environmental Significance
OS	Species otherwise in need of special protection
PEC	Priority Ecological Communities
PNT	Potential Nesting Tree
RIA	The 3 road intersection areas
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SP	Specially protected
SWREL	South West Regional Ecological Linkages
TEC	Threatened Ecological Communities
WA	Western Australia
WAPC	Western Australian Planning Commission
WFA	Wind Farm Area
WRP	Western Ringtail Possum

1 INTRODUCTION

Synergy Renewable Energy Development Pty Ltd (SynergyRED) is a wholly owned subsidiary of Synergy Pty Ltd. SynergyRED is investigating the feasibility of a Proposed Wind Farm in Scott River (the Project), located approximately 15 km north-east of Augusta, Western Australia (WA; Figure 1-1). In April 2023, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by SynergyRED to undertake Basic and Targeted vertebrate fauna survey for the Project.

1.1 OBJECTIVES AND SCOPE OF WORK

The objective of the Basic and Targeted vertebrate fauna survey was to identify fauna of conservation significance to inform the feasibility and design layouts. The survey will be used to support environmental and planning approvals as required.

The scope of the Basic and Targeted fauna survey was to:

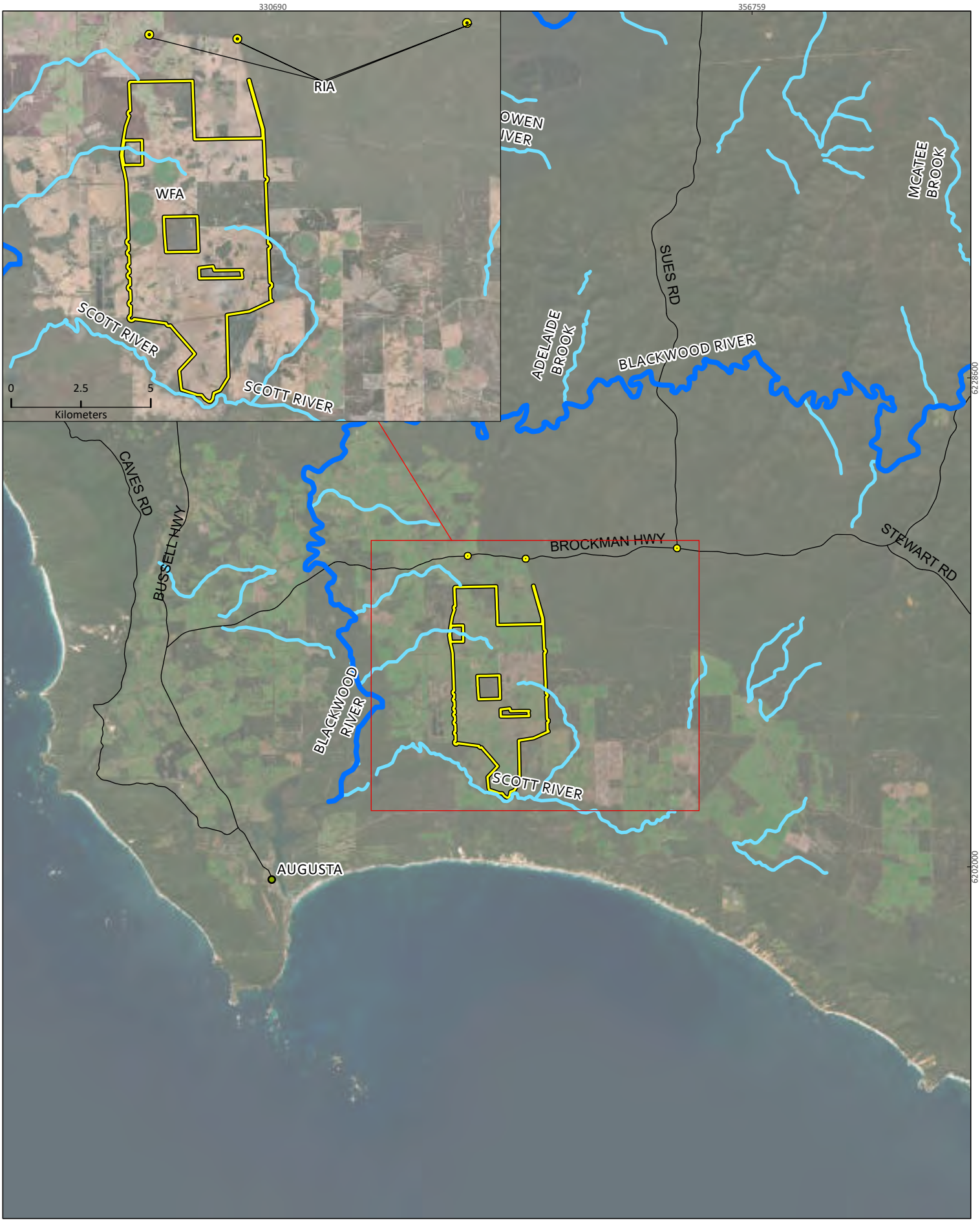
- identify potentially occurring significant fauna species via a desktop assessment
- document occurring fauna species detectable via a Basic fauna survey
- map general fauna habitats and identify habitats for significant species
- conduct targeted surveys for black cockatoos, Australasian Bittern and Western Ringtail Possum.

Phoenix also conducted a bird and bat risk assessment survey (BBRAS) for the Project over 2 years between 2023 and 2025. The results of that survey are documented in detail in Phoenix (2025a) but records of conservation significant birds and bats are also reported here for completeness, as appropriate.

1.2 STUDY AREA

The total study area is 3,891.6 ha and comprises (Figure 1-1):

- the wind farm area (the 'WFA', approximately 3,882.2 ha)
- 3 road intersection areas (the 'RIAs', approximately 9.4 ha).





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	12/06/2025
Drawn by	BK
Map author	KC

0 5 10
Kilometers

1:266,000 (at A4) GDA 1994 MGA Zone 50

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- Study area
- Major watercourses
- Minor watercourses
- Roads

Figure 1-1

Project location and study area

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2 LEGISLATIVE CONTEXT

The protection of fauna in WA is principally governed by 3 acts:

- Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- State Biodiversity Conservation Act 2016 (BC Act)
- State Environmental Protection Act 1986 (EP Act).

2.1 COMMONWEALTH

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act provides for the listing of Threatened fauna as matters of National Environmental Significance (NES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES, require approval from the Australian Government Minister for the Environment through a formal referral process. Key threats and habitat critical to the survival of EPBC Act Threatened species are usually defined in the conservation advice and/or recovery plan for the species.

Conservation categories applicable to Threatened fauna species under the EPBC Act are as follows:

- Extinct (EX)1 – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD)1 – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

The EPBC Act is also the enabling legislation for protection of Migratory species as matters of NES under several international agreements:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened fauna species (Government of Western Australia 2018a, b) in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future2
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future2

[1] Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

[2] As determined in accordance with criteria set out in the ministerial guidelines.

- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future2.

Species may also be listed as specially protected (SP) under the BC Act in one or more of the following categories:

- species of special conservation interest (conservation dependent fauna, CD) – species with a naturally low population, restricted natural range, of special interest to science, or subject to or recovering from a significant population decline or reduction in natural range,
- Migratory species (Mig.), including birds subject to international agreement,
- species otherwise in need of special protection (OS).

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and maintains a non-statutory list of Priority fauna. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna lists are assigned to one of 4 Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species and its listing is otherwise in accordance with the ministerial guidelines. This provision pertains to formal listing by the Minister, as distinct from (for example) critical habitat for a Threatened fauna species referred to in a recovery plan or conservation advice.

2.2.3 Other significant fauna

Under the EPA's environmental factor guideline, fauna may be considered significant for a range of reasons other than listing as a Threatened or Priority species. EPA (2016a) identifies the following attributes that constitute significant fauna:

- species with restricted distribution
- species subject to a degree of historical impact from threatening processes
- providing an important function required to maintain the ecological integrity of a significant ecosystem.

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into 89 'bioregions' and 419 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). In WA there are 27 bioregions and 55 subregions. The study area is located predominantly within the Warren (WAR01) subregion, with a very small area (mainly the RIAs) in the north within the Southern Jarrah Forest (JAF02) subregion (Figure 3-1). The Warren bioregion (and analogous subregion) is made up of dissected undulating country of the Leeuwin Complex, Southern Perth Basin (Blackwood Plateau), south-west intrusions of the Yilgarn Craton and western parts of the Albany Orogen. The area sustains loamy soils supporting Karri forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting low Jarrah woodlands and paperbark/sedge swamps, and holocene marine dunes with Agonis flexuosa and Banksia woodlands and heaths (May & McKenzie 2003). The Southern Jarrah Forest subregion is made up of duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean (May & McKenzie 2003).

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

DPIRD undertook land system mapping for WA using a nested soil-landscape mapping hierarchy (Schoknecht & Payne 2011). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004). The study area intersects 2 land systems (Table 3-1; Figure 3-2).

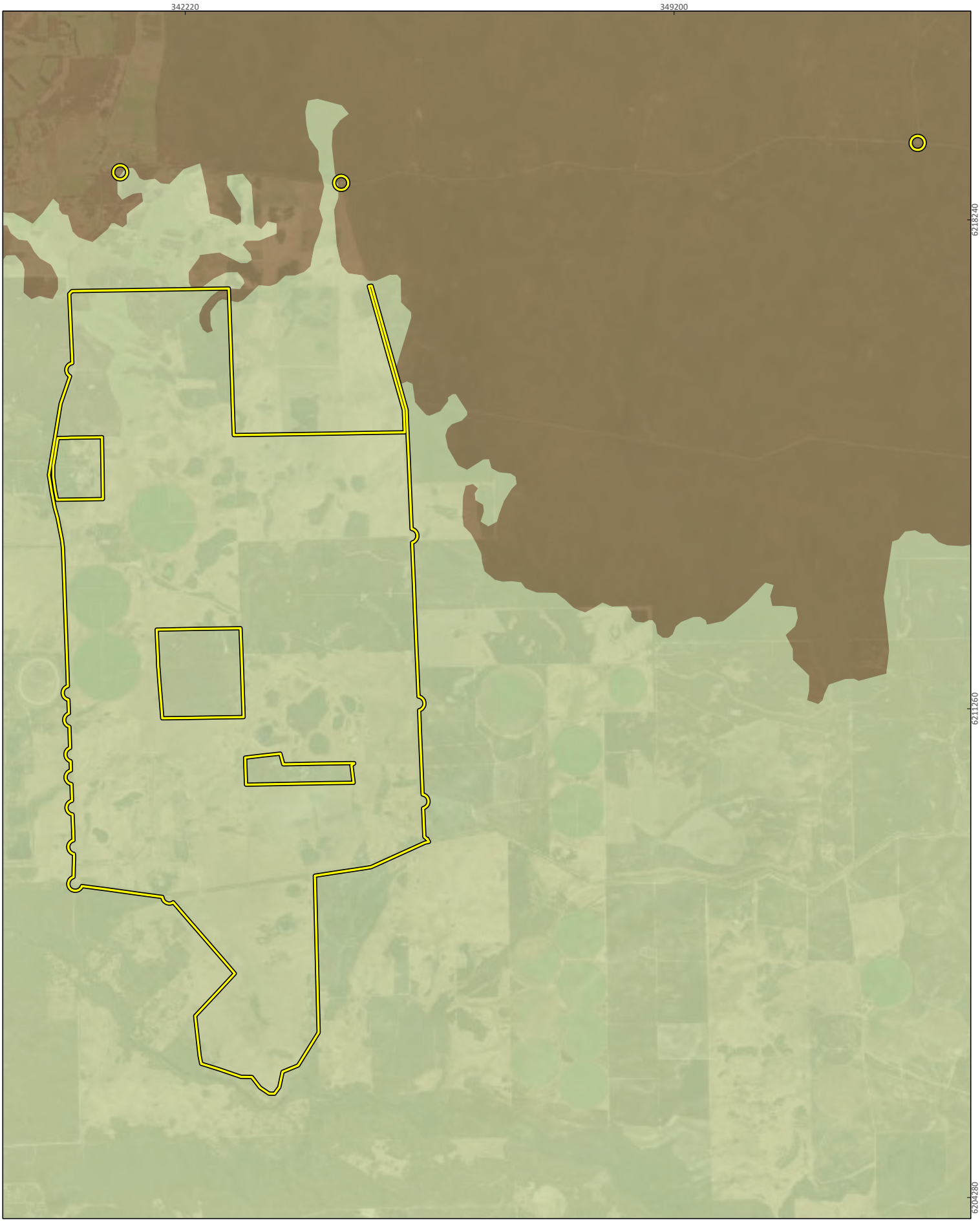
Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
Nillup Plain System	Poorly drained plain, in the southern Donnybrook Sunkland. Sandy gravel, non-saline wet soil, grey deep sandy duplex, loamy gravel and pale deep sands. Jarrah-Marri-paperbark woodland.	26.8	0.7
Scott River Plain System	Poorly drained coastal plain, in the southern Donnybrook Sunkland. Non-saline wet soil and pale deep sand. Heaths, sedgelands and Jarrah-Marri-paperbark woodland.	3,864.8	99.3
	Total	**3,891.6**	**100**

According to the Surface Geology of Australia 1:1,000,000 scale, WA database (Stewart *et al.* 2008), the study area intersects 3 geological formations (Table 3-2; Figure 3-2).

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
Estuarine, lagoonal, and lacustrine deposits 74394	Cze	Estuarine, lagoonal, and lacustrine deposits. Numerous small lakes and swamps. Linear dunes common.	3,832.9	98.5
Bunbury basalt	Kbb	Porphyritic tholeiitic basalt.	49.3	1.3
Ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite.	9.4	0.2
		Total	**3,891.6**	**100.0**





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	17/04/2025
Drawn by	BK
Map author	KC

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Kilometers

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Study area

Region, subregion

Jarrah Forest, Southern Jarrah Forest

Warren, Warren

Figure 3-1

Study area in relation to IBRA bioregions and subregions

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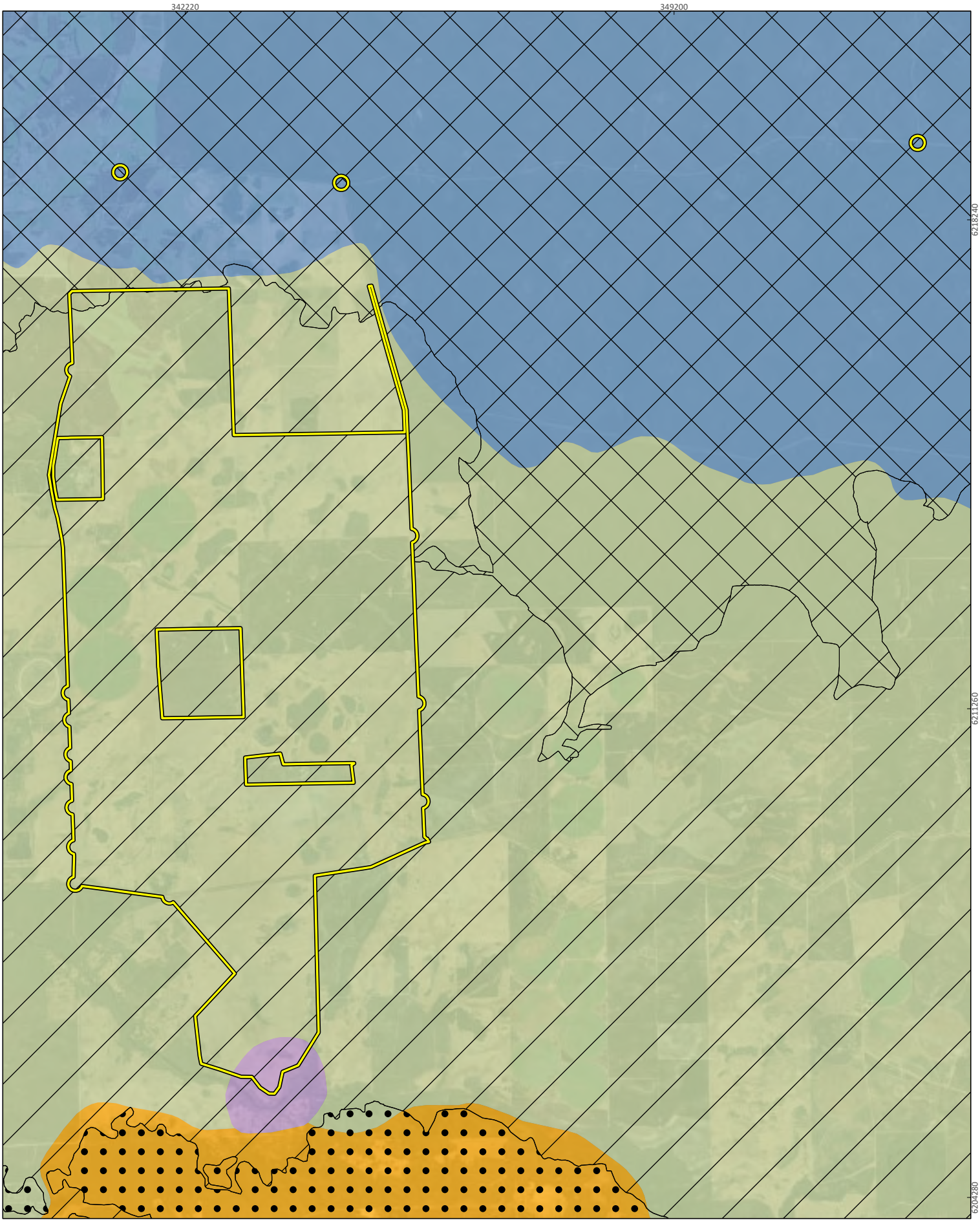



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Study area

Surface geology
- Cze
- Czl
- Kbb
- Qdct

Land system
- D'Entrecasteaux Dunes System
- Nillup Plain System
- Scott River Plain System

Figure 3-2

Land systems and surface geology in the study area

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3.3 CLIMATE AND WEATHER

The climate of the Warren (WAR01) subregion is described as Warm Mediterranean and moderate Mediterranean, respectively. The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate data is Cape Leeuwin (no. 009518, Latitude: 34.37°S Longitude 115.14°E), located 17.8 km south-west of the study area.

Cape Leeuwin records the highest mean maximum monthly temperature (23.4°C) in February and the lowest in July and August (16.5°C). The lowest mean minimum monthly temperature in June (11.3°C) and highest in February (17.3°C) (Figure 3-3). Mean annual rainfall is 947.5 mm, with July and June recording the highest mean monthly rainfall total (178.2 mm and 174.1 mm, respectively) (Figure 3-3).

Daily mean maximum and minimum temperatures at Cape Leeuwin between May 2023 and January 2025 (which includes all survey months) were almost all higher than long-term averages (Figure 3-3), in some cases substantially, e.g. monthly mean maximum temperature for October 2023 was 2°C higher than the long-term average and May 2024 was 3°C higher. Across the complete survey period, monthly mean maximum and minimum temperatures were on average, 1.1°C and 1.0°C above the long-term means, respectively. The above average temperatures over the survey period are reflective of the warming trend occurring within south-west WA.

Rainfall records from Cape Leeuwin show monthly totals during 2023–2025 did not correlate closely with long-term averages. Only 4 months (of 21 months shown) received higher than average monthly rainfall totals (June 2023, March 2024, April 2024, June 2024 and August 2024). August 2024 received the highest rainfall with 228.4 mm received compared to the long-term average of 135.1 mm. This is reflective of the drying trend occurring within south-west WA.

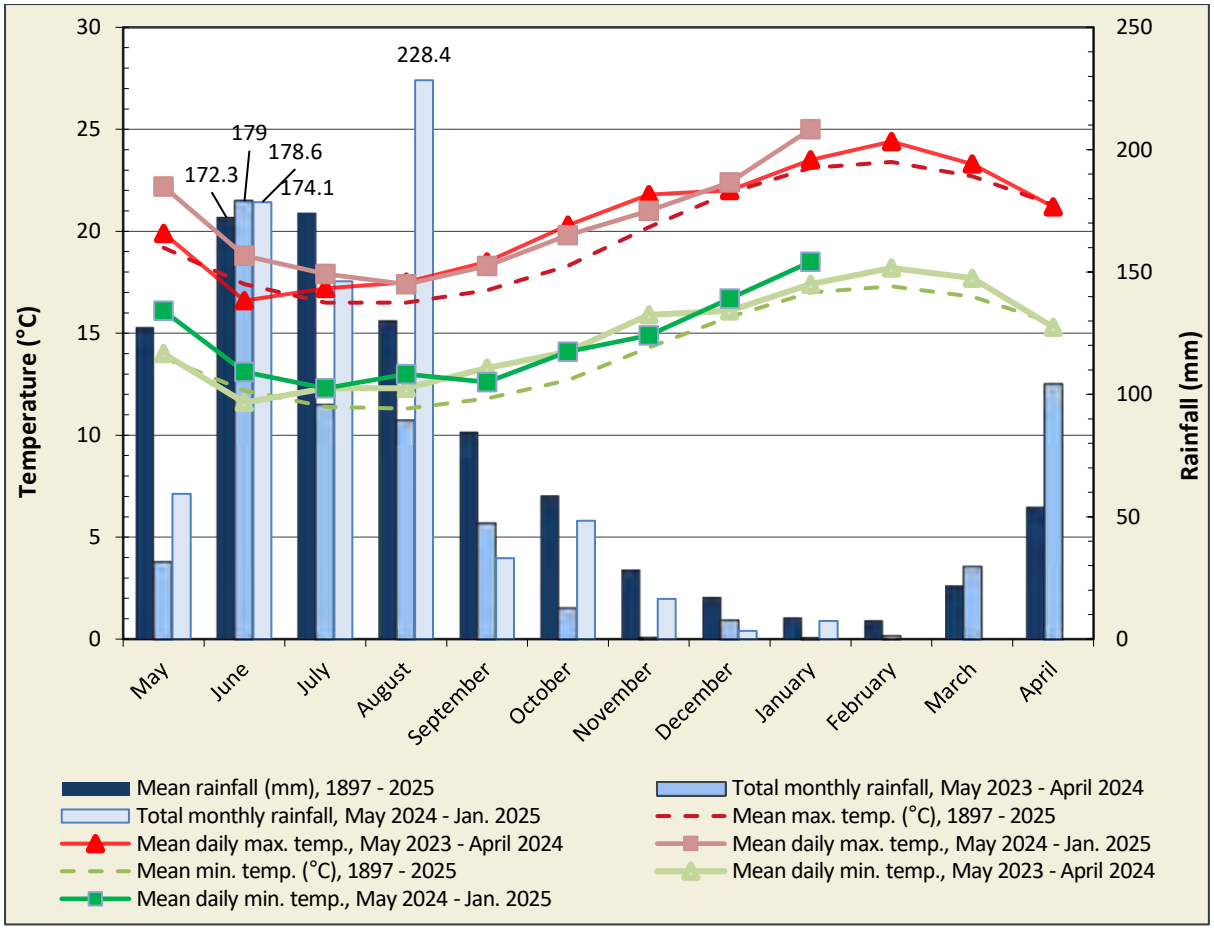


Figure 3-3 **Annual climate and weather data for Cape Leeuwin (no. 009518) and mean monthly data for the survey period (BoM 2024)**

3.4 LAND USE

Land use within the Warren and Southern Jarrah Forest subregions consists of predominantly dryland agriculture and plantations (3,739,542 ha or 36%), the majority of which is modified pastures for grazing, and cropping (Table 3-3). This is closely followed by conservation and natural environments (3,572,471 ha or 34%), the majority of which is subclass 1 – "nature conservation", being 24% of the total area. Similar proportions of the region are used for irrigated agriculture and plantations (132,365 ha), intensive uses (101,356 ha) and water (162,785 ha).

Table 3-3 **Land use within the Warren and Southern Jarrah Forest regions (ABARES 2018)**

Land use	Area (ha)
1 Conservation and natural environments	**3,572,471**
1.1 Nature conservation	2,486,646
1.2 Managed resource protection	1,089
1.3 Other minimal use	1,084,737
2 Production from relatively natural environments	**2,649,200**
2.1 Grazing native vegetation	61,997
2.2 Production native forests	2,587,203

Land use	Area (ha)
3 Production from dryland agriculture and plantations	**3,739,542**
3.1 Plantation forests	771,191
3.2 Grazing modified pastures	1,830,075
3.3 Cropping	1,128,405
3.4 Perennial horticulture	361
3.5 Seasonal horticulture	95
3.6 Land in transition	9,414
4 Production from irrigated agriculture and plantations	**132,365**
4.0 Production from irrigated agriculture and plantations	35
4.1 Irrigated plantation forests	598
4.2 Grazing irrigated modified pastures	56,813
4.3 Irrigated cropping	334
4.4 Irrigated perennial horticulture	62,330
4.5 Irrigated seasonal horticulture	8,406
4.6 Irrigated land in transition	3,849
5 Intensive uses	**101,356**
5.0 Intensive uses	4
5.1 Intensive horticulture	249
5.2 Intensive animal production	6,865
5.3 Manufacturing and industrial	2,008
5.4 Residential and farm infrastructure	41,183
5.5 Services	10,148
5.6 Utilities	268
5.7 Transport and communication	24,566
5.8 Mining	15,462
5.9 Waste treatment and disposal	599
6 Water	**162,785**
6.0 Water	8
6.1 Lake	51,489
6.2 Reservoir/dam	32,353
6.3 River	10,755
6.4 Channel/aqueduct	63
6.5 Marsh/wetland	53,748
6.6 Estuary/coastal waters	14,369
Grand total	**10,357,716**

3.5 CONSERVATION RESERVES AND ESAS

Numerous conservation reserves, national parks and State Forest occur within 10 km of the study area (Figure 3-4). Two National Parks and 2 Nature Reserves and one State Forest partially intersect and/or share a boundary with the study area:

- Blackwood River National Park – intersects part of the most eastern RIA (~0.6 ha)
- Scott National Park – very small (~0.07 ha) intersect at the south-west corner of the WFA
- Pagett Nature Reserve – adjoins part of the eastern boundary of the WFA
- Unnamed R42377 Nature Reserve – occurs within but excluded from the WFA
- South Blackwood State Forest – intersects part of the central RIA and adjoins part of the eastern boundary of the WFA (~2.4 ha).

Several additional reserves also occur within 10 km of the study area:

- Milyeannup National Park
- Wiltshire-Butler National Park
- Leeuwin-Naturalist National Park
- Unnamed WA46400 National Park
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Ngari Capes Marine Park
- Unnamed R42942 Nature Reserve
- Unnamed R15185 Nature Reserve
- Unnamed O20125 Timber Reserve
- Unnamed O12925 Timber Reserve
- Blackwood State Forest
- Milyeannup State Forest.

The gazetted Environmentally Sensitive Areas (ESA) dataset (DWER 2023), which lists areas of high conservation value, shows 61 ESAs intersecting the study area, collectively covering 3,853.3 ha (99% of the study area; Figure 3-5). These appear to be associated with Threatened flora, TECs and wetlands. The mapped polygons encompass a buffer for each value, typically 50 m for Threatened flora/wetlands and between 500 m – 2,000 m for TEC, therefore the true spatial extent of ESAs in the study area is likely much lower than the mapped ESA polygons in Figure 3-5.

3.6 SURFACE HYDROLOGY

Two ephemeral watercourses are located within 10 km of the study area; the Blackwood River located approximately ~4.5 km east of the study area at its closest point; and the Scott River located approximately 1 km south of the study area (Figure 3-6). Both Rivers discharge to the Hardy Inlet, located 8 km south-west of the study area. The Geoscience Australia WA Lakes dataset demarcates the lower reaches of the Scott River ~3.7 km west of the study area as a perennial lake (Figure 3-6).

A number of minor waterways traverse the study area, primarily flowing from north-east to south-west towards the Blackwood River, with a smaller proportion flowing in a southeasterly direction towards Scott River located approximately 1 km south of the study area (Stantec 2025). Approximately 10 km of coastline is also present within 10 km of the study area.

The 'Blackwood River (Lower Reaches) and Tributaries System' is listed as a nationally important wetland (Figure 3-6), which is listed for being a good example of lower reaches of a river (the largest)

in south-western Australia, and good examples of near-pristine creeks (e.g. Spearwood Creek) (DCCEEW 2022a). Another nationally important wetland, the Gingilup-Jasper Wetland System, is located ~19 km east-south-east of the study area (Figure 3-6). This is recognised in the listing as an outstanding example of a near-pristine, extensive system of freshwater lakes, marshes and shrub swamps including the deepest, large freshwater lake in south-western Australia (Lake Jasper) (DCCEEW 2022a). No RAMSAR sites are located in or near the study area.

According to the Geomorphic Wetlands, Augusta to Walpole (DBCA-017) dataset (WRC 2017), which is based on mapping by V. & C. Semeniuk Research Group (2017), ~83% of the study area is wetland (Figure 3-6). The mapping indicates that the study area is dominated by Palusplain (seasonally waterlogged flat) wetlands and includes numerous damplands (seasonally waterlogged basin) and Sumplands (seasonally inundated basin) (Figure 3-6). It was evident from the field surveys and aerial imagery however, that the wetland boundaries are not accurate, and that much of the single polygon that defines the extent of Palusplain wetland is today agricultural land. Currently no management categories have been assigned to the DBCA-017 dataset.

3.7 ECOLOGICAL LINKAGES

The importance of ecological linkages is recognised by existing environmental and planning policy documents (e.g. EPA Guidance Statement 10, EPA Guidance Statement 33 - Chapters B1, B2 and B3, EPA Bulletin 1108 Greater Bunbury Region Scheme Report and Recommendations, and the Western Australian Planning Commission Statement of Panning Policy No 2 Environment and Natural Resources Policy 2003) and is increasingly considered as part of Environmental Impact Assessment, particularly in the Southwest, Great Southern and Wheatbelt regions of WA due to the high degree of fragmentation in those landscapes.

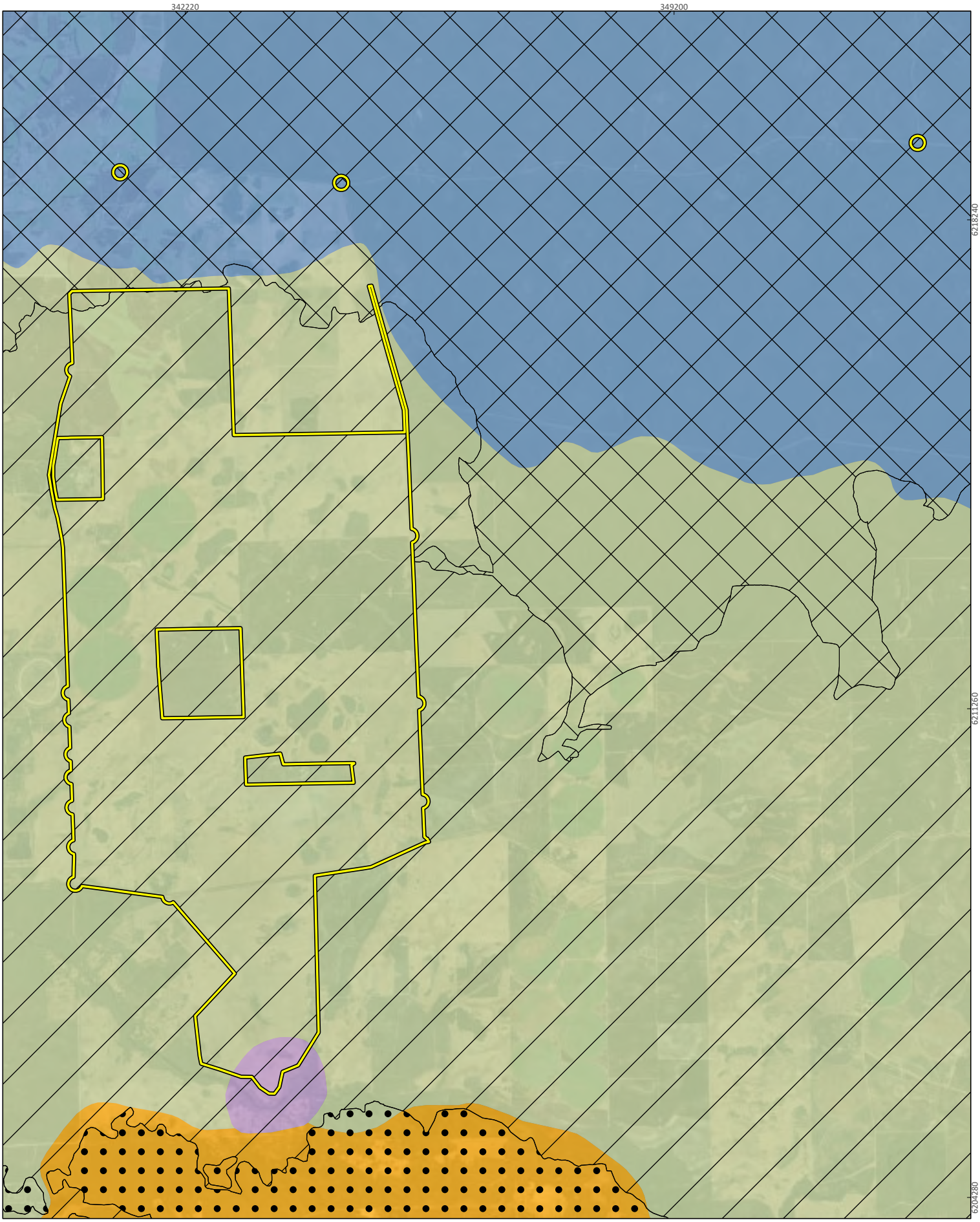
The South West Regional Ecological Linkages (SWREL) Project identified a network of regional-scale ecological linkages throughout the Southwest region (Molloy *et al.* 2009). The network was subsequently extended into the eastern Jarrah Forest, Avon Wheatbelt and Mallee IBRA regions and into the Serpentine-Jarrahdale Shire (Molloy & Deeley 2013)

An ecological linkage was defined by Molloy *et al.* (2009) as:

> "a series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape."

Ecological linkages are just one measure of the biodiversity conservation value of a patch of native vegetation. The purpose of an ecological linkage therefore is to recognise a patch's additional value to biodiversity conservation and thus they allow managers and planners to achieve more effective planning and impact assessment.

The study area is situated at the junction of 3 SWREL linkages (Figure 3-4). One east-west linkage intersects the northern end of the WFA connecting Pagett Nature Reserve/South Blackwood State Forest with Scott National Park. Another east-west linkage borders the southern boundary of the study area following the Scott River between Gingilup Swamps Nature Reserve (and surrounding coastal remnant vegetation) and Scott National Park. The third linkage runs north-south on the eastern boundary of the study area connecting Pagett Nature Reserve/South Blackwood State Forest to coastal remnants south of the study area.





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Drawn by	BK
Map author	JC

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Kilometers

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Study area

Surface geology
- Cze
- Czl
- Kbb
- Qdct

Land system
- D'Entrecasteaux Dunes System
- Nillup Plain System
- Scott River Plain System

Figure 3-2

Land systems and surface geology in the study area

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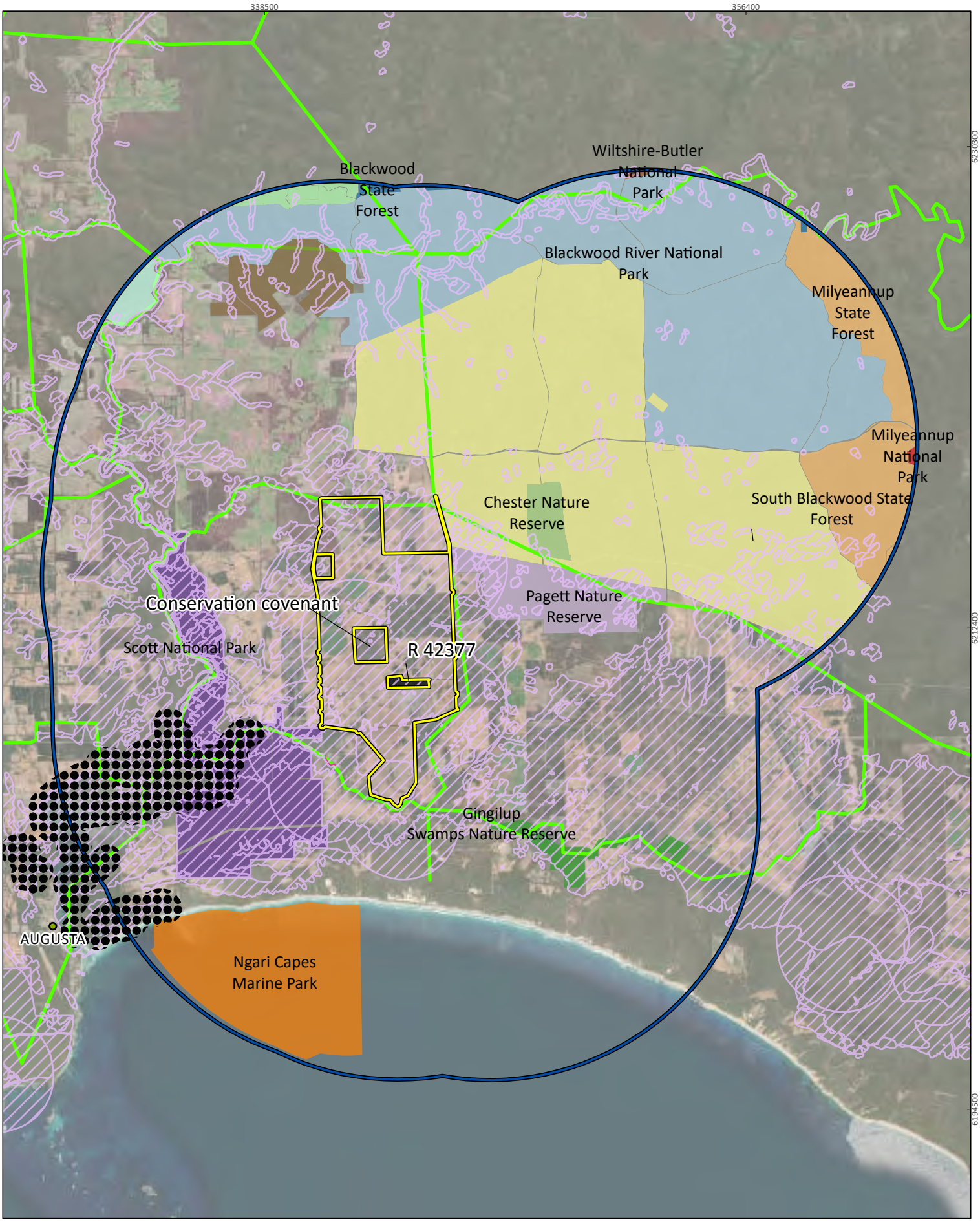



SynergyRED
Scott River Wind Fam

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Map author	KC

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Kilometers

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- Study area
- Bird/Bat Investigation Area
- South West Regional Ecological Linkages
- Environmentally Sensitive Areas

TEC/PECs

- Subtropical and Temperate Coastal Saltmarsh

- O 129 25
- O 201 25
- R 15185
- R 42377
- R 42942
- R 46400

Figure 3-4

Conservation reserves and ecological linkages

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Proposed wind farm in Scott River

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- Study area
- 10 km desktop search extent
- Environmentally Sensitive Areas

Figure 3-5

Environmentally Sensitive Areas

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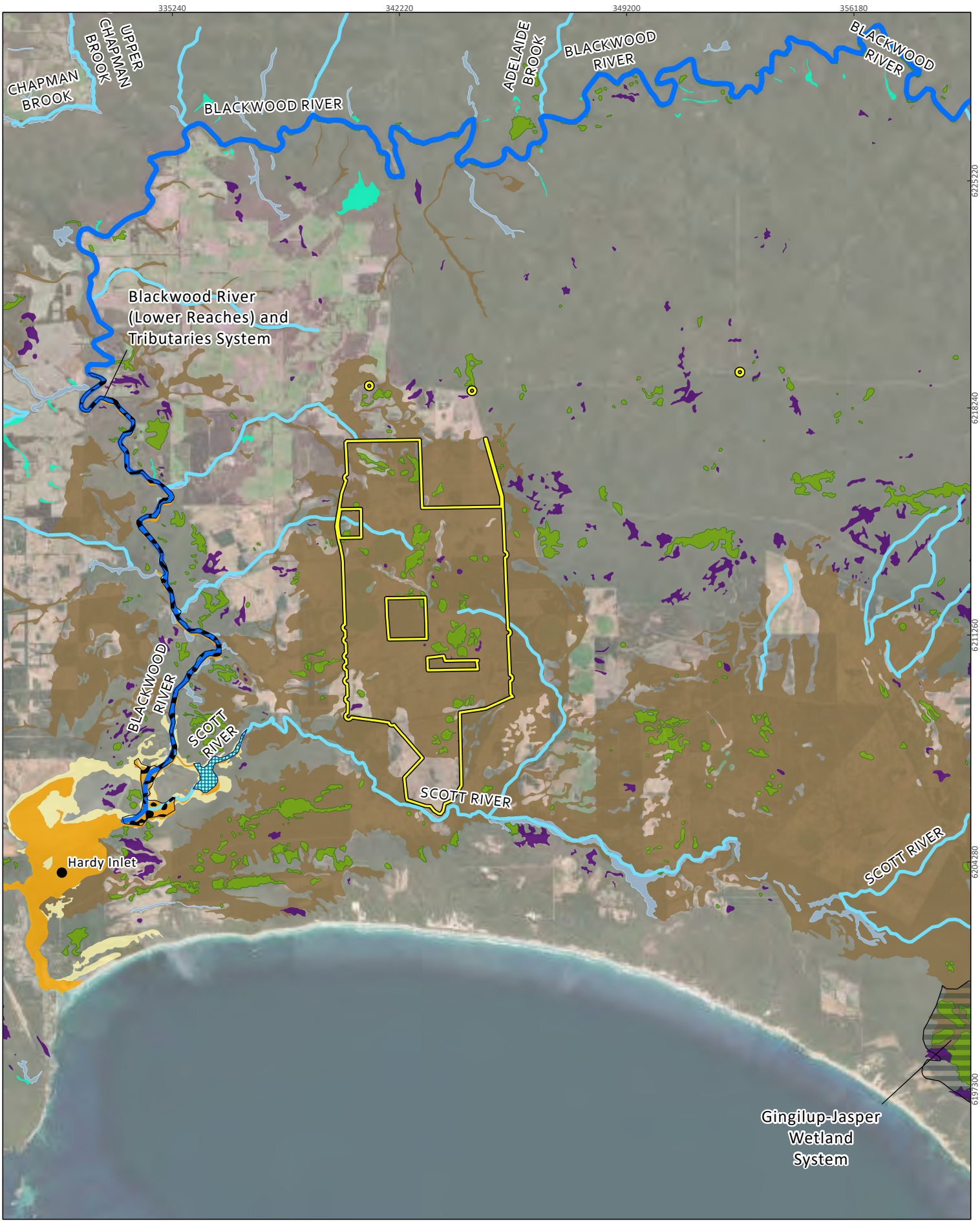



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- Study area

Wetlands

- Dampland (seasonally waterlogged basin)
- Estuary (shoreline and peripheral)
- Estuary (waterbody)
- Floodplain (seasonally inundated flat)
- Paluslope (seasonally waterlogged slope)
- Palusplain (seasonally waterlogged flat)
- Sumpland (seasonally inundated basin)
- Major watercourses
- Minor watercourses
- Lakes

Important wetlands

- Blackwood River (Lower Reaches) and Tributaries System
- Gingilup-Jasper Wetland System

Figure 3-6
Surface hydrology

PHOENIX ENVIRONMENTAL SCIENCES

4 METHODS

The survey was conducted in accordance with the following guidelines and standards:

- Environmental Factor Guideline: Terrestrial fauna (EPA 2016a)
- Technical Guidance: Terrestrial vertebrate fauna surveys for Environmental Impact Assessment (EPA 2020)
- Survey guidelines for Australia's Threatened birds. Guidelines for detecting birds listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DEHWA 2010)
- Survey guidelines for Australia's Threatened mammals. Guidelines for detecting mammals listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DSEWPaC 2011)
- Referral guideline for 3 WA Threatened black cockatoo species Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-cockatoo (Calyptorhynchus banksii naso) (DAWE 2022)
- Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos (Bamford 2021)
- Significant impact guidelines for the vulnerable western ringtail possum (Pseudocheirus occidentalis) in the southern Swan Coastal Plain, Western Australia. Nationally threatened species and ecological communities, EPBC Act policy statement 3.10 (DEWHA 2009b)
- Background paper to EPBC Act Policy Statement 3.10 - Significant impact guidelines for the vulnerable western ringtail possum (Pseudocheirus occidentalis) in the southern Swan Coastal Plain, Western Australia (DEWHA 2009a).

4.1 DESKTOP REVIEW

Searches of several biological databases (at 10 km or 40 km buffer) were undertaken to identify and prepare a list of terrestrial vertebrate fauna that may occur within the study area (Table 4-1). A literature search was conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the lists developed from the database searches (Table 4-2).

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2023a)	EPBC Act listed Threatened fauna and Migratory species	Study area plus a 10 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2023c)	Threatened and Priority Fauna	Study area plus a 10 km buffer
Dandjoo Biodiversity Data Repository (DBCA 2023a)	Fauna records	Study area plus a 10 km buffer
Birdlife Birdata (Birdlife Australia 2023)	Avifauna	Study area plus a 10 km buffer
Index of Biodiversity Surveys for Assessment (IBSA) database (IBSA 2023) for nearby survey reports and data	Fauna survey records and data	Study area plus a 40 km buffer

Table 4-2 Survey reports included in the desktop review

Report author	Survey description	Project
LEC (1990)	Comprehensive fauna survey	Heavy minerals mine Beenup
Biota (2009)	Windfarm survey	Milyeannup wind farm terrestrial fauna survey
Ninox (2011)	Monitoring of waterbirds and vertebrate fauna	Beenup Mineral Sands Mine site 2005 - 2011
Litoria Ecoservices (2016)	Level 1 fauna assessment, Level 1 terrestrial vertebrate fauna	Expansion of recreational facilities at Gloucester Park, Margaret River
Litoria Ecoservices (2017)	Western Ringtail Possum habitat assessment	Augusta Boat Harbour to Dead Finish Pathway Project
ELM (2017)	Fauna assessment	Lot 2602 McDonald Road, Karridale Flora and Fauna Assessment
Harewood (2018)	Targeted vertebrate fauna survey assessment	Turner Caravan Park – Augusta – Fauna Assessment
Ecosystem Solutions (2020)	Fauna significance assessment	Margaret River Senior High School

4.2 FIELD SURVEY

4.2.1 Survey timing

Field surveys were undertaken over 3 phases, an initial survey in August 2023 which focused on sampling wetland habitats in winter to account for rainfall and inundated conditions, followed by a second survey in December 2023 sampling all habitats and when access was better due to evaporation of seasonal wetlands. The third phase was over the spring-summer 2024-2025 period where 14 additional field trips were completed in response to the results of phases 1 and 2 and the first year of the BBRAS survey (Phoenix 2025a). Field survey activities and dates for each phase of the current survey are provided in Table 4-3.

The separate BBRAS conducted for the Project (Phoenix 2025a) was undertaken over 2 years with each site typically achieving between 8 and 14 sample events per phase from autumn 2023 to summer 2025. Those results are referenced where relevant in this report and distinguished from the current survey results.

Table 4-3 Survey dates

Phase	Season	Dates	Task
1	Winter	28-31 August 2023	Habitat assessments and mapping of wetland areas, fauna sampling focused on wetland habitats/fauna (waterbirds and frogs)
2	Summer	6-13 December 2023	Habitat assessments of remaining habitats, fauna sampling of all habitats, targeted surveys for significant species (Western Ringtail Possum, black cockatoos, Australasian Bittern), potential breeding tree assessment
3	Spring	24 and 28 October, 18 and 25, 29 November 2024	Black cockatoo nesting/roosting surveillance, audio recordings for black cockatoos
		27-29 November 2024	Additional potential breeding tree assessment
	Summer	2, 9, 11-12 and 16 December 2024, 6 and 13 January 2025	Black cockatoo nesting/roosting surveillance, audio recordings for black cockatoos
		4-5, 13 and 17 December 2024, 6 and 13 January 2025	Western Ringtail Possum nocturnal searches

4.2.2 Field methods

Field methods for the Basic and Targeted fauna survey included:

- broad fauna habitat assessment (see 4.2.2.1)
- active diurnal searches (4.2.2.2)
- avifauna censusing (4.2.2.3)
- bat echolocation recordings (4.2.2.4)
- targeted survey for black cockatoos (4.2.2.5)
- targeted survey for Western Ringtail Possum (4.2.2.6)
- targeted survey for Australasian Bittern (4.2.2.7).

Sampling was conducted at a total of 151 sites across all survey phases, with work undertaken at each site ranging from habitat descriptions through to multiple sampling methods (Figure 4-1; Table 4-4). Opportunistic records were made at a further 63 locations (Appendix 1).

4.2.2.1 Broad fauna habitat assessment

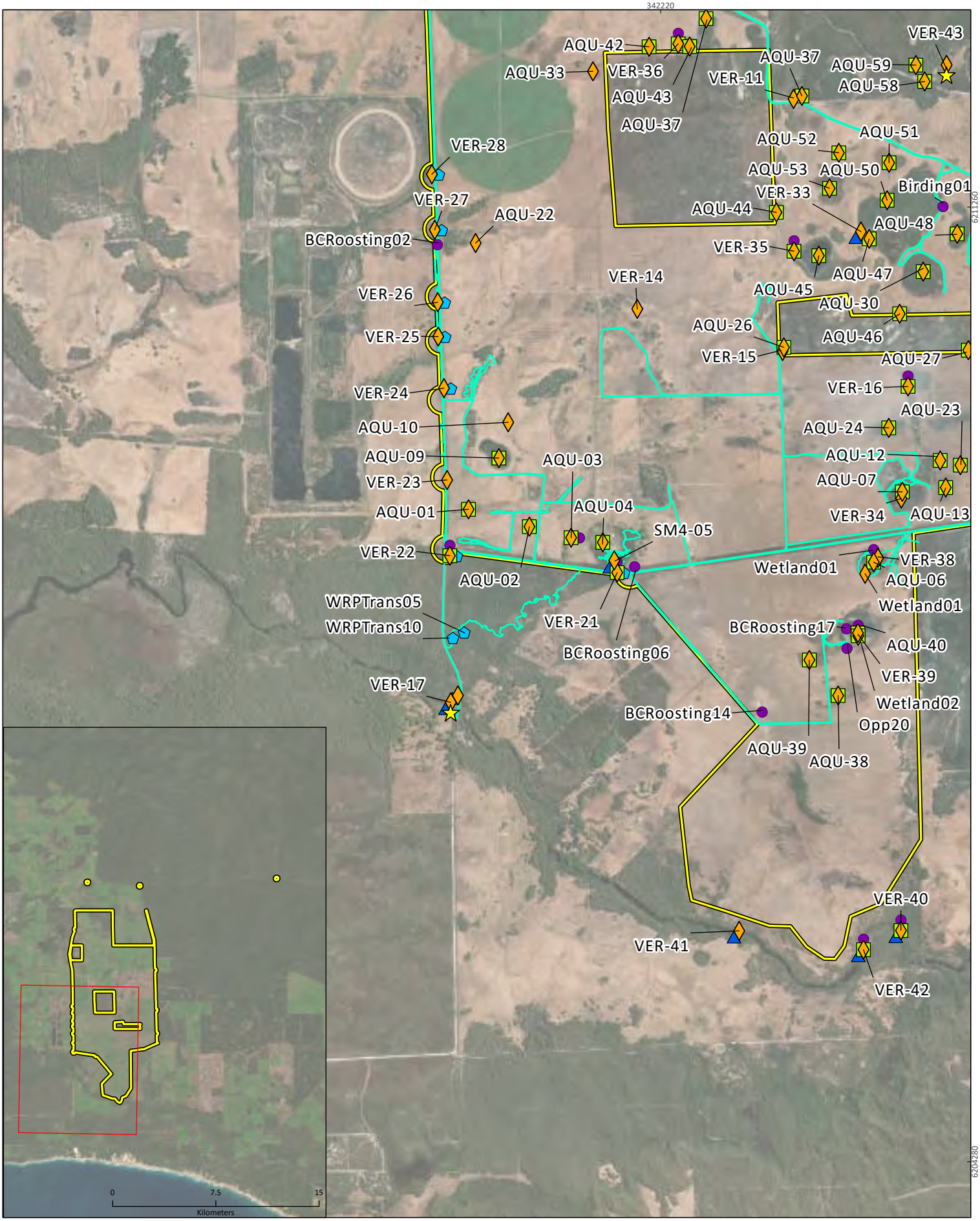
Initial habitat characterisation was undertaken using various remote geographical tools, including aerial photography (Google Earth®), land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats of such species within the Warren and Jarrah Forest bioregions. Tentative sites were selected for the terrestrial fauna survey to represent all habitat types. Site selection was informed by the team who had conducted the (Phoenix 2025a) prior to mobilisation of the Basic fauna survey. Final survey site selection was conducted after ground-truthing of site characteristics.

At the broadest scale, site selection considered aspect, topography, and land systems. At the finer scale, consideration was given to proximity to water bodies (wetlands, drainage lines/creeks), vegetation complexes and condition and soil type. Sites were primarily chosen to represent the best example of distinct habitats within the broader habitat associations of the study area with a focus on

significant species identified in the desktop review. Habitat descriptions and characteristics were recorded at 121 locations (Table 4-4; Appendix 2).

In August 2023 the Augusta-Walpole Geomorphic wetlands boundary file was taken into the field and boundaries of the sumplands and damplands reviewed and adjusted as necessary. The resultant polygon set was then incorporated into the vegetation and fauna habitat mapping. Following the fauna and flora field surveys, vegetation units mapped for the Project (Phoenix 2025b) were reinterpreted to define and map fauna habitats. Vegetation types were grouped by their structure (e.g. woodland versus shrubland), dominant plant species and a range of attributes (e.g. presence of hollows or surface water) with respect to the utility they provide for fauna species; as such plant species composition may differ. Three wetland habitat types were delineated based on vegetation and geomorphology.

Habitat value for 4 targeted significant species was considered further, as part of targeted species surveys (detailed in sections 4.2.2.5 and 4.2.2.6).





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	16/04/2025
Drawn by	BK
Map author	KC

0 0.5 1
Kilometers

1:35,750 (at A4) GDA 1994 MGA Zone 50

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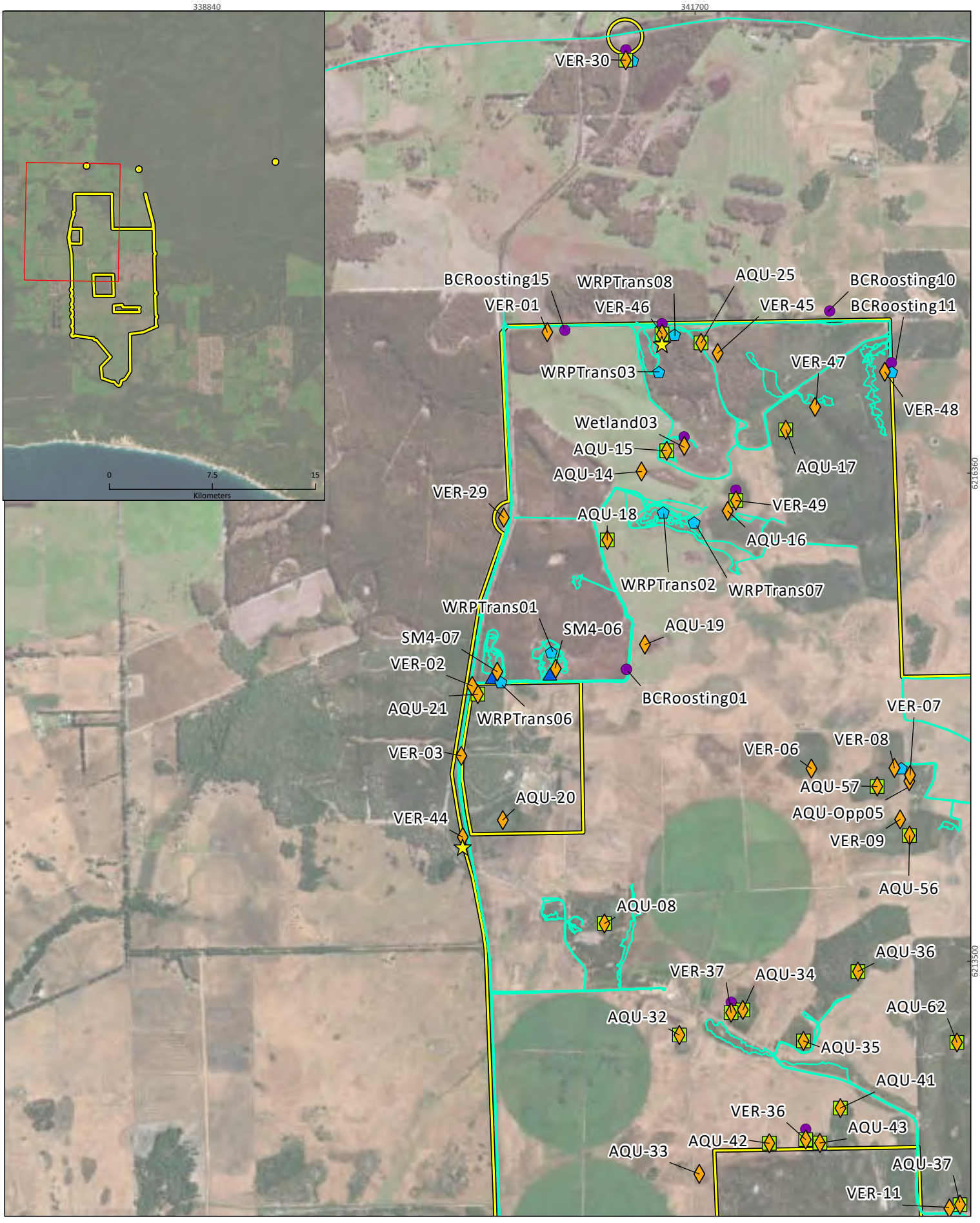
Study area
Tracks

Site type

Audio recording
Avifauna census
Nocturnal searches
Active diurnal searches
Site description
Ultrasonic recording

Figure 4-1a
Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	16/04/2025
Drawn by	BK
Map author	KC

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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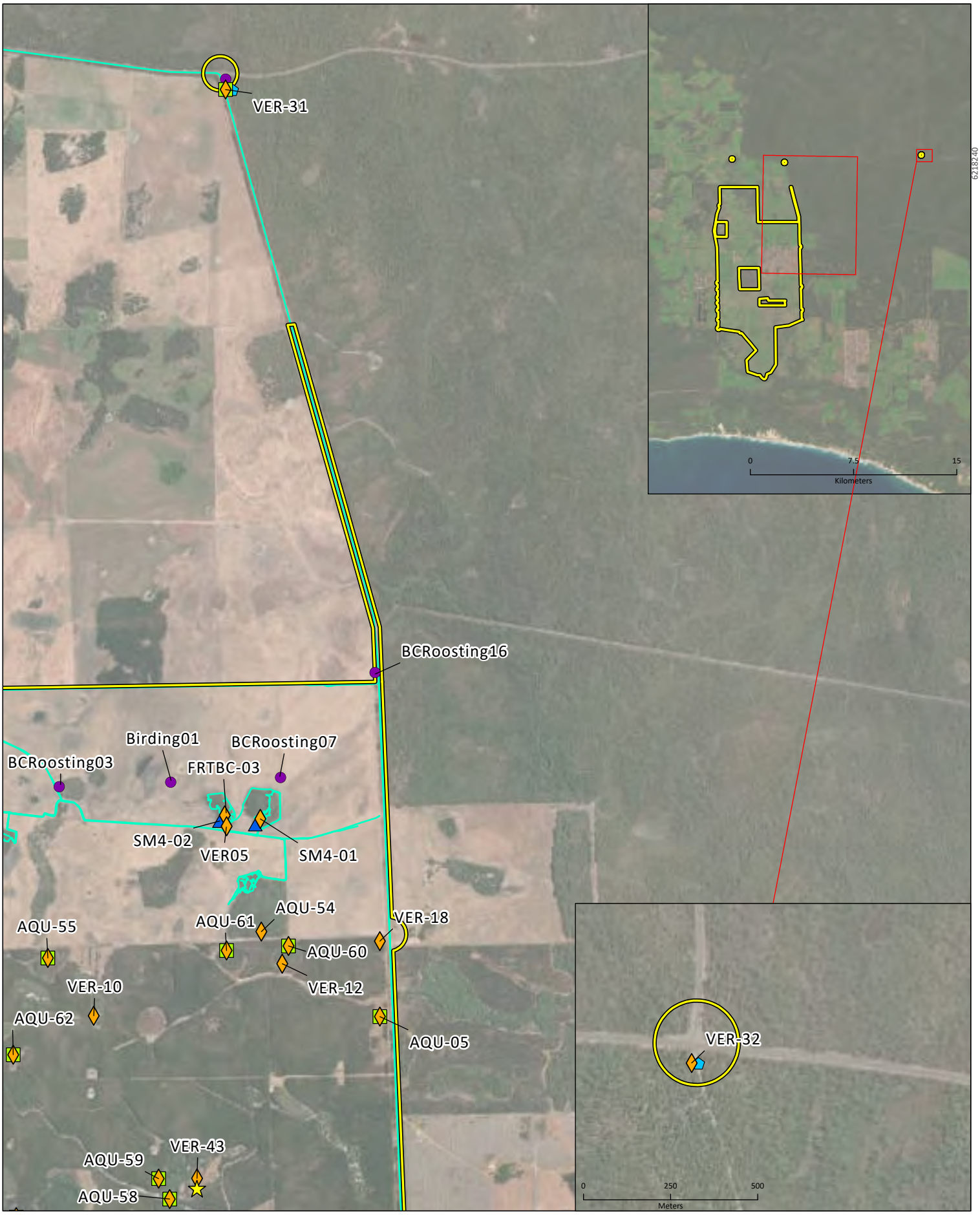
Study area
Tracks

Site type

Audio recording
Avifauna census
Nocturnal searches
Active diurnal searches
Site description
Ultrasonic recording

Figure 4-1b
Survey sites

PHOENIX ENVIRONMENTAL SCIENCES



Western Australia

PERTH

SynergyRED
Beenup Wind Farm

Project No	1583
Date	17/04/2025
Drawn by	BK
Map author	KC

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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Study area
Tracks

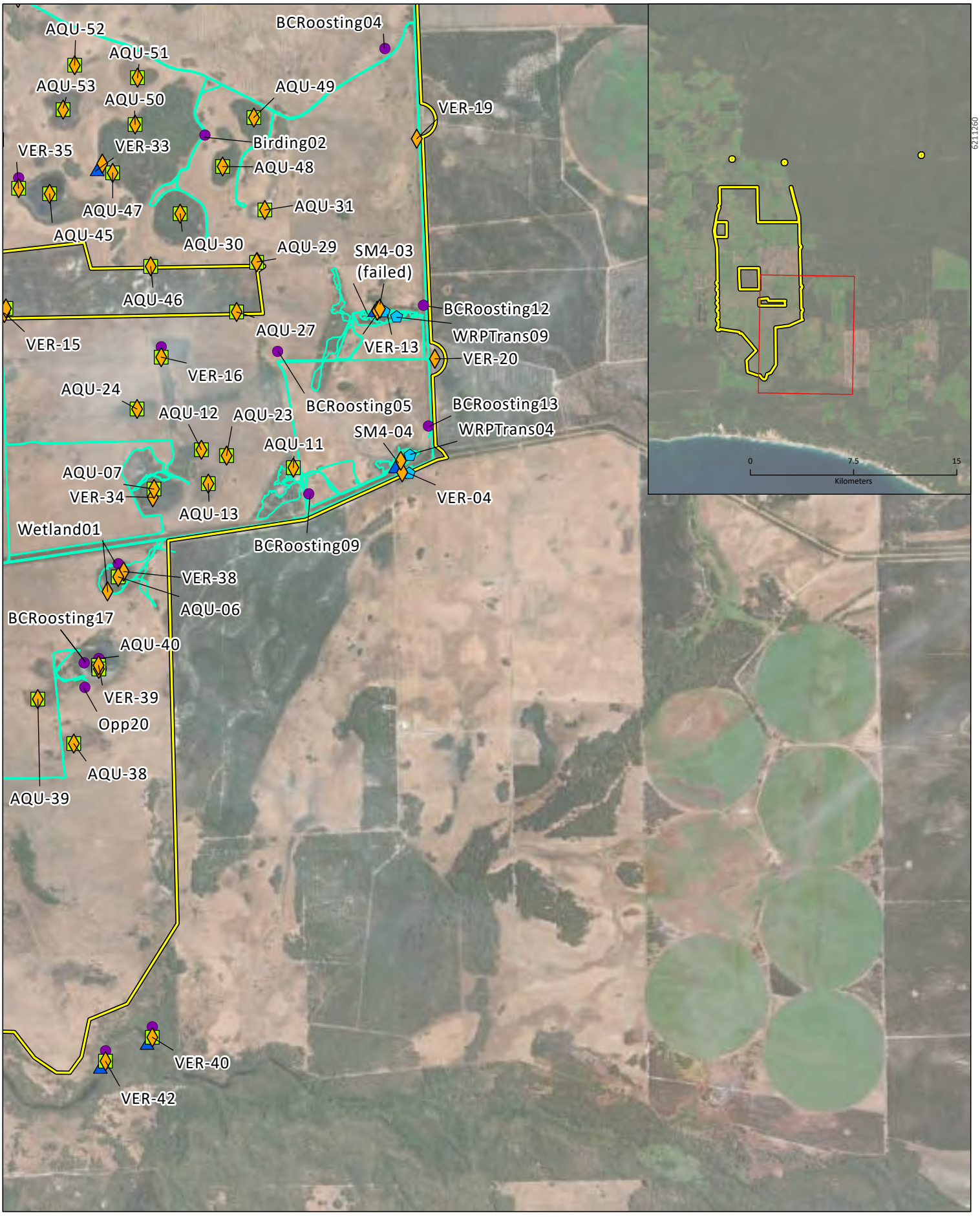
Site type

Audio recording
Avifauna census
Nocturnal searches
Active diurnal searches
Site description
Ultrasonic recording

Figure 4-1c

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	16/04/2025
Drawn by	BK
Map author	KC

0 0.5 1
Kilometers

1:28,600 (at A4) GDA 1994 MGA Zone 50

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Study area
Tracks

Site type

Audio recording
Avifauna census
Nocturnal searches
Active diurnal searches
Site description
Ultrasonic recording

Figure 4-1d

Terrestrial fauna survey sites

PHOENIX ENVIRONMENTAL SCIENCES

Table 4-4 Survey sites and effort

Site name	Phase	Site description	Active searches diurnal (min.)	Avifauna census (min.)	Audio recording (nights)	Bat echo. recording (nights)	Nocturnal searches for WRP (min.)	BC roosting/ breeding surveillance (min.)
AQU-01	1	1	40					
AQU-02	1	1	40					
AQU-03	1	1	40					
AQU-04	1	1	40					
AQU-05	1	1	40					
AQU-06	1	1	40					
AQU-07	1	1	40					
AQU-08	1	1	40					
AQU-09	1	1	40					
AQU-10	1	1						
AQU-11	1	1	40					
AQU-12	1	1	40					
AQU-13	1	1	40					
AQU-14	1	1						
AQU-15	1	1	40					
AQU-16	1	1						
AQU-17	1	1	40					
AQU-18	1	1	40					
AQU-19	1	1	40					
AQU-20	1	1						
AQU-21	1	1	40					
AQU-22	1	1						
AQU-23	1	1	40					
AQU-24	1	1	40					
AQU-25	1	1	40					
AQU-26	1	1	40					
AQU-27	1	1	40					
AQU-28	1	1	40					
AQU-29	1	1						
AQU-30	1	1	40					
AQU-31	1	1	40					
AQU-32	1	1	40					
AQU-33	1	1						
AQU-34	1	1	40					
AQU-35	1	1	40					
AQU-36	1	1	40					
AQU-37	1	1	40					
AQU-38	1	1	40					
AQU-39	1	1	40					

Site name	Phase	Site description	Active searches diurnal (min.)	Avifauna census (min.)	Audio recording (nights)	Bat echo. recording (nights)	Nocturnal searches for WRP (min.)	BC roosting/ breeding surveillance (min.)
AQU-40	1	1	40					
AQU-41	1	1	40					
AQU-42	1	1	40					
AQU-43	1	1	40					
AQU-44	1	1	40					
AQU-45	1	1	40					
AQU-46	1	1	40					
AQU-47	1	1	40					
AQU-48	1	1	40					
AQU-49	1	1	40					
AQU-50	1	1	40					
AQU-51	1	1	40					
AQU-52	1	1	40					
AQU-53	1	1	40					
AQU-54	1	1						
AQU-55	1	1	40					
AQU-56	1	1	40					
AQU-57	1	1	40					
AQU-58	1	1	40					
AQU-59	1	1	40					
AQU-60	1	1	40					
AQU-61	1	1	40					
AQU-62	1	1	40					
Mowl01	1	1			1			
VER-01	2	1						
VER-02	2	1						
VER-03	2	1						
VER-04	2	1					60	
VER-05	2	1						
VER-06	2	1						
VER-07	2	1						
VER-08	2	1					60	
VER-09	2	1						
VER-10	2	1						
VER-11	2	1						
VER-12	2	1						
VER-13	2	1					60	
VER-14	2	1						
VER-15	2	1						
VER-16	2	1	60	60				

Site name	Phase	Site description	Active searches diurnal (min.)	Avifauna census (min.)	Audio recording (nights)	Bat echo. recording (nights)	Nocturnal searches for WRP (min.)	BC roosting/ breeding surveillance (min.)
VER-17	2	1			3	2		
VER-18	2	1						
VER-19	2	1						
VER-20	2	1						
VER-21	2	1	40	40			60	
VER-22	2	1	40	40			20	
VER-23	2	1						
VER-24	2	1					20	
VER-25	2	1					20	
VER-26	2	1					20	
VER-27	2	1					20	
VER-28	2	1					20	
VER-29	2	1						
VER-30	2	1	40	40			60	
VER-31	2	1	40	40			40	
VER-32	2	1					40	
VER-33	2	1			4			
VER-34	2	1						
VER-35	2	1	30	40				
VER-36	2	1	40	40				
VER-37	2	1	40	40				
VER-38	2	1						
VER-39	2	1	40	40				
VER-40	2	1	40	50	4			
VER-41	2	1			4			
VER-42	2	1	40	40	4			
VER-43	2	1				4		
VER-44	2	1				4		
VER-45	2	1						
VER-46	2	1	40	40		4		
VER-47	2	1						
VER-48	2	1					60	
VER-49	2	1	40	40				
BCRoosting01	3							240
BCRoosting02	3							60
BCRoosting03	3							120
BCRoosting04	3							210
BCRoosting05	3							65
BCRoosting06	3							150
BCRoosting07	3							90

Site name	Phase	Site description	Active searches diurnal (min.)	Avifauna census (min.)	Audio recording (nights)	Bat echo. recording (nights)	Nocturnal searches for WRP (min.)	BC roosting/ breeding surveillance (min.)
BCRoosting09	3							65
BCRoosting10	3							105
BCRoosting11	3							80
BCRoosting12	3							60
BCRoosting13	3							60
BCRoosting14	3							60
BCRoosting15	3							70
BCRoosting16	3							70
BCRoosting17	3							90
Birding01	3							120
Birding02	3							130
Birding03	3							220
Opp20	3			20				
SM4-01	3	1			39			
SM4-02	3	1			39			
SM4-03	3	1			0[1]			
SM4-04	3	1			40			
SM4-05	3	1			34			
SM4-06	3	1			13			
SM4-07	3	1			38			
Wetland01	3	1		20				
Wetland02	3			80				
Wetland03	3	1		40				
WRPTrans01	3						35	
WRPTrans02	3						35	
WRPTrans03	3						30	
WRPTrans04	3						50	
WRPTrans05	3						20	
WRPTrans06	3						35	
WRPTrans07	3						40	
WRPTrans08	3						20	
WRPTrans09	3						50	
WRPTrans10	3						20	
Total effort			**45 hours**	**12 hours**	**223 nights**	**14 nights**	**15 hours**	**34 hours**
Total # sites	**152**	**121**	**67**	**17**	**12**	**4**	**24**	**19**

[1]No effort as audio recording failed.

4.2.2.2 Active diurnal searches

Active diurnal searches ('foraging') were undertaken at 67 sites throughout the study area during Phase 1 and 2, representing 45 hours of survey (Figure 4-1; Table 4-4). Active searches primarily targeted diurnal herpetofauna and mammals from direct sightings and secondary evidence.

Searches were undertaken in any observable microhabitats considered likely to support mammals, reptiles and amphibians. Additionally, sites were selected based on habitat suitability for conservation significant fauna species. Techniques included: overturning logs, searching beneath the bark of trees, investigating dead trees and logs, investigating burrows, investigating infrastructure ruins or disused building materials such as tin piles and identifying any secondary evidence including tracks, diggings, scats, fur or sloughs (shed skins), predation or feeding sites, and nest sites.

Waterbirds and frogs were recorded at each wetland visited to document wetland associated species in particular.

4.2.2.3 Avifauna censusing

Twenty-minute avifauna censuses were undertaken at 13 sites in Phase 2 and at 4 sites in Phase 3, totalling 12 hrs (Figure 4-1; Table 4-4). Each census was confined to a single habitat type (up to 2 ha) to collect assemblage data for that habitat, with all main habitat types sampled. The birding surveys occurred throughout the day with a focus on periods of higher activity around sunrise and sunset. Sampling consisted of bird recordings from visual sightings and call recognition.

Avifauna observations were also recorded opportunistically while other field work was being completed, including observations made during travel and active searches. Additional bird assemblage data was collected by audio recorders set out to target Australasian Bittern (see section 4.2.2.7) and black cockatoos (see section 4.2.2.5.5).

Additional bird censusing was conducted for the BBRAS (Phoenix 2025a), consisting of morning and afternoon 30-minute censuses at 14 sites over 4 seasons (autumn 2023 – summer 2024) in year 1 and 14 sites over 3 seasons (spring 2024 – autumn 2025) in year 2, as per the methods suggested in Brett Lane and Associates (2005). An additional 6 sites were also sampled up to twice each in September and December at the Hardy Inlet (Blackwood River) to investigate and compare Migratory bird usage there during the period of wetland inundation in the study area and coincided with the start of year 2 sampling in the study area. Site locations from the BBRAS are presented in Appendix 3. Species assemblage and significant species records from the BBRAS are noted in this report for completeness. Full details on the BBRAS bird surveys are presented in Phoenix (2025a).

4.2.2.4 Bat echolocation recordings

Song Meter SM4 recording devices were used to record bat echolocation calls at 4 sites (Figure 4-1). Recording devices were deployed for a total of 14 nights, for ~15 continuous hours per night (Table 4-4).

Echolocation recordings were also completed for one night each quarter, at each of the 14 sites investigated in year 1 of the BBRAS. As with avifauna, the species recorded in the BBRAS are noted in this report, but the full details of the quarterly bat sampling are reported in Phoenix (2025a).

4.2.2.5 Targeted surveys for black cockatoos

Targeted survey work for WA's 3 Threatened black cockatoo species, Baudin's Cockatoo (*Zanda baudinii;* VU), Carnaby's Cockatoo (*Zanda latirostris*; EN) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU), included breeding and roosting habitat assessments, surveys for

evidence of breeding /roosting activity, audio recordings and finally foraging habitat value analysis based on the evidence from the field surveys.

4.2.2.5.1 Breeding habitat assessment

Breeding habitat for the 3 Threatened black cockatoo species consists of woodland or forest; however, they will also breed in areas of former woodland or forest habitats which consist of now fragmented patches of habitat and/or isolated trees. Breeding habitat is defined in DAWE (2022) as "trees of species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow" (referred to as potential nesting trees; PNTs). Suitable DBH is 500 mm for most tree species known to support breeding hollows and 300 mm for Salmon Gum and Wandoo (DSEWPaC 2012b). Known breeding tree species in the Jarrah Forest and Warren bioregions include *Corymbia calophylla* Marri, *Eucalyptus marginata* Jarrah, *E. rudis* Flooded Gum, *E. diversicolor* Karri, *E. megacarpa* Bullich, *E. patens* Blackbutt, *E. salmonophloia* Salmon Gum and *E. wandoo* Wandoo. Trees with a DBH >500mm were recorded where they had a hollow with potential to develop into a suitable nesting hollow.

The location of PNTs in Jarrah/Marri woodland and other prospective habitats was recorded on GPS. All native vegetation remnants containing PNTs were thoroughly searched, and all paddocks were visited to detect any isolated paddock trees.

Tree species identifications were conducted in the field using tree descriptors and photographs. Trees that met the required DBH measurement were inspected for hollows and were assessed for nesting suitability. Both live and dead PNTs were catalogued and inspected. In addition to tree species, the following attributes were recorded:

- DBH (mm)
- number of hollows
- hollow height (m)
- hollow diameter (mm)
- hollow type/category
- presence of feral bees
- presence of other species using a hollow
- evidence of use by black cockatoo species.

PNTs with hollows were inspected from ground level using binoculars. A pole camera was available for further inspection of hollows if needed (e.g. evidence of breeding visible); however, this was not utilised as no trees with hollows were observed to have recent breeding activity or were greater than 8 m above ground level and could not be accessed. PNTs were later classified according to the following parameters, which largely align with the definition of DAWE (2022):

- Known nesting tree – trees which contain a hollow where a black cockatoo has been directly recorded breeding, or has evidence of use, such as chewings/scratches around the hollow and/or feathers and wood chips in the base.
- Suitable nesting tree – trees with suitable DBH for the species, containing a suitable hollow, but with no evidence of use.
- Potential nesting tree – any tree with a DBH >500mm that do not currently contain a suitable nesting hollow (DCCEEW 2024f, h).

A suitable nest hollow is defined as – A hollow in a live tree, with a near vertical alignment, >300 mm in internal diameter and >5 m above the ground (DCCEEW 2024f, h).

The PNT dataset, as well as the botanical quadrat-level dataset (Phoenix 2025a), long-term audio data and nocturnal roosting survey results were all used to rate the remnants in the study area in terms of their potential to support breeding and roosting for each species.

4.2.2.5.2 Roosting assessment

Presence of known roosting species was recorded, and evidence of night roosting was searched for (i.e. by the presence of clipped leaves, branches and droppings under suitable trees) while undertaking active diurnal searches (section 4.2.2.2), the PNT assessment (section 4.2.2.5.1), night roosting/breeding surveillance (section 4.2.2.5.4) and audio recordings (section 4.2.2.5.5). Known roosting tree species for the 3 black cockatoo species in the Jarrah Forest and Warren bioregion include *Corymbia calophylla* Marri, *E. marginata* Jarrah, *E. rudis* Flooded Gum, *E. diversicolor* Karri, *E. megacarpa* Bullich, *E. patens* Blackbutt, *E. salmonophloia* Salmon Gum and *E. wandoo* Wandoo, introduced eucalypts (e.g. blue gum) and introduced pines.

4.2.2.5.3 Foraging habitat assessment

Assessment of foraging habitat quality for each black cockatoo species was undertaken based on 2 scoring methods; the federal government scoring tool DAWE (2022) and Bamford (2021) scoring tool, an alternative scoring method that provides more effective analysis by consideration of site attributes (such as plant species composition and vegetation condition), site context and stocking rate. The intended outcome of both methods is a score out of 10 to inform the EPBC Act Offset Assessment Guide (DSEWPaC 2012a, c), with 10 being highest quality foraging habitat and one being lowest.

The DAWE (2022) scoring tool starts at a score of 10 and then subtracts points for the following attributes: foraging potential, connectivity, proximity to breeding and/or roosting, and impact from plant disease (see Appendix 4 for the scoring template).

The Bamford (2021) method calculates values on 3 functional aspects that are then summed to get the total score (see Appendix 5 for the scoring framework):

- Site condition – determine a score out of 6 for the vegetation composition, condition and structure, ideally based on site-specific floristic data applied to each fauna habitat polygon.
- Site context – determine a score out of 3 for the context of the entire study area, i.e. within 15 km of the study area how much native vegetation remains and is there known roosting or breeding occurring.
- Species stocking rate – determine a score out of one for species density, i.e. essentially a presence-absence determination whereby a score of one is applied across the entire study area where the species is seen or reported regularly and/or there is abundant foraging evidence.
- Determine total score – may require moderation for context and species density with respect to the site condition (vegetation) score. Pine plantations are also considered as a special case for foraging value.

Observations of foraging habitat quality and feeding residues were recorded throughout the study area during the survey. This information, together with the fauna habitat and vegetation association mapping, desktop data, site contextual information and floristic data (i.e. the presence of known food plant species used by each black cockatoo species) was used to calculate foraging habitat quality for each black cockatoo species in accordance with the Bamford (2021) scoring method. Floristic data was obtained from the flora and vegetation survey conducted for the Project (Phoenix 2025b).

A Structured Query Language script was written to intersect all known black cockatoo food plant species (and their respective height (m) and cover values (%)) with vegetation type, vegetation condition and fauna habitat type, so that every polygon could be systematically and consistently scored.

The scores from the Bamford (2021) assessment were categorised into high (8 or above), moderate (5–7) and low (1-4) quality ratings to give an overall picture of where the higher value foraging habitat was throughout the study area.

4.2.2.5.4 Night roosting/breeding surveillance

Surveillance for evidence of black cockatoo night roosting and/or breeding activity was undertaken at 19 sites over 11 evenings during spring 2024 and summer 2024/2025 (Table 4-4). Zoologists arrived on site approximately 45 minutes prior to sunset and were positioned at different locations around the periphery of the study area to detect any black cockatoos moving into the study area to roost and/or tend to chicks at the nest. Each person stayed at their location until it was too dark to see. Only black cockatoos were recorded. The sites were chosen based on their proximity to good condition vegetation containing PNT, and in consideration of visibility across the landscape and likely flight paths.

4.2.2.5.5 Audio recordings

Seven audio recorders were established during Phase 3 to detect any breeding over the spring-summer that may not have been detected during the crepuscular roosting and breeding surveillance (Figure 4-1). One recorder was damaged by cattle and no data obtained. Sites were selected in remnants that contained PNTs with hollows and black cockatoo records.

The recorders ran for between 13 and 40 nights per site (see Table 4-4), they were set to record continuously from 30 minutes prior to sunrise to 30 minutes after sunset each day.

The resultant audio data was processed in the Kaleidoscope software package. Recordings of black cockatoos were identified and extracted using a classifier based on previous recordings of each species. The 2 *Zanda* species cannot be confidently distinguished and were thus recorded as 'white-tailed black cockatoo', whereas Forest Red-tailed Black Cockatoo is readily distinguishable from the 2 white-tailed species.

The dataset was then analysed in terms of 'detections', where a detection was considered to be any recordings occurring within 15 minutes of one another. For example, if FRTBC was detected at 0600 am, 0605 am and 0615 am at a site, the data was lumped and considered a single detection, and the length of that visitation (minutes) calculated. If 2 recordings of a single species, at a single site were more than 15 minutes apart they were treated as 2 distinct detections. A single call at a site was treated as a 'flyover'. Calls after sunset were to be treated as potential roosting or breeding records, that would require follow up.

4.2.2.6 Targeted surveys for Western Ringtail Possum

4.2.2.6.1 Nocturnal searches

Nocturnal searches were undertaken for the species at 14 sites in Phase 2 and 10 sites in Phase 3 following completion of the PNT assessment (Table 4-4). The nocturnal searches were between 20-60 minutes in duration each and took place between sunset and 11 pm for a total of 15 hrs (Table 4-4).

The nocturnal searches comprised using handheld and head torches to inspect trees and tall shrubs for animal movement, eye shine, on foot (Phase 2 and 3) and by vehicle (Phase 2 only). These took place in areas of suitable high-quality habitat, being woodland habitats dominated by Jarrah and Marri, and stands of Peppermint, which were typically degraded and lacked understorey. While the focus of the nocturnal sampling was on Western Ringtail Possum, any species detected was recorded.

Evidence of Western Ringtail Possum (*Pseudocheirus occidentalis*; CR) presence (e.g. dreys, hollows, scats and tracks) was sought during the active diurnal searches in Phase 1 and 2 (section 4.2.2.2; Table 4-4).

4.2.2.6.2 Habitat assessment

A habitat quality assessment was undertaken using the scoring tool of DCCEEW (2024c). The scoring tool considers 3 elements (refer to Appendix 6 for detailed method):

- habitat quality (0-3) – all elements indicative of suitable habitat for the species, i.e. evidence of occupation, nests/dreys and hollows, canopy cover, ground cover for shelter, fire history, and evidence of predators
- site context (0-3) – connectivity of habitat in the study area and surrounding landscape, management tenure of site
- species stocking rate (0-4) – records of species on site; as WRP was recorded during the survey all polygons were assigned a score of 4 as a starting point.

The assessment was conducted spatially, whereby each polygon (n = 1,129) in the fauna habitat dataset was scored against the criteria. As such the raw scores cannot be presented in this report in tabular form and are instead provided as part of the spatial dataset accompanying this report.

The scores were categorised into high (8 or above), moderate (5-7.5) and low (0.5-4.5) quality ratings to give an overall picture of where the higher value habitat was in the study area for Western Ringtail Possum.

4.2.2.7 Targeted survey for Australasian Bittern

The Australasian Bittern (*Botaurus poiciloptilus*; EN) was formerly widespread in the south-west of WA, from Moora in the north to Cape Arid in the east. However, since the 1980's the species has dramatically declined and has only been recorded from a handful of locations, including wetlands along the south coast from Augusta, east to Cape Arid. Habitat critical to survival of the species is described in the species recovery plan as (DBCA 2018a):

> "generally large, fresh to moderately brackish wetlands with pH levels ranging from 5.5 to 8.5. Extensive areas of water plants, especially rushes, reeds and sedges, provide habitat for the bitterns and support abundant prey (Pickering 2013). Shallow water, less than 30 cm deep with a low to medium density of water plants mixed with, or near short fine sedges are favoured for foraging while higher density emergent vegetation is preferred for nesting (Jaensch 1982; A. Clarke, pers.2017)."

Targeted surveys were conducted for Australasian Bittern (*Botaurus poiciloptilus*; EN) as the species is known from the Hardy Inlet south-west of the study area, and the Gingilup/Quitchup/Jasper wetlands to the south-east. Many of the wetlands in the study area were considered to have the potential to support the species based on the habitat preferences described in the species recovery plans (DBCA 2018a; DCCEEW 2022b).

The most effective survey methodology for detecting presence of Australasian Bitterns is by using passive acoustic surveys via autonomous recording units (ARUs) (Birdlife Australia 2024a). Currently there is no survey technique available to irrefutably prove that Australasian Bitterns are absent from a site, and as such habitat assessments are critical.

Five ARUs were deployed, for a total of 19 nights in Phase 2 (December 2023) in suitable habitat for Australasian Bittern (Figure 4-1; Table 4-4), the aim of detecting males vocalising with their "booming" calls. The devices were set to actively record from dusk to dawn each day. Sampling was conducted during the breeding season (between mid-October and late-March) in accordance with Birdlife Australia (2024a).

While the ARUs targeted Australasian Bittern, the recordings were also analysed to detect other bird species, supplementing the assemblage data from the avifauna censusing.

4.2.3 Likelihood of occurrence assessment

Following completion of all field surveys, the likelihood of occurrence for each significant fauna species identified in the desktop review but not recorded in the field was assessed and assigned to one of the following categories:

- Recorded – species recorded within the study area by previous or current survey.
- Likely – study area within current known range of species, nearby (within 10 km) recent records (within the last 10 years), suitable habitat within the study area.
- Possible – study area within current known range of species, suitable or potentially suitable habitat within the study area, no nearby recent/relatively recent desktop records or species has a wide home range and utilises a wide variety of habitats.
- Possible (rare) –for Migratory listed species whose preferred/core foraging habitat is not present, but the study area contains marginal or rarely used habitat; species is rare in the region; occurs in very low numbers.
- Unlikely – study area outside current known range of species, no suitable habitat present in study area, very old desktop records only.

4.2.4 Survey personnel

The personnel involved in the survey are listed in Table 4-5. All survey work was carried out under a Fauna taking (biological assessment) licence (BA27000943) issued by DBCA under the BC Act.

Table 4-5 Survey personnel

Name	Qualifications	Role/s
Jarrad Clark	BSc. (Env. Mgt)	Project management, fieldwork, reporting
Karen Crews	BSc. (Env. Biol.) (Hons)	Reporting
Kerryn Fox	Ma. Vet. Sci. (Wildlife Health and Con.), BSc. (Cons. and Wildlife Bio., and Marine Bio.)	Senior Zoologist, fieldwork, reporting
Patrick Williams	Ma. (Env. Sci.) and BSc. (Cons. Bio. and Marine and Fresh. Bio.)	Zoologist, fieldwork, reporting
Brigitte Kovar	Ma. (Geospatial Intelligence)	GIS specialist, mapping
Dr Boyd Wykes	BSc. (Hons.) Zoology and PhD (Monash University); Dip Ed. (Murdoch University)	Fieldwork (BBRAS; Phoenix 2025a)
Andrew Green	Bachelor of Arts, BirdLife Accredited (monitoring and camera deployment)	Fieldwork

5 RESULTS

5.1 DESKTOP REVIEW

5.1.1 Desktop fauna assemblage

The desktop review identified records of 262[3] vertebrate taxa within the desktop search extent, 256 native and 6 introduced species (Appendix 7). The list comprised 12 amphibians, 24 reptiles, 198 birds and 28 mammals (Table 5-1).

Table 5-1 Summary of terrestrial fauna desktop results

Class	Native	Introduced	Total
Amphibia	12	0	12
Reptilia	24	0	24
Aves	197	1	198
Mammalia	23	5	28
Total	**256**	**6**	**262**

5.1.2 Significant fauna

Seventy-one significant vertebrate fauna were identified in the desktop review, including 41 EPBC Act and/or BC Act Threatened species (Table 5-2; Figure 5-1). One species, South-western Brush-tailed Phascogale, is listed as CD under the BC Act and one other species, Peregrine Falcon, is listed as OS under that act. Another 9 species are listed as Priority by DBCA and 45 species are listed as Migratory under the EPBC Act and/or BC Act, including several of the Threatened and one of the Priority species (Table 5-2).

Three black cockatoo species were the only significant vertebrate fauna species to have been recorded within the study area (Table 5-2) prior to the survey:

- Baudin's Cockatoo (*Zanda baudinii*; EN) – one record each from the WFA and western RIA
- Carnaby's Cockatoo (*Zanda latirostris*; EN) – 18 records, all from the WFA
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU) – 2 records from WFA.

The study area is within the modelled distribution for all 3 black cockatoo species (DAWE 2022). It is within the predicted breeding range for Baudin's but in the non-breeding range for Carnaby's, as defined in DAWE (2022). No breeding habitat map is provided for Forest Red-tailed Black Cockatoo in DAWE (2022), but the distribution map shows it is 'likely to occur' in the study area. According to FloraBase records (WA Herbarium 1998–), the study area occurs within the distribution of several known tree species used by black cockatoos for breeding and roosting in the Jarrah Forest and Warren bioregions (see 4.2.2.5), including *Corymbia calophylla* Marri, *E. marginata* Jarrah, *E. diversicolor* Karri, *E. megacarpa* Bullich and *E. patens* Blackbutt.

Based on the desktop assessment, no known black cockatoo nesting sites are present in the study area, or wider desktop search area, with no known black cockatoo breeding sites returned in the

[3] Count excludes indet. black cockatoo rows in Appendix 7 (i.e. *Calyptorhynchus* sp., *Calyptorhynchus*/*Zanda* sp. and *Zanda* sp.) as these records will belong to one of the 3 black cockatoo species listed in the appendix. Other indet. taxa detected in the desktop review have been excluded from Appendix 7 as they can be attributed to other species already listed.

Threatened and Priority Fauna database search (DBCA 2023c). According to DBCA (2023c), the nearest known roost site (from 2019, count of 19 white-tails) is located roughly 4.5 km north of the WFA (2.8 km north of the westernmost RIA). Another is located roughly 11.5 km north-west of the WFA but has no bird count data. Specific locations are not shown on Figure 5-1 due to DBCA conditions of data supply.

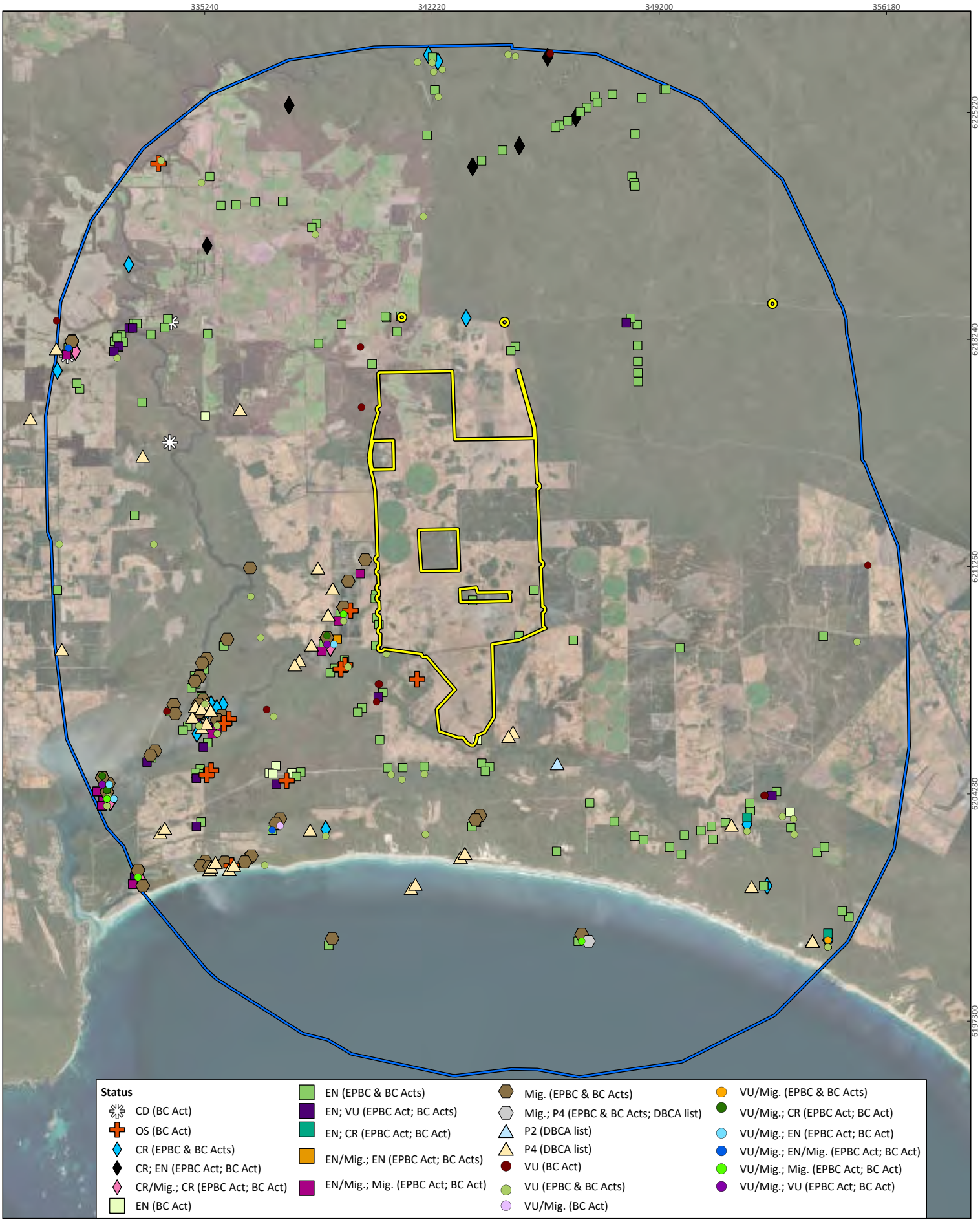
Biota (2009) recorded Western Ringtail Possum dreys in their survey area, located roughly 8.5 km east of the study area and several records of the species were returned in the DBCA Threatened and Priority Fauna database within 10 km of the study area. The species was also recorded by Litoria Ecoservices (2017), Harewood (2018) and ELM (2017).

Table 5-2 Significant vertebrate fauna identified in the desktop review

Species	Vernacular	Status
Amphibia (2)		
Anstisia alba	White-bellied Frog	CR (EPBC & BC Acts)
Anstisia vitellina	Orange-bellied Frog	VU (EPBC & BC Acts)
Reptilia (1)		
Elapognathus minor	Short-nosed Snake	P2 (DBCA list)
Aves (58)		
Actitis hypoleucos	Common Sandpiper	Mig. (EPBC & BC Acts)
Anarhynchus bicinctus	Double-banded Plover	Mig. (EPBC & BC Acts)
Anarhynchus leschenaultii	Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)
Anarhynchus mongolus	Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)
Anous tenuirostris melanops	Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)
Apus pacificus	Fork-tailed Swift	Mig. (EPBC & BC Acts)
Ardenna carneipes	Flesh-footed Shearwater	VU/Mig. (BC Act)
Ardenna grisea	Sooty Shearwater	Mig. (BC Act)
Arenaria interpres	Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)
Botaurus poiciloptilus	Australasian Bittern	EN (EPBC & BC Acts)
Calidris acuminata	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)
Calidris alba	Sanderling	Mig. (EPBC & BC Acts)
Calidris canutus	Red Knot	VU/Mig. (EPBC Act); EN (BC Act)
Calidris falcinellus	Broad-billed Sandpiper	Mig. (EPBC & BC Acts)
Calidris ferruginea	Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)
Calidris melanotos	Pectoral Sandpiper	Mig. (EPBC & BC Acts)
Calidris ruficollis	Red-necked Stint	Mig. (EPBC & BC Acts)
Calidris tenuirostris	Great Knot	CR/Mig. (EPBC Act); CR (BC Act)
Charadrius cucullatus	Hooded Plover/Dotterel	P4 (DBCA list)
Diomedea amsterdamensis	Amsterdam Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)
Diomedea dabbenena	Tristan Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)
Diomedea epomophora	Southern Royal Albatross	VU/Mig. (EPBC & BC Acts)
Diomedea exulans	Wandering Albatross	VU/Mig. (EPBC & BC Acts)

Species	Vernacular	Status
Diomedea sanfordi	Northern Royal Albatross	EN/Mig. (EPBC Act; BC Act)
Falco peregrinus	Peregrine Falcon	OS (BC Act)
Halobaena caerulea	Blue Petrel	VU (EPBC Act)
Hydroprogne caspia	Caspian Tern	Mig. (EPBC & BC Acts)
Leipoa ocellata	Malleefowl	VU (EPBC & BC Acts)
Limosa lapponica	Bar-tailed Godwit	Mig. (EPBC & BC Acts)
Limosa limosa	Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)
Macronectes giganteus	Southern Giant Petrel	EN/Mig. (EPBC Act); Mig. (BC Act)
Macronectes halli	Northern Giant Petrel	VU/Mig. (EPBC Act); Mig. (BC Act)
Motacilla cinerea	Grey Wagtail	Mig. (EPBC & BC Acts)
Numenius madagascariensis	Eastern Curlew	CR/Mig./CR (EPBC Act; BC Act)
Numenius phaeopus	Whimbrel	Mig. (EPBC & BC Acts)
Onychoprion anaethetus	Bridled Tern	Mig. (EPBC & BC Acts)
Oxyura australis	Blue-billed Duck	P4 (DBCA list)
Pandion haliaetus	Osprey	Mig. (EPBC & BC Acts)
Phoebetria fusca	Sooty Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)
Pluvialis fulva	Pacific Golden Plover	Mig. (EPBC & BC Acts)
Pluvialis squatarola	Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Act)
Pterodroma mollis	Soft-plumaged Petrel	VU (EPBC Act)
Stercorarius pomarinus	Pomarine Skua (Pomarine Jaeger)	Mig. (EPBC & BC Acts)
Sternula nereis nereis	Fairy Tern	VU (EPBC & BC Acts)
Thalassarche carteri	Indian Yellow-nosed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)
Thalassarche cauta	Shy Albatross	VU/Mig. (EPBC & BC Acts)
Thalassarche chlororhynchos	Atlantic Yellow-nosed Albatross	VU/Mig. (BC Act)
Thalassarche impavida	Campbell Albatross	VU/Mig. (EPBC & BC Acts)
Thalassarche melanophris	Black-browed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)
Thalasseus bergii	Greater Crested Tern	Mig. (EPBC & BC Acts)
Tringa brevipes	Grey-tailed Tattler	Mig. (EPBC & BC Acts) P4 (DBCA list)
Tringa glareola	Wood Sandpiper	Mig. (EPBC & BC Acts)
Tringa nebularia	Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)
Tringa stagnatilis	Marsh Sandpiper	Mig. (EPBC & BC Acts)
Tyto novaehollandiae novaehollandiae	Masked Owl (southwest)	P3 (DBCA list)
Zanda baudinii	Baudin's Cockatoo	EN (EPBC & BC Acts)
Zanda latirostris	Carnaby's Cockatoo	EN (EPBC & BC Acts)
Mammalia (10)		
Bettongia penicillata ogilbyi	Woylie	EN/CR (EPBC Act; BC Act)
Dasyurus geoffroii	Chuditch	VU (EPBC & BC Acts)

Species	Vernacular	Status
Falsistrellus mackenziei	Western False Pipistrelle	P4 (DBCA list)
Hydromys chrysogaster	Water-rat	P4 (DBCA list)
Isoodon fusciventer	Quenda	P4 (DBCA list)
Myrmecobius fasciatus	Numbat	EN (EPBC & BC Acts)
Notamacropus irma	Western Brush Wallaby	P4 (DBCA list)
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	CD (BC Act)
Pseudocheirus occidentalis	Western Ringtail Possum	CR (EPBC & BC Acts)
Setonix brachyurus	Quokka	VU (EPBC & BC Acts)





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	17/04/2025
Drawn by	BK
Map author	JC

0 2.5 5
Kilometers

1:150,180 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 17/04/2025. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

P:\Data\Projects\BeenupWindFarm\1583-BWF-SR-VER\GIS\Mapping\MapDocuments\Figures\1583maps.aprx

Study area
10 km desktop search extent

Figure 5-1

Desktop records of significant vertebrate fauna

PHOENIX ENVIRONMENTAL SCIENCES

5.1.3 Migratory shorebird movements

Figure 5-2 and Figure 5-3 display the individual and overall abundance, respectively, for 9 shorebird species for the Cape to Cape region based on data from ALA (2024). Only 9 species were returned where reliable record dates were available; however, these represent a good range of Migratory shorebirds in terms of preferred habitat and feeding preferences.

The individual species and aggregate abundance, diversity and activity levels (number of records) for Migratory shorebirds increases significantly after September each year, with abundance activity levels peaking in October and diversity peaking in January.

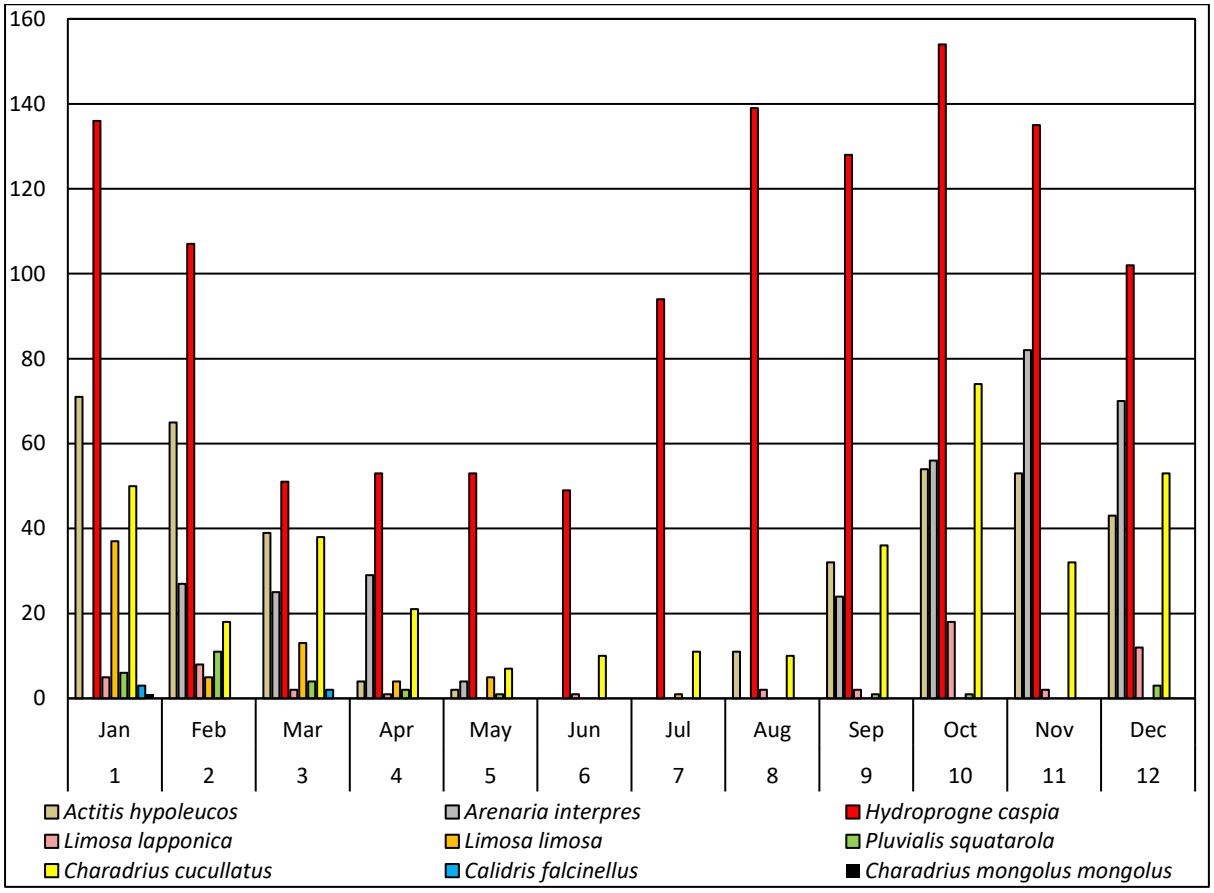


Figure 5-2 Abundance per species per month for 9 Migratory shorebird species from the Cape to Cape region (ALA 2024)

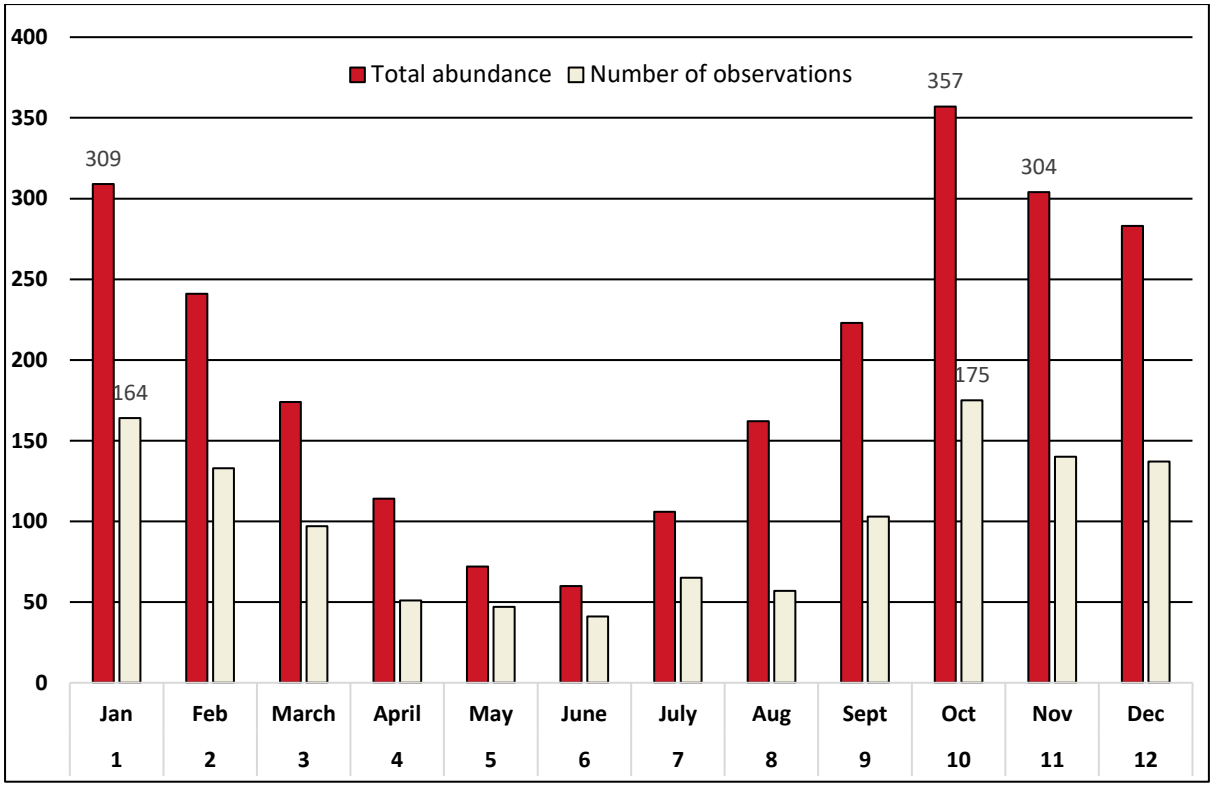


Figure 5-3 **Aggregate abundance per month for 9 Migratory shorebird species from the Cape to Cape region (ALA 2024)**

5.2 FIELD SURVEY

5.2.1 Habitats

Ten fauna habitat types were identified in the study area, including 3 wetland habitats, 2 woodlands and 5 highly modified habitats (Table 5-3; Figure 5-4).

The wetlands were a mix of Seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 378 ha (9.7%) of the study area, and were patchily distributed throughout (Figure 5-4). Condition of the wetlands was variable, with the paperbark woodlands and shrublands generally in better condition than the sedgelands, which tended to be heavily grazed. The majority of wetlands are seasonally inundated (i.e. ephemeral) and relatively shallow with water level typically less than 1 m, except for a large wetland south of Governor Broome Road and a wetland cluster in the northern part of the WFA that persisted into summer, suggesting that they have the potential to be permanently inundated (i.e. perennial); these are demarcated as 'potentially permanently inundated' in Figure 5-4. The southern wetland may be an expression of a perched aquifer as it is in relatively poor condition floristically having been accessed by cattle for many years and thus is not shaded and must have a high evaporation rate.

Woodlands were in varying condition throughout the study area. These were categorised into Marri-Jarrah-Peppermint woodland and degraded Open woodland of Peppermint trees, together covering 420.9 ha (10.8%) of the study area. They occurred within remnant vegetation patches in the WFA and as roadside vegetation, sometimes adjacent to wetland habitats (Figure 5-4).

The highly modified habitats comprised cleared areas, dams and plantations. The study area is predominantly (68.7%) cleared areas, mainly represented by paddocks that contain little to no native vegetation. While cleared areas usually offer no fauna habitat value, the paddocks in the study area become inundated in winter, essentially acting as flooded grasslands, with some degraded sumplands

also present. These attract and provide seasonal foraging habitat for several water birds, such as mountain ducks and ibis. Carnaby's Cockatoo was also observed foraging on the ground, within the paddock grasslands.

Two large Bluegum plantations are present in the WFA, and a small strip of Pine plantation occurs along Scott River Road on the western boundary of the WFA (Figure 5-4).

Excluding the cleared areas that represent roads, the central and eastern RIAs intersect Marri-Jarrah-Peppermint woodland that is contiguous with much larger intact remnant vegetation (Figure 5-4). The westernmost RIA was predominantly within a Seasonally inundated shrubland.

Most habitat in the study area is of low-quality with respect to the general flora assemblage (i.e. cleared areas, plantations, the degraded Open woodland of Peppermint trees, and dams). There are however several small – moderate sized remnants of high-quality habitat remaining, some of which have been fenced off to prevent cattle access. The study area is also largely surrounded by land set aside for conservation and forestry (see section 3.5; Figure 3-4). Notwithstanding the above, habitat value for black cockatoos and Western Ringtail Possum is assessed seperately in section 5.2.4).

Table 5-3 Extent and description of each fauna habitat in the study area

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
Wetland habitats				
Seasonally inundated paperbark woodland (wetland)	AQU-06, AQU-07, AQU-08, AQU-14, AQU-15, AQU-16, AQU-34, AQU-35, AQU-36, AQU-40, AQU-41, AQU-42, AQU-43, AQU-44, AQU-45, AQU-48, AQU-49, AQU-53, AQU-54, AQU-55, AQU-58, AQU-59, AQU-60, AQU-62, BCRoosting17, Dugite02, Opp01, TigerSnake01, VER-12, VER-34, VER-35, VER-36, VER-37, VER-38, VER-39, VER-49, Wetland01, Wetland02, Wetland03	Seasonally inundated sumplands of paperbark woodlands, flora dominated by *Lemna disperma, Melaleuca rhaphiophylla, Taxandria juniperina, Taxandria inundata, Melaleuca preissiana, Callistachys lanceolata* and *Leptocarpus scariosus*. This wetland habitat is typically less floristically diverse (56 species recorded) than the shrublands, but far more diverse than the sedgelands. The tree canopy ranges from open to closed. Water is typically <50 cm deep and tannin stained, often with Duckweed at the surface and aquatic plants present. Large, old trees often present some with hollows being used by waterbirds. Habitat enhanced for fauna with log debris but can be plentiful or absent. Many examples fenced to prevent stock access. Four examples possibly perennially inundated (Figure 5-4).	144.9 ha (3.7%)	

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
Seasonally inundated sedgeland (wetland)	AQU-11, AQU-12, AQU-13, AQU-17, AQU-18, AQU-23, AQU-28, AQU-29, AQU-31, AQU-37, AQU-46, AQU-51, AQU-52, AQU-Opp01, VER-43, VER-47	Seasonally inundated sumplands of open to dense mixed sedges, dominated by *Leptocarpus roycei*, *Machaerina juncea, Leptocarpus scariosus, Lepidosperma longitudinale* and *Melaleuca incana* subsp. *incana*. With or without occasional stands of paperbark (*Melaleuca rhaphiophylla*) typically at the periphery. Low floristic diversity. Often grazed at margins with associated weed encroachment. Can be relatively closed or with extensive open water areas. Typically inhabited by numerous frogs, but bird presence generally limited to a handful of waterbirds that choose to nest in dense sedge stands that can form large homogenic stands.	107.0 ha (2.7%)	
Seasonally inundated shrubland (wetland)	AQU-09, AQU-19, AQU-24, AQU-25, AQU-30, AQU-47, AQU-50, AQU-56, AQU-57, BCRoosting15, VER-06, VER-08, VER-09, VER-16, VER-33, VER-45, VER-Opp05	Seasonally inundated sumplands with variable open to sparse shrublands. High floristic diversity (238 species in total). Dominated by *Taxandria inundata, Anarthria scabra, Loxocarya magna, Hypolaena caespitosa, Astartea scoparia, Leptocarpus scariosus*. Often grazed at margins with weed encroachment. Can be relatively closed or with extensive open water areas. Inhabited by numerous frogs. Bird diversity generally greater compared with the 2 other wetland types (sedgelands or woodlands) due to higher diversity of flowering shrubs	126.1 ha (3.2%)	

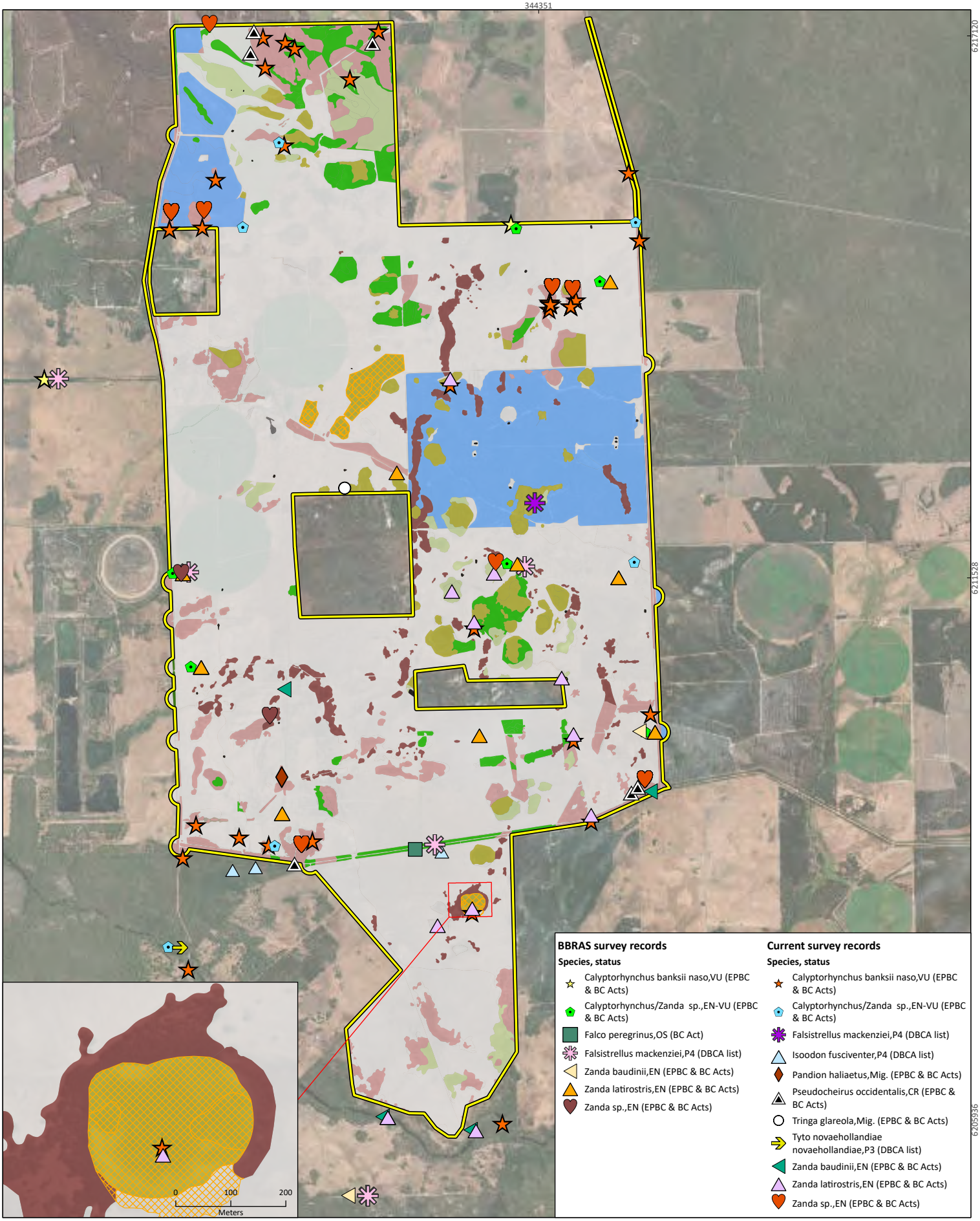
Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
		present offering a greater diversity of feeding and nesting opportunities. Waterbirds also present in low numbers.		
Woodland habitats				
Marri-Jarrah-Peppermint woodland	AQU-01, AQU-61, AQU-Opp05, BC2024_01, BCForaging, BCRoosting12, BCRoosting13, carnabysCockies02, Cat2024_01, Drey01, Fox2024_01, Fox2024_01, Fox2024_03, Fox2024_04, Fox2024_04, FRTBC-01, FRTBC-02, FRTBC-03, FRTBC-05, FRTBC-06, Opp12, Opp13, Opp14, Opp15, Opp19, Raven01, SM4-01, SM4-02, SM4-04, SM4-05, SM4-06, SM4-07, Tawny01, VER-02, VER-04, VER-05, VER-07, VER-13, VER-19, VER-21, VER-22, VER-23, VER-24, VER-27, VER-28, VER-31, VER-32, VER-44, VER-46, VER-48, VER-Opp02, VER-Opp07, White-tail_Foraging, WRP01, WRPTrans03, WRPTrans04, WRPTrans06, WRPTrans07, WRPTrans08, WRPTrans09	Low to mid open woodlands dominated by *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana, Agonis flexuosa* var. *flexuosa*, *Machaerina juncea, Taxandria juniperina, Cyathochaeta equitans, Anarthria scabra, Lepidosperma leptostachyum, Platychorda applanata, Gastrolobium formosum* and *Astartea scoparia*. Habitat condition varies greatly depending on grazing history and can have excellent condition understorey through to completely degraded. Structural complexity also varies substantially with some remnants retaining many logs and debris on the floor and others with very little. The best examples are high-quality habitat for a several significant species including the 3 black cockatoo species, Western Ringtail Possum and Quenda.	322.0 ha (8.3%)	

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
				
Open woodland of Peppermint trees (degraded)	Birding03, Opp11, VER-03, VER-10, VER-11, VER-14	Highly modified habitat dominated by a single native species, *Agonis flexuosa* var. *flexuosa*, and a variety of introduced weeds, such as **Rumex acetosella, *Hordeum leporinum and *Lolium rigidum, *Ehrharta longiflora* and **Bromus diandrus*. This habitat represents limited value to most native fauna due to the completely degraded nature of the understorey, and the fact *Agonis flexuosa* var. *flexuosa* rarely forms hollows.	98.9 ha (2.5%)	

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
				
Highly modified habitats				
Cleared	AQU-02, AQU-04, AQU-05, AQU-22, AQU-33, AQU-38, AQU-39, AQU-Opp02, AQU-Opp03, AQU-Opp04, BC Roosting 18, BCRoosting01, BCRoosting03, BCRoosting04, BCRoosting05, BCRoosting06, BCRoosting09, BCRoosting10, BCRoosting10, BCRoosting14, BCRoosting16, Bfalcon, Birding01, Birding02, Fox2024_02, Goanna01,	Cleared areas absent or near absent of native vegetation; agricultural paddocks and roads. May contain isolated paddock trees, generally of Peppermint (*Agonis flexuosa* var. *flexuosa*). Limited value to native fauna. Typically used by birds that tolerate and sometimes thrive in modified environments. Carnaby's Cockatoo observed on 2 occasions feeding on paddock weeds in seed.	2,666.0 ha (68.5%)	

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
	KingSkink01, Opp02, Opp03, Opp05, Opp06, Opp07, Opp08, Opp09, Opp10, Opp17, Opp20, Opp22, Opp23, Osprey, VER-Opp01, VER-Opp03, VER-Opp04, VER-Opp06, VER-Opp08, VER-Opp09, WRPTrans02			
Cleared - degraded sumpland	AQU-32	Seasonally inundated sumpland wetland that has been cleared (i.e., now paddock) and is almost completely devoid of native vegetation, excepting occasional isolated sedge plants. This habitat is essentially a highly degraded form of Seasonally inundated sedgeland (wetland) habitat. As such it supports a limited number of native fauna species. Most prominent were frogs and the more degradation tolerant bird species. White-faced heron were regularly seen foraging in this habitat while it was inundated.	8.1 ha (0.2%)	
Dam	AQU-03, AQU-10	Artificial pond or dam with standing water. Typically provides habitat for a handful of waterbirds only, and generally only in the largest examples. One example on Dennis Road was constructed with a sizeable rim and some rocky features affording protection and visibility limited predation and which attracted more birds than elsewhere.	1.7 ha (<0.1%)	

Habitat type	Site/s	Description	Extent (ha) and % of study area	Representative photograph
Bluegum plantation	Shingleback01, VER-01, VER-18, VER-20, VER-29, WRPTrans01	Planted mid woodland of Bluegum (*_Eucalyptus globulus_* subsp. _globulus_). Monoculture which provides limited habitat value for native fauna. Western Grey Kangaroos were abundant, but few other species observed. Carnaby's Cockatoo and Western Ringtail Possum are known to use this habitat type on occasion, but this was not observed in the study area.	415.4 ha (10.7%)	
Pine plantation	BCRoosting02, VER-25, VER-26	Planted open woodland of Pine (*_Pinus_ sp.) plantation. Monoculture which provides limited habitat value for native fauna. Carnaby's Cockatoo are known to feed on _Pinus_ sp. but were not observed doing so in the study area. Ninox (2012) observed a flock of Baudin's Cockatoo land in the stand of Pines on Scott River Road (in the study area) in 2006.	1.6 ha (<0.1%)	
		Total	**3,891.6 ha**	



BBRAS survey records

Species, status

- Calyptorhynchus banksii naso,VU (EPBC & BC Acts)
- Calyptorhynchus/Zanda sp.,EN-VU (EPBC & BC Acts)
- Falco peregrinus,OS (BC Act)
- Falsistrellus mackenziei,P4 (DBCA list)
- Zanda baudinii,EN (EPBC & BC Acts)
- Zanda latirostris,EN (EPBC & BC Acts)
- Zanda sp.,EN (EPBC & BC Acts)

Current survey records

Species, status

- Calyptorhynchus banksii naso,VU (EPBC & BC Acts)
- Calyptorhynchus/Zanda sp.,EN-VU (EPBC & BC Acts)
- Falsistrellus mackenziei,P4 (DBCA list)
- Isoodon fusciventer,P4 (DBCA list)
- Pandion haliaetus,Mig. (EPBC & BC Acts)
- Pseudocheirus occidentalis,CR (EPBC & BC Acts)
- Tringa glareola,Mig. (EPBC & BC Acts)
- Tyto novaehollandiae novaehollandiae,P3 (DBCA list)
- Zanda baudinii,EN (EPBC & BC Acts)
- Zanda latirostris,EN (EPBC & BC Acts)
- Zanda sp.,EN (EPBC & BC Acts)



SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	17/04/2025
Drawn by	BK
Map author	JC

0 0.75 1.5
Kilometers

1:50,450(at A4) GDA 1994 MGA Zone 50

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- Study area

Habitat

- Bluegum plantation
- Cleared
- Cleared - degraded sumpland
- Dam
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Seasonally inundated paperbark woodland (wetland) - potentally permanently inundated

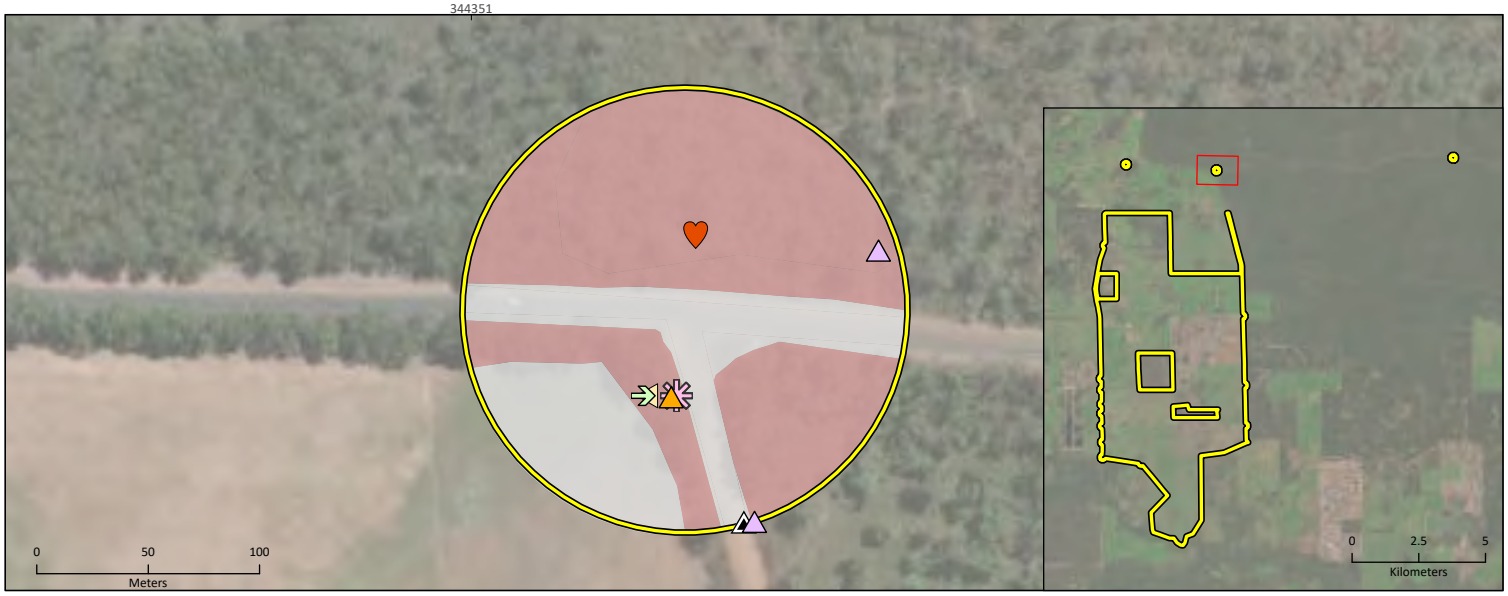
Figure 5-4a

Fauna habitats and significant fauna records from the field surveys

PHOENIX ENVIRONMENTAL SCIENCES



344351







SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	18/08/2025
Drawn by	BK
Map author	JC

1:3,374 (at A4) GDA 1994 MGA Zone 50

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Study area

Habitat
- Cleared
- Marri-Jarrah-Peppermint woodland
- Seasonally inundated shrubland (wetland)

BBRAS survey records

Species, status
- Falsistrellus mackenziei,P4 (DBCA list)
- Tyto novaehollandiae novaehollandiae,P3 (DBCA list)
- Zanda baudinii,EN (EPBC & BC Acts)
- Zanda latirostris,EN (EPBC & BC Acts)

Current survey records

Species, status
- Pseudocheirus occidentalis,CR (EPBC & BC Acts)
- Zanda latirostris,EN (EPBC & BC Acts)
- Zanda sp.,EN (EPBC & BC Acts)
- Calyptorhynchus banksii naso,VU (EPBC & BC Acts)

Figure 5-4b

Fauna habitats and significant fauna records from the field survey

PHOENIX ENVIRONMENTAL SCIENCES

5.2.2 Fauna assemblage

A total of 120 vertebrate species were recorded in the Basic and Targeted fauna survey (Appendix 7). The assemblage comprised 9 amphibians (from 3 families), 6 reptiles (from 4 families), 89 birds (from 37 families) and 16 mammals (from 10 families) (Table 5-4; Appendix 7). An additional 16 bird species and one additional bat were recorded in the study area in the BBRAS (Phoenix 2025a) that were not recorded in the current survey (Table 5-4), taking the overall assemblage to 138 species. A further 14 bird species recorded at regional sites in the BBRAS (Appendix 7) have not been included as part of the overall assemblage here as they were not detected in the study area.

The recorded assemblage was roughly 52% of the richness identified in the desktop list (section 5.1.1; Table 5-4). Fifteen species were recorded in the surveys that were not returned in the desktop review, including 2 amphibians (Slender Tree Frog and Sand Frog), one reptile (South-western Long-necked Turtle), 6 birds (Peaceful Dove, Pied Butcherbird, Mistletoebird, Yellow-throated Miner, Jacky Winter and Little Corella) and 6 mammals (dog, cat, pig, Lesser Long-eared Bat, Holt's Long-eared Bat and Greater Long-eared Bat) (Appendix 7).

Seven species from the overall assemblage are introduced, comprising one bird and 6 mammals. Three are feral predators, cat, dog and red fox. Three of the recorded introduced species (dog, cat and pig) were not identified in the desktop review.

Proportionate representation of each class of vertebrates in the recorded assemblage roughly aligns with that of the desktop review, with the dominance of birds being recorded. It also reflects the sampling methods as Basic surveys largely comprise foraging and birding; as birds are more visible and audible, they tend to be detected more readily. The avifauna assemblage was also supplemented by the BBRAS (Phoenix 2024). Amphibians were represented in slightly greater proportion than the desktop list (4.5% of desktop, 6.5% of field records), while reptiles were under-represented (9.5% of desktop, 4.3% of field records).

Agricultural clearing in the study area provides extensive ‘open grassland’ hunting grounds, albeit a modified habitat. These grasslands are interspersed with numerous wetland and bushland remnants that together provide a diversity of habitats that support both urban tolerant and urban avoidant ‘raptors’ (Headland *et al.* 2023) which were common and abundant; comprising 9 kites/eagles/hawks/osprey (Accipitridae,), 4 falcons (Falconidae), 2 owls and Southern Boobook. Such agricultural landscapes tend to favour large-bodied granivorous or carnivorous birds, at the expense of arboreal foragers and nectarivores (F. Bennett & A. Ford 1997).

Waterbirds were moderately represented in the fauna assemblage given the presence of wetland habitats (25% of all birds recorded), including 9 ducks (Anatidae), 4 cormorants (Phalacrocoracidae), 4 ibis/spoonbill (Threskiornithidae), 3 herons/egrets (Ardeidae) and 3 shorebirds (Charadriidae, Scolopacidae).

Of the native mammals recorded, most were bats (8 species; Appendix 7), with 3 marsupials also recorded.

Table 5-4 Comparison of species recorded versus desktop list

Class	Desktop records	Current (Basic and Targeted fauna) survey records	Additional species recorded in study area in BBRAS	Total recorded assemblage (current survey & BBRAS)	Recorded in field but not in desktop list
Amphibians	12 (all native)	9 (all native)		9 (all native)	2 (all native)
Reptiles	25 (all native)	6 (all native)		6 (all native)	1 (native)
Birds	199 (198 native, 1 introduced)	89 (88 native, 1 introduced)	16 (all native)	105 (104 native, 1 introduced)	6 (all native)
Mammals	28 (23 native, 5 introduced)	16 (10 native, 6 introduced)	1 (native)	17 (11 native, 6 introduced)	6 (3 native, 3 introduced)
Total	**264**	**120**	**17**	**137**	**15**

5.2.3 Significant fauna records

Eight significant vertebrate species were recorded in the current survey, with a further 2 recorded in the BBRAS (Phoenix 2025a) that were not recorded in the current survey. They comprised 4 Threatened, 3 Priority, 2 Migratory and one OS species (Table 5-5; Figure 5-4):

Threatened

- Western Ringtail Possum (*Pseudocheirus occidentalis*; CR)
- Baudin's Cockatoo (*Zanda baudinii*; EN)
- Carnaby's Cockatoo (*Zanda latirostris*; EN)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU).

Priority species

- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; P3)
- Quenda (*Isoodon fusciventer*; P4)
- Western False Pipistrelle (*Falsistrellus mackenziei*; P4).

Migratory and other specially protected species

- Wood Sandpiper (*Tringa glareola*; Mig.)
- Osprey (*Pandion haliaetus*; Mig.)
- Peregrine Falcon (*Falco peregrinus*; OS).

Black cockatoos were recorded in all survey phases. The most frequently and abundantly recorded black cockatoo species by visual observation was Forest Red-tailed Black Cockatoo, which was observed in all seasons (Appendix 8). The audio recordings in summer 2024-25 however, yielded a higher number of white-tailed black cockatoo detections than Forest Red-tails (Appendix 8). Carnaby's Cockatoo was recorded by visual observation in higher frequency and abundance than Baudin's Cockatoo, so it is reasonable to assume that a higher proportion of the audio recordings were also attributable to the former.

The largest black cockatoo counts were of Forest Red-tails (flock of 53) in autumn 2023, Baudin's (flock of 26) in winter 2023 and Forest Red-tails (flock of 17) in winter 2023. Most visual observations of black cockatoos however were of singles, pairs and small groups (<10; Appendix 8).

Table 5-5 Sites and habitat from which significant vertebrate fauna were recorded during the field survey

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland[2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Birds (7)													
Calyptorhynchus banksii naso Forest Red-tailed Black Cockatoo	VU (EPBC & BC Acts)	Audio recording, direct sighting, foraging, foraging evidence in the study area at sites AQU-01, AQU-02, AQU-03, AQU-25, AQU-40, AQU-55, BC2024_01, BCForaging, BCRoosting05, BCRoosting09, FRTBC-01, FRTBC-02, FRTBC-05, FRTBC-06, Opp12, Opp13, Opp15, Opp19, SM4-01, SM4-02, SM4-06, SM4-07, VER-22, VER-32, VER-33, VER-45, VER-47, VER-Opp04, VER-Opp07, VER-Opp08. Records throughout the WFA and from 2 RIAs. Most records of individuals and pairs, with only 9 records of >2 birds. The largest flock (53 individuals) recorded 1.5 km west of study area during the BBRAS (site BUS013[1]). It was directly observed foraging at one site (VER-Opp04) while foraging evidence (chewed Marri nuts predominantly) was obtained from 7 sites. Recorded 23 times on audio recordings, but only once from the BBRAS recorders (open paddocks). The Phase 3 audio recordings identified 12 detections, of which 6 were flyovers and 6 were foraging detections where the birds spent >1 minute at that site presumably foraging, or prospecting. All other records were of the birds moving through/over this habitat. No breeding or night roosting behaviour was observed. Suitable habitat within and surrounding the study area. Species is endemic to SW WA but the study area represents <0.1% of species estimated extent of occurrence (EOO) of 61,000 km² (DCCEEW 2024f) and is not at limit of species distribution.	45	R, S	R, S	R, S	R, S	S	R		R		
Falco peregrinus Peregrine Falcon	OS (BC Act)	Direct sighting of one individual at BUS011[1] in the WFA. Observed hunting near Governor Broome Rd in the southern part of the WFA. Much of the study area is suitable hunting habitat. May be a resident close to the study area, using the available habitats for hunting. Unlikely to nest in study area.	1	S	S	S	S	S	R, S	S	S	S	S

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland [2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Pandion haliaetus Osprey	Mig. (EPBC & BC Acts)	Direct sighting at 'Osprey' in the WFA as an opportunistic record during heritage survey, flying over a paddock WFA. Known to utilise a variety of near-coastal habitats. Suitable foraging habitat is abundant outside the study area. Unlikely to nest within the study area. Study area extent is insignificant relative to the distribution of this species which occurs around the entire Australian coastline. Study area is not at limit of species distribution.	1	S	S	S			R				
Tringa glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	Direct sighting of 3 individuals at VER-36 in a SIPW wetland in the WFA. Likely to utilise wetland habitats in study area. Suitable habitat within and outside study area. Study area extent is insignificant relative to the distribution of this species which occurs at many coastal sites around Australia. Study area is not at limit of species distribution.	3	R, S	S	S							
Tyto novaehollandiae novaehollandiae Masked Owl (southwest)	P3 (DBCA List)	Audio recording at sites BUS014[1] in the central RIA and Mowl01 approximately 1 km south of the WFA. Recorded in May and November 2023 in the BBRAS. May be resident within woodland habitats generally of the study area, but more likely to roost and nest in such habitat along the Scott River and in nature reserve to the north where habitat is extensive. Study area extent is insignificant relative to the distribution of this species which occurs in SW corner of WA between Yanchep and Albany (ALA 2025). Study area is not at limit of species distribution.	2				R, S	S	R			S	

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland [2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Zanda baudinii Baudin's Cockatoo	EN (EPBC & BC Acts)	Records from the WFA, central RIA and outside the study area (south of WFA, including along the Scott River). Calls, direct sightings in the study area at BUS014[1], BUS019[1], Opp11 and VER-Opp01. Direct sightings outside study area at BUS015[1] and VER-41. The largest flock recorded was of 26 individuals and flocks of 8, 9 and 10 individuals also observed. One individual was observed on 3 occasions. Observed foraging just once, in MJP woodland along Governor Broome Rd (site VER-Opp01) in the WFA. All other observations were of birds moving through the landscape. No breeding or night roosting behaviour was observed. In addition to the records of Baudin's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections/visitations) for a total occupation time of 9.5 hours over ~2 months of recording. Of the 82 detections via Phase 3 audio recorders, 37 (45%) were of birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that the majority of these records were Carnaby's Cockatoo given the much higher rate of detection of this species over Baudin's (~4:1) during the surveys. Based on the records, the species appears to make limited use of vegetation/habitats within the WFA. Suitable habitat within and surrounding the study area. Species is endemic to SW WA but the study area represents <0.1% of species estimated EOO of 70,000 km² (DCCEEW 2024h) and is not at limit of species distribution.	7	S	S	S	R, S	S	R	S		S	

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland [2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Zanda latirostris Carnaby's Cockatoo	EN (EPBC & BC Acts)	Records throughout the WFA, as well as central RIA and outside the study area along the Scott River. Evidence of occupation via calls and direct sightings at 23 sites (36 total records), with repeated detections at a number of those sites. Predominantly recorded as singletons, with only 9 records of more than one individual and flocks >10 birds observed on 3 occasions, in the WFA and RIA. Observed foraging in MJP woodland just once, in the central RIA (site BUS014[1]). Only 2 other observations of foraging occurred, which was on the ground eating paddock seeds. All other records were of birds moving through the landscape. In addition to the records of Baudin's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections/visitations) for a total occupation time of 9.5 hours over ~2 months of recording. Of the 82 detections via Phase 3 audio recorders, 37 (45%) were of birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that the majority of these records were Carnaby's Cockatoo given the much higher rate of detection of this species over Baudin's (~4:1) during the surveys. No breeding or night roosting behaviour was observed. Suitable habitat within and surrounding the study area. Species is endemic to SW WA but the study area represents <0.1% of species estimated EOO of 180,000 km² (DCCEEW 2024i) and is not at limit of species distribution.	36	R, S	R, S	R, S	R, S					S	S
Mammals (3)													

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland [2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Falsistrellus mackenziei Western False Pipistrelle	P4 (DBCA List)	Records from WFA, RIA and outside study area west and south of WFA. Calls in the study area at BUS001[1], BUS004[1], BUS011[1], , BUS014[1] and VER-43, and outside the study area at BUS013[1] and BUS015[1]. Recorded regularly, over several site visits. Recorded from MJP woodland in the central RIA, and from SISE wetland, SISH wetland and cleared areas in the WFA. Records in study area are considered foraging or dispersal activity. Limited 'roosting' habitat within the study area, species prefers dense 'old-growth'/mature wet sclerophyll forests of Karri, Jarrah and Tuart eucalypts. Suitable roosting habitat plentiful outside the study area. Species is endemic to SW WA but the study area represents ~0.1% of species estimated EOO of 33,750 km² (Armstrong *et al.* 2017) and is not at limit of species distribution.	10		R	R	R, S	S	R				
Isoodon fusciventer Quenda	P4 (DBCA List)	Direct sighting and foraging evidence in the study area at Quenda01, Quenda02 and VER-Opp05 in SISH wetland along Governor Broome Rd in the WFA and outside the study area south of Governor Broome Road. Suitable habitat within and surrounding the study area. Species is endemic to SW WA but the study area represents <0.1% of species distribution and is not at the limit of this.	3	S	S	R, S	S						

Species	Status	Records and comments	No. records	Habitats (recorded = R, suitable = S)[3, 4]									
				SIPW wetland[2]	SISE wetland[2]	SISH wetland [2]	MJP woodland[2]	OWP deg.[2]	Cleared	Cleared - DS[2]	Dam	Bluegum plant.	Pine plant.
Pseudocheirus occidentalis Western Ringtail Possum	CR (EPBC & BC Acts)	Sixteen individuals recorded by direct sighting in the study area at VER-21 (female with juvenile), VER-31 (3 individuals), WRP01 (3 individuals), WRPTrans03 (female with juvenile), WRPTrans04 (female with juvenile and 2 solo individuals), WRPTrans08 (female with juvenile). In addition, one drey with possible individual recorded (site Drey01). All records were in MJP woodland remnants at the northern and southern margins of the WFA and in the central RIA. Suitable habitat within and surrounding study area. Species is endemic to SW WA. Study area represents <0.1% of species estimated EOO of 40,000 km² (DSEWPaC 2013). Extent of high-value habitat in study area is 97.6 ha. Estimated area of occupancy in DSEWPaC (2013) is inferred as <50,000 ha, possibly <10,000 ha. Study area is not at limit of species distribution.	9				R, S						

1 - Sites from BBRAS (see Appendix 3). 2-SIPW wetland – Seasonally inundated paperbark woodland (wetland); SISE wetland – Seasonally inundated sedgeland (wetland); SI shrubland – Seasonally inundated shrubland; MJP woodland – Marri-Jarrah-Peppermint woodland; OWP deg. – Open woodland of Peppermint trees (degraded); DS – degraded sumpland. 3 - Recorded (R) includes observations of birds flying over/transiting through a habitat. Habitats designated suitable (S) are those that may be suitable for foraging (received a moderate or high foraging habitat quality rating), roosting and/or breeding by the species. 4 - Refer to Table 5-2 for habitat preferences for each species.

5.2.4 Significant fauna habitat assessments

5.2.4.1 Black cockatoo habitat

5.2.4.1.1 Potential nesting trees

A total of 760 PNTs represented by at least 5 species were recorded in the study area (Table 5-6; Figure 5-5; Appendix 9). Jarrah was the most commonly recorded PNT species, with 405 (53.3%) trees ranging in size from 500–1,400 mm (DBH) and had a mean DBH of 673.7 mm (SD ± 158.4 mm).

Marri were the 2nd most common PNT recorded (246 trees; 32.4%), with DBH ranging from 500 mm–1,900 mm (SD ± 192.2 mm) and a mean DBH of 692.3 mm (Table 5-6).

The 3rd most common 'group' could not be identified to species level because they were dead (88) but were generally assumed to be Jarrah or Marri. These trees ranged in size from 500–1,400 mm, and on average had the greatest DBH with a mean of 697.0 mm (SD ± 179.9 mm).

A handful of Flooded Gum (6 trees; 0.7%) and Swan River Blackbutt (14 trees; 1.7%) were recorded in wetter areas and drainage lines, and a single paddock-planted old Bluegum was also recorded.

The majority of PNTs in the study area (672; 88.4%) were recorded in Marri-Jarrah-Peppermint woodland. The remainder were recorded in Seasonally inundated shrubland (111; 14.6%), Seasonally inundated paperbark woodland (14; 1.8%), Bluegum plantation (8; 1.0%), Cleared (7) and Open woodland of Peppermint trees (degraded) (2).

Based on current guidance (DAWE 2022), 3 of the 4 tree species may support breeding by Baudin's Cockatoo and 2 of the tree species may support breeding by Forest Red-tailed Black Cockatoo. Carnaby's Cockatoo is known to nest in Jarrah, Marri and Flooded Gum, as well as other eucalypt species with suitable hollows; however, as noted in section 5.1.2 the study area is outside the current breeding range for the species.

Table 5-6 PNTs recorded in the study area

Species	Black cockatoo usage[1]			Total count	DBH (mm) – all trees					
	Carnaby's	Baudin's	FRTBC		Min.	Max.	Range	Median	Mean	Std. dev.
Eucalyptus marginata (Jarrah)	F, N, R	F, N, R	F, N, R	405	500	1,400	900	630	673.7	158.4
Corymbia calophylla (Marri)	F, N, R	F, N	F, N	246	500	1,900	1,400	640	692.3	192.2
Unidentified tree[2]	N, R	N, R	N, R	88	500	1,400	900	650	697.0	179.9
Eucalyptus patens (Swan River Blackbutt)	F, N, R	R	F, N, R	14	520	990	470	610	657.1	124.7
Eucalyptus globulus (Bluegum)	F, N, R	F, N, R		6	500	1,150	650	525	716.7	289.6
Eucalyptus rudis (Flooded Gum)	F, N, R			1	680	680	0	680	680.0	0.0
Total/Mean				**760**	**533.3**	**1,253.3**	**720**	**622.5**	**686.1**	**157.5**

1 - F - foraging, R - roosting, N - nesting. 2 - *Eucalyptus* sp. or *Corymbia calophylla*, typically unable to be assigned to species level because they were dead.

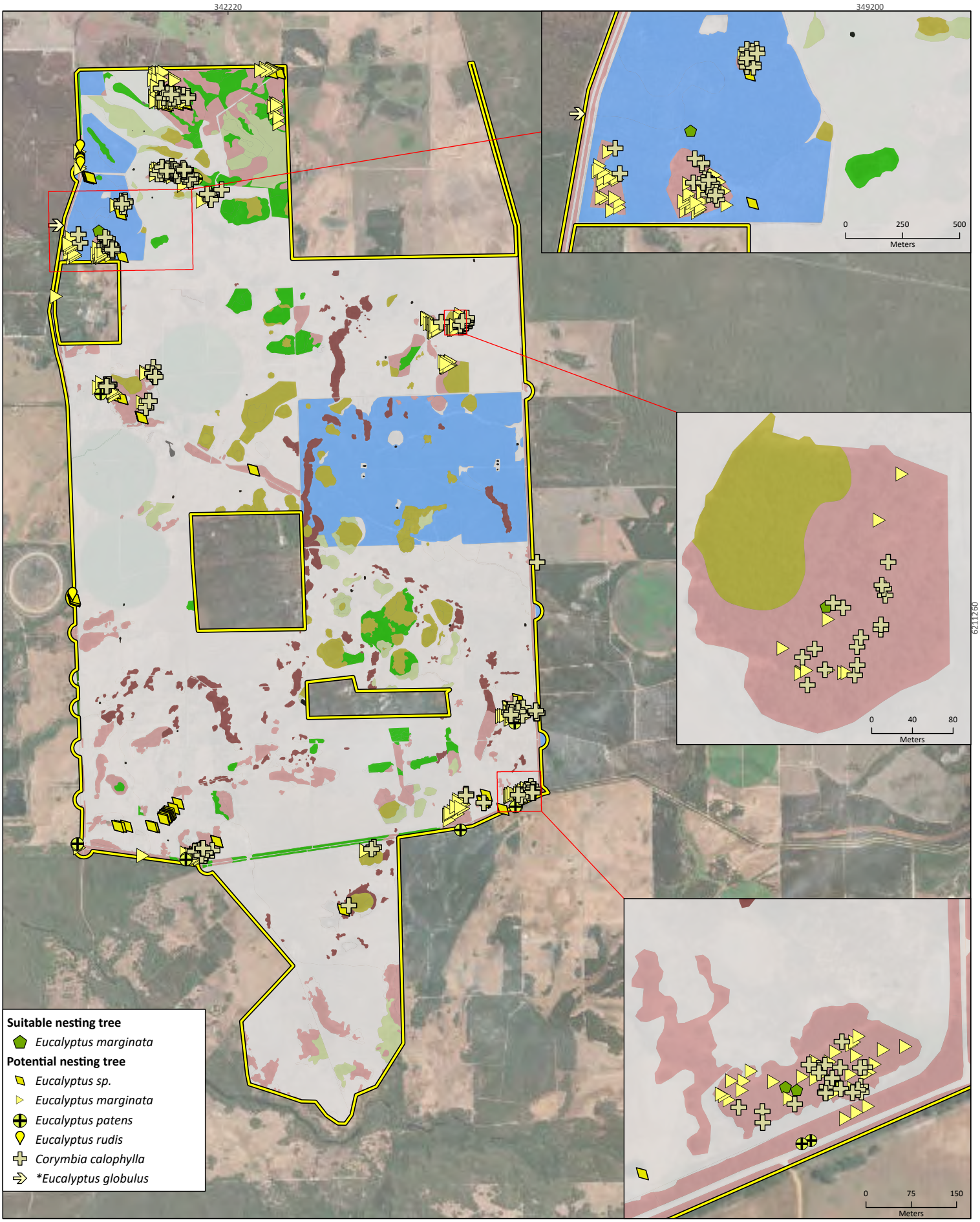
Table 5-7 summarises the PNTs recorded in the study area with respect to trees with hollows and trees in each of the 3 PNT categories (see definitions in section 4.2.2.5.1). Jarrah recorded the greatest number of trees with hollows (102) with a total 128 hollows identified. Marri recorded >71% fewer hollows than Jarrah, with a total of only 35 hollows recorded from 30 individual trees. Twenty-three hollows were recorded from dead trees that could not be identified. And finally, Swan River Blackbutt also recorded 3 hollows from 2 trees.

Using the criteria presented in section 4.2.2.5.1 the study area was found to contain no known nesting trees and just 4 suitable nesting trees, all from Jarrah. Potential nesting trees are any tree with a DBH >500mm that do not currently contain a suitable nesting hollow, a total of 756 such trees were recorded; 53.0% of these trees were Jarrah, 32.5% were Marri and 11.6% were dead trees. Overall, therefore, it is noted that Jarrah trees with hollows were recorded at over 3 times the rate of Marri, i.e. while Marri are generally considered far better at producing hollows this is not the case within the study area.

Table 5-7 Number of hollows recorded for each tree species per PNT category

PNT Species	No. trees with hollows	Total no. of hollows	Known nesting tree	Suitable nesting tree	Potential nesting tree
Eucalyptus marginata (Jarrah)	102	128		4	401
Corymbia calophylla (Marri)	30	35			246
Unidentified tree[1]	21	23			88
Eucalyptus patens (Swan River Blackbutt)	2	3			14
Eucalyptus rudis (Flooded Gum)	0	0			6
Eucalyptus globulus (Bluegum)	0	0			1
Total	**155**	**189**	**0**	**4**	**756**

1 – typically unable to be assigned to species level because they were dead.





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Study area

Habitat

- Bluegum plantation
- Cleared
- Cleared - degraded sumpland
- Dam
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)

Figure 5-5a

Black cockatoo potential nesting trees

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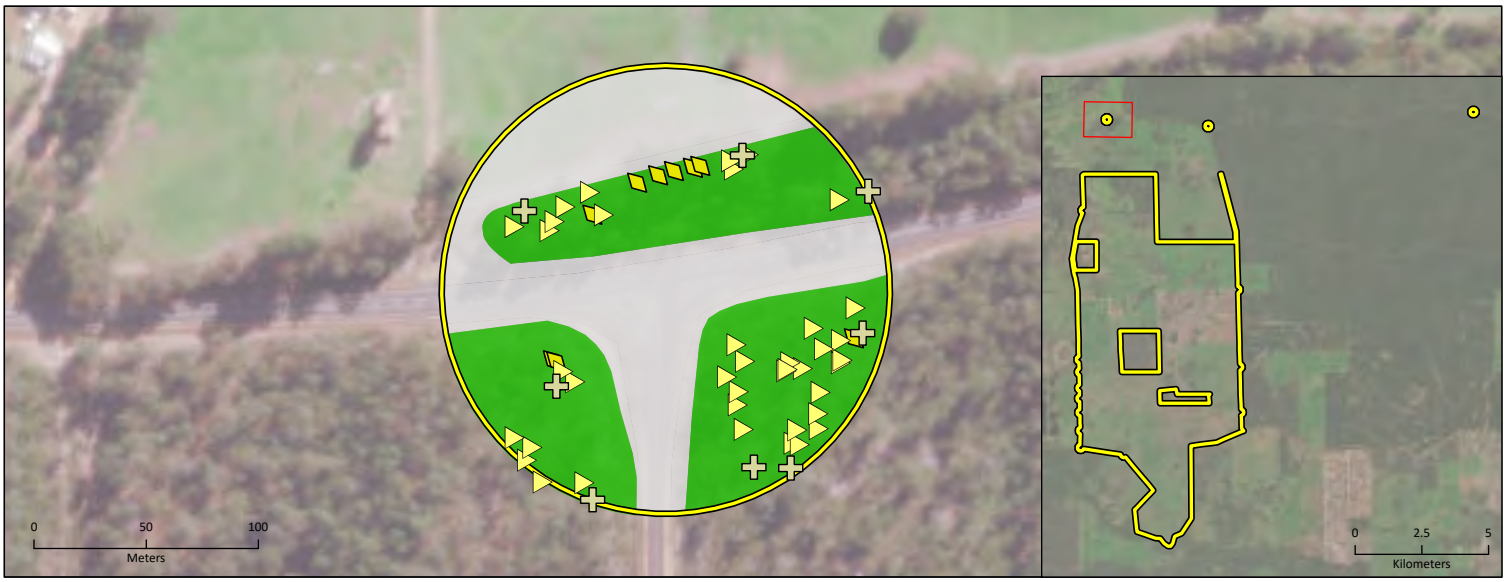

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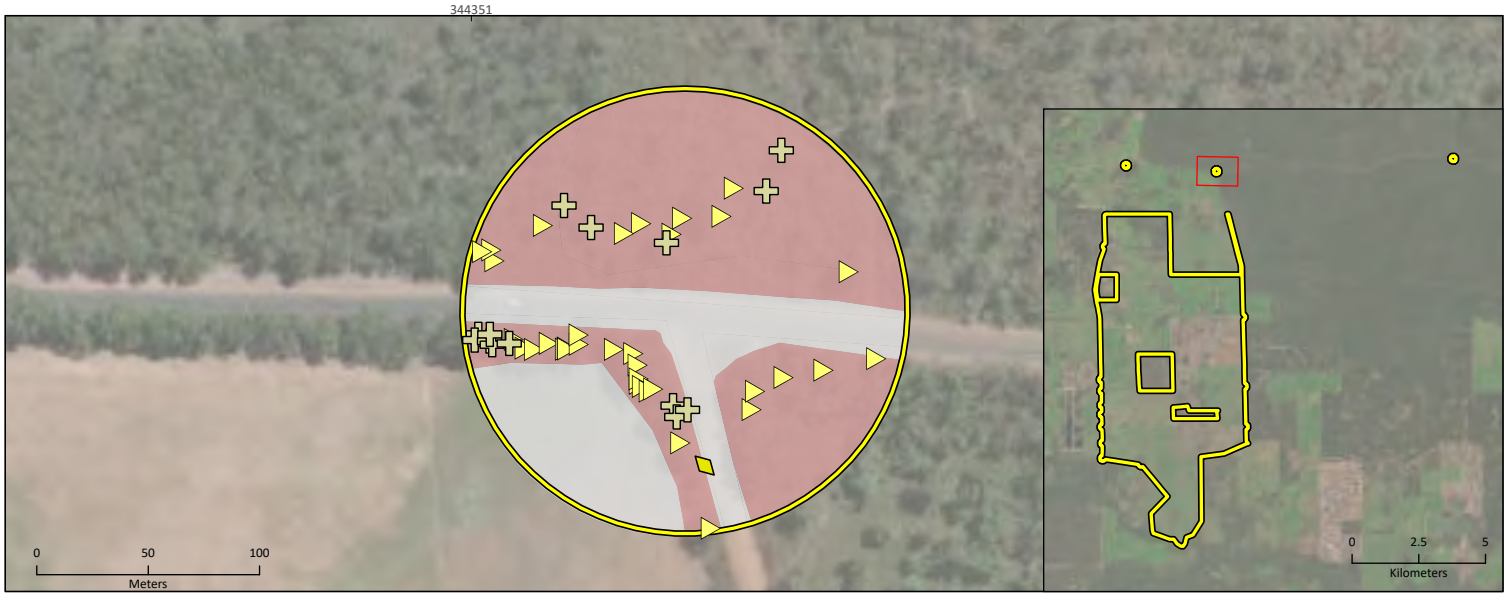





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Study area

Habitat

- Cleared
- Marri-Jarrah-Peppermint woodland
- Seasonally inundated shrubland (wetland)

Potential nesting tree

- Eucalyptus sp.
- Eucalyptus marginata
- Corymbia calophylla

Figure 5-5b

Black cockatoo potential nesting trees

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5.2.4.1.2 Night roosting

No evidence of night roosting by black cockatoos was detected during the surveys, with no individuals or flocks seen arriving in the study area near dusk over an extended survey period during night roosting surveillance, no audio data recording evening arrivals or other activity and no aggregations of feathers or feeding debris observed under trees. While no evidence of roosting was observed, the study area contains numerous remnants with known roosting tree species as listed in Table 5-6 and including the *Pinus* sp. (Carnaby's Cockatoo only) found within Pine plantation habitat (Figure 5-4).

Habitats that provide suitable trees for night roosting in the study area are the same as those that contain PNT, principally Marri-Jarrah-Peppermint woodland, as well as Seasonally inundated shrubland wetland and Seasonally inundated paperbark woodland (wetland). The tightly planted row of *Pinus* sp. on Scott River Road may also support roosting.

There is no way to quantitatively assess roosting habitat quality, suffice it to say that the study area and general surrounds contain numerous largely ephemeral natural and artificial water sources (e.g. dams and soaks), a range of different food sources (e.g. eucalypt forests and woodlands, *Banksia* woodlands and coastal heaths), and extensive forest and woodland habitats possibly suitable for breeding, although no breeding is known within 14 km of the study area. As such the Marri-Jarrah-Peppermint woodland habitat of the study area in particular cannot be discounted as roosting habitat, even though none has been observed to date (directly or indirectly) and the trees were found to be smaller in height compared with typical Jarrah and Marri heights in the Southern Jarrah Forest (JAF02), noting that DAWE (2022) identifies 'tall' trees as a prerequisite for roosting of Carnaby's Cockatoo and FRTBC, which were the 2 most commonly recorded species of the 3 black cockatoos.

5.2.4.1.3 Foraging habitat

A total of 23 species of plant that are known to be food sources for the 3 black cockatoo species were recorded in the study area by Phoenix (2025b), including 21 for Carnaby's Cockatoo, 11 for Baudin's and 5 for Forest Red-tailed Black Cockatoo (Table 5-8). The list of plants includes 3 introduced species, **Pinus* sp., **Arctotheca calendula* (Cape Weed) and **Romulea rosea* var. *australis* (Guildford Grass).

When the food sources are considered in terms of their relative distribution and cover values, the following species are considered the most important foraging plants for black cockatoos in the study area (highlighted in grey in Table 5-8):

- *Agonis flexuosa* var. *flexuosa* Peppermint – food source for Carnaby's Cockatoo
- *Allocasuarina fraseriana* Sheoak – food source for all 3 black cockatoo species
- *Banksia attenuata* Slender Banksia – food source for Carnaby's Cockatoo
- *Corymbia calophylla* Marri – food source for all 3 black cockatoo species
- *Eucalyptus marginata* Jarrah – food source for all 3 black cockatoo species
- *Xanthorrhoea preissii* Grass tree – food source for Carnaby's and Baudin's Cockatoos.

While distinguishing species' foraging evidence on Marri nuts can be done fairly readily, it is generally not possible for the other species of plants recorded and accordingly chewed Marri nuts was the only foraging evidence directly recorded, for all 3 species of cockatoo. Carnaby's Cockatoo were however directly observed twice foraging on the ground, on paddock grasses. It is not known whether the plant was Guildford Grass or Cape Weed, or another paddock grass/weed.

In addition, the extended audio recorder deployment in Phase 3 recorded 572 minutes of 'white-tailed black cockatoo' foraging and 42 minutes of Forest Red-tailed Black Cockatoo foraging (assumed due to the length of time birds were active; Appendix 8) over the ~2 month period the recorders were deployed.

Table 5-8 Black cockatoo food sources, sites, habitats, and their recorded minimum and maximum cover values

Family	Species[1]	Vernacular	Habitats present	No. sites[2]	Min. cover (%)[2]	Max. cover (%)[2]	Carnaby's	Baudin's	FRTBC
Asteraceae	**Arctotheca calendula*	Cape Weed	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	6	0.1	3	✓		
Casuarinaceae	*Allocasuarina fraseriana*	Sheoak	Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	9	2	25	✓	✓	✓
Dasypogonaceae	*Kingia australis*	Kingia	Marri-Jarrah-Peppermint woodland	2	8	15		✓	
Fabaceae	*Jacksonia furcellata*	Grey Stinkwood	Marri-Jarrah-Peppermint woodland	1	0.2	0.2	✓		
Haemodoraceae	*Anigozanthos flavidus*	Tall Kangaroo Paw	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated paperbark woodland (wetland), Seasonally inundated shrubland (wetland)	11	0.1	3		✓	
Iridaceae	**Romulea rosea* var. *australis*	Guildford Grass	Seasonally inundated shrubland (wetland)	4	0.1	0.1	✓		
Myrtaceae	*Agonis flexuosa* var. *flexuosa*	Peppermint	Cleared, Marri-Jarrah-Peppermint woodland, Open woodland of Peppermint trees (degraded), Seasonally inundated shrubland (wetland)	34	0	60	✓		
Myrtaceae	*Corymbia calophylla*	Marri	Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	14	4	65	✓	✓	✓
Myrtaceae	*Eucalyptus marginata* subsp. *marginata*	Jarrah	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	34	0.2	65	✓	✓	✓
Pinaceae	**Pinus* sp.	Pine tree	Pine plantation - a long single-row of densely planted Pine trees on Scott River Road that numbered 187 in total	1			✓		

Family	Species[1]	Vernacular	Habitats present	No. sites[2]	Min. cover (%)[2]	Max. cover (%)[2]	Carnaby's	Baudin's	FRTBC
Proteaceae	*Banksia attenuata*	Slender Banksia	Marri-Jarrah-Peppermint woodland	8	1	15	✓		
Proteaceae	*Banksia grandis*	Bull Banksia	Seasonally inundated shrubland (wetland)	1	1	1	✓	✓	
Proteaceae	*Banksia ilicifolia*	Holly-leaved Banksia	Marri-Jarrah-Peppermint woodland	6	0.2	7	✓		
Proteaceae	*Banksia littoralis*	Swamp Banksia	Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	3	0.2	2	✓		
Proteaceae	*Banksia nivea* subsp. *nivea*		Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	4	0.1	15	✓		
Proteaceae	*Hakea falcata*		Marri-Jarrah-Peppermint woodland	1	0.1	0.1	✓		
Proteaceae	*Hakea lasianthoides*		Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	4	1	15	✓	✓	
Proteaceae	*Hakea lissocarpha*	Honey Bush	Marri-Jarrah-Peppermint woodland	3	0.1	2	✓	✓	
Proteaceae	*Hakea ruscifolia*	Candle Hakea	Cleared, Marri-Jarrah-Peppermint woodland	3	0.1	0.3	✓	✓	✓
Proteaceae	*Hakea sulcata*	Furrowed Hakea	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	8	0.1	3	✓		
Proteaceae	*Hakea varia*	Variable-leaved Hakea	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	7	0.1	3	✓	✓	
Proteaceae	*Persoonia longifolia*	Snottygobble	Marri-Jarrah-Peppermint woodland	3	0	3	✓		✓
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass tree	Cleared, Marri-Jarrah-Peppermint woodland, Seasonally inundated shrubland (wetland)	44	0.1	11	✓	✓	
						Total	**21**	**11**	**5**

1 - Shaded rows denote species that are the most important foraging plants for black cockatoos in the study area. [2]Data/sites from flora and vegetation survey for Project (Phoenix 2025b).

Foraging habitat quality was assessed using 2 methods, DAWE (2022) and Bamford (2021). The results against the DAWE (2022) assessment metrics are presented in Table 5-9 for each black cockatoo species. The scores per habitat type for each species are presented in Table 5-10. The final score in Table 5-10 for each species applies only to native remnant vegetation that supports foraging species (per Table 5-8), except for Pine plantation which is a food source for Carnaby's Cockatoo. Highly modified habitats, or habitat without foraging species were scored 0. The scores therefore primarily apply to Marri-Jarrah-Peppermint woodland and Seasonally inundated paperbark woodland (wetland). Foraging habitat quality per DAWE (2022) scored 9 for Baudin's Cockatoo and Forest Red-tailed Black Cockatoo, and 7 for Carnaby's Cockatoo, as the study area is outside its known breeding range.

Marri-Jarrah-Peppermint woodland is the most important habitat for all 3 black cockatoo species using DAWE (2022) as it contains the highest number of food sources and has the greatest extent in the study area (Table 5-10; Figure 5-6–Figure 5-8). Seasonally inundated shrubland (wetland) is also important as it too supports all 3 species and is widespread across the study area. In aggregate, 17.9% of the study area is considered black cockatoo foraging habitat under the DAWE method.

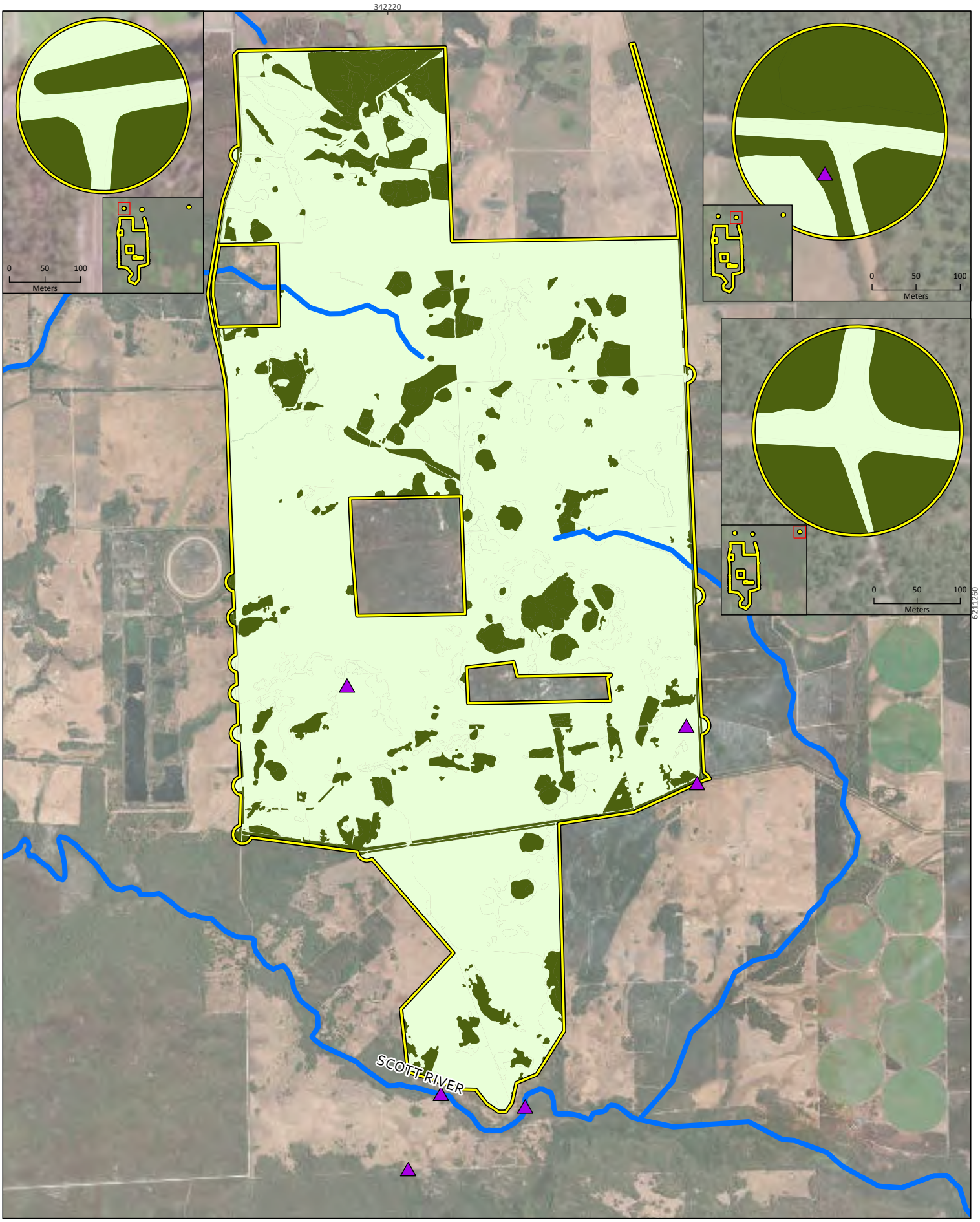
Table 5-9 Black cockatoo foraging habitat quality scores per DAWE (2022)

Attributes	Baudin's Cockatoo	Carnaby's Cockatoo	FRTBC	Justification
Starting score	10	10	10	Remnants include native eucalypt (Jarrah/Marri) woodland and shrubland containing proteaceous species (*Banksia* sp. *Hakea* sp. and *Grevillea* sp.). Study area is within the range of all 3 species.
Foraging attributes				
Foraging potential	0	0	0	There is evidence of foraging by all species.
Connectivity	0	0	0	There is ample foraging habitat within 12 km for all 3 species.
Proximity to breeding	0	-2	0	There is no direct evidence of breeding within 12 km for all 3 species, however there is breeding habitat present for Baudin's Cockatoo and FRTBC and so undetected breeding cannot be discounted. The study area is outside the breeding range for Carnaby's Cockatoo.
Proximity to roosting	0	0	0	There are known roosting sites within 20 km (DBCA 2023c) one 'white-tailed cockatoo' roost (therefore either Carnaby's or Baudin's) and one unknown taxa (therefore any one of the 3 species). Potentially other roost sites present.
Impact from significant plant disease	-1	-1	-1	While dieback was not obvious with many susceptible species present, there is a long history of habitat modification and intensive use in the area, and the floodplain nature means spores can be transported easily across the landscape. Therefore, it is assumed that dieback is present.
Final score	**9**	**7**	**9**	

Table 5-10 DAWE (2022) foraging habitat scores per habitat type

Fauna habitat	Area of habitat (ha)	Foraging habitat score			Area all foraging habitat (ha)[1]
		Baudin's Cockatoo	Carnaby's Cockatoo	FRTBC	
Marri-Jarrah-Peppermint woodland	322	9	7	9	322
Seasonally inundated paperbark woodland (wetland)	144.9	9	0	0	144.9
Seasonally inundated shrubland (wetland)	126.1	9	7	9	126.1
Open woodland of Peppermint trees (degraded)	98.9	0	7	0	98.9
Pine plantation	1.6	0	7	0	1.6
Dam	1.7	0	0	0	0
Cleared - degraded sumpland	8.1	0	0	0	0
Cleared	2666	0	0	0	0
Seasonally inundated sedgeland (wetland)	107	0	0	0	0
Bluegum plantation	415.4	0	0	0	0
Total area / total area foraging habitat	**3,891.7**	**593.0**	**548.6**	**448.1**	**693.5**
% of study area	**100.0%**	**15.2%**	**14.1%**	**11.5%**	**17.8%**

1 - For any black cockatoo species.





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- Study area
- Rivers
- Baudin's Cockatoo records

Habitat score

- 0
- 9

Figure 5-6

Baudin's Cockatoo foraging habitat quality (DAWE 2022 method)

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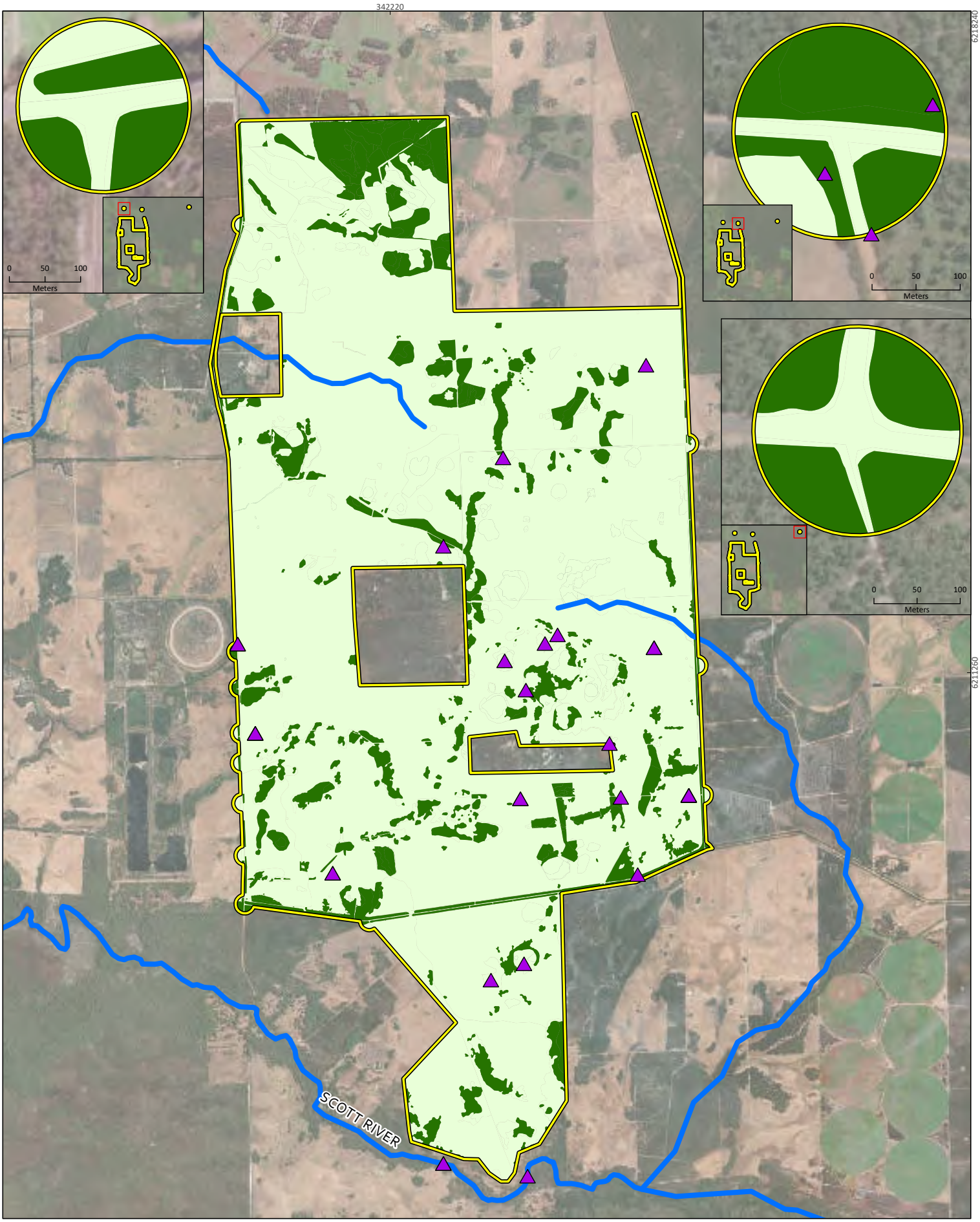



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Study area
Rivers
Carnaby's Cockatoo records

Habitat score

0
7

Figure 5-7
Carnaby's Cockatoo foraging habitat quality (DAWE 2022 method)

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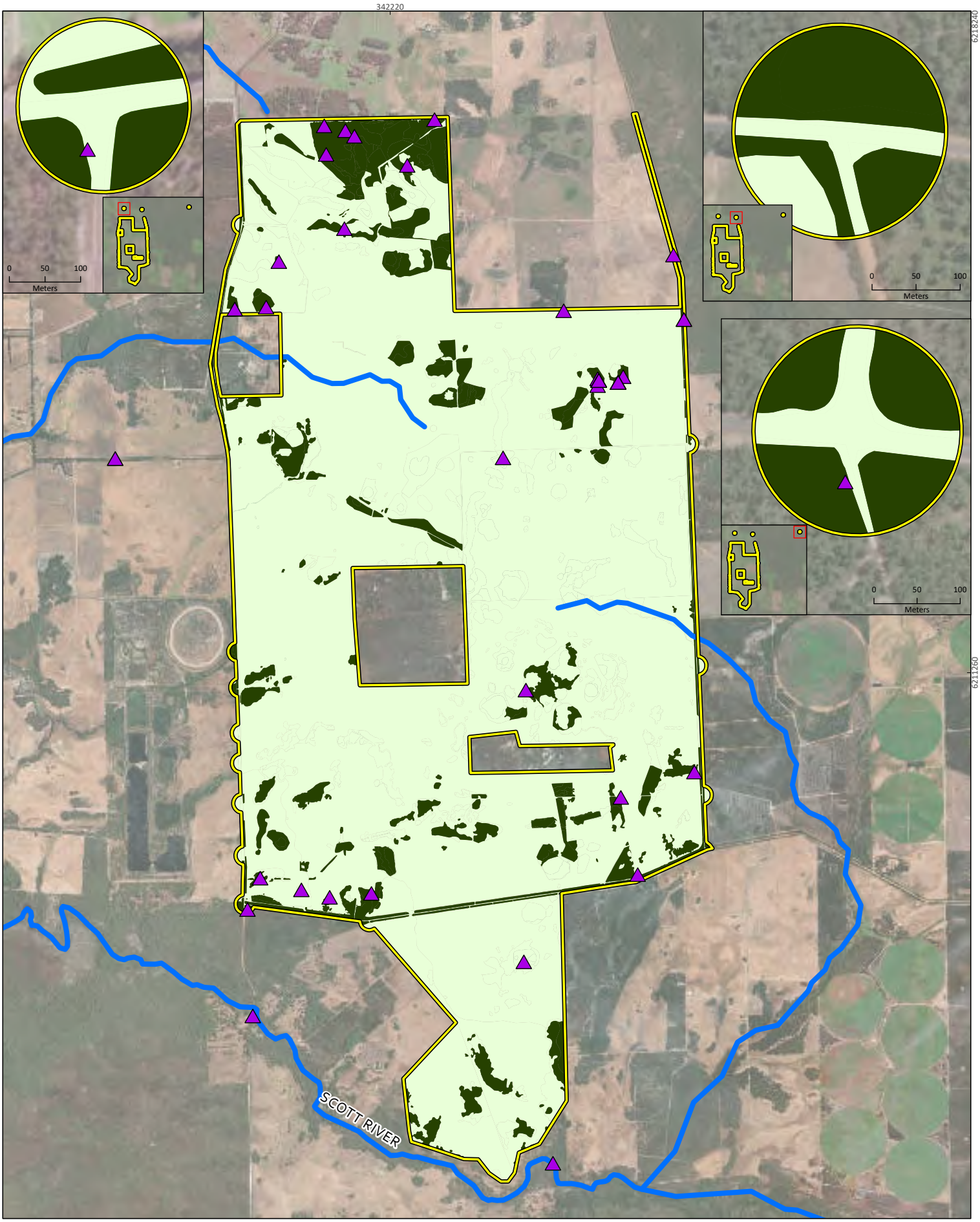

Western Australia

PERTH

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- Study area
- Rivers
- Forest Red-tailed Black Cockatoo records

Habitat score

- 0
- 9

Figure 5-8

Forest Red-tailed Black Cockatoo foraging habitat quality (DAWE 2022 method)

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The area (ha) of foraging habitat in the study area for each black cockatoo species, per quality category (see section 4.2.2.5.3) based on the Bamford (2021) assessment metrics is shown graphically in Figure 5-9 (and spatially in Figure 5-10, Figure 5-11 and Figure 5-12). In Figure 5-9 it can be clearly seen that Carnaby's Cockatoo is the only species where almost the entirety of the study area is considering to have at least low foraging value, and this is because Carnaby's Cockatoo is known to feed on a variety of paddock grasses such as *Erodium* species, Cape Weed (*Arctotheca calendula*) (Table 5-8) and melons, and indeed it was observed doing just that on 2 occasions. For Baudin's Cockatoo and Forest Red-tailed Black Cockatoo the vast majority of the study area is considered not to be foraging habitat. The largest area of high-quality foraging habitat (318 ha) is for Forest Red-tailed Black Cockatoo.

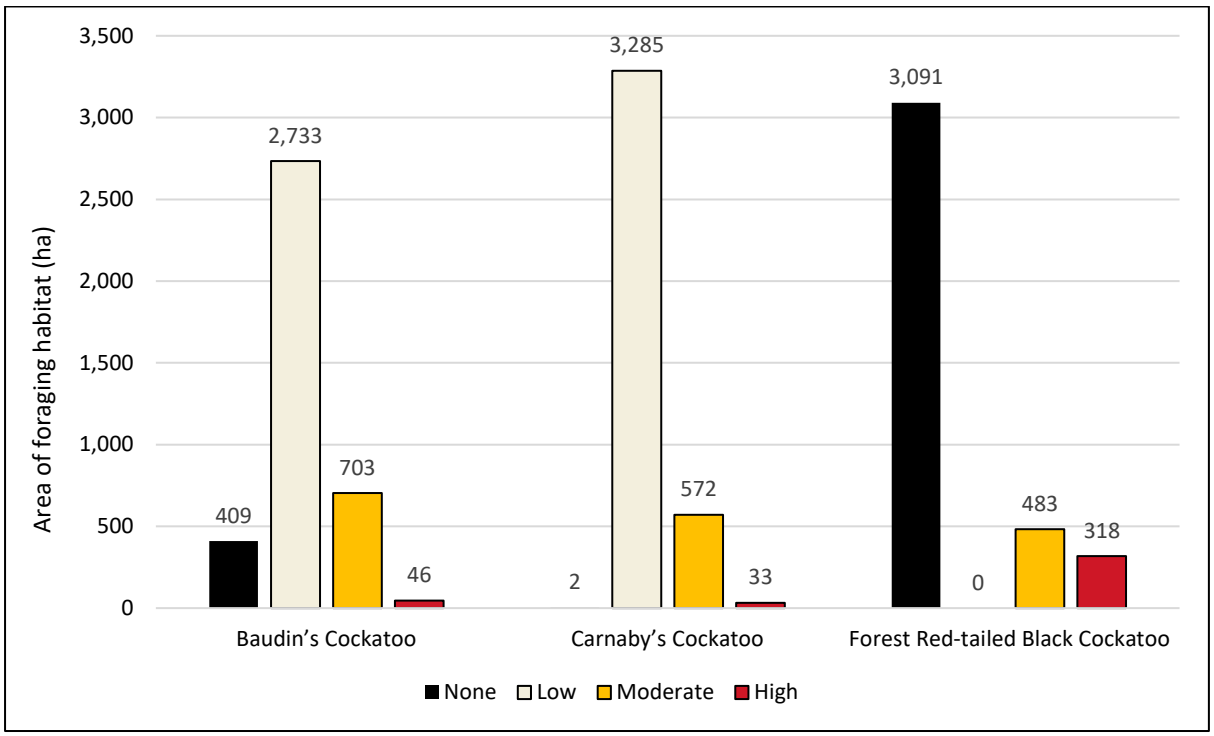


Figure 5-9 Area (ha) of foraging habitat (Bamford 2021) per quality category per species

The raw scores per habitat type are provided for each species separately in Table 5-11 – Table 5-13. High-quality and moderate-quality foraging habitat for black cockatoos occurred in the 3 RIAs, a large continuous area at the northern boundary of the WFA and in smaller remnants elsewhere in the study area (Figure 5-10 – Figure 5-12).

Baudin's Cockatoo

Approximately 3,191.6 ha (82.0%) was found to have no foraging value for Baudin's Cockatoo. High-quality foraging habitat totalled 46 ha (1.2% of the study area) and was restricted to Marri-Jarrah-Peppermint woodland. Moderate-quality habitat (score of 5–7) was found to occur in Marri-Jarrah-Peppermint woodland and Seasonally inundated shrubland (wetland) and comprised 392.1 ha (10.1%) in total (Table 5-11). The remainder of the study area was classified as low-quality or having no foraging value for Baudin's Cockatoo.

Considering the distribution of foraging habitat value, it can be seen in Figure 5-10 that a large aggregation of moderate and high-value habitat occurs on the northern boundary. Elsewhere high-value habitat occurs in clustered remnants in the northeast paddock, and moderate–high-value patches occur across the south, just north of Governor Broome Road, as well as south of Governor Broome Road, near the southern extent of the study area. Low-value foraging habitat is distributed in patches throughout the central portion of the study area.

Carnaby's Cockatoo

For Carnaby's Cockatoo, just ~33.0 ha (0.8% of the study area) was assessed as high-quality foraging habitat, all within Marri-Jarrah-Peppermint woodland habitat (Table 5-12). A further 571.5 ha (14.7%) was classified as moderate-quality foraging habitat, comprising the 3 wetland habitat types and Marri-Jarrah-Peppermint woodland. A total of 3,285.3 ha (84.4%) is considered low-quality foraging habitat, comprising of predominantly the cleared areas which seasonally support paddock grasses such as *Erodium* species and Cape Weed (*Arctotheca calendula*) on which the species is known to feed. Just 1.7 ha (dams) is not foraging habitat for the species.

In contrast to Baudin's Cockatoo and Forest Red-tailed Black Cockatoo, the majority of the study area has some foraging value to Carnaby's Cockatoo (Figure 5-11). However, similarly, the best remnants represent moderate–high-value habitat, such that, again, there is a large aggregation of moderate–high-value habitat on the northern boundary and high-value habitat clustered in remnants in the northeast paddock, moderate–high-value patches occur across the south, just north of Governor Broome Road and south of Governor Broome Road near the southern extent of the WFA. There is also 2 patches of high-value habitat within the north-western Bluegum plantation (Figure 5-11).

Forest Red-tailed Black Cockatoo

For Forest Red-tailed Black Cockatoo, 3,443.6 (88.5%) of the study area is not foraging habitat. A total of 170.5 ha (4.4% of the study area) was assessed as high-quality foraging habitat and 261.6 ha (6.7%) classified as moderate-quality habitat, almost entirely all within Marri-Jarrah-Peppermint woodland. Seasonally inundated shrubland (wetland) also represented foraging habitat, being 110.1 ha of moderate-quality and 15.9 ha being of low-quality. The vast majority therefore is not foraging habitat for the species (3,443.6 ha; 88.5%) (Table 5-13).

The distribution of foraging habitat value for Forest Red-tailed Black Cockatoo is shown in Figure 5-12. The value for this species is very similar to that of Baudin's Cockatoo. There is a large aggregation of moderate–high-value habitat on the northern boundary, and high-value habitat occurs in clustered remnants in the northeast paddock. Moderate–high-value patches occur across the south, just north of Governor Broome Road, as well as south of Governor Broome Road, near the southern extent of the study area. Much of the central remnants considered low-value for Baudin's however is not considered foraging habitat for Forest Red-tailed Black Cockatoo (Figure 5-12).

Table 5-11 Baudin's Cockatoo foraging habitat quality (Bamford 2021) – area (ha) per score and habitat type

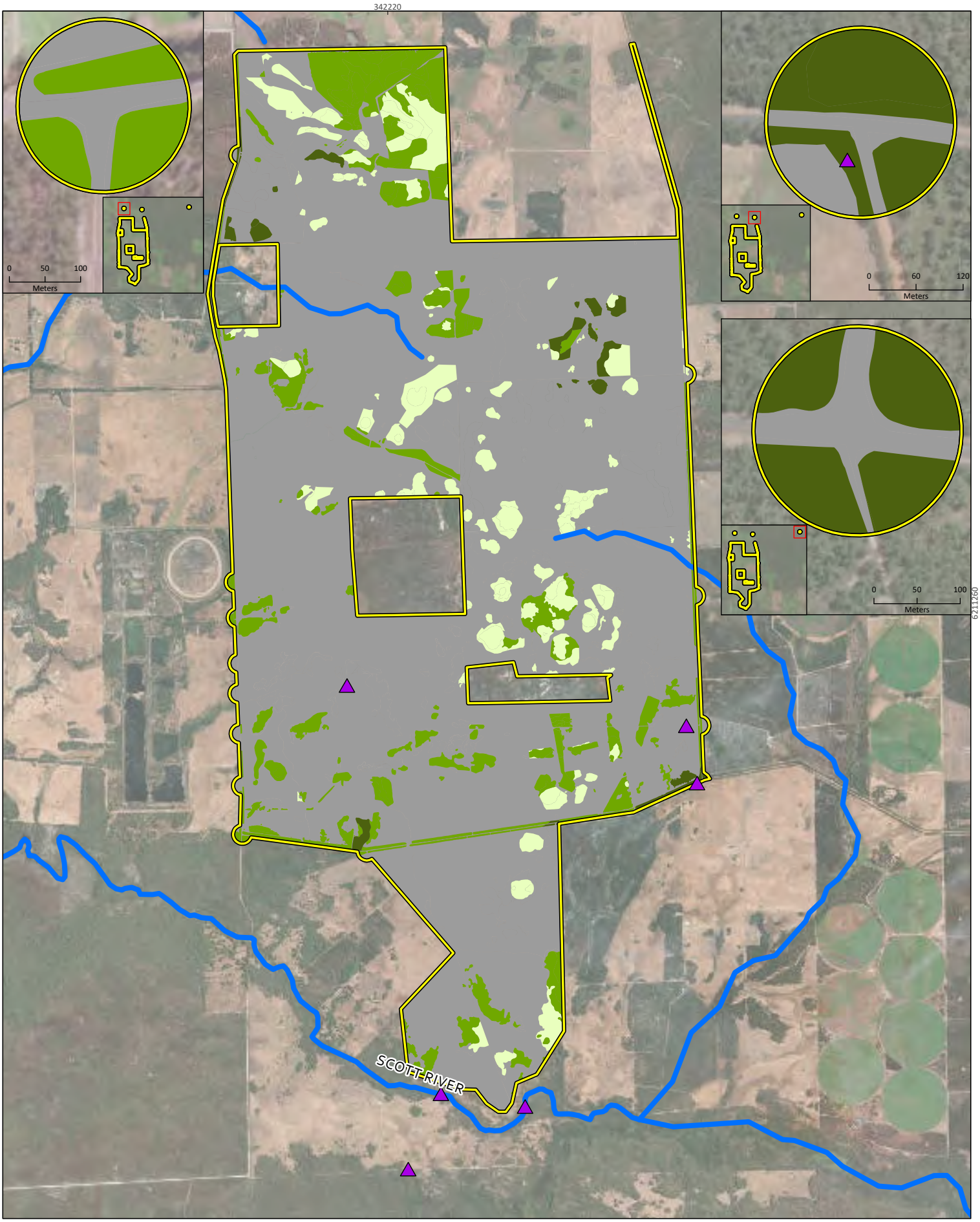
Habitat type	None	Low			Moderate			High	Total
	0	2	3	4	5	6	7	8	
Bluegum plantation	415.4								415.4
Cleared	2,666.0								2,666.0
Cleared - degraded sumpland	8.1								8.1
Dam	1.7								1.7
Marri-Jarrah-Peppermint woodland				4.1	22.9	61.6	187.4	46.1	322.0
Open woodland of Peppermint trees (degraded)	98.9								98.9
Pine plantation	1.6								1.6
Seasonally inundated paperbark woodland (wetland)			144.9						144.9
Seasonally inundated sedgeland (wetland)		107.0							107.0
Seasonally inundated shrubland (wetland)			5.8		120.3				126.1
Total per score	**3,191.6**	**107.0**	**150.7**	**4.1**	**143.2**	**61.6**	**187.4**	**46.1**	**3,891.6**
Total per category	**3,191.6**	**261.8**			**392.1**			**46.1**	**3,891.6**
% per category	**82.0%**	**6.7%**			**10.1%**			**1.2%**	**100.0%**

Table 5-12 Carnaby's Cockatoo foraging habitat quality (Bamford 2021) – area (ha) per score s habitat type

Habitat type	None	Low			Moderate			High	Total
	0	1	3	4	5	6	7	8	
Bluegum plantation		415.4							415.4
Cleared		2666.0							2666.0
Cleared - degraded sumpland		8.1							8.1
Dam	1.7								1.7
Marri-Jarrah-Peppermint woodland				4.1	31.5	122.6	130.7	33.0	322.0
Open woodland of Peppermint trees (degraded)				98.9					98.9
Pine plantation				1.6					1.6
Seasonally inundated paperbark woodland (wetland)			11.2	18.5	115.2				144.9
Seasonally inundated sedgeland (wetland)			37.2	9.0	60.7				107.0
Seasonally inundated shrubland (wetland)			5.8	9.5	84.4	26.383			126.1
Total per score	**1.7**	**3089.5**	**54.2**	**141.7**	**291.8**	**149.0**	**130.7**	**33.0**	**3891.6**
Total per category	**1.7**	**3285.3**			**571.5**			**33.0**	**3891.6**
% per category	**0.04%**	**84.4%**			**14.7%**			**0.8%**	**100%**

Table 5-13 Forest Red-tailed Black Cockatoo foraging habitat quality (Bamford 2021) – area (ha) per score and habitat type

Habitat type	None	Low		Moderate			High		Total
	0	3	4	5	6	7	8	10	
Bluegum plantation	415.4								415.4
Cleared	2,666.0								2,666.0
Cleared - degraded sumpland	8.1								8.1
Dam	1.7								1.7
Marri-Jarrah-Peppermint woodland					64.2	87.2	170.2	0.3	322.0
Open woodland of Peppermint trees (degraded)	98.9								98.9
Pine plantation	1.6								1.6
Seasonally inundated paperbark woodland (wetland)	144.9								144.9
Seasonally inundated sedgeland (wetland)	107.0								107.0
Seasonally inundated shrubland (wetland)		5.8	10.2	110.1					126.1
Total per score	**3,443.6**	**5.8**	**10.2**	**110.1**	**64.2**	**87.2**	**170.2**	**0.3**	**3,891.6**
Total per category	**3,443.6**	**15.9**		**261.6**			**170.5**		**3,891.6**
% per category	**88.5%**	**0.4%**		**6.7%**			**4.4%**		**100%**





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	21/07/2025
Drawn by	BK
Map author	JC

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Kilometers

1:52,800 (at A4) GDA 1994 MGA Zone 50

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- Study area
- Rivers
- Baudin's Cockatoo records

Habitat score (Bamford 2021 method)

- None (0)
- Low (1-4)
- Moderate (5-7)
- High (8-10)

Figure 5-10
Baudin's Cockatoo foraging habitat quality (Bamford 2021 method)

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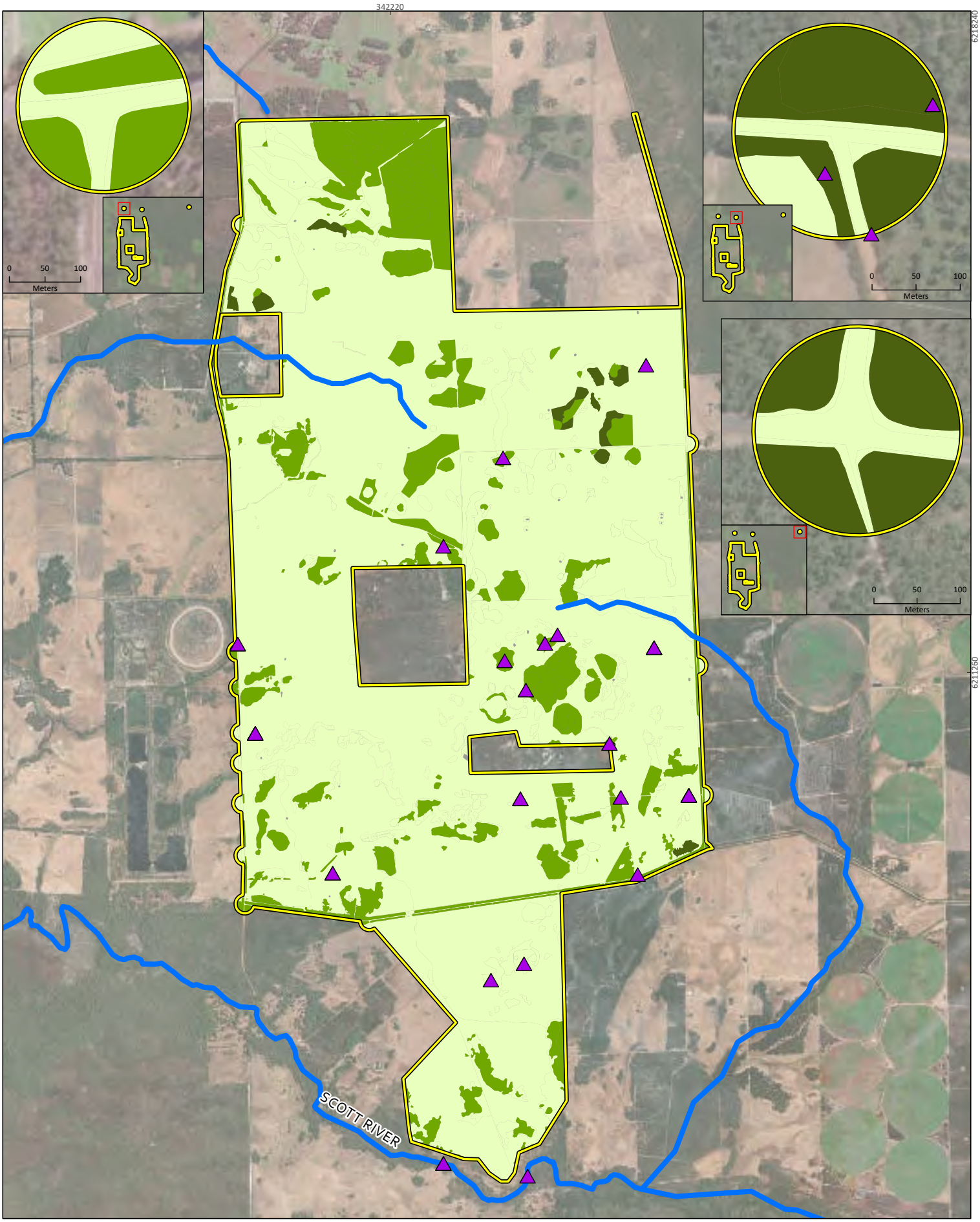

Western Australia

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Study area
Rivers
Carnaby's Cockatoo records

Habitat score
None (0)
Low (1-4)
Moderate (5-7)
High (8-10)

Figure 5-11
Carnaby's Cockatoo foraging habitat quality (Bamford 2021 method)

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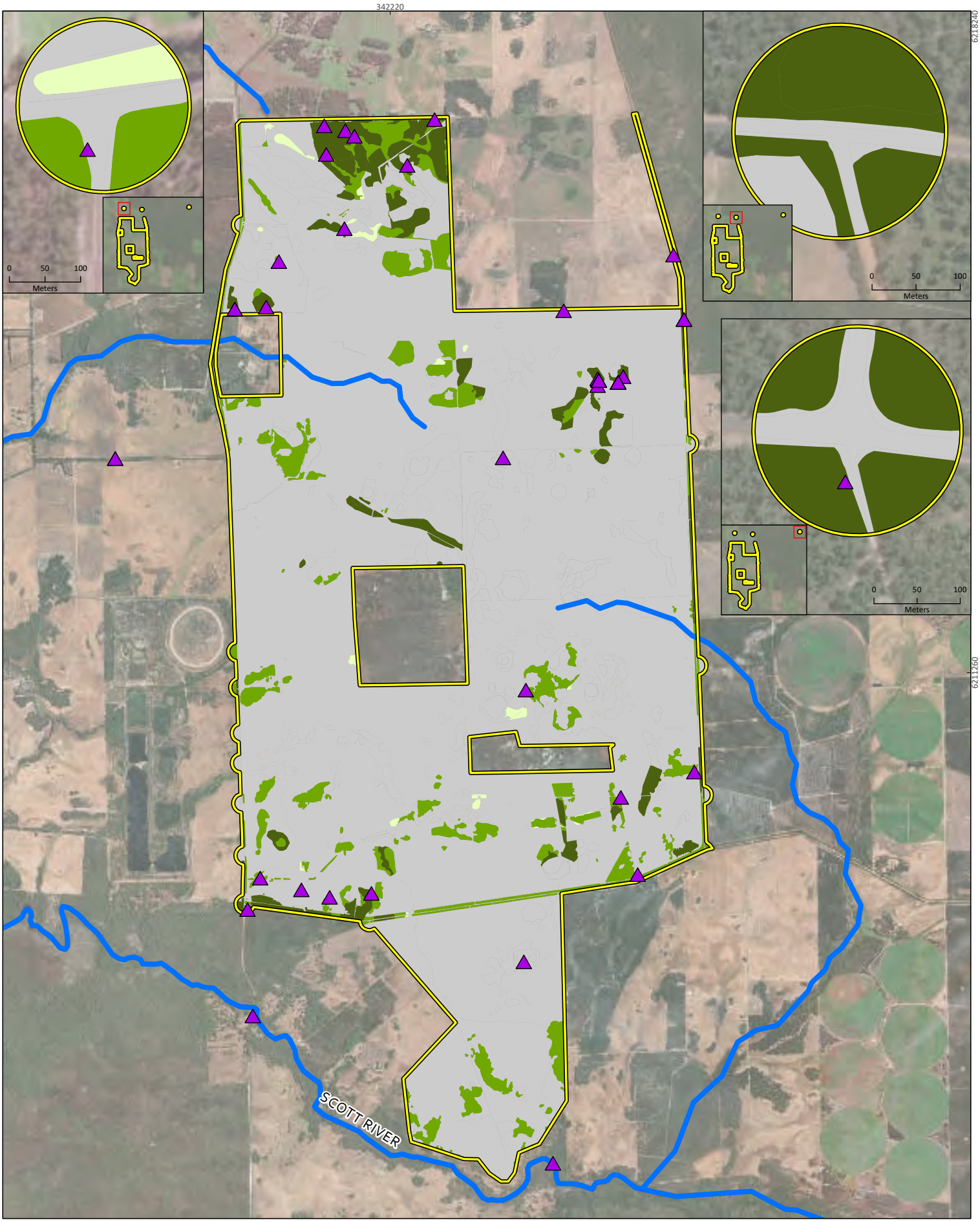

Western Australia

PERTH

SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	1/07/2025
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Map author	JC

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Study area
Rivers
Forest Red-tailed Black Cockatoo records

Habitat score
None (0)
Low (1-4)
Moderate (5-7)
High (8-10)

Figure 5-12
Forest Red-tailed Black Cockatoo foraging habitat quality (Bamford 2021 method)

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5.2.4.2 Western Ringtail Possum habitat

Based on the habitat quality calculations for Western Ringtail Possum, 103.0 ha (2.6% of the study area) was found to be of moderate-quality and 98.0 ha (2.5%) was found to be of high-quality (Table 5-14; Figure 5-13). The remainder of the study area (94.8%) was classified as low-quality habitat, or as not habitat for the species (Table 5-14; Figure 5-13). A more detailed breakdown of the habitat value calculations is provided in Appendix 10.

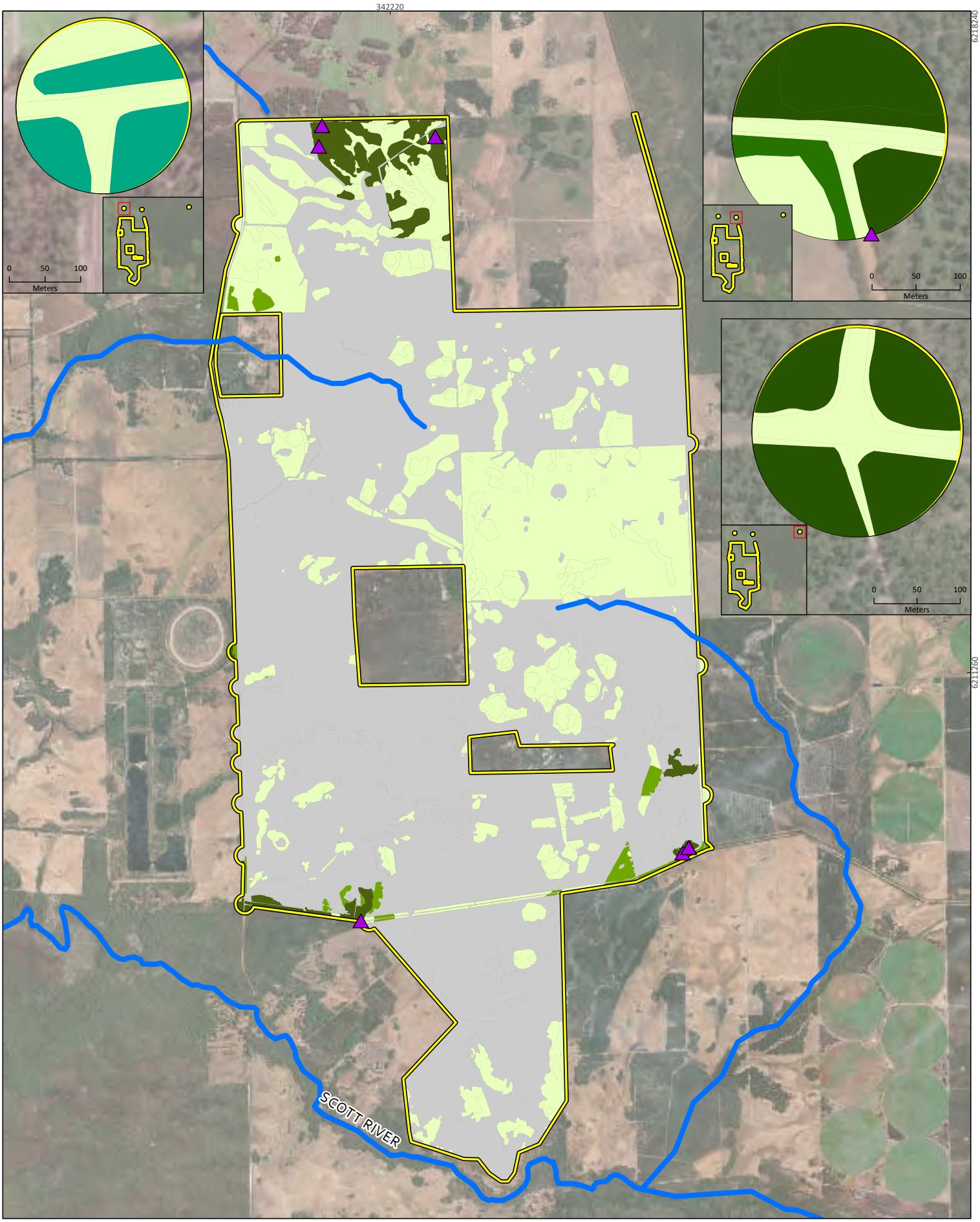
High-quality and moderate-quality habitat was confined to a single habitat type, Marri-Jarrah-Peppermint woodland (Table 5-14). Low-value habitat was represented by Bluegum plantation, Open woodland of Peppermint trees (degraded), Seasonally inundated paperbark woodland (wetland), Seasonally inundated sedgeland (wetland), Seasonally inundated shrubland (wetland) and poor condition, isolated or low density (reduced canopy cover) Marri-Jarrah-Peppermint woodland. While stands of Peppermint are typically associated with the Western Ringtail Possum, in the study area these stands are largely in poor condition lacking mid and understorey species, due to them being accessed by cattle. They are also typically isolated by more than 50 m of open paddock which acts to prevent this arboreal species from moving between those patches and other native habitats.

Bluegum plantation was classified as low-quality for Western Ringtail Possum as the species is known to utilise such habitat, but their typical usage is restricted to the margins where they border suitable native vegetation, particularly riparian zones (DPaW 2017b), both of which occur within the large plantation located in the mid-eastern portion of the study area and the smaller north-western plantation.

Large areas of contiguous suitable habitat for Western Ringtail Possum occur adjacent to the study area in the north-east, east of Dennis Road in State Forest and also to the south in Scott National Park (Figure 3-4; Figure 5-13).

Table 5-14 Western Ringtail Possum habitat quality – area (ha) per quality rating and habitat type

Fauna habitat	None	Low	Moderate	High	Total
Bluegum plantation		415.4	0	0	415.4
Cleared	2,666	0	0	0	2,666
Cleared - degraded sumpland	8.1	0	0	0	8.1
Dam	1.7	0	0	0	1.7
Marri-Jarrah-Peppermint woodland	32.5	88.4	103	98	321.9
Open woodland of Peppermint trees (degraded)	50.7	48.1	0	0	98.8
Pine plantation	1.6	0	0	0	1.6
Seasonally inundated paperbark woodland (wetland)		145	0	0	145
Seasonally inundated sedgeland (wetland)		107	0	0	107
Seasonally inundated shrubland (wetland)	5.1	121	0	0	126.1
Total area (ha)	**2,765.70**	**924.9**	**103**	**98**	**3,891.60**
% of study area per score	**71.1%**	**23.8%**	**2.6%**	**2.5%**	**100.0%**





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Study area
Rivers
Western Ringtail Possum records

Habitat score
None (0)
Low (0.5-4.5)
Moderate (5-7.5)
High (8-10)

Figure 5-13
Western Ringtail Possum habitat

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5.2.5 Likelihood of occurrence assessment

The likelihood of occurrence assessment for the significant species identified in the desktop review is provided in Table 5-15. In addition to the 10 recorded species, 4 species are considered as likely to occur, based on the currency and proximity of desktop records and suitability of habitat in the study area: Short-nosed Snake, Blue-billed Duck, Common Greenshank and South-western Brush-tailed Phascogale. A further 14 species are considered to possibly occur (Table 5-15), including 11 Migratory birds, 2 mammals and one other bird species.

Use of the study area by the Migratory shorebirds that are considered to be likely or possibly occurring is mostly limited to the spring months. Based on the Migratory shorebird data from ALA (section 5.1.3), birds typically start arriving in the Southwest region in September. Many of the wetlands in the study area have either dried already or are in the process of receding by October. In wetter years suitable habitat may persist further into late spring.

The remaining 42 species in Table 5-15 were considered unlikely to occur in the study area (35 species), or unlikely (rare) (7 species, all Migratory shorebirds). Two Threatened frogs, and 3 Threatened mammals are unlikely to occur either due to current distributions being outside the study area or no suitable habitat being present (Table 5-15). All of the pelagic birds (i.e. the albatrosses, petrels, shearwaters and Pomarine Jaeger) are unlikely to occur as they do not utilise inland habitats.

Table 5-15 Likelihood of occurrence for significant vertebrate fauna identified in the desktop review

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Amphibia (2)															
Anstisia alba White-bellied Frog	CR (EPBC & BC Acts)	9.8 km WNW of study area	Distribution is extremely restricted and fragmented occurring in an area north and west of the Blackwood River between Margaret River and Augusta. Inhabits permanently moist sites of U-shaped drainage depressions with swampy floors within undulating to hilly country on Leeuwin Block granite and narrow V-shaped valleys on laterised Perth Basin Sediments (DCCEEW 2024m; Wardell-Johnson *et al.* 1995).	Unlikely	Species distribution is outside (roughly 10 km NW of) the study area. Study area does not contain habitat features the species is associated with.										
Anstisia vitellina Orange-bellied Frog	VU (EPBC & BC Acts)	7.8 km N of study area	Distribution is extremely restricted, with the species appearing to reflect very localised suitable habitat conditions. Occurs in permanently moist sites in broad U-shaped valleys where there is marked topographic relief but rarely found on valley floor; abundant at seepages (DCCEEW 2024l; DPaW 2015; Wardell-Johnson *et al.* 1995).	Unlikely	Species distribution is outside (roughly 8 km N of) the study area. Study area does not contain habitat features the species is associated with.										
Reptilia (1)															
Elapognathus minor Short-nosed Snake	P2 (DBCA list)	3.2 km ESE of study area	Occurs in heath along the margin of swamps, in sedgeland and in wet sclerophyll forests growing on sandy soil in far south-west of WA. Associated with ephemeral wetlands and shelters in low dense vegetation such as tussocks and sedges (Craig *et al.* 2017).	Likely	Recently recorded in close proximity. Suitable habitat present.	●	●	●	●						

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Aves (58)															
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	0.5 km W of study area	Small ponds, large inlets, mudflats where they forage on the shore usually close to the vegetation (DCCEEW 2024j). Uses a wide variety of coastal wetlands and some inland wetlands. Species arrives in the Southwest in Sept-Oct (DCCEEW 2024j).	Possible	Nearby record. Suitable habitat present, but receding as species arrives in the Southwest, therefore, may be a temporary, seasonal visitor.	●	●	●							
Anarhynchus bicinctus Double-banded Plover	Mig. (EPBC & BC Acts)	1.9 km W of study area	Found on littoral, estuarine and fresh or saline terrestrial wetlands, rivers, saltmarshes, lagoons, grasslands and pasture. Also occurs on muddy, sandy, shingled or rocky beaches, bays and inlets (DCCEEW 2024s).	Possible (rare)	Previous desktop records <10 km from the WFA but old (1979-80) and from a single site near the artificial wetlands. No other desktop records returned. While the species is known to use terrestrial wetlands and pasture near the coast, it only occurs rarely in WA. Therefore, considered unlikely to occur except as possibly a very rare visitor.	●	●	●			●	●			

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Anarhynchus leschenaultii Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)	1.9 km W of study area	Utilises coastal and estuarine environments. Typically occupies sheltered sandy or muddy beaches, as well as intertidal sandbanks, mudflats, reefs and rock platforms. Occasional records from saltworks, salt lakes and marginal saltmarshes and brackish swamps (DAWE 2023; TSSC 2016).	Unlikely	Nearby record. Inhabits coastal habitats, no suitable habitat present in study area.										
Anarhynchus mongolus Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)	1.9 km W of study area	Typically found in coastal and estuarine environments. Utilises intertidal mudflats and sandflats, as well as sheltered harbours. Occasionally occupies sandy beaches, rock platforms, saltmarshes, mangrove saltworks, brackish swamps and silt islands (DCCEEW 2024t).	Possible (rare)	Nearby record but mainly occurs in coastal habitats. Main habitats not present.	●	●	●							
Anous tenuirostris melanops Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)	Proj. dist. (DCCEEW 2023c)	Nests in mangroves on offshore islands and mostly remain near breeding islands. Large oceanic foraging range (Surman *et al.* 2017). Gales can displace birds many hundreds of kilometres (DCCEEW 2024k; TSSC 2015a).	Unlikely	Desktop record is projected distribution only. No nearby records, and no suitable foraging habitat in the study area.										
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Acts)	Proj. dist. (DCCEEW 2023c)	Occurs in a wide range of dry or open habitats, including riparian woodlands, tea tree swamps, low scrub, heathland, saltmarsh, grassland and spinifex sandplains, open farmland and inland and coastal sand dunes (DCCEEW 2021).	Possible	Within species distribution, but no nearby records. Occupies wide range of habitats. Aerial feeder, may feed on insects over the study area on occasion.	●	●	●	●	●	●	●	●		

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Ardenna carneipes Flesh-footed shearwater	VU/Mig. (BC Act)	Proj. dist. (DCCEEW 2023c)	Continental shelves and slopes and occasionally inshore waters (DCCEEW 2024n).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Ardenna grisea Sooty Shearwater	Mig. (BC Act)	Proj. dist. (DCCEEW 2023c)	Marine and highly pelagic, usually being found far from land except during the breeding season.	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Arenaria interpres Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)	7 km S (offshore) and 12 km west (Hardy Inlet) of study area	Found in coastal regions containing exposed rocks, tidal pools, coral reefs and sandy beaches. Occasionally found in estuaries, harbours and lagoons. Can also live away from coastal areas in habitats such as riverbeds, and on inland lakes and adjacent farmland. Has also been recorded on sewage ponds and on mudflats (DCCEEW 2024o).	Unlikely	Limited desktop records, associated with Hardy Inlet and coast. Species mainly uses coastal habitats.	●	●	●							

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Botaurus poiciloptilus Australasian Bittern	EN (EPBC & BC Acts)	Hardy Inlet ~12 km SW and the Gingilup/ Quitchup/ Jasper wetlands ~30 km SE	Found in large, relatively undisturbed, freshwater or brackish swamps with dense vegetation (Birdlife Australia 2013), including wetlands on the south coast from Augusta to Cape Arid. Habitat critical to survival is described as generally large, fresh to moderately brackish wetlands with pH of 5.5-8.5 (DBCA 2018a). Extensive areas of water plants, especially rushes, reeds and sedges, provide habitat and support abundant prey (Pickering 2013). Shallow water, less than 30 cm deep with low to medium density of water plants mixed with, or near short fine sedges are favoured for foraging while higher density emergent vegetation is preferred for nesting (Jaensch 1982; A. Clarke, pers. comm. 2017). In the SW, occurs in wetlands where thickets of wetland shrubs (e.g. *Melaleuca*, *Agonis* spp.) provide patches of tall cover within sedge-dominated habitat (DCCEEW 2022b).	Possible (rare)	WFA is within known range and potentially suitable habitat is present. No previous records within 10 km (nearest desktop records from Hardy Inlet ~12 km SW and Gingilup/ wetlands ~30 km SE, dates unknown). While targeted searches and ARUs deployed did not detect the species during the surveys, potential for occasional presence cannot be discounted. Potential for occasional use of the larger wetlands in the WFA but unlikely a regular visitor or regularly transit through the WFA.	●	●	●							

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Calidris acuminata Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)	1.2 km W of study area	Muddy edges of shallow fresh or brackish vegetated wetlands, including lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hyper-saline salt lakes inland (DCCEEW 2024a).	Possible	Nearby record. Suitable habitat present in the seasonally inundated wetland types in early spring, coinciding with arrival of the species in the Southwest. Therefore, may be a temporary, seasonal visitor.	●	●	●					●		
Calidris alba Sanderling	Mig. (EPBC & BC Acts)	1.9 km W of study area	Utilises coastal environments open to sea swell, sandbars, spits and shingle banks. Also occur on wave-washed rock outcrops. Less frequently found in estuaries and inlet harbours and near-coastal inland wetlands (DCCEEW 2024p).	Unlikely	Nearby record; however, the species almost always prefers coastal habitats.										
Calidris canutus Red Knot	VU/Mig. (EPBC Act); EN (BC Act)	1.9 km W of study area	Typically occupies intertidal mudflats, sandflats and sheltered coasts. Also known to utilise beaches, lagoons and harbours. Has also been recorded from saline terrestrial wetlands and sewage ponds. Rarely found in freshwater swamps (DCCEEW 2024q).	Unlikely	Nearby record but mainly occurs in coastal habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Calidris falcinellus Broad-billed Sandpiper	Mig. (BC Act)	1.9 km W of study area	Found in sheltered coastal environments, mudflats and favours estuarine habitats. Occasionally in saltmarshes, freshwater lagoons, saltworks and sewage farms. Has also been known to occupy creeks, swamps and lakes near the coast, favouring those with mudflats and exposed sands with receding tides (DCCEEW 2024v).	Possible (rare)	Old (1979-80) desktop records <10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Mainly uses sheltered coastal habitats, favouring estuarine mudflats. Only occasional records from swamps and lakes. Arrives in southwest in September but rare.	●	●	●							
Calidris ferruginea Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)	1.9 km W of study area	Occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons. Known to favour non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bores/drains, usually with bare edges of mud or sand (DCCEEW 2024r).	Possible	Nearby record. Suitable habitat present. Arrives in Southwest in spring therefore may be a temporary, seasonal visitor.	●	●	●			●	●	●		

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	12.7 km SWS of study area	Utilises shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DCCEEW 2023b).	Possible	Nearby record. Suitable habitat present. Arrives in Southwest in spring. Arrives in Southwest in spring therefore may be a temporary, seasonal visitor.	●	●	●			●	●			
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	1.9 km W of study area	Found across a wide range of open mudflat-like habitats in salt and freshwater systems (DCCEEW 2024ae).	Possible	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers sheltered coastal habitats with large intertidal flats. Rarely uses swamps near the coast and saltlakes. Uncommon in the southwest.	●	●	●			●	●	●		
Calidris tenuirostris Great Knot	VU/Mig. (EPBC Act); CR (BC Act)	1.9 km W of study area	Usually occupies sheltered coastal habitats, mudflats and sandflats such as inlets, bays, harbours, estuaries and lagoons. Known to use reefs and rock platforms, as well as shorelines and mangroves. There are also records in swamps near the coast, salt lakes and non-tidal lagoons (DAWE 2021a).	Possible (rare)	Nearby record but mainly occurs in coastal habitats. Uncommon in the Southwest.	●	●	●							

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Calyptorhynchus banksii naso Forest Red-tailed Black Cockatoo	VU (EPBC & BC Acts)	Within study area	Occurs in dense Jarrah, Karri and Marri forests, mainly in the hilly interior, and a range of other forest and woodland types (DCCEEW 2024f).	Recorded		●	●	●	●	●					
Charadrius cucullatus Hooded Plover	P4 (DBCA list)	3.3 km S of study area	In WA, is found on ocean beaches. Occasionally occurs inland on the edges of lakes, on nearby grassy freshwater seepages and in estuaries (Birdlife Australia N.D.; TSSC 2014).	Unlikely	Nearby record but is from sandy beach habitat. No suitable habitat present.										
Diomedea amsterdamensis Amsterdam Albatross	EN/Mig./CR/Mig. (EPBC Act; BC Act)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Diomedea dabbenena Tristan Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Diomedea epomophora Southern Royal Albatross	VU/Mig. (EPBC & BC Acts)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Diomedea exulans Wandering Albatross	VU/Mig. (EPBC & BC Acts)	14.0 km ESE of study area	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Diomedea sanfordi Northern Royal Albatross	EN/Mig. (EPBC & BC Acts)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Falco peregrinus Peregrine Falcon	OS (BC Act)	0.9 km S of study area	Preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges, granite outcrops, quarries and in trees with old Raven or Wedge-tailed Eagle nests (Johnstone & Storr 1998). Also build nests on human structures such as utility poles.	Recorded			●	●	●	●	●	●	●	●	●
Halobaena caerulea Blue Petrel	VU (EPBC Act)	Proj. dist.	Marine and highly pelagic, usually being found far from land except during the breeding season.	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Hydroprogne caspia Caspian Tern	Mig. (EPBC & BC Acts)	1.0 km W of study area	Found in sheltered coastal embayments (such as harbours, lagoons, inlets, bays, estuaries and river deltas). Also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, but especially lakes, and artificial wetlands and reservoirs and near-coastal terrestrial wetlands (DCCEEW 2024u). Common in the Blackwood River estuary.	Poissible (rare)	Nearby record. Wetlands present are shallow and unlikely to provide the food sources the species requires.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	1.2 km SSW of study area	Mainly occurs in scrubs and thickets of mallee (*Eucalyptus* spp.), boree (*Melaleuca lanceolata*) and bowgada (*Acacia linophylla*), and other dense litter-forming shrublands including mulga shrublands (Johnstone & Storr 2004). Nest mounds require sandy soil and abundant litter (Benshemesh 2007).	Unlikely	Limited, degraded habitat present. Only 3 desktop records and are from 1916 (2) and 1962. Current distribution is unlikely to extend to study area.										
Limosa lapponica Bar-tailed Godwit	Mig. (EPBC & BC Acts)	1.9 km W of study area	Occurs in intertidal sandflats, banks, mudflats, estuaries coastal lagoons and harbours. Has also been found on occasion on inland wetlands or in areas of short grass, such as paddocks (DCCEEW 2024w).	Possible (rare)	Nearby record. Suitable habitat present but not primary habitat. Potential presence is considered likely very rare.		●	●			●	●			

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Limosa limosa Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)	1.9 km W of study area	Typically found in coastal environments with sheltered bays, estuaries and lagoons, as well as shallow and sparsely vegetated near-coastal wetlands (DCCEEW 2024x). There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. Habitat use is dictated by tides.	Recorded in BBRAS Regional sites, Possible (rare) in study area	Old (1980) desktop records <10 km of study area from a site near the artificial wetlands, and another near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet and coast. Survey records also only from Hardy Inlet Regional sites. Occurs almost entirely in coastal habitats such as intertidal sandflats, mudflats and estuaries. It has been observed on occasion on inland wetlands and paddocks but potential presence in the study area is considered very rare.										
Macronectes giganteus Southern Giant Petrel	EN/Mig. (EPBC Act); Mig. (BC Act)	Proj. dist.	Pelagic. Breeds on 6 subantarctic and Antarctic islands in Australian territory (DAWE 2021b).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Macronectes halli Northern Giant Petrel	VU/Mig. (EPBC Act); Mig. (BC Act)	Proj. dist.	Marine and highly pelagic, usually being found far from land except during the breeding season.	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	Proj. dist.	Uses a wide array of habitats. A small wagtail that is a vagrant visitor to mainly northern Australia that inhabits fast flowing streams and rivers (IUCN 2019).	Possible (rare)	Desktop record is projected distribution only. Suitable habitat is present but occurs in a wide range of habitats. Very few records of this species from the region. May occur in the study area on rare occasion only.										
Numenius madagascariensis Eastern Curlew	CR/Mig. (EPBC Act); CR (BC Act)	11.5 km W of study area	Mainly forages in sheltered intertidal sandflats and open bare mudflats. Also, near mangroves, on salt flats or saltmarsh, around rockpools, amongst rubble on coral reefs and beaches. Preference for soft substrate containing little or no hard material that provides better access to prey (TSSC 2015b).	Unlikely	Nearby record but no suitable habitat present.										
Numenius phaeopus Whimbrel	Mig. (EPBC & BC Acts)	1.9 km W of study area	Usually found on intertidal mudflats and sheltered coastal areas. Also occur in harbours, lagoons, estuaries, rivers and mangroves. Occasionally in sandy and rocky beaches (DCCEEW 2024y).	Unlikely	Nearby record but no suitable habitat present.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Onychoprion anaethetus Bridled Tern	Mig. (EPBC & BC Acts)	11.3 km W of study area	Occupies subtropical and tropical sea environments, including islands, coral cays with adequate vegetation, and continental islands. Rarely recorded on inshore continental waters. Has been reported breeding on mainland WA (DCCEEW 2024z).	Unlikely	Nearby record but no suitable habitat present.										
Oxyura australis Blue-billed Duck	P4 (DBCA list)	1.0 km W of study area	Endemic to Australia's temperate regions, inhabiting terrestrial wetlands (fresh or saline) with extensive bordering vegetation, including artificial wetland, such as sewage ponds (Birdlife International 2015; del Hoyo *et al.* 2014).	Likely	Previously recorded nearby from multiple sources. Suitable habitat present, particularly the larger lakes (SIPW wetlands).	●									
Pandion haliaetus Osprey	Mig. (EPBC & BC Acts)	1.2 km W of study area	Occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Utilises inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs, large lakes and waterholes. Requires extensive areas of open fresh, brackish or saline water for foraging (DCCEEW 2024g).	Recorded		●	●	●							
Phoebetria fusca Sooty Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands in open or patchy vegetation near exposed ridges (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Pluvialis fulva Pacific Golden Plover	Mig. (EPBC & BC Acts)	1.9 km W of study area	Usually inhabits coastal habitats (e.g. beaches, mudflats and sandflats, harbours, estuaries and lagoons), but will use inland wetlands, such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. It may even use other terrestrial habitats such as short grass in paddocks (DAWE 2021c).	Possible	Nearby record. Suitable habitat present. May occur on occasion when they arrive in spring, before the ephemeral wetlands dry for the summer.	●	●	●			●	●			
Pluvialis squatarola Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Acts)	11.0 km WSW of study area	Inhabits coastal areas, typically those that are sheltered, such as embayments and estuaries, although is also known to occupy rocky coasts and platforms. Occasionally found in inland waterbodies (DCCEEW 2024aa).	Possible (rare)	Nearby record from the Blackwood River but Grey Plovers occur mostly in coastal habitats.	●	●	●							
Pterodroma mollis Soft-plumaged Petrel	VU (EPBC Act)	Proj. dist.	Marine and highly pelagic, usually being found far from land except during the breeding season (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Stercorarius pomarinus Pomarine Jaeger	Mig. (EPBC & BC Acts)	11.1 km WSW of study area	Marine and highly pelagic, usually being found far from land except during the breeding season (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Sternula nereis nereis Fairy Tern	VU (EPBC & BC Acts)	7.0 km WSW of study area	In WA, is present along the entire coastline, with rare records from the far north (Kimberley) and off the Nullarbor Plain. Occurs in offshore, estuarine or lacustrine (lake) islands, wetlands, beaches and spits (DCCEEW 2024ab). Nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	Unlikely	Desktop record is projected distribution only. No nearby records. Occurs in coastal habitats. No suitable habitat present.										
Thalassarche carteri Indian Yellow-nosed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)	6.8 km SW of study area	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Thalassarche cauta Shy Albatross	VU/Mig. (EPBC & BC Acts)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Thalassarche chlororhynchos Atlantic Yellow-nosed Albatross	VU/Mig. (BC Act)	6.5 km SW of study area	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Thalassarche impavida Campbell Albatross	VU/Mig. (EPBC & BC Acts)	Proj. dist.	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Thalassarche melanophris Black-browed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)	11.4 km W of study area	A marine pelagic species that flies large circumpolar distances, only landing to breed and feed. Breeds on offshore islands (Birdlife International 2018).	Unlikely	Marine pelagic species. Doesn't utilise inland habitats.										
Thalasseus bergii Greater Crested Tern	Mig. (EPBC & BC Acts)	1.9 km W of study area	Occurs in temperate and tropical environments. Found in coastal areas including low-lying rocky, sandy and coral islands. Persist in areas with a distinct lack of shelter. Often found on open shores, less often in tidal creeks and inland waterbodies (ALA 2023).	Unlikely	Nearby records but mostly associated with the Blackwood River estuary and the coast. No suitable habitat present.										
Tringa brevipes Grey-tailed Tattler	Mig. (EPBC and BC Acts); P4 DBCA list	6.9 km SSE of study area	Occurs on sheltered coasts with reefs and rock platforms or mudflats and can also be found on reefs or platforms that are exposed at low tide (DCCEEW 2024ac). It is occasionally found around near-coastal wetlands, such as lagoons, and lakes and ponds, in sewage farms and saltworks. Inland records for the species are rare (Higgins & Davies 1996).	Possible (rare)	Nearby record. Inland records for the species are rare. Main habitats not present.										
Tringa Glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	0.5 km W of study area	Mostly on the coast but sometimes inland; uses permanent and ephemeral terrestrial wetlands, including rivers and creeks (DCCEEW 2024e).	Recorded		●	●	●							

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Tringa nebularia Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)	0.5 km W of study area	Mostly occurs on the coast but sometimes inland; uses permanent and ephemeral terrestrial wetlands, and waterways (DCCEEW 2024d). Found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and salt flats (DCCEEW 2024b).	Likely	Nearby record. Suitable habitat present when they arrive in early spring.	●	●	●				●	●		
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	12.5 km SW of study area	Mostly occurs on the coast but sometimes inland; uses permanent and ephemeral terrestrial wetlands, including rivers and creeks (DCCEEW 2024ad).	Possible	No previous desktop records <10 km of study area, last record in December 2000 (BirdLife 2023) at Swan Lake which is part of the Hardy Inlet. Inhabits a range of permanent or ephemeral wetlands and inundated floodplains. Suitable habitat present when species arrives in southwest in early spring.	●	●	●					●		

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Tyto novaehollandiae novaehollandiae Masked Owl	P3 (DBCA list)	1.0 km S of study area	Has a preference for woodlands with large old trees in the proximity to open grasslands where it can hunt for (Marchant & Higgins 1993).	Recorded					●	●				●	
Zanda baudinii Baudin's Cockatoo	EN (EPBC & BC Acts)	Within study area	Occurs in eucalypt forests, especially Jarrah, Marri and Karri forest and less frequently in woodlands of Wandoo, Blackbutt, Flooded Gum, Yate, partly cleared farmlands and urban areas (DCCEEW 2024h).	Recorded		●	●	●	●	●		●		●	
Zanda latirostris Carnaby's Cockatoo	EN (EPBC & BC Acts)	Within study area	Occurs in uncleared or remnant native eucalypt woodlands, and in shrublands or kwongan heathlands dominated by *Hakea*, *Dryandra*, *Banksia* and *Grevillea* species (DCCEEW 2024i; Garnett & Crowley 2000; Weerheim 2008).	Recorded		●	●	●	●					●	●
Mammalia (10)															
Bettongia penicillata ogilbyi Woylie	EN (EPBC Act); CR (BC Act)	9.9 km SE of study area	Inhabited a wide range of landscapes prior to European colonisation. Remnant subpopulations inhabit woodlands and adjacent heaths with a dense understorey of shrubs, particularly *Gastrolobium* spp. (poison pea) (TSSC 2018).	Unlikely	Desktop records are from 1920 and otherwise un-dated. Study area occurs outside the species current range (ALA 2024).										

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Dasyurus geoffroii Chuditch	VU (EPBC & BC Acts)	9.9 km SE of study area	Confined to south-WA, occurring in only 5% of its former range. Mostly found in Jarrah Forest and woodland of the Southwest or heath and mallee habitats along the south coast. Uses horizontal hollow logs or earth burrows as refugia and dens (DEC 2012b).	Possible	Nearby record. While Chuditch will disperse long distances the closest records are old, pre-dating 1934. Suitable habitat present, though somewhat marginal. Numerous unexpected sightings in the Southwest in recent years. Potential for presence therefore cannot be discounted.	●	●	●	●	●				●	
Falsistrellus mackenziei Western False Pipistrelle	P4 (DBCA list)	1.2 km W of study area	Restricted to area in or adjacent to high rainfall old-growth forest. Wet sclerophyll dominated by Karri and Marri, and in Jarrah and Tuart in higher rainfall areas (Armstrong *et al.* 2017). Forages in woodland habitats.	Recorded					●	●					

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Hydromys chrysogaster Water-rat	P4 (DBCA list)	4.4 km W of study area	In the Southwest, occupies habitats in the vicinity of permanent water, favouring areas with dense, low-lying vegetation, low density canopy cover, good water quality, narrow water bodies and some habitat complexity (DEC 2012c; Speldewinde *et al.* 2013). It is likely that woody debris, rock ledges and wetland islands are important for refuge and feeding. Can also occur in mangrove and estuarine areas (IUCN 2019).	Unlikely	Few recent records nearby (latest 2007). Due to ephemeral nature of wetlands in study area no suitable habitat present. More likely to occur on the Scott River and Blackwood River (located south and west of the study area, respectively), which retain dense riparian vegetation and perches, as well as water and pools all year.										
Isoodon fusciventer Quenda	P4 (DBCA list)	1.1 km SE of study area	Found in scrubby vegetation with dense cover up to 1 m high, often around swamps, wetlands or in *Banksia* and Jarrah woodland. Feeds in frequently burnt forest and woodland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Also occurs in more open habitat if it is subjected to introduced predator control (DBCA 2018b).	Recorded		●	●	●	●						

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Myrmecobius fasciatus Numbat	EN (EPBC & BC Acts)	Proj. dist.	Now restricted to 2 isolated wild populations in the Southwest. Nests in hollow logs, trees or in burrows. Inhabits eucalypt woodland and forests with abundant termites, and hollow logs for shelter (DPaW 2017a).	Unlikely	Study area occurs outside of current known range. Desktop record is projected distribution only.										
Notamacropus irma Western Brush Wallaby	P4 (DBCA list)	11.4 km NNW of study area	Grazing species, occurs in open forest or woodland with low grasses and scrubby thickets, and also found in some areas of mallee and heathland (DEC 2012d). Prefers open grassy areas and is absent in Karri forests with dense understorey (Woinarski & Burbidge 2016).	Possible	Few desktop records but including some relatively close (11.4 km) and recent (2019, 2010) records. Suitable habitat present, particularly in the large remnant bushland on the northern-central boundary of the WFA.				●						
Phascogale tapoatafa wambenger South-western Brush-tailed Phascogale	CD (BC Act)	7.4 km W of study area	Occurs in mature dry sclerophyll forests and open woodlands that contain hollow-bearing trees. These nocturnal, arboreal carnivores forage for food under the bark of trees (DEC 2012a) and nest in the hollows of dead and mature Jarrah and Marri trees (Burbidge & Woinarksi 2020).	Likely	A few records close to the study area, including a relatively recent record in 2014. Suitable habitat present, particularly in the large remnant bushland on the northern-central boundary of the WFA.				●						

Species	Status	Proximity	Habitat	LOO	Justification	SIPW wetland	SISE wetland	SISH wetland	MJP woodland	OWP deg.	Cleared	Cleared - DS	Dam	Bluegum plant.	Pine plant.
Pseudocheirus occidentalis Western Ringtail Possum	CR (EPBC & BC Acts)	1.7 km N of study area	Found on the southern extremity of the Swan Coastal Plain and was formerly found in several types of forest and woodland (DPaW 2017b). Now mostly restricted to long-unburnt mature Peppermint/Tuart closed forest and relatively unburnt Jarrah and Marri forests and woodlands with limited disturbance. Also occurs in coastal heath, Peppermint woodland, myrtaceous heaths and shrubland, riparian zones and Karri forest (DPaW 2017b).	Recorded					●						
Setonix brachyurus Quokka	VU (EPBC & BC Acts)	3.0 km S of study area	A habitat specialist, inhabits dense riparian vegetation, but also uses a range of other habitats on the mainland, such as heath and shrublands, swamps, and forests (DCCEEW 2024d).	Unlikely	Study area occurs outside of current known range. Records close to study area are not recent (most recent dated 1984).										

5.3 SURVEY LIMITATIONS

The limitations of the terrestrial fauna survey have been considered in accordance with EPA (2016b) (Table 5-16).

Table 5-16 Consideration of potential survey limitations

Limitations	Limitation	Comments
Availability of contextual information at a regional and local scale	Minor	While conservation agencies have done several floristic surveys in the 'Scott River region', few comprehensive or systematic fauna surveys have been completed; including within the adjacent National Park and State Forest. The exceptions are Biota (2009) to the east but in somewhat different habitats, and Ninox (2011) immediately to the west, where birds were monitored in artificial lake/wetland habitat, largely incomparable to that of the study area. A total of 15 taxa not detected in the desktop review were recorded as evidence of this fact.
Competency/experience of the team carrying out the survey	None	The survey team members were adequately experienced in the methods and species being targeted.
Scope and completeness	None	The surveys undertaken and reported here are adequate to characterise the fauna habitats of the study area and surrounds with respect to the nature of the Project.
Proportion of fauna recorded and/or collected, any identification issues	None	Approximately 75% of expected amphibian species, 53% of expected birds and 48% of expected native mammals were recorded. Few reptiles were recorded but this reflects the Basic and Targeted survey methods deployed. A Detailed survey would be expected to record additional reptiles and mammals but was considered unnecessary given the very limited clearing of native vegetation proposed and the nature of the Project.
Access within the study area	None	There were areas that could not be accessed easily in winter due to extensive inundation of paddocks and tracks. However, over the 2-year survey period all areas were accessed.
Timing, rainfall, season	None	The timing of the fauna surveys were appropriate for the habitats and species potentially occurring. Winter and spring rainfall was less than the long-term average, but not insufficient to expect a lower detectability of any species.
Disturbance that may have affected the results of the survey	None	No disturbance affected the results of the survey.

6 DISCUSSION

6.1 FAUNA HABITATS AND ASSEMBLAGE

Most of the study area, approximately 80%, has been cleared for dairy, livestock and timber production. The paddocks and plantations provide limited habitat value to vertebrate fauna. Paddocks provide a limited food source for some species once seed has set, as evidenced from foraging records of Carnaby's Cockatoo and numerous waterbirds, some in abundance (e.g. Straw-necked Ibis and Australian Shelduck) when the paddocks were inundated. Dams provide a drinking water source for many species including black cockatoos. Bluegum and Pine plantations both provide limited support for Carnaby's Cockatoo and Baudin's Cockatoo. Both species feed on Pine nuts and north of Perth pine can be an important seasonal food source; however, that isn't the case in the study area and surrounds where the extent of native habitat is much greater and in better condition, compared with areas close to Perth.

The remaining ~20% of the study area comprises the 5 native fauna habitats. They are of overall higher value to fauna but display variable importance both between and within due to varying historical disturbances. These habitats comprise many small, isolated, and often degraded remnants of limited value. As well as larger patches which are typically in much better condition and therefore of higher relative value for fauna. Many of the large patches have been fenced off (with some even resumed by the State Government) to prevent stock access and thus protect floristic values and by association, fauna values.

When habitat value of the study area is considered relative to the surrounding landscape, it is of lower value in comparison to the expansive areas of intact conservation estate to the north, east and south-west of the study area. All 5 native habitat types in the study area, however, have some areas of significance for conservation significant fauna, as summarised in Table 6-1.

The current survey, in conjunction with the BBRAS (Phoenix 2025a), recorded 138 species (predominantly birds; 77%), including 10 conservation significant species. The dominance of birds in the assemblage was anticipated, considering the dominance of birds in the desktop species list and the survey methods which favour detection of avifauna.

The detection of roughly 52% of species relative to the number of species identified in the desktop is considered a reasonable result considering the survey was limited to a Basic and Targeted survey (i.e. no systematic trapping) and considering 80% of the study area is cleared or highly modified.

The high number of species (i.e. 15) recorded in the field that were not returned in the desktop review speaks to the limited fauna surveys having been done in the region, even within the regionally important Blackwood River National Park and Scott National Park. For example, only 3 species of bat were expected to occur based on the desktop data, but 8 species were recorded. The waterbird and vertebrate fauna monitoring of the adjacent Beenup artificial wetlands by Ninox (2011) between 2005-2011 are the best data available for comparison.

Given much of the study area is floodplain and wetland, the fauna assemblage was strongly seasonal. During the wetter months (May - September) the study area was dominated by waterbirds, including Straw-necked Ibis, Australian White Ibis, Australian Shelduck, Grey Teal, Black Swan, Pacific Black Duck and White-faced Heron. These were often observed in large aggregations. Ninox (2011) also commented on the seasonality of the bird assemblage; they also noted significant change in composition year to year at the Beenup artificial wetlands.

Table 6-1 Summary of native fauna habitat value for recorded conservation significant species in the study area

Habitat	Species and associated values in study area					
	Western Ringtail Possum	**Baudin's Cockatoo**	**Carnaby's Cockatoo**	**Forest Red-tailed Black Cockatoo**	**Migratory listed birds**	**Other**
Marri-Jarrah-Peppermint woodland	16 individuals, including females with juveniles confirmed from multiple remnants ~98 ha of high-quality habitat ~103 ha of moderate-quality habitat	Confirmed foraging activity Contains most PNT (357), including 4 'suitable' PNTs; but no 'known' nesting trees ~46 ha high-quality foraging habitat ~272 ha moderate-quality foraging habitat	Confirmed foraging activity ~79.3 ha of high-quality ~242.6 ha moderate-quality foraging habitat	Confirmed foraging activity Contains most PNT (357), including 4 'suitable' PNTs; but no 'known' nesting trees ~170 ha high-quality foraging habitat ~151 ha moderate-quality foraging habitat		Suitable habitat and record of Masked Owl (southwest) and Western False Pipistrelle Suitable habitat for Quenda, and Peregrine Falcon
Open woodland of Peppermint trees (degraded)	~48 ha of low-quality habitat	Contains 2 PNT, none suitable for current breeding	~99 ha of low-quality foraging habitat	Contains 2 PNT, none suitable for current breeding		Suitable habitat for Western False Pipistrelle, Masked Owl (southwest) and Peregrine Falcon
Seasonally inundated paperbark woodland (wetland)	~145 ha of low-quality habitat	~145 ha of low-quality foraging habitat Contains 14 PNT, none currently suitable for breeding	~145 ha of moderate-quality foraging habitat	Contains 14 PNT, none suitable for current breeding	Limited suitable foraging habitat for several species, restricted to spring and early summer months Record of Wood Sandpiper	Suitable habitat for Quenda, Peregrine Falcon and Osprey

Habitat	Species and associated values in study area					
	Western Ringtail Possum	**Baudin's Cockatoo**	**Carnaby's Cockatoo**	**Forest Red-tailed Black Cockatoo**	**Migratory listed birds**	**Other**
Seasonally inundated sedgeland (wetland)	~107 ha of low-quality habitat	Unidentified white-tailed black cockatoos seen foraging ~107 ha of low-quality foraging habitat	Unidentified white-tailed black cockatoos seen foraging ~107 ha of moderate-quality foraging habitat		Limited suitable foraging habitat for several species, restricted to spring and early summer months	Suitable habitat and record of Western False Pipistrelle Suitable habitat for Quenda, Peregrine Falcon and Osprey
Seasonally inundated shrubland (wetland)	~121 ha of low-quality habitat	~120 ha of moderate-quality foraging habitat ~6 ha of low-quality foraging habitat Contains 54 PNT, none currently suitable for breeding	~126 ha of moderate-quality foraging habitat	~110 ha of moderate-quality foraging habitat ~16 ha of low-quality foraging habitat Contains 54 PNT, none suitable for current breeding	Limited suitable foraging habitat for several species, restricted to spring and early summer months	Suitable habitat and record of Western False Pipistrelle and Quenda Suitable habitat for Peregrine Falcon and Osprey

Migratory shorebirds were entirely absent during the winter months, indicating the study area does not support overwintering birds. Most wetland habitats in the study area are only of foraging value to Migratory shorebirds in the spring and early summer months, between their arrival in the Southwest from September onwards and the drying out of most of the wetlands by late spring, though this may be later in wetter years. While a few wetlands remain inundated for longer (presumably due to water column depth and/or reduced evaporation rates), based on the field records of only a single Migratory shorebird species being recorded on one occasion, the wetland habitats of the study area do not represent important summer Migratory shorebird habitat either.

In contrast, Migratory shorebirds are common at the Hardy Inlet, on the Blackwood River generally further upstream on shallow sandbars, and on beaches east of Augusta south of the study area, over the spring and summer months, with diversity and abundance peaking in early January. The BBRAS (Phoenix 2025a) recorded a number of Migratory species at the Hardy Inlet that were not detected in the study area (as demarcated in BBRAS column of Appendix 7 as species on recorded at regional sites).

Further, immediately adjacent the study area at the Beenup artificial wetlands 7 shorebirds were detected by Ninox (2011) that were not recorded in the study area (i.e. Common Sandpiper, Common Greenshank, Sharp-tailed Sandpiper, Black-winged Stilt, Red-capped Plover, Caspian Tern and Black-fronted Plover) and they were recorded in every season, including winter. The Ninox report does not present abundance data per season (only presence) but does present abundance per habitat attribute. The monitoring recorded very low shorebird numbers with a total of just 69 individuals recorded in 7 years of monitoring, with the highest habitat attribute aggregate abundance being 8 individuals (Red-capped Plover and Black-fronted Plover).

Throughout the year the paddocks and other disturbed habitats are utilised by a range of cosmopolitan bird species and in particular, those that respond positively to disturbance. These include Australian Raven, White-fronted Chat, Yellow-rumped Thornbill, Willie Wagtail, Tree Martin, Australian Pipit, Dusky Woodswallow and Emu which dominated the paddocks, and Red Wattlebird, Australian Ringneck, Australian Magpie at wetland and bushland boundaries, and which were commonly seen crossing paddocks between remnants.

Raptors were commonly observed hunting over the wetlands and surrounding paddocks. Of the 14 species recorded, the most commonly observed were Swamp Harrier, Brown Falcon, Australian Kestrel and Wedge-tailed Eagle, typically as single birds. Others, such as the Peregrine Falcon and Osprey were recorded only once. Ninox (2011) recorded very similar results with respect to raptors (and owls), with 14 species recorded in total including 3 significant species, Osprey, White-bellied Sea-Eagle and Peregrine Falcon. Swamp Harrier was also ubiquitous in the Ninox (2011) surveys, being recorded in every monitoring period, but being restricted to 'vegetated' habitats.

Frogs were far more active in the wetter autumn – spring months, being largely absent during the Basic survey, in December 2023 when the wetlands and woodland substrates were largely dry. All 8 species recorded in the current survey were also recorded by Ninox (2011).

In contrast to frogs, 3 of the 8 bat species recorded were more abundant in summer than the previous 3 seasons. This was most evident for Southern Forest Bat which is known to hibernate over the colder months (Churchill 2008). The seasonal variation in abundance of the other 5 bat species was not as pronounced. Ninox (2011) definitively recorded 5 bat species, including Western False Pipistrelle, and 2 unidentified species. One of the unidentified species was a Nyctophilus/long-eared bat that likely represents species recorded in the current survey (Lesser Long-eared Bat, Holt's Long-eared Bat and/or Greater Long-eared Bat).

6.2 SIGNIFICANT SPECIES

The 10 conservation significant fauna species recorded in the study area in the current survey and/or BBRAS (Phoenix 2025a) are discussed below:

- Western Ringtail Possum (*Pseudocheirus occidentalis;* CR)
- Baudin's Cockatoo (*Zanda baudinii;* EN)
- Carnaby's Cockatoo (*Zanda latirostris;* EN)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso;* VU)
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; P4)
- Quenda (*Isoodon fusciventer*; P4)
- Western False Pipistrelle (*Falsistrellus mackenziei*; P4)
- Wood Sandpiper (*Tringa glareola*; Mig.)
- Osprey (*Pandion haliaetus*; Mig.)
- Peregrine Falcon (*Falco peregrinus*; OS).

The conservation significant species not recorded in the field but are likely to occur are discussed in Section 6.2.9.

6.2.1 Western Ringtail Possum (*Pseudocheirus occidentalis*)

The study area falls outside the Swan Coastal Plain management zone for the Western Ringtail Possum under the recovery plan for the species (DPaW 2017b). Habitat critical to survival in this management zone comprises long-unburnt mature remnant Peppermint woodlands with high canopy continuity and high nutrient foliage with minimal periods of summer moisture stress, and habitat connecting patches of remnants (DPaW 2017b). The recovery plan emphasises the importance of maintaining corridors between suitable habitats and refuge patches for safe dispersal across modified landscapes, specifically remnant Peppermint woodlands, and Jarrah and/or Marri forests and woodlands.

While Peppermint dominated woodlands are relatively widespread as remnants throughout the study area (i.e. Open woodland of Peppermint trees (degraded) habitat type), most are isolated (>25 m between patches) and highly degraded with no understorey. Accordingly, none of the Open woodland of Peppermint trees (degraded) habitat was considered of high-quality or moderate-quality for Western Ringtail Possum, and only about half of this habitat type (48 ha of 99 ha) was considered low-quality, with the remainder classified as having no habitat value (Table 5-14).

Instead, the Marri-Jarrah-Peppermint woodland habitat was found to be of importance to the species in the WFA and RIA, with all Western Ringtail Possum records (16 individuals) being from this habitat type and it being the only habitat type to receive high-quality or moderate-quality rating. Quality of the Marri-Jarrah-Peppermint woodland for Western Ringtail Possum was variable however, with only around 98 ha (2.5% of the study area) rated high-quality and 103 ha (2.6% of the study area rated moderate-quality, with the remaining 3,690.6 ha (95% of the study area) being low-quality habitat or of not habitat for the species (Table 5-14). High and moderate value habitat occurs typically in the larger remnants, those adjoining/near contiguous vegetation outside the study area and where there is close connectivity between patches (Figure 5-13).

Based on the field records of Western Ringtail Possum, occurrence in the WFA appears to be restricted to Marri-Jarrah-Peppermint woodland near its boundaries (Figure 5-4), where such habitat is contiguous with, or occurs in close proximity to, larger intact remnants outside the WFA. Similarly, the records from the RIA suggest the same, i.e. a direct connection to habitat with a much larger extent outside the study area, in this case the South Blackwood State Forest.

Many of the Marri-Jarrah-Peppermint woodland remnants further inside the WFA are too isolated (DCCEEW 2024c) for this arboreal species, preventing it from moving safely across the agricultural landscape that supports an abundant fox population.

Three of 4 instances of a female with juvenile were from the northern part of the WFA, and one was from the south-east corner. Female home ranges in Peppermint dominated woodland are generally less than 2 ha (DPaW 2017b), therefore the nests/dreys of the females are likely to occur within 150 m of the location of the records.

6.2.2 Black cockatoos (*Calyptorhynchus banksii naso*, *Zanda baudinii* and *Zanda latirostris*)

All 3 species of black cockatoo were observed while zoologists were on site throughout 2023 and summer 2024/2025 and the long-term audio recorders deployed in Phase 3 detected ~6 hours of foraging activity across the 6 sites investigated, over a 2-month period. Forest Red-tailed Black Cockatoo was directly observed most, followed by Carnaby's Cockatoo. All 3 species were most often observed moving about and over the study area, rather than actively using it, directly observing foraging was rare, indirectly foraging via chewed nuts was more common, mainly by Forest Red-tailed Black Cockatoo.

Conversely, the long-term audio recorders detected only 42 minutes of foraging by Forest Red-tailed Black Cockatoo, but 5.7 hours of foraging by 'white-tailed' cockatoos that could be either Carnaby's Cockatoo or Baudin's Cockatoo. Given Baudin's Cockatoo was directly observed much less frequently than Carnaby's Cockatoo, it is reasonable to assume the majority of that time can be attributed to the latter species. Conversely, Ninox (2011) did not record Carnaby's Cockatoo, and did record Baudin's Cockatoo and Forest Red-tailed Black Cockatoo, but in low numbers over 7 years of monitoring at the adjacent Beenup artificial wetlands.

No evidence to suggest any of the 3 species breed or roost in the study area was recorded during the surveys, which is not surprising given no known nesting trees and only 4 suitable nesting trees from 760 PNTs were recorded. This was confirmed via an exhaustive PNT assessment that investigated hundreds of hollows, evening night roosting assessments and long-term audio recorder deployment through summer and spring 2024/2025. The weight of evidence therefore strongly suggests that the primary contribution of the habitats of the study area to black cockatoos is in providing foraging resources.

The study area supports at least 23 plant species (Phoenix 2025b) known to be food resources for one or more black cockatoo species (Table 5-8). Given this and in consideration of known roosting sites being present within 15 km of the study area, the foraging habitat analysis using the Bamford (2021) scoring system found high-quality foraging habitat to be present in the study area for all species. As with Western Ringtail Possum, high-quality (foraging) habitat was restricted to Marri-Jarrah-Peppermint woodland habitat (Table 5-11 – Table 5-12). A greater extent of Marri-Jarrah-Peppermint woodland was rated high-quality for Forest Red-tailed Black Cockatoo because less is known of the species' food preferences, especially compared to Carnaby's Cockatoo, and therefore the descriptive elements of each score are broader (Appendix 5). Forest Red-tailed Black Cockatoo were also directly observed more frequently and more foraging evidence was attained.

The DAWE (2022) foraging habitat quality scoring system, which was also applied, is a more blunt framework than that of Bamford (2021), resulting in scores of either 0 (for habitat not used by the species) or 9/7 (for any habitat they will forage in), i.e. there is no difference between the high-quality Marri-Jarrah-Peppermint woodlands, which is the most important habitat for all 3 species, and the other foraging habitats, which is clearly incorrect biologically. The Bamford (2021) system and its resultant scores are therefore considered a more useful assessment tool as it requires that the individual food species composition and their respective cover values be considered in each habitat type.

The study area occurs right on the southern boundary of the JAF02 bioregion and as such there is extensive Jarrah Forest to the north and east, and expansive proteaceous shrublands and *Banksia* woodlands to the south-west in the Scott National Park, adjoining freehold land to the south and south-east, nearer the coast. Presence of these habitat values in the vicinity likely encourage black cockatoo flights across the study area (north-south and east-west), stopping to forage as needed, as they traverse from their forest roosting and breeding grounds to the north/north-east. As such it is considered that the WFA contains habitats that are unlikely to be critical (foraging, roosting or breeding) but rather provide supplementary foraging habitat for all 3 species.

6.2.3 Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*)

The Masked Owl was originally detected outside the study area by an audio recorder placed opportunistically on the Scott River in May 2023 as part of the BBRAS (Phoenix 2025a). In response, the decision was made to actively record for the species at all bird-bat fixed observations sites for the remainder of that survey program (see Phoenix 2025a). It was subsequently detected once more via audio recording in November 2023 in the central RIA. Both records are from densely forested habitats, outside the WFA, on the periphery of paddocks.

Until very recently the state of Masked Owls in the Margaret River area was poorly understood, and that remains the case for much of the Southwest region. However, extensive survey effort in the Margaret River area by Dr Boyd Wykes (lead ornithologist for Phoenix 2024b) has started to document a healthy population between Cape Naturaliste and Cape Leeuwin extending east towards Manjimup, particularly along the Blackwood Valley. Detecting the species in riverine forest of the Scott River area was therefore anticipated.

Masked Owls are most detectable in autumn when they are preparing to breed and are thus actively pair-bonding and advertising their territories using their unique screech vocalisations. While breeding and roosting typically takes place in forest habitats where there are ancient trees with suitable large hollows (mainly Karri and Marri), they have also been recorded roosting in plantations (Boyd Wykes pers. comm.). They are a perch and drop hunter primarily on the edges of open paddocks and forest. Due to a lack of large hollows recorded it is concluded therefore that the species is unlikely to breed within the WFA and, if it forages in the WFA while it has not been detected to date, it is likely to be restricted to the edges of woodland remnants.

6.2.4 Quenda (*Isoodon fusciventer*)

The record of Quenda immediately north and south of Governor Broome Road in the survey (and nearby desktop records) is not surprising given the presence of suitable habitats with scrubby vegetation, i.e. the Seasonally inundated shrublands, woodlands and sedgelands, along with Marri-Jarrah-Peppermint woodland. These collectively cover 700 ha of the study area, though the wetland habitats may vary in suitability seasonally and smaller remnants may not be utilised.

Higher-quality (larger intact remnant) habitats are available in the excised remnants internal of the WFA, and to the south-west, east, and north of the study area. Quenda are most likely to utilise habitat recorded along the boundary of the WFA which lie adjacent to large remnant habitat areas surrounding the WFA, while the smaller isolated remnants within the WFA are unlikely to provide critical habitat for Quenda locally, given their disconnected/isolated nature. Rather, Quenda are likely opportunistically utilising the resources available within the WFA or by males seeking new territory. Their presence is also likely to be heavily controlled by the large fox population of the area generally. The high-quality and abundant habitats surrounding the study area are more likely to provide critical habitat to the local Quenda population.

6.2.5 Western False Pipistrelle (*Falsistrellus mackenziei*)

Western False Pipistrelle was not previously known from the study area, with the closest record being 14 km to the north-east. The extensive echolocation recordings undertaken for the bird-bat risk assessment (Phoenix 2025a) detected the species from 7 locations in autumn, spring and summer sampling, albeit in low numbers and which included open paddocks.

These observations are at odds with current research which suggests the species is strongly associated with mature or even old-growth forest where nesting and roosting hollows are more plentiful (Churchill 2008). Therefore, recording it across the study area (although at a very low detection rate) was unexpected.

The PNT assessment recorded 155 trees with 189 hollows in total, many of which would be considered suitably sized to support the species; these were nearly entirely within Marri-Jarrah-Peppermint woodland habitat. As discussed for Western Ringtail Possum above, the best examples of this habitat occur at the periphery of the WFA, thus it is expected that support for breeding and roosting is restricted mainly to the northern boundary and patches in the south-east, north of Governor Broome Road. As mentioned for other species, the study area is bounded to the north, east and west by high-quality forest protected within National Park and Nature Reserve.

6.2.6 Wood Sandpiper (*Tringa glareola*)

Wood Sandpiper was observed once in December 2023, as a group of 3 birds. It was the only Migratory species recorded during the surveys completed between May 2023 and January 2024, and including the BBRAS (Phoenix 2025a).

Wood Sandpipers are commonly seen throughout coastal and inland areas of Australia (ALA 2024); however, unlike many Migratory shorebirds, Wood Sandpiper typically shuns coastal mudflats, instead foraging in shallow, freshwater wetlands, usually where there is grass or aquatic plants protruding above the water, and often with trees and fallen timber. These attributes are common in the wetlands of the WFA, e.g. most are shallow with areas of introduced grass as well as dense stands of sedges or shrubs, many have open water and aquatic plants. Paperbark trees were isolated or occasional in Seasonally inundated sedgelands and shrublands but dominated the Seasonally inundated paperbark woodland habitat.

The species is generally observed in small flocks or singly, often with other waders. They leave their breeding areas by early September and are mostly seen in Australia between August and April. Small numbers of birds may remain in Australia over winter (Birdlife Australia 2024b); no overwintering individuals were recorded in the study area. The desktop review found only a single record, from the Beenup artificial wetlands adjacent the study area, but the record is not associated with the waterbird monitoring of Ninox (2011).

The East Asian-Australian Flyway population estimate for Wood Sandpiper is 130,000 birds (Hansen *et al.* 2016). However, as noted repeatedly in Hansen *et al.* (2016) estimating population sizes for inland wetland species is much harder than for coastal species foraging on open mudflats, which is the more typical foraging habitat of species migrating to Australia. Nonetheless, as per DoEE (2017), 3 individuals recorded precludes the study area from being considered Internationally or Nationally significant habitat, which would require 1,300 or 130 birds to be observed, respectively.

6.2.7 Osprey (*Pandion haliaetus*)

The Osprey has been commonly recorded in the region, but generally in proximity of the Hardy Inlet and Blackwood River (Figure 5-1), where according to the compiled desktop dataset it has been recorded at least 125 times. The only other records beyond this regionally important river are 2.3 km south of the study area, and just once at the Beenup artificial wetlands by Ninox (2011), in 12

monitoring events over 7 years. It was recorded in the study area once, by the heritage survey for the Project, and not in any of the fauna surveys. Given the rarity of records locally and beyond the Hardy Inlet more generally, the study area is considered minor/supplemental foraging habitat, within the home range of Hardy Inlet/Blackwood River individuals, and breeding is unlikely to occur.

6.2.8 Peregrine Falcon (*Falco peregrinus*)

The single record of Peregrine Falcon hunting around Governor Broome Road, along with desktop records at the Beenup artificial wetlands (4 records over a number of years) and 4 km west, indicate the study area is part of the territory of a resident bird/s. The habitats of the study area provide ample hunting grounds for the species, with a variety of small birds available as prey within/above the farm-habitat mosaic of open paddocks, dams, plantations, woodlands and wetlands.

The most common natural structures Peregrine Falcons use for nesting (rocky cliff edges, steep escarpments, gorge walls and rocky outcrops) are not present in the study area. However, they have been recorded nesting on utility towers, like the tall electrical towers in the Western Power corridor. These towers were inspected and only an Australian Raven nest was observed throughout the survey period. The study area therefore does not contain 'natural' breeding/nesting habitat and is considered foraging habitat within a resident bird's home range.

6.2.9 Likely to occur significant species

The likelihood of occurrence assessment (see section 5.2.5) found that of the conservation significant species identified in the desktop but not recorded in the field, 4 species were considered likely to occur in the study area:

- Short-nosed Snake (*Elapognathus minor*; P2) –close (3.2 km) record south-east of the study area and the wetland habitats especially are suitable habitat; the species prefers swamps, marshes, and seasonally inundated areas with dense vegetation (such as sedges, reeds, and rushes) in low-lying heathlands and moorlands), on sandy or peaty soils where it can burrow and seek shelter.
- Blue-billed Duck (*Oxyura australis*; P4) – considered likely to occur on occasion due to presence of suitable habitat and very close (<1 km) desktop records from the Beenup artificial wetlands (Ninox 2011). Likely to utilise the larger lakes in Seasonally inundated sedgeland (wetland).
- Common Greenshank (*Tringa nebularia*; Mig.) – many desktop records (>90) in proximity to the study area (principally associated with the Blackwood River, Scott River and the artificial wetlands to the west), suitable habitat present (forages in coastal wetlands, lakes and swamps) and arrives in Southwest as early as August. Commonly recorded along the Southwest coast and inland wetlands. Early arrivals may be observed from late August, with the majority arriving in September, and presence becoming widespread by October. Likely to occur in September and October when some of the wetlands are still inundated and may also utilise inundated paddocks.
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*; CD) – likely to occur due to nearby recent (<10 km) desktop record, presence of suitable habitat (key habitat in the Southwest includes dry sclerophyll forests and open woodlands containing hollow-bearing trees) and proximity to large tracts of conservation reserve. Most likely to utilise the large woodland - wetland mosaic remnant on the northern boundary of the WFA, where it is close to other remnants that may act as linkages to the conservation reserves to the north.

A further 14 and 13 species were considered to possibly and possibly (rarely) occur, respectively, based on the currency of records and suitability of habitat present in the study area (Table 5-15).

6.3 ECOLOGICAL LINKAGE VALUES

The study area occurs at the junction of 3 SWREL ecological linkages, 2 of which partially intersect the study area (section 3.7; Figure 3-5). The east-west linkage at the northern end of the WFA (Figure 3-5) runs through the large woodland - wetland mosaic remnant on the northern boundary of the WFA. This remnant, along with another large remnant immediately adjacent the study area to the west, likely provide important stepping stones for movement of fauna between the extensive intact habitat of Pagett Nature Reserve/South Blackwood State Forest in the east and Scott National Park in the west. This remnant, which supports black cockatoo foraging and Western Ringtail Possum breeding is therefore considered significant as supporting a regional ecological linkage.

The single north-south linkage that runs along the eastern boundary of the WFA intersects it at the northern extent along Dennis Road (Figure 3-5). While the linkage is situated mainly outside the study area boundary, the woodland and wetland habitat remnants on the eastern side of the study area (mainly south of the Bluegum plantation) may support some movement of fauna, thus making a minor contribution to this linkage. However, significance of these remnants to this linkage is less clear than for the northern east-west linkage, due to the small size, isolation and variable conditions of the remnants present in that area.

The third linkage runs east-west just south of the WFA boundary within continuous habitat cover associated with the Scott River (Figure 3-5); it is intersected by the north-south linkage to the east of the study area. The habitat remnants in the south of the study area that are contiguous with, or near to, the Scott River are typically small, isolated and degraded (but a few better examples are present, such as at the intersections of Scott River Road-Governor Broome Road, Dennis Road-Governor Broome Road) and likely may partially support this third linkage.

Key vertebrate groups likely to depend on the linkages for movement, either foraging or dispersal are mobile, small-moderate sized bush birds, small native mammals and reptiles, and specifically, black cockatoos, Western Ringtail Possum and Quenda with respect to significant fauna recorded.

6.4 CONCLUSION

The study area comprises mostly cleared areas interspersed with native wetland and woodland habitat remnants of varying size, condition and contribution to fauna values. The larger habitat patches are typically better quality and of higher value for vertebrate fauna than the smaller, more isolated remnants. Key habitat values in the study area mainly relate to significant species such as the 3 Threatened black cockatoo species and Western Ringtail Possum, with one main habitat Marri-Jarrah-Peppermint woodland providing the highest value to these species. Even these values are relatively low compared with those likely to be present in the expansive, intact conservation reserves immediately north-east and south-west of the study area.

Observed use of the study area by black cockatoos was limited to foraging, with no evidence of breeding or night roosting recorded. Foraging habitat in the study area probably represents supplementary resources to the abundant habitats adjacent to the study area.

Use of the WFA by Western Ringtail Possum appeared to be restricted to Marri-Jarrah-Peppermint woodland near its boundaries, where such habitat is contiguous with, or occurs near, larger intact remnants outside the WFA.

The value of the wetlands in the study area to Migratory shorebirds is low relative to the higher value shorebird habitat elsewhere in the region, such as at the Hardy Inlet. Most wetland habitats in the study area are only of foraging value to Migratory shorebirds in spring and early summer, between their arrival in the Southwest and the drying out of most of the wetlands.

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Appendix 1 Survey site locations

Site	Latitude	Longitude
AQU-01	-34.247482	115.271328
AQU-02	-34.248689	115.276135
AQU-03	-34.249464	115.279433
AQU-04	-34.249808	115.281943
AQU-05	-34.210338	115.321636
AQU-06	-34.251412	115.303417
AQU-07	-34.24681	115.305785
AQU-08	-34.205434	115.276028
AQU-09	-34.244135	115.273808
AQU-10	-34.241789	115.274589
AQU-11	-34.245805	115.314653
AQU-12	-34.244781	115.308837
AQU-13	-34.246574	115.309238
AQU-14	-34.181586	115.27887
AQU-15	-34.180514	115.280501
AQU-16	-34.183749	115.284309
AQU-17	-34.179513	115.288093
AQU-18	-34.185171	115.276625
AQU-19	-34.190734	115.278902
AQU-20	-34.199881	115.269676
AQU-21	-34.193204	115.268229
AQU-22	-34.229937	115.272246
AQU-23	-34.245113	115.310428
AQU-24	-34.242576	115.304795
AQU-25	-34.174843	115.282793
AQU-26	-34.237156	115.296574
AQU-27	-34.237546	115.311216
AQU-28	-34.234948	115.312542
AQU-29	-34.234925	115.312569
AQU-30	-34.232315	115.307734
AQU-31	-34.232194	115.313117
AQU-32	-34.211393	115.280677
AQU-33	-34.218751	115.281792
AQU-34	-34.210126	115.284739
AQU-35	-34.211817	115.288561
AQU-36	-34.208199	115.292099
AQU-37	-34.220606	115.298343
AQU-38	-34.260164	115.300419
AQU-39	-34.257787	115.298181
AQU-40	-34.256061	115.302074
AQU-41	-34.215397	115.290838
AQU-42	-34.217194	115.286282
AQU-43	-34.217226	115.289498
AQU-44	-34.228251	115.296158

Site	Latitude	Longitude
AQU-45	-34.231149	115.299469
AQU-46	-34.235068	115.305809
AQU-47	-34.2301	115.303493
AQU-48	-34.229863	115.310481
AQU-49	-34.227313	115.312516
AQU-50	-34.227574	115.304967
AQU-51	-34.225103	115.30517
AQU-52	-34.224393	115.301195
AQU-53	-34.226724	115.300412
AQU-54	-34.20575	115.314201
AQU-55	-34.206957	115.300623
AQU-56	-34.201059	115.295523
AQU-57	-34.198439	115.29352
AQU-58	-34.219785	115.308102
AQU-59	-34.218696	115.307423
AQU-60	-34.206534	115.31591
AQU-61	-34.20672	115.311975
AQU-62	-34.212032	115.298321
AQU-Opp01	-34.222283	115.299462
AQU-Opp02	-34.233752	115.269336
AQU-Opp03	-34.195279	115.292389
AQU-Opp04	-34.238697	115.269518
BC Roosting 18	-34.224332	115.320894
BC2024_01	-34.199253	115.314846
BCForaging	-34.199442	115.311924
BCRoosting01	-34.192577	115.277687
BCRoosting03	-34.198479	115.30151
BCRoosting04	-34.224194	115.306812
BCRoosting05	-34.24021	115.313766
BCRoosting06	-34.250175	115.280087
BCRoosting07	-34.198186	115.315568
BCRoosting09	-34.24775	115.315593
BCRoosting10	-34.173825	115.290991
BCRoosting11	-34.176611	115.294864
BCRoosting12	-34.237906	115.323072
BCRoosting13	-34.24428	115.323264
BCRoosting14	-34.261857	115.29435
BCRoosting15	-34.174604	115.274135
BCRoosting16	-34.19273	115.321675
BCRoosting17	-34.256463	115.301149
Bfalcon	-34.240213	115.293611
Birding01	-34.197116	115.307535
Birding02	-34.228454	115.30931
Birding03	-34.242562	115.320686

Site	Latitude	Longitude
Black Cockatoos	-34.259281	115.267938
CarnabysCockies02	-34.160129	115.313343
Cat2024_01	-34.249886	115.283611
Drey01	-34.24573	115.320908
Dugite02	-34.185929	115.286062
Fox2024_01	-34.245848	115.320142
Fox2024_02	-34.19998	115.315116
Fox2024_03	-34.249569	115.272026
Fox2024_04	-34.245716	115.313908
FRTBC-01	-34.237853	115.322438
FRTBC-02	-34.249158	115.284346
FRTBC-03	-34.19941	115.31187
FRTBC-04	-34.260883	115.270208
FRTBC-05	-34.187524	115.274718
FRTBC-06	-34.184362	115.282472
Goanna01	-34.250683	115.269393
KingSkink01	-34.251079	115.277141
Mowl01	-34.259673	115.270071
Opp01	-34.21009	115.284195
Opp02	-34.20948	115.281391
Opp03	-34.257498	115.298576
Opp05	-34.214073	115.290011
Opp06	-34.21658	115.269288
Opp07	-34.213811	115.26955
Opp08	-34.239714	115.294114
Opp09	-34.249946	115.290238
Opp10	-34.208905	115.278547
Opp11	-34.234284	115.281151
Opp12	-34.200064	115.31186
Opp13	-34.187483	115.321007
Opp14	-34.160229	115.312543
Opp15	-34.193784	115.322088
Opp17	-34.209966	115.281969
Opp18	-34.270554	115.271178
Opp19	-34.177184	115.280408
Opp21	-34.253592	115.277606
Opp22	-34.249947	115.276697
Opp23	-34.209581	115.278315
Osprey	-34.243811	115.281009
Quenda01	-34.251458	115.277907
Quenda02	-34.251695	115.27534
Raven01	-34.237716	115.322554
Shingleback01	-34.216754	115.295742
SM4-01	-34.199801	115.314268
SM4-02	-34.19959	115.311994
SM4-03 (failed)	-34.23748	115.320312

Site	Latitude	Longitude
SM4-04	-34.245543	115.321471
SM4-05	-34.251034	115.282892
SM4-06	-34.191929	115.273207
SM4-07	-34.192035	115.269482
Tawny01	-34.237682	115.322316
TigerSnake01	-34.250872	115.302703
VER-01	-34.174142	115.273032
VER-02	-34.192763	115.267878
VER-03	-34.196448	115.267111
VER-04	-34.24615	115.321561
VER-05	-34.200165	115.312108
VER-06	-34.197436	115.289356
VER-07	-34.197868	115.295623
VER-08	-34.197474	115.294637
VER-09	-34.200199	115.294946
VER-10	-34.210046	115.30347
VER-11	-34.220795	115.297671
VER-12	-34.207463	115.315493
VER-13	-34.237608	115.320145
VER-14	-34.23446	115.28499
VER-15	-34.237397	115.296469
VER-16	-34.239866	115.306381
VER-17	-34.260188	115.269656
VER-18	-34.206358	115.321713
VER-19	-34.22857	115.322834
VER-20	-34.240189	115.323754
VER-21	-34.251811	115.283041
VER-22	-34.250516	115.269781
VER-23	-34.245524	115.269662
VER-24	-34.239467	115.269539
VER-25	-34.236058	115.269151
VER-26	-34.233795	115.269163
VER-27	-34.229022	115.269025
VER-28	-34.225355	115.268869
VER-29	-34.183902	115.270066
VER-30	-34.159844	115.278315
VER-31	-34.161288	115.312818
VER-32	-34.15691	115.401718
VER-33	-34.229605	115.302845
VER-34	-34.247248	115.305696
VER-35	-34.230832	115.297507
VER-36	-34.217031	115.288597
VER-37	-34.210259	115.28399
VER-38	-34.251138	115.303766
VER-39	-34.25625	115.30209
VER-40	-34.275721	115.305096

Site	Latitude	Longitude
VER-41	-34.275564	115.292249
VER-42	-34.276938	115.302097
VER-43	-34.218715	115.309859
VER-44	-34.200739	115.267108
VER-45	-34.175399	115.283843
VER-46	-34.17434	115.280321
VER-47	-34.178331	115.289973
VER-48	-34.176532	115.294445
VER-49	-34.183202	115.28484
VER-Opp01	-34.245723	115.32289
VER-Opp02	-34.215468	115.294549
VER-Opp03	-34.21245	115.295645
VER-Opp04	-34.159037	115.278097
VER-Opp05	-34.250311	115.298814
VER-Opp06	-34.259541	115.29166
VER-Opp07	-34.17434	115.280321
VER-Opp08	-34.173919	115.293257

Site	Latitude	Longitude
VER-Opp09	-34.250525	115.272565
WedgeyOpp	-34.172799	115.274289
Wetland01	-34.251319	115.303338
Wetland02	-34.256765	115.30225
Wetland03	-34.18034	115.281604
White-tail_Foraging	-34.184758	115.281894
WRP01	-34.175554	115.293327
WRPTrans01	-34.192522	115.269225
WRPTrans02	-34.183529	115.279169
WRPTrans03	-34.17627	115.279641
WRPTrans04	-34.245207	115.32162
WRPTrans05	-34.255915	115.269368
WRPTrans06	-34.191537	115.269395
WRPTrans07	-34.184343	115.281709
WRPTrans08	-34.174352	115.280063
WRPTrans09	-34.237868	115.321003
WRPTrans10	-34.255566	115.270273

Appendix 2 Terrestrial fauna survey site descriptions

Site details			
Site	**AQU-01**	**Position (WGS84)**	115.2713, -34.2475
Slope	negligible	**Topography**	depression
Soil colour	brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Seasonally inundated paperbark woodland, (degraded). Altered vegetation structure through grazing, and substrate physically altered by machinery.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, large-scale clearing		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	131	**Litter distribution**	under vegetation
Tree cover (%)	1	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	1
Grass cover (%)	90	**Herb cover (%)**	30



Site details			
Site	**AQU-02**	**Position (WGS84)**	115.2761, -34.2487
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Small sumpland, highly degraded, small patch of dead shrubs still standing. Very shallow water, patchily distributed throughout the grass.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	107	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	2	**Litter cover (%)**	1
Grass cover (%)	95	**Herb cover (%)**	5



Site details			
Site	**AQU-03**	**Position (WGS84)**	115.2794, -34.2495
Slope	negligible	**Topography**	undulating plain
Soil colour	black, brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Sumpland consisting of sparse Melaleuca, Acacia and sedges over paddock grass. Inundation partially artificial due to adjacent road.			
Habitat	Dam		
Disturbance	current operations, grazing-low, historic clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	0



Site details			
Site	**AQU-04**	**Position (WGS84)**	115.2819, -34.2498
Slope	negligible	**Topography**	undulating plain
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Highly degraded sumpland. Tall dead trees over isolated Melaleuca and Acacia ssp. over sedges and weeds. Some puddles of shallow open water, but mostly inundated grassland.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, evidence of feral animals, grazing-high, large-scale clearing, livestock tracks, litter, weed infestation, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	130	**Litter distribution**	under vegetation
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	10



Site details			
Site	**AQU-05**	**Position (WGS84)**	115.3216, -34.2103
Slope	negligible	**Topography**	depression
Soil colour	red-brown	**Soil texture**	clay loam, laterite
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Artificial sumpland (dam) within Bluegum plantation. No vegetation besides occasional sedges and herbs continuous up to the water edge. Various waterbirds regularly seen on water's surface.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75	**Litter distribution**	concentrated in drifts
Tree cover (%)	60	**Litter depth (cm)**	3.0
Shrub cover (%)	5	**Litter cover (%)**	40
Grass cover (%)	0	**Herb cover (%)**	10



Site details			
Site	**AQU-06**	**Position (WGS84)**	115.3034, -34.2514
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, peat, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Seasonally inundated Paperbark woodland, with extensive open water, largely covered on duckweed. Grass and herbs on dry areas, but few shrubs present. Banjo frogs calling and several birds present. Isolated in the middle of a paddock.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, large-scale clearing, litter		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	165	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	5	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	60



Site details			
Site	**AQU-07**	**Position (WGS84)**	115.3058, -34.2468
Slope	negligible	**Topography**	floodplain
Soil colour	brown, black	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Very good condition seasonally inundated Paperbark wetland. Paperbarks in the centre with sedges and isolated grass trees at the periphery. Aquatic plants present as well as a number of frog and breeding waterbird species. Same remnant as site VER-34.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, vehicle tracks, livestock tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	180	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	1
Grass cover (%)	90	**Herb cover (%)**	60



Site details			
Site	**AQU-08**	**Position (WGS84)**	115.2760, -34.2054
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated Paperbark wetland. Vegetation comprised of Paperbark low trees over tall shrubs, over sedges and introduced grasses. Aquatic plants present and duckweed covering at least half the surface of the open water. Four frog species present and several bush birds.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, evidence of feral animals, grazing-low, large-scale clearing, livestock tracks, litter, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	105	**Litter distribution**	sparse
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	25	**Herb cover (%)**	10



Site details			
Site	**AQU-09**	**Position (WGS84)**	115.2738, -34.2441
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated Paperbark wetland. Vegetation consists of Melaleuca (Paperbark) over sedges and ferns, and occasional grass trees. High-quality vegetation surrounding wetland.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, evidence of feral animals, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	40



Site details			
Site	**AQU-10**	**Position (WGS84)**	115.2746, -34.2418
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Degraded sumpland. Little to no vegetation remaining.			
Habitat	Dam		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	152	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	1.0
Shrub cover (%)	5	**Litter cover (%)**	1
Grass cover (%)	95	**Herb cover (%)**	50



Site details			
Site	**AQU-11**	**Position (WGS84)**	115.3147, -34.2458
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated wetland. Excellent condition sedgeland with vegetation structurally intact. Eucalypts and Banksia over Melaleuca (Paperbark) over sedges and grasses. Multiple frog species present, but no waterbirds present at the time of survey. Little open water.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, large-scale clearing, litter, weed infestation, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	180	**Litter distribution**	none
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	70	**Herb cover (%)**	50



Site details			
Site	**AQU-12**	**Position (WGS84)**	115.3088, -34.2448
Slope	negligible	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	clay loam and laterite, sandy loam
Rock cover (%)	20	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated wetland. High-quality shallow water sedgeland. Waterbody surrounded by peppermint trees over Melaleuca (Paperbark), over sedge ssp. Surrounded by paddocks. No water birds present but multiple frogs calling.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, vehicle tracks, weed infestation, firebreak		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	190	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	60



Site details			
Site	**AQU-13**	**Position (WGS84)**	115.3092, -34.2466
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	2	**Rock type**	granite - outcropping

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated wetland. Severely grazed sedgeland consisting of low Melaleuca shrubs (0.5 m in height), over sedge ssp. and aquatic plants. Ticking Frogs abundant but no waterbirds present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	grazing-low, large-scale clearing, current operations, livestock tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	160	**Litter distribution**	none
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	1
Grass cover (%)	60	**Herb cover (%)**	40



Site details			
Site	**AQU-14**	**Position (WGS84)**	115.2789, -34.1816
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Narrow seasonally inundated Paperbark wetland. Sedges at the water boundaries and in open areas and denser Melaleuca (Paperbark) woodland towards the centre, surrounded by paddocks. Water up to 0.5m deep. Six bird species including White-faced Heron and 2 frog species present. Obvious signs of cattle grazing.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, livestock tracks, vehicle tracks, historic clearing		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	190	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	1
Grass cover (%)	90	**Herb cover (%)**	80



Site details			
Site	**AQU-15**	**Position (WGS84)**	115.2805, -34.1805
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Seasonally inundated wetland. Very degraded in parts due to cattle grazing, resulting in lost structure and only sedges persisting. The remainder of vegetation in excellent condition comprising areas of Paperbark woodland and sedge ssp. in and around waterbody. See also site Wetland03 located to the east.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	grazing-low		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	190	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	70



Site details			
Site	**AQU-16**	**Position (WGS84)**	115.2843, -34.1837
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Long system of disjunct seasonally inundated Paperbark wetlands (sumpland). Dense stands of sedges at boundaries and between wetlands with dense Melaleuca (Paperbarks) towards the centre.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	grazing-low, large-scale clearing, livestock tracks, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	165	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	1
Grass cover (%)	70	**Herb cover (%)**	60



Site details			
Site	**AQU-17**	**Position (WGS84)**	115.2881, -34.1795
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Seasonally inundated wetland consisting of dense stands of sedge with some areas of open of water. Some patches of Melaleuca (Paperbark). Two frogs and 3 bird species present. Site was burnt-off in Spring 2024 by owner.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	vehicle tracks, livestock tracks, grazing-low		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	50	**Herb cover (%)**	0



Site details			
Site	**AQU-18**	**Position (WGS84)**	115.2766, -34.1852
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Sumpland highly degraded with only sparsely distributed sedges left. A few stands of Melaleuca shrubs remaining.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, vehicle tracks, livestock tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	180	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	1.0
Shrub cover (%)	5	**Litter cover (%)**	1
Grass cover (%)	95	**Herb cover (%)**	80



Site details			
Site	**AQU-19**	**Position (WGS84)**	115.2789, -34.1907
Slope	negligible	**Topography**	undulating plain
Soil colour	brown, black	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Seasonally inundated wetland. Small sumpland with up to 1m of water and a 50/50 mix of sedge ssp. and Melaleuca shrubs. Surrounded by paddocks, being accessed by cattle. Two frog species present, but no waterbirds. Some open water.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	grazing-low, historic clearing, livestock tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	161	**Litter distribution**	none
Tree cover (%)	1	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	60



Site details			
Site	**AQU-20**	**Position (WGS84)**	115.2697, -34.1999
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Excellent condition lake, seasonally inundated. Vegetation is mixed Acacia tall shrubs, tea tree and occasional Banksia, over Melaleuca shrubs, over mixed shrubs and sedges, over grasses and herbs. Surrounded by good terrestrial vegetation. A Musk Duck and Little Pied Cormorant using the lake.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	litter, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	60	**Litter distribution**	under vegetation
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	5	**Herb cover (%)**	5



Site details			
Site	**AQU-21**	**Position (WGS84)**	115.2682, -34.1932
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023
1	Foraging - vertebrates	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Small dampland, seasonally inundated. Shrubland, over sedge spp. No water present at time or survey but lots of Mosquitos suggest damp soils. Grevillea, Banksia and Persoonia at margins.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	litter, evidence of feral animals		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	sparse
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	5
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**AQU-22**	**Position (WGS84)**	115.2722, -34.2299
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	clay loam, sandy clay, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	28 Aug 2023	28 Aug 2023

Site description - visit 1 (28 Aug 2023)			
Mostly degraded sumpland, but with small patches of good quality vegetation, not being accessed by cattle.			
Habitat	Cleared - degraded sumpland		
Disturbance	weed infestation, livestock tracks, grazing-low, current operations		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	20



Site details			
Site	**AQU-23**	**Position (WGS84)**	115.3104, -34.2451
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated sedgeland (sumpland). Vegetation severely grazed. Vegetation mostly less than 0.5m. Remaining native vegetation consists of Melaleuca tall shrubs, over sedges, over aquatic plants. Ticking Frogs abundant but no waterbirds observed.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	190	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	1
Grass cover (%)	90	**Herb cover (%)**	70



Site details			
Site	**AQU-24**	**Position (WGS84)**	115.3048, -34.2426
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated shrubland. Vegetation structure dense in core and largely intact. Grasses beyond, inside the fence line. Vegetation consists of Melaleuca and Acacia mid shrubs, over sedges and grasses. Surface water extent limited. Frogs present, no waterbirds.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, historic clearing, grazing-low, livestock tracks, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	160	**Litter distribution**	under vegetation
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	50	**Litter cover (%)**	1
Grass cover (%)	60	**Herb cover (%)**	40



Site details			
Site	**AQU-25**	**Position (WGS84)**	115.2828, -34.1748
Slope	negligible	**Topography**	drainage line
Soil colour	black, grey	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Seasonally inundated shrubland. Longitudinal sumpland surrounded by remnant vegetation. Vegetation consists of occasional Melaleuca (Paperbark) trees, over mixed shrubs and sedges. Site was burnt-off in Spring 2024 by owner. See also site VER-45.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	grazing-low, firebreak, current operations, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	60	**Litter distribution**	concentrated in drifts
Tree cover (%)	30	**Litter depth (cm)**	3.0
Shrub cover (%)	20	**Litter cover (%)**	40
Grass cover (%)	5	**Herb cover (%)**	5



Site details			
Site	**AQU-26**	**Position (WGS84)**	115.2966, -34.2372
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated shrubland. Vegetation structure largely intact. Water mostly shallow puddles forming in low points between vegetation. Vegetation consists of Melaleuca over Acacia over sedges. Ticking Frogs present, no waterbirds. Area is legally protected (R 42377). Same remnant as AQU-27 and VER-15.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, firebreak, large-scale clearing, historic clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	60	**Herb cover (%)**	50



Site details			
Site	**AQU-27**	**Position (WGS84)**	115.3112, -34.2375
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
High-quality vegetation throughout sumpland. Vegetation consists of Eucalyptus over Melaleuca over Acacia and dense mixed shrubs over sedges over shallow water. Two frog species present and no waterbirds. Area is legally protected (R 42377). Same remnant as AQU-26 and VER-15.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	0.0
Shrub cover (%)	80	**Litter cover (%)**	0
Grass cover (%)	30	**Herb cover (%)**	20



Site details			
Site	**AQU-28**	**Position (WGS84)**	115.3125, -34.2349
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown, black	**Soil texture**	clay loam, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated sedgeland. High-quality vegetation throughout sumpland. Vegetation consists of occasional Eucalypt (Paperbark), Myrtaceae and Acacia shrubs over mixed dense shrubs and sedges. Expansive areas of shallow open water extending into paddock. Aquatic plants and 2 frog species present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, vehicle tracks, weed infestation, large-scale clearing, livestock tracks		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	165	**Litter distribution**	none
Tree cover (%)	15	**Litter depth (cm)**	0.0
Shrub cover (%)	80	**Litter cover (%)**	0
Grass cover (%)	40	**Herb cover (%)**	30



Site details			
Site	**AQU-29**	**Position (WGS84)**	115.3126, -34.2349
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Large sumpland with limited native vegetation. Vegetation consists of sparse Melaleuca trees (Paperbark) over occasional sedges around periphery of large open waterbody. A large dead tree overhangs the water, being used by cormorants for perching. Ticking Frogs, Shelducks and Pacific Black Ducks present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, vehicle tracks, large-scale clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	200	**Litter distribution**	none
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	80	**Herb cover (%)**	60



Site details			
Site	**AQU-30**	**Position (WGS84)**	115.3077, -34.2323
Slope	negligible	**Topography**	depression
Soil colour	black, brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Large seasonally inundated shrubland with vegetation relatively intact. Vegetation consists of Melaleuca over mixed shrubs and sedges. Moderate-heavy grazing on outer edges of waterbody has led to damage to overstorey, sedges remain. Frogs present, no waterbirds.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	170	**Litter distribution**	none
Tree cover (%)	30	**Litter depth (cm)**	0.0
Shrub cover (%)	50	**Litter cover (%)**	0
Grass cover (%)	60	**Herb cover (%)**	30



Site details			
Site	**AQU-31**	**Position (WGS84)**	115.3131, -34.2322
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated sedgeland, with little to no native vegetation remaining at periphery. A single dead tree being used by cormorants along with a few Melaleuca, over occasional sedges. Shelducks and Ticking Frogs present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, evidence of feral animals, grazing-low, large-scale clearing, weed infestation, livestock tracks		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	115	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	1
Grass cover (%)	60	**Herb cover (%)**	40



Site details			
Site	**AQU-32**	**Position (WGS84)**	115.2807, -34.2114
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Completely degraded sumpland in the middle of a paddock. No native vegetation remaining.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	60	**Herb cover (%)**	40



Site details			
Site	**AQU-33**	**Position (WGS84)**	115.2818, -34.2188
Slope	negligible	**Topography**	floodplain
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Completely degraded sumpland. Likely holding more water for longer as a result of nearby road preventing flow. Some dead Melaleuca present, no other native vegetation.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, livestock tracks, vehicle tracks, weed infestation, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	145	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	1
Grass cover (%)	100	**Herb cover (%)**	40



Site details			
Site	**AQU-34**	**Position (WGS84)**	115.2847, -34.2101
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Large sumpland. Vegetation largely intact in places, but also much disturbance and weed (grass) infestation, also disturbance from heavy waterbird roosting - highest density of waterbirds observed in a wetland to date. Vegetation consists of Myrtaceae trees over Melaleuca (Paperbarks), over grass and sedges at margin. Possibly perennially inundated. See also site VER-37.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	0.0
Shrub cover (%)	20	**Litter cover (%)**	0
Grass cover (%)	60	**Herb cover (%)**	20



Site details			
Site	**AQU-35**	**Position (WGS84)**	115.2886, -34.2118
Slope	negligible	**Topography**	depression
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Vegetation surrounding sumpland largely intact and in good condition. Large Myrtaceae trees over Melaleuca (Paperbark), over mixed shrubs, over sedges and grasses. Pacific Black Ducks, Rattling and Squelching Frogs present. Possibly perennially inundated.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, vehicle tracks, weed infestation, large-scale clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	under vegetation
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	1
Grass cover (%)	60	**Herb cover (%)**	30



Site details			
Site	**AQU-36**	**Position (WGS84)**	115.2921, -34.2082
Slope	negligible	**Topography**	seasonally wet area
Soil colour	black, brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Large, seasonally inundated Paperbark wetland (sumpland), potentially inundated year-round. Very tall Myrtaceae trees over some very old dead Melaleuca (Paperbark), over smaller Melaleuca sp. and mixed shrubs and sedges. Possibly perennially inundated.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70	**Litter distribution**	scattered
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	5
Grass cover (%)	5	**Herb cover (%)**	5



Site details			
Site	**AQU-37**	**Position (WGS84)**	115.2983, -34.2206
Slope	negligible	**Topography**	floodplain
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	5	**Rock type**	limestone

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	29 Aug 2023	29 Aug 2023
1	Foraging - vertebrates	29 Aug 2023	29 Aug 2023

Site description - visit 1 (29 Aug 2023)			
Seasonally inundated sedgeland where vegetation structure likely altered as a result of surrounding bluegum plantation. Vegetation consists of sparse Melaleuca tall shrubs, over sedges and grasses, with some areas of shallow open water. Small area of exposed limestone also present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	under vegetation
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	5
Grass cover (%)	60	**Herb cover (%)**	20



Site details			
Site	**AQU-38**	**Position (WGS84)**	115.3004, -34.2602
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large sumpland with almost no native vegetation remaining in middle of paddock. Some small sedges remaining. Wetland entirely open body of shallow water. Aquatic plants present.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	115	**Litter distribution**	concentrated in drifts
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	15
Grass cover (%)	70	**Herb cover (%)**	40



Site details			
Site	**AQU-39**	**Position (WGS84)**	115.2982, -34.2578
Slope	negligible	**Topography**	floodplain
Soil colour	brown, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Highly degraded sumpland in the middle of a paddock. Limited native vegetation remaining besides sedges around the edges of the wetland. Some dead Melaleuca remaining in the middle of the wetland.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, vehicle tracks, livestock tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	0.0
Shrub cover (%)	5	**Litter cover (%)**	0
Grass cover (%)	80	**Herb cover (%)**	20



Site details			
Site	**AQU-40**	**Position (WGS84)**	115.3021, -34.2561
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large lake. Vegetation consists of peppermint trees around the northern and western perimeter, a stand of Melaleuca (Paperbark) in the middle and sedges on the eastern side. Site highly impacted by grazing livestock with tracks under tree stands and at waters edge. Despite this impact, many different waterbirds present and ticking Frogs present. Possibly perennially inundated. See also site VER-39.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, weed infestation, large-scale clearing		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	none
Tree cover (%)	40	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	70	**Herb cover (%)**	45



Site details			
Site	**AQU-41**	**Position (WGS84)**	115.2908, -34.2154
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large lake. Vegetation consists of peppermint trees, Eucalypts and Myrtaceae trees, over Melaleuca tall shrubs, over mixed sedges, and aquatic plants. Large area of open water with Duckweed abundant.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, weed infestation, large-scale clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	scattered
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	1
Grass cover (%)	50	**Herb cover (%)**	20



Site details			
Site	**AQU-42**	**Position (WGS84)**	115.2863, -34.2172
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Medium-sized sumpland with some native vegetation remaining. Vegetation consists of occasional stands of Melaleuca (Paperbark), over mixed sedges, surrounding open waterbody.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	135	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	0.0
Shrub cover (%)	15	**Litter cover (%)**	0
Grass cover (%)	80	**Herb cover (%)**	30



Site details			
Site	**AQU-43**	**Position (WGS84)**	115.2895, -34.2172
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023
1	Site description	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated wetland. Vegetation consists of Melaleucas (Paperbarks) and Eucalypts, over Lepidosperma and other sedges, over grasses. Surrounded by paddocks. Remnant same as per site VER-36.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	0.0
Shrub cover (%)	10	**Litter cover (%)**	0
Grass cover (%)	30	**Herb cover (%)**	30



Site details			
Site	**AQU-44**	**Position (WGS84)**	115.2962, -34.2283
Slope	negligible	**Topography**	floodplain
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated Paperbark dominated sumpland. Vegetation structure altered, consisting of stands of Paperbark, as well as Acacia, Eucalypt and Melaleuca, over mixed shrubs and sedges, over grass and herbs, with some open, cleared edges surrounding open waterbody.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, vehicle tracks, weed infestation, livestock tracks		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	under vegetation
Tree cover (%)	30	**Litter depth (cm)**	2.0
Shrub cover (%)	20	**Litter cover (%)**	5
Grass cover (%)	60	**Herb cover (%)**	15



Site details			
Site	**AQU-45**	**Position (WGS84)**	115.2995, -34.2311
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large lake with limited midstorey that has been impacted by grazing. Remaining vegetation consists of Myrtaceae and Eucalypts trees, over occasional Melaleuca (Paperbark), over mixed sedges, and extensive paddock grasses almost continuous surrounding the lake. Same wetland as site VER-35.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80	**Litter distribution**	none
Tree cover (%)	15	**Litter depth (cm)**	0.0
Shrub cover (%)	5	**Litter cover (%)**	0
Grass cover (%)	30	**Herb cover (%)**	30



Site details			
Site	**AQU-46**	**Position (WGS84)**	115.3058, -34.2351
Slope	negligible	**Topography**	floodplain
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated sedgeland wetland on northern boundary of protected land R 42377. Vegetation consists of Eucalypt spp., over mixed shrubs, over mixed sedges and grasses.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	150	**Litter distribution**	sparse
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	2
Grass cover (%)	60	**Herb cover (%)**	30



Site details			
Site	**AQU-47**	**Position (WGS84)**	115.3035, -34.2301
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated shrubland wetland. Large area of shallow, open water surrounded by relatively intact vegetation. Vegetation consists of occasional Eucalypt spp., over large Melaleucas (Paperbark), over large expanses of mixed sedges. Abundant frogs calling and few waterbirds present. Same vegetation complex as site VER-33			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	sparse
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	2
Grass cover (%)	80	**Herb cover (%)**	20



Site details			
Site	**AQU-48**	**Position (WGS84)**	115.3105, -34.2299
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large, seasonally inundated Paperbark wetland. Vegetation relatively intact, consisting of Melaleuca (Paperbark), over mixed Acacia and other shrubs, over sedges and grasses. Water covered by Duckweed. Multiple frog species present, with some waterbirds and bush birds present.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	scattered
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	5
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**AQU-49**	**Position (WGS84)**	115.3125, -34.2273
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated Paperbark wetland. Dense vegetation consisting of Myrtaceae and Melaleuca (Paperbark) trees, over Acacia and other shrubs, over sedges and grasses. Aquatic plants present. Water shallow throughout.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, large-scale clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	180	**Litter distribution**	scattered
Tree cover (%)	50	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	5
Grass cover (%)	70	**Herb cover (%)**	20



Site details			
Site	**AQU-50**	**Position (WGS84)**	115.3050, -34.2276
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated shrubland wetland. Large wetland, vegetation consists of Myrtaceae tall shrubs, over mixed mid-low shrubs and sedges. Water body shallow throughout.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks, large-scale clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	0.0
Shrub cover (%)	60	**Litter cover (%)**	0
Grass cover (%)	5	**Herb cover (%)**	5



Site details			
Site	**AQU-51**	**Position (WGS84)**	115.3052, -34.2251
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated sedgeland wetland. Vegetation consists of mixed sedges with the occasional Melaleuca spp. tall shrub or low tree. Water body shallow throughout. Lots of clicking frogs. White-faced heron foraging in grasses at periphery. Carnaby's Cockatoo coming in to drink.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, weed infestation, livestock tracks		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	102	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	30	**Litter cover (%)**	0
Grass cover (%)	60	**Herb cover (%)**	10



Site details			
Site	**AQU-52**	**Position (WGS84)**	115.3012, -34.2244
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Series of degraded, hydrologically connected sumplands. Vegetation consists of low, sparse sedges and paddock grasses.			
Habitat	Cleared - degraded sumpland		
Disturbance	current operations, grazing-low, large-scale clearing, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	112	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	90	**Herb cover (%)**	20



Site details			
Site	**AQU-53**	**Position (WGS84)**	115.3004, -34.2267
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Large seasonally inundated sedgeland wetland. Predominantly covered by sedges with some stands of taller mixed shrubs. Very shallow water throughout, drying out. Aquatic plants and several frog species present.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	122	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	20	**Litter cover (%)**	0
Grass cover (%)	80	**Herb cover (%)**	20



Site details			
Site	**AQU-54**	**Position (WGS84)**	115.3142, -34.2057
Slope	negligible	**Topography**	riparian
Soil colour	black	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Seasonally inundated Paperbark wetland. Medium-sized sumpland, vegetation structure likely altered as a result of bluegum plantation to the south. Vegetation consists of few Melaleuca (Paperbarks), over sedges and grasses with some areas of shallow open water. Small area of exposed limestone.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	under vegetation
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	20	**Litter cover (%)**	5
Grass cover (%)	60	**Herb cover (%)**	20



Site details			
Site	**AQU-55**	**Position (WGS84)**	115.3006, -34.2070
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Seasonally inundated Paperbark wetland. Medium-sized sumpland with vegetation structure altered. Vegetation consisting of Melaleuca (Paperbark), over mixed fringing sedges, and grasses. One section of wetland open and covered in sedges and low water. The other is a closed Melaleuca (Paperbark).			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth (cm)**	3.0
Shrub cover (%)	40	**Litter cover (%)**	10
Grass cover (%)	10	**Herb cover (%)**	20



Site details			
Site	**AQU-56**	**Position (WGS84)**	115.2955, -34.2011
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Large complex aggregation of seasonally inundated shrublands. Vegetation consists of Melaleuca ssp. over mixed shrubs and sedges, over grasses and aquatic plants. Lots of frogs and waterbirds using wetland. An area of open water in the middle a result of fenceline clearing.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, firebreak, grazing-low, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	92	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	70	**Litter cover (%)**	0
Grass cover (%)	10	**Herb cover (%)**	10



Site details			
Site	**AQU-57**	**Position (WGS84)**	115.2935, -34.1984
Slope	negligible	**Topography**	floodplain
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Sumpland with relatively intact vegetation consisting of a mosaic of shrubland and sedgeland with some taller Melaleucas throughout. Occasional grass trees around the drier parts of the wetland. Frogs and waterbirds present.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, large-scale clearing, livestock tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	none
Tree cover (%)	20	**Litter depth (cm)**	0.0
Shrub cover (%)	80	**Litter cover (%)**	0
Grass cover (%)	20	**Herb cover (%)**	20



Site details			
Site	**AQU-58**	**Position (WGS84)**	115.3081, -34.2198
Slope	negligible	**Topography**	riparian
Soil colour	black, grey	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated Paperbark wetland, surrounded by good-quality bushland and set in middle of a Bluegum plantation. Surrounding land use likely degrading the habitat. Vegetation consists of Melaleuca (Paperbark) trees, over mixed shrubs and sedges. Frogs present.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, evidence of feral animals, firebreak, grazing-low, vehicle tracks, historic clearing		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth (cm)**	3.0
Shrub cover (%)	20	**Litter cover (%)**	80
Grass cover (%)	20	**Herb cover (%)**	5



Site details			
Site	**AQU-59**	**Position (WGS84)**	115.3074, -34.2187
Slope	negligible	**Topography**	depression
Soil colour	brown-grey, black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Small seasonally inundated Paperbark wetland. Vegetation predominantly head-high juvenile Melaleuca (Paperbark) but with clumps of taller dead Melaleuca (Paperbark) in the middle of the water body. Approximately 25% open water.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, firebreak, grazing-low, large-scale clearing, historic clearing, vehicle tracks, weed infestation, evidence of feral animals		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	88	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth (cm)**	3.0
Shrub cover (%)	5	**Litter cover (%)**	80
Grass cover (%)	2	**Herb cover (%)**	1



Site details			
Site	**AQU-60**	**Position (WGS84)**	115.3159, -34.2065
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Seasonally inundated Paperbark woodland (dampland). Vegetation relatively intact, but midstorey limited. Vegetation consists of Melaleuca (Paperbark; some with hollows) over mixed herbs. Located in the middle of the large Bluegum plantation on eastern side of study area. Some water holding between bluegum rows. Identical to site AQU-61.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, firebreak, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth (cm)**	3.0
Shrub cover (%)	5	**Litter cover (%)**	80
Grass cover (%)	20	**Herb cover (%)**	30



Site details			
Site	**AQU-61**	**Position (WGS84)**	115.3120, -34.2067
Slope	negligible	**Topography**	depression
Soil colour	black	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	31 Aug 2023	31 Aug 2023
1	Foraging - vertebrates	31 Aug 2023	31 Aug 2023

Site description - visit 1 (31 Aug 2023)			
Seasonally inundated Paperbark woodland (dampland). Vegetation relatively intact, but mid-storey limited. Vegetation consists of Melaleuca (some with hollows; Paperbark) over mixed herbs. Located in the middle of the large Bluegum plantation on eastern side of study area. Some water holding between bluegum rows. Identical to site AQU-60.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-low, firebreak, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth (cm)**	3.0
Shrub cover (%)	5	**Litter cover (%)**	80
Grass cover (%)	20	**Herb cover (%)**	30



Site details			
Site	**AQU-62**	**Position (WGS84)**	115.2983, -34.2120
Slope	negligible	**Topography**	depression
Soil colour	black, brown	**Soil texture**	clay loam, loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	30 Aug 2023	30 Aug 2023
1	Foraging - vertebrates	30 Aug 2023	30 Aug 2023

Site description - visit 1 (30 Aug 2023)			
Seasonally inundated Paperbark wetland. Vegetation consists of Melaleuca (Paperbark), over mixed sedges. Large areas of shallow water. Several frogs present but no waterbirds observed. Located in the middle of the eastern bluegum plantation.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, evidence of feral animals, grazing-low, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	97	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth (cm)**	3.0
Shrub cover (%)	5	**Litter cover (%)**	80
Grass cover (%)	10	**Herb cover (%)**	2



Site details			
Site	**Mowl01**	**Position (WGS84)**	115.2702, -34.2597
Slope	gentle	**Topography**	creek
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)		**Rock type**	

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023

Site description - visit 1 (25 May 2023)			
Scott River riparian woodland of Agonis flexuosa (peppermint) trees and Corymbia calophylla (Marri) over dense shrubs and introduced grasses.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	Weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	167	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth (cm)**	5.0
Shrub cover (%)	60	**Litter cover (%)**	35
Grass cover (%)	35	**Herb cover (%)**	2



Site details			
Site	**SM4-01**	**Position (WGS84)**	115.3143, -34.1998
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	01 Feb 2025
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland, with old (but relatively short) trees containing hollows and many small trees coming through. Mid and understorey fairly sparse, but dense ground cover of Lomandra and other species. Plentiful log debris on the floor. Almost identical to site SM4-02, likely were both a single stand historically.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance			
Vegetation condition	Pristine	**Fire age**	moderate (5-10 years)
Total veg. cover (%)	91	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth (cm)**	2.0
Shrub cover (%)	5	**Litter cover (%)**	20
Grass cover (%)	5	**Herb cover (%)**	1



Site details			
Site	**SM4-02**	**Position (WGS84)**	115.3120, -34.1996
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	2	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	01 Feb 2025
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland, with old (but relatively short) trees containing hollows and many small trees coming through. Mid and understorey fairly sparse, but dense ground cover of Lomandra and other species. Plentiful log debris on the floor. Almost identical to site SM4-01, likely were both a single stand historically.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance			
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	96	**Litter distribution**	even/continuous
Tree cover (%)	65	**Litter depth (cm)**	0.0
Shrub cover (%)	20	**Litter cover (%)**	20
Grass cover (%)	10	**Herb cover (%)**	1



Site details			
Site	**SM4-03 (failed)**	**Position (WGS84)**	115.3203, -34.2375
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	29 Nov 2024
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
See veg mapping			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	grazing-high		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	170	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth (cm)**	0.5
Shrub cover (%)	0	**Litter cover (%)**	5
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**SM4-04**	**Position (WGS84)**	115.3215, -34.2455
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	03 Feb 2025
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland, with old (but relatively short) trees, some with hollows. Relatively dense canopy, mid-storey of peppermint, Banksia and Persoonia. Plentiful log debris on the floor. Very similar to SM4-05.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	111	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth (cm)**	2.0
Shrub cover (%)	10	**Litter cover (%)**	35
Grass cover (%)	20	**Herb cover (%)**	1



Site details			
Site	**SM4-05**	**Position (WGS84)**	115.2828, -34.2510
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	24 Jan 2025
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland, with old (but relatively short) trees, some with hollows. Relatively dense canopy, mid-storey of peppermint, Banksia and Persoonia. Plentiful log debris on the floor. Very similar to SM4-04.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance			
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	131	**Litter distribution**	even/continuous
Tree cover (%)	85	**Litter depth (cm)**	2.0
Shrub cover (%)	15	**Litter cover (%)**	30
Grass cover (%)	30	**Herb cover (%)**	1



Site details			
Site	**SM4-06**	**Position (WGS84)**	115.2732, -34.1919
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	20 Dec 2024
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland of variable condition. Closed canopy in areas, open elsewhere. Mid-storey of Banksia and Persoonia, with shrub layer present in best areas; no shrubs in degraded patches. Plentiful log debris on the floor, but paddock weeds encroaching.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	152	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth (cm)**	2.0
Shrub cover (%)	30	**Litter cover (%)**	25
Grass cover (%)	50	**Herb cover (%)**	2



Site details			
Site	**SM4-07**	**Position (WGS84)**	115.2695, -34.1920
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	29 Nov 2024	01 Feb 2025
1	Site description	29 Nov 2024	29 Nov 2024

Site description - visit 1 (29 Nov 2024)			
Jarrah-marri-peppermint woodland, with older trees, but few with hollows. Canopy open. Mid-storey of Banksia, Persoonia and Agonis sp. Plentiful log debris on the floor. Weeds encroaching at margins throughout.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance			
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	96	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth (cm)**	0.5
Shrub cover (%)	15	**Litter cover (%)**	20
Grass cover (%)	50	**Herb cover (%)**	1



Site details			
Site	**VER-01**	**Position (WGS84)**	115.2730, -34.1741
Slope	negligible	**Topography**	undulating plain
Soil colour	light-brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Opportunistic sighting	10 Dec 2023	10 Dec 2023
1	Site description	12 Dec 2023	12 Dec 2023

Site description - visit 1 (12 Dec 2023)			
Bluegum plantation surrounded by grazing paddocks.			
Habitat	Bluegum plantation		
Disturbance	current operations, evidence of feral animals, grazing-high, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	102	**Litter distribution**	under vegetation
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	30
Grass cover (%)	60	**Herb cover (%)**	2



Site details			
Site	**VER-02**	**Position (WGS84)**	115.2679, -34.1928
Slope	negligible	**Topography**	floodplain
Soil colour	light-brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Dec 2023	12 Dec 2023

Site description - visit 1 (12 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Small patch of remnant vegetation surrounded by Bluegum plantations. Remnant vegetation consists of young Jarrah over mixed sedges, Tea Tree, Woolly Bush, and other shrubs, over grass.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, evidence of feral animals, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	92	**Litter distribution**	under vegetation
Tree cover (%)	50	**Litter depth (cm)**	3.0
Shrub cover (%)	30	**Litter cover (%)**	20
Grass cover (%)	10	**Herb cover (%)**	2



Site details			
Site	**VER-03**	**Position (WGS84)**	115.2671, -34.1964
Slope	negligible	**Topography**	floodplain
Soil colour	light-brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	12 Dec 2023	12 Dec 2023

Site description - visit 1 (12 Dec 2023)			
Small remnant of open peppermint woodland degraded). Vegetation on eastern side of road with occasional Jarrah, over peppermint trees, Mid-storey of mixed Acacia, over sedges and mixed grasses. Bluegum plantation present on western side of road. Not suitable black cockatoo breeding habitat.			
Habitat	Open woodland of Peppermint trees (degraded)		
Disturbance	current operations, evidence of feral animals, firebreak, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	under vegetation
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	30
Grass cover (%)	20	**Herb cover (%)**	5



Site details			
Site	**VER-04**	**Position (WGS84)**	115.3216, -34.2461
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	11 Dec 2023	11 Dec 2023
1	Foraging - nocturnal	11 Dec 2023	11 Dec 2023

Site description - visit 1 (11 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Roadside remnant surrounded by paddocks. Peppermint and Jarrah, over mid-storey of Banksia, over Grass Trees, young Eucalypts, sedges and Tea Tree. Roadside weeds occur atop loam substrate.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	81	**Litter distribution**	under vegetation
Tree cover (%)	25	**Litter depth (cm)**	1.0
Shrub cover (%)	35	**Litter cover (%)**	20
Grass cover (%)	20	**Herb cover (%)**	1



Site details			
Site	**VER-05**	**Position (WGS84)**	115.3121, -34.2002
Slope	negligible	**Topography**	undulating plain
Soil colour	light-brown	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	10 Dec 2023	10 Dec 2023

Site description - visit 1 (10 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Jarrah, over mixed Acacia, Melaleuca, over Grass Trees and Tea Trees, over mixed sedges and grasses. Substrate is light brown loamy-sand.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	evidence of feral animals, erosion channels, grazing-high, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	scattered
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	50	**Litter cover (%)**	20
Grass cover (%)	60	**Herb cover (%)**	5



Site details			
Site	**VER-06**	**Position (WGS84)**	115.2894, -34.1974
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	10 Dec 2023	10 Dec 2023
1	Opportunistic sighting	10 Dec 2023	10 Dec 2023

Site description - visit 1 (10 Dec 2023)			
Seasonally inundated wetland surrounded by paddocks. Tea Tree and Melaleucas over younger Tea Tree, Grass Trees, and Acacias. Understorey of Lepidosperma and other sedges, over infestation of weeds.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, evidence of feral animals, livestock tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	under vegetation
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	65	**Litter cover (%)**	5
Grass cover (%)	20	**Herb cover (%)**	10



Site details			
Site	**VER-07**	**Position (WGS84)**	115.2956, -34.1979
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	10 Dec 2023	10 Dec 2023

Site description - visit 1 (10 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Over storey of Jarrah, over Tea Trees, over Grass Trees, Lepidosperma and other sedges and Acacias. Grasses invading from edge.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, evidence of feral animals, historic clearing		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	under vegetation
Tree cover (%)	55	**Litter depth (cm)**	1.0
Shrub cover (%)	50	**Litter cover (%)**	15
Grass cover (%)	10	**Herb cover (%)**	10



Site details			
Site	**VER-08**	**Position (WGS84)**	115.2946, -34.1975
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	clay loam, loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	10 Dec 2023	10 Dec 2023
1	Opportunistic sighting	10 Dec 2023	10 Dec 2023
1	Foraging - nocturnal	11 Dec 2023	11 Dec 2023

Site description - visit 1 (10 Dec 2023)			
Seasonally inundated shrubland wetland. Occasional Melaleuca (Paperbark) over Tea Trees, Christmas trees and smaller Melaleuca thickets, over mixed shrubs, herbs and grasses. Aquatic plants present in places. Located in same remnant, NE of site AQU-57.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	evidence of feral animals, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	101	**Litter distribution**	even/continuous
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	90	**Litter cover (%)**	40
Grass cover (%)	5	**Herb cover (%)**	1



Site details			
Site	**VER-09**	**Position (WGS84)**	115.2949, -34.2002
Slope	gentle	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	10 Dec 2023	10 Dec 2023
1	Opportunistic sighting	10 Dec 2023	10 Dec 2023

Site description - visit 1 (10 Dec 2023)			
Seasonally inundated wetland surrounded by paddocks. Vegetation consists of occasional Melaleucas (Paperbark), over Tea Tree, Acacias and Myrtaceae shrubs, over Bracken fern, Lepidosperma and other sedges.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-high, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	under vegetation
Tree cover (%)	50	**Litter depth (cm)**	1.0
Shrub cover (%)	60	**Litter cover (%)**	20
Grass cover (%)	20	**Herb cover (%)**	10



Site details			
Site	**VER-10**	**Position (WGS84)**	115.3035, -34.2100
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Degraded open woodland of Peppermint trees, no understorey. Located within eastern Bluegum plantation.			
Habitat	Open woodland of Peppermint trees (degraded)		
Disturbance	current operations, erosion channels, firebreak, historic clearing, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	40	**Litter distribution**	under vegetation
Tree cover (%)	25	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	35
Grass cover (%)	5	**Herb cover (%)**	10



Site details			
Site	**VER-11**	**Position (WGS84)**	115.2977, -34.2208
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Degraded open woodland of Peppermint trees, with no understorey species present. Within the eastern Bluegum plantation.			
Habitat	Open woodland of Peppermint trees (degraded)		
Disturbance	current operations, firebreak, historic clearing, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	65	**Litter distribution**	under vegetation
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	30
Grass cover (%)	20	**Herb cover (%)**	10



Site details			
Site	**VER-12**	**Position (WGS84)**	115.3155, -34.2075
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Seasonally inundated Paperbark wetland. Vegetation degraded, consists of Paperbarks, over grasses and weeds.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	erosion channels, firebreak, weed infestation, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	125	**Litter distribution**	under vegetation
Tree cover (%)	50	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	5
Grass cover (%)	50	**Herb cover (%)**	10



Site details			
Site	**VER-13**	**Position (WGS84)**	115.3201, -34.2376
Slope	negligible	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023
1	Opportunistic sighting	09 Dec 2023	09 Dec 2023
1	Foraging - nocturnal	11 Dec 2023	11 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Jarrah and Peppermint trees, over Eucalypt saplings, Acacia, and Conifers, over grass infestation.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, firebreak, grazing-high, historic clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	30
Grass cover (%)	15	**Herb cover (%)**	10



Site details			
Site	**VER-14**	**Position (WGS84)**	115.2850, -34.2345
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Degraded open woodland of Peppermint trees with no understorey, just grass infestation.			
Habitat	Open woodland of Peppermint trees (degraded)		
Disturbance	current operations, grazing-high, firebreak, historic clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	96	**Litter distribution**	none
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	2
Grass cover (%)	85	**Herb cover (%)**	1



Site details			
Site	**VER-15**	**Position (WGS84)**	115.2965, -34.2374
Slope	negligible	**Topography**	seasonally wet area
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Seasonally inundated shrubland. Vegetation structure largely intact. Water mostly shallow puddles forming in low points between vegetation. Vegetation consists of Melaleuca over Acacia over sedges. Ticking Frogs present, no waterbirds. Area is legally protected (R 42377). Same remnant as AQU-27 and VER-15.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	erosion channels, current operations, firebreak, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	under vegetation
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	75	**Litter cover (%)**	5
Grass cover (%)	15	**Herb cover (%)**	10



Site details			
Site	**VER-16**	**Position (WGS84)**	115.3064, -34.2399
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023
1	Birding	09 Dec 2023	09 Dec 2023
1	Opportunistic sighting	09 Dec 2023	09 Dec 2023
1	Foraging - vertebrates	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Seasonally inundated shrubland, surrounded by paddocks. Vegetation consists of Low Eucalypts, Agonis and Melaleuca, over Lepidosperma and other sedges, young Melaleucas and Acacias, over grasses invading from periphery.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, erosion channels, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	under vegetation
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	60	**Litter cover (%)**	20
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**VER-17**	**Position (WGS84)**	115.2697, -34.2602
Slope	negligible	**Topography**	creek
Soil colour	black, brown	**Soil texture**	clay loam
Rock cover (%)	5	**Rock type**	limestone

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	09 Dec 2023	09 Dec 2023
1	Audio recording	09 Dec 2023	12 Dec 2023
1	Ultrasonic recording	09 Dec 2023	12 Dec 2023
1	Opportunistic sighting	09 Dec 2023	09 Dec 2023

Site description - visit 1 (09 Dec 2023)			
Scott River (south bank) riparian zone. Vegetation consists of Eucalypts, over Peppermint trees and Melaleuca (Paperbarks) over Tea Trees, over Grass Trees and sedges on dark-brown loam soil.			
Habitat	Riparian zone (outside mapped extent)		
Disturbance	erosion channels, evidence of feral animals, firebreak, historic clearing, litter, weed infestation		
Vegetation condition	Good	**Fire age**	recent (1 year)
Total veg. cover (%)	155	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	50	**Litter cover (%)**	60
Grass cover (%)	60	**Herb cover (%)**	5



Site details			
Site	**VER-18**	**Position (WGS84)**	115.3217, -34.2064
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Bluegums and occasional Peppermint trees, over Grass Trees. Understorey is grass infestation only, on loamy substrate.			
Habitat	Bluegum plantation		
Disturbance	current operations, firebreak, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	77	**Litter distribution**	scattered
Tree cover (%)	2	**Litter depth (cm)**	1.0
Shrub cover (%)	5	**Litter cover (%)**	10
Grass cover (%)	70	**Herb cover (%)**	0



Site details			
Site	**VER-19**	**Position (WGS84)**	115.3228, -34.2286
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Roadside remnant of Marri-Jarrah-Peppermint woodland. Degraded understorey, with few species present.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, firebreak, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	55
Grass cover (%)	50	**Herb cover (%)**	0



Site details			
Site	**VER-20**	**Position (WGS84)**	115.3238, -34.2402
Slope	gentle	**Topography**	undulating plain
Soil colour	brown-grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant road vegetation and Bluegum plantation. Young Eucalypts, Allocasuarina and Peppermints over Bluegum saplings, Grass trees and Woolly Bush, over ground over of grass infestation, with some herbs, on loamy soils.			
Habitat	Bluegum plantation		
Disturbance	current operations, firebreak, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	under vegetation
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	5
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**VER-21**	**Position (WGS84)**	115.2830, -34.2518
Slope	negligible	**Topography**	undulating plain
Soil colour	brown-grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Birding	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023
1	Foraging - vertebrates	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Vegetation consists of Jarrah and Peppermint trees, over Tea Trees, over understorey of Grass Trees, Acacias, young Eucalypts and Australian Christmas tree, over ground cover of grass infestation, on loam substrate.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	under vegetation
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	80	**Litter cover (%)**	5
Grass cover (%)	35	**Herb cover (%)**	10



Site details			
Site	**VER-22**	**Position (WGS84)**	115.2698, -34.2505
Slope	negligible	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Birding	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023
1	Foraging - vertebrates	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Vegetation consists of Peppermint trees, over midstorey of Tea Tree and Banksia and Acacias, over Kangaroo Paws, Eucalypt saplings and sedges, over ground cover of grasses and herbs.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	135	**Litter distribution**	under vegetation
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	60	**Litter cover (%)**	30
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**VER-23**	**Position (WGS84)**	115.2697, -34.2455
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant roadside vegetation of Marri-Jarrah-Peppermint woodland, completely degraded.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, firebreak, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	115	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	15
Grass cover (%)	90	**Herb cover (%)**	10



Site details			
Site	**VER-24**	**Position (WGS84)**	115.2695, -34.2395
Slope	negligible	**Topography**	undulating plain
Soil colour	whitish, yellow	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant roadside vegetation of Marri-Jarrah-Peppermint woodland. Vegetation consists of Jarrah and Marri over clusters of Peppermint, over understorey of young sedges, Kangaroo Paws and Acacias, over ground cover of grass, on yellowish loam substrate.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	92	**Litter distribution**	under vegetation
Tree cover (%)	10	**Litter depth (cm)**	1.0
Shrub cover (%)	5	**Litter cover (%)**	5
Grass cover (%)	75	**Herb cover (%)**	2



Site details			
Site	**VER-25**	**Position (WGS84)**	115.2692, -34.2361
Slope	gentle	**Topography**	undulating plain
Soil colour	brown-grey, whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Pine plantation. Single row of planted Pinus sp. No understorey.			
Habitat	Pine plantation		
Disturbance	current operations, excavation, vehicle tracks, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	102	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	2	**Litter cover (%)**	15
Grass cover (%)	75	**Herb cover (%)**	20



Site details			
Site	**VER-26**	**Position (WGS84)**	115.2692, -34.2338
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish, brown-grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Pine plantation. Single row of planted Pinus sp. No understorey.			
Habitat	Pine plantation		
Disturbance	current operations, erosion channels, historic clearing, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	103	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	3	**Litter cover (%)**	2
Grass cover (%)	85	**Herb cover (%)**	10



Site details			
Site	**VER-27**	**Position (WGS84)**	115.2690, -34.2290
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Jarrah and Marri trees, over midstorey of Allocasuarina and Peppermint trees, over understorey of Acacias, grass trees and younger Peppermint trees, over ground cover of grass.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, weed infestation, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	150	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	25	**Litter cover (%)**	25
Grass cover (%)	65	**Herb cover (%)**	25



Site details			
Site	**VER-28**	**Position (WGS84)**	115.2689, -34.2254
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Opportunistic sighting	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	10 Dec 2023	10 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant roadside Marri-Jarrah-Peppermint woodland, degraded. Jarrah and Marri trees, over midstorey of Peppermint trees, over Melaleucas and sedges, over grass ground cover.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, weed infestation, vehicle tracks		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	155	**Litter distribution**	even/continuous
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	65	**Litter cover (%)**	10
Grass cover (%)	70	**Herb cover (%)**	5



Site details			
Site	**VER-29**	**Position (WGS84)**	115.2701, -34.1839
Slope	gentle	**Topography**	undulating plain
Soil colour	brown-grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Opportunistic sighting	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Bluegum plantation with occasional Acacia sp. and sedges. Understorey is cleared with only grasses remaining.			
Habitat	Bluegum plantation		
Disturbance	current operations, erosion channels, evidence of feral animals, firebreak, historic clearing, weed infestation		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	42	**Litter distribution**	under vegetation
Tree cover (%)	25	**Litter depth (cm)**	1.0
Shrub cover (%)	10	**Litter cover (%)**	15
Grass cover (%)	5	**Herb cover (%)**	2



Site details			
Site	**VER-30**	**Position (WGS84)**	115.2783, -34.1598
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Birding	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	09 Dec 2023	09 Dec 2023
1	Opportunistic sighting	10 Dec 2023	10 Dec 2023
1	Foraging - vertebrates	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant roadside Marri-Jarrah-Peppermint woodland, degraded. Open Marri and Jarrah trees over Allocasuarina, Tea Tree, Acacia and sedges. Abundant leaf litter covers whitish loam substrate.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	vehicle tracks, weed infestation, erosion channels, historic clearing		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	35	**Litter cover (%)**	80
Grass cover (%)	20	**Herb cover (%)**	10



Site details			
Site	**VER-31**	**Position (WGS84)**	115.3128, -34.1613
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Birding	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	09 Dec 2023	09 Dec 2023
1	Foraging - vertebrates	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Remnant roadside Marri-Jarrah-Peppermint woodland, over road drain, but in good condition. Jarrah and Marri over dense shrubs of Melaleucas, Grass Trees, Hakeas and Acacias, over understorey is continuous of introduced grasses.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	190	**Litter distribution**	even/continuous
Tree cover (%)	20	**Litter depth (cm)**	2.0
Shrub cover (%)	70	**Litter cover (%)**	75
Grass cover (%)	80	**Herb cover (%)**	20



Site details			
Site	**VER-32**	**Position (WGS84)**	115.4017, -34.1569
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish, grey	**Soil texture**	loam
Rock cover (%)	1	**Rock type**	granite - rocks

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Foraging - nocturnal	09 Dec 2023	09 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Vegetation consists of Jarrah and Marri trees, over midstorey of Acacias, Grass Trees, Hakeas and Melaleucas, over grasses and herbs. Leaf litter continuous. At the intersection of 2 unsealed roads.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, historic clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	65
Grass cover (%)	20	**Herb cover (%)**	10



Site details			
Site	**VER-33**	**Position (WGS84)**	115.3028, -34.2296
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	08 Dec 2023	08 Dec 2023
1	Audio recording	08 Dec 2023	12 Dec 2023
1	Opportunistic sighting	08 Dec 2023	08 Dec 2023

Site description - visit 1 (08 Dec 2023)			
Seasonally inundated shrubland wetland. Large area of shallow, open water surrounded by relatively intact vegetation. Vegetation consists of occasional Eucalypt spp., over large Melaleucas (Paperbark), over large expanses of mixed sedges. Abundant frogs calling and few waterbirds present. Same vegetation complex as site AQU-47.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, historic clearing, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	under vegetation
Tree cover (%)	25	**Litter depth (cm)**	0.0
Shrub cover (%)	55	**Litter cover (%)**	0
Grass cover (%)	10	**Herb cover (%)**	5



Site details			
Site	**VER-34**	**Position (WGS84)**	115.3057, -34.2472
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Opportunistic sighting	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Very good condition seasonally inundated Paperbark wetland. Paperbarks in the centre with sedges and isolated grass trees at the periphery. Aquatic plants present as well as a number of frog and breeding waterbird species. Same remnant as site AQU-07			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	67	**Litter distribution**	scattered
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	5
Grass cover (%)	15	**Herb cover (%)**	2



Site details			
Site	**VER-35**	**Position (WGS84)**	115.2975, -34.2308
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Large lake with limited midstorey that has been impacted by grazing. Remaining vegetation consists of Myrtaceae and Eucalypts trees, over occasional Melaleuca (Paperbark), over mixed sedges, and extensive paddock grasses almost continuous surrounding the lake. Same wetland as site AQU45.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-medium, historic clearing, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	under vegetation
Tree cover (%)	25	**Litter depth (cm)**	1.0
Shrub cover (%)	30	**Litter cover (%)**	20
Grass cover (%)	50	**Herb cover (%)**	5



Site details			
Site	**VER-36**	**Position (WGS84)**	115.2886, -34.2170
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Seasonally inundated wetland. Vegetation consists of Melaleucas (Paperbarks) and Eucalypts, over Lepidosperma and other sedges, over grasses. Surrounded by paddocks. Remnant same as per site AQU-43.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, historic clearing, livestock tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	65	**Litter distribution**	none
Tree cover (%)	30	**Litter depth (cm)**	0.0
Shrub cover (%)	20	**Litter cover (%)**	0
Grass cover (%)	10	**Herb cover (%)**	5



Site details			
Site	**VER-37**	**Position (WGS84)**	115.2840, -34.2103
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Large sumpland. Vegetation largely intact in places, but also much disturbance and weed (grass) infestation, also disturbance from heavy waterbird roosting - highest density of waterbirds observed in a wetland to date. Vegetation consists of Myrtaceae trees over Melaleuca (Paperbarks), over grass and sedges at margin. Possibly perennially inundated. See also site AQU-34.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, historic clearing, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	112	**Litter distribution**	none
Tree cover (%)	20	**Litter depth (cm)**	0.0
Shrub cover (%)	2	**Litter cover (%)**	0
Grass cover (%)	90	**Herb cover (%)**	0



Site details			
Site	**VER-38**	**Position (WGS84)**	115.3038, -34.2511
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Opportunistic sighting	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Seasonally inundated Paperbark wetland, area surrounded by paddock. Large Melaleucas (Paperbark) and Peppermint trees, no midstorey, understorey of introduced grasses and weeds.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, livestock tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	72	**Litter distribution**	under vegetation
Tree cover (%)	45	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	22	**Herb cover (%)**	5



Site details			
Site	**VER-39**	**Position (WGS84)**	115.3021, -34.2563
Slope	negligible	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Large lake. Vegetation consists of peppermint trees around the northern and western perimeter, a stand of Melaleuca (Paperbark) in the middle and sedges on the eastern side. Site highly impacted by grazing livestock with tracks under tree stands and at waters edge. Despite this impact, many different waterbirds present and ticking Frogs present. Possibly perennially inundated. See also site AQU-40.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	current operations, grazing-high, historic clearing, livestock tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	under vegetation
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	0	**Litter cover (%)**	5
Grass cover (%)	50	**Herb cover (%)**	5



Site details			
Site	**VER-40**	**Position (WGS84)**	115.3051, -34.2757
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Audio recording	07 Dec 2023	11 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Scott River riparian zone. Melaleucas Paperbark trees, over younger Melaleucas, over Grass Trees and Lepidosperma and other sedges, over infestation of grasses and introduced weeds.			
Habitat	Riparian zone (outside mapped extent)		
Disturbance	erosion channels, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	117	**Litter distribution**	under vegetation
Tree cover (%)	35	**Litter depth (cm)**	1.0
Shrub cover (%)	60	**Litter cover (%)**	20
Grass cover (%)	20	**Herb cover (%)**	2



Site details			
Site	**VER-41**	**Position (WGS84)**	115.2922, -34.2756
Slope	gentle	**Topography**	drainage line
Soil colour	brown	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Audio recording	07 Dec 2023	11 Dec 2023
1	Site description	07 Dec 2023	07 Dec 2023
1	Opportunistic sighting	07 Dec 2023	07 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Scott River riparian zone. Large Jarrah and Marri trees, over Peppermint trees, open middle storey, over Lepidosperma and other sedges, over grasses, on loam substrate.			
Habitat	Riparian zone (outside mapped extent)		
Disturbance	erosion channels, grazing-low, historic clearing		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	120	**Litter distribution**	under vegetation
Tree cover (%)	30	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	10
Grass cover (%)	70	**Herb cover (%)**	5



Site details			
Site	**VER-42**	**Position (WGS84)**	115.3021, -34.2769
Slope	moderate	**Topography**	drainage line
Soil colour	grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	07 Dec 2023	07 Dec 2023
1	Birding	07 Dec 2023	07 Dec 2023
1	Foraging - vertebrates	07 Dec 2023	07 Dec 2023
1	Audio recording	07 Dec 2023	11 Dec 2023

Site description - visit 1 (07 Dec 2023)			
Scott River riparian zone. Melaleucas Paperbark trees, over younger Melaleucas, over Grass Trees and Lepidosperma and other sedges, over infestation of grasses and introduced weeds.			
Habitat	Riparian zone (outside mapped extent)		
Disturbance	current operations, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75	**Litter distribution**	scattered
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	15	**Litter cover (%)**	30
Grass cover (%)	30	**Herb cover (%)**	10



Site details			
Site	**VER-43**	**Position (WGS84)**	115.3099, -34.2187
Slope	gentle	**Topography**	undulating plain
Soil colour	grey	**Soil texture**	loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Ultrasonic recording	06 Dec 2023	11 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Seasonally inundated sedgeland. Occasional Melaleucas (Paperbarks) over stands of Tea Tree, over Lepidosperma and other sedges, over grasses, on loam substrate. Surrounded by plantation.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	weed infestation, vehicle tracks, historic clearing		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	140	**Litter distribution**	even/continuous
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	60
Grass cover (%)	65	**Herb cover (%)**	20



Site details			
Site	**VER-44**	**Position (WGS84)**	115.2671, -34.2007
Slope	gentle	**Topography**	drainage line
Soil colour	brown-grey	**Soil texture**	loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Ultrasonic recording	06 Dec 2023	11 Dec 2023
1	Opportunistic sighting	06 Dec 2023	06 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Remnant roadside vegetation of Marri-Jarrah-Peppermint woodland, receiving drainage. Vegetation consists of Jarrah, Marri and Peppermint trees, over and Melaleucas species, over younger Melaleucas, Lepidosperma and other sedges, on moist loam soils.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	40	**Litter cover (%)**	10
Grass cover (%)	10	**Herb cover (%)**	5



Site details			
Site	**VER-45**	**Position (WGS84)**	115.2838, -34.1754
Slope	gentle	**Topography**	undulating plain
Soil colour	grey	**Soil texture**	loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Opportunistic sighting	06 Dec 2023	06 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Seasonally inundated shrubland. Longitudinal sumpland surrounded by remnant vegetation. Vegetation consists of occasional Melaleuca (Paperbark) trees, over mixed shrubs and sedges. Site was burnt-off in Spring 2024 by owner. See also site AQU-25.			
Habitat	Seasonally inundated shrubland (wetland)		
Disturbance	current operations, grazing-low, livestock tracks		
Vegetation condition	Good	**Fire age**	recent (1 year)
Total veg. cover (%)	82	**Litter distribution**	none
Tree cover (%)	5	**Litter depth (cm)**	1.0
Shrub cover (%)	70	**Litter cover (%)**	5
Grass cover (%)	5	**Herb cover (%)**	2



Site details			
Site	**VER-46**	**Position (WGS84)**	115.2803, -34.1743
Slope	gentle	**Topography**	undulating plain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Ultrasonic recording	06 Dec 2023	11 Dec 2023
1	Birding	10 Dec 2023	10 Dec 2023
1	Foraging - vertebrates	10 Dec 2023	10 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Overstorey of Jarrah and Allocasuarina and Jarrah trees, over Grass Trees, over sedges and Acacias. Continuous leaf litter atop sandy loam substrate. Site was burnt-off in Spring 2024 by owner.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	current operations, firebreak, grazing-medium, livestock tracks, vehicle tracks		
Vegetation condition	Good	**Fire age**	recent (1 year)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth (cm)**	1.0
Shrub cover (%)	35	**Litter cover (%)**	80
Grass cover (%)	10	**Herb cover (%)**	5



Site details			
Site	**VER-47**	**Position (WGS84)**	115.2900, -34.1783
Slope	gentle	**Topography**	undulating plain
Soil colour	brown-grey	**Soil texture**	loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Opportunistic sighting	06 Dec 2023	06 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Seasonally inundated sedgeland. Occasional, large Melaleucas (Paperbark) at margins. Dense cover of Lepidosperma and other sedges on loam substrate. Site was burnt-off in Spring 2024 by owner.			
Habitat	Seasonally inundated sedgeland (wetland)		
Disturbance	weed infestation		
Vegetation condition	Good	**Fire age**	recent (1 year)
Total veg. cover (%)	111	**Litter distribution**	even/continuous
Tree cover (%)	15	**Litter depth (cm)**	1.0
Shrub cover (%)	90	**Litter cover (%)**	80
Grass cover (%)	2	**Herb cover (%)**	4



Site details			
Site	**VER-48**	**Position (WGS84)**	115.2944, -34.1765
Slope	gentle	**Topography**	undulating plain
Soil colour	grey	**Soil texture**	sandy loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Opportunistic sighting	06 Dec 2023	06 Dec 2023
1	Foraging - nocturnal	11 Dec 2023	11 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Marri-Jarrah-Peppermint woodland. Overstorey of Jarrah and Allocasuarina and Jarrah trees, over Grass Trees, over sedges and Acacias. Continuous leaf litter atop sandy loam substrate. Site was burnt-off in Spring 2024 by owner.			
Habitat	Marri-Jarrah-Peppermint woodland		
Disturbance	erosion channels, firebreak, large-scale clearing, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	recent (1 year)
Total veg. cover (%)	97	**Litter distribution**	scattered
Tree cover (%)	20	**Litter depth (cm)**	1.0
Shrub cover (%)	70	**Litter cover (%)**	25
Grass cover (%)	5	**Herb cover (%)**	2



Site details			
Site	**VER-49**	**Position (WGS84)**	115.2848, -34.1832
Slope	negligible	**Topography**	undulating plain
Soil colour	grey	**Soil texture**	sandy loam
Rock cover (%)	1	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Site description	06 Dec 2023	06 Dec 2023
1	Birding	06 Dec 2023	06 Dec 2023
1	Foraging - vertebrates	06 Dec 2023	06 Dec 2023

Site description - visit 1 (06 Dec 2023)			
Seasonally inundated Paperbark woodland. Large Melaleucas (Paperbark), over Melaleuca saplings, Lepidosperma and other sedges, on moist loamy substrate.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	grazing-medium, livestock tracks, large-scale clearing, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	87	**Litter distribution**	even/continuous
Tree cover (%)	15	**Litter depth (cm)**	2.0
Shrub cover (%)	60	**Litter cover (%)**	85
Grass cover (%)	10	**Herb cover (%)**	2



Site details			
Site	**Wetland01**	**Position (WGS84)**	115.3027, -34.2522
Slope	negligible	**Topography**	seasonally wet area
Soil colour	grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Birding	28 Nov 2024	28 Nov 2024
1	Site description	28 Nov 2024	28 Nov 2024

Site description - visit 1 (28 Nov 2024)			
Seasonally inundated Paperbark wetland. Vegetation consists of large Melaleucas (Paperbark) and scattered she-oak, over Melaleuca saplings and sedges. Many large logs and debris present, as well as perches for waterbirds. See also sites AQU-06 and VER-38.			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	grazing-medium, livestock tracks, large-scale clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	107	**Litter distribution**	under vegetation
Tree cover (%)	95	**Litter depth (cm)**	1.0
Shrub cover (%)	2	**Litter cover (%)**	2
Grass cover (%)	10	**Herb cover (%)**	0



Site details			
Site	**Wetland03**	**Position (WGS84)**	115.2816, -34.1803
Slope	negligible	**Topography**	seasonally wet area
Soil colour	grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	laterite

Sample and effort summary			
Visit	**Sample method**	**Date start**	**Date stop**
1	Birding	05 Dec 2024	05 Dec 2024
1	Site description	05 Dec 2024	05 Dec 2024

Site description - visit 1 (05 Dec 2024)			
Seasonally inundated Paperbark and shrubland wetland, surrounded by paddock. Melaleuca fringing and shrubs and sedges internally. Condition varies, as stock are accessing it, particularly on western side. See also site AQU-015			
Habitat	Seasonally inundated paperbark woodland (wetland)		
Disturbance	grazing-medium, livestock tracks, large-scale clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	110	**Litter distribution**	under vegetation
Tree cover (%)	50	**Litter depth (cm)**	1.0
Shrub cover (%)	50	**Litter cover (%)**	2
Grass cover (%)	10	**Herb cover (%)**	0



Appendix 3 Survey site locations from BBRAS (Phoenix 2025a)

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS001	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.224836	115.269157
BUS001	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.224587	115.269442
BUS001	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.224666	115.269155
BUS001	Opportunistic sighting	24/05/2023 15:55	24/05/2023 15:55	-34.224656	115.269168
BUS001	Opportunistic sighting	24/05/2023 15:55	24/05/2023 15:55	-34.224656	115.269168
BUS001	Opportunistic sighting	25/05/2023 7:00	25/05/2023 7:00	-34.224656	115.269168
BUS001	Site description	24/05/2023 16:12	24/05/2023 16:12	-34.224656	115.269168
BUS001	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.224656	115.269168
BUS001	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.224836	115.269157
BUS001	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.22459	115.269424
BUS001	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.224669	115.269178
BUS001	Wind farm point count	24/05/2023 15:40	24/05/2023 16:10	-34.224657	115.269165
BUS001	Wind farm point count	25/05/2023 8:00	25/05/2023 8:30	-34.224657	115.269165
BUS001	Wind farm point count	14/08/2023 9:35	14/08/2023 10:05	-34.224657	115.269165
BUS001	Wind farm point count	15/08/2023 12:05	15/08/2023 12:35	-34.224657	115.269165
BUS001	Wind farm point count	17/11/2023 7:30	17/11/2023 8:00	-34.224657	115.269165
BUS001	Wind farm point count	18/11/2023 15:45	18/11/2023 16:15	-34.224657	115.269165
BUS001	Wind farm point count	10/01/2024 14:50	10/01/2024 15:20	-34.224657	115.269165
BUS001	Wind farm point count	11/01/2024 10:45	11/01/2024 11:15	-34.224657	115.269165
BUS002	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.261064	115.300137
BUS002	Audio recording	17/11/2023 18:32	18/11/2023 5:36	-34.260641	115.300421
BUS002	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.260677	115.300558
BUS002	Site description	25/05/2023 14:26	25/05/2023 14:26	-34.261125	115.300098
BUS002	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.261317	115.300227
BUS002	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.261053	115.300123
BUS002	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:36	-34.260651	115.300431
BUS002	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.260661	115.300538
BUS002	Wind farm point count	25/05/2023 14:00	25/05/2023 14:30	-34.26111	115.300091
BUS002	Wind farm point count	26/05/2023 12:00	26/05/2023 12:30	-34.26111	115.300091
BUS002	Wind farm point count	14/08/2023 11:50	14/08/2023 12:20	-34.26111	115.300091
BUS002	Wind farm point count	15/08/2023 14:20	15/08/2023 14:50	-34.26111	115.300091
BUS002	Wind farm point count	17/11/2023 14:00	17/11/2023 14:30	-34.26111	115.300091
BUS002	Wind farm point count	18/11/2023 8:25	18/11/2023 8:55	-34.26111	115.300091
BUS002	Wind farm point count	10/01/2024 7:40	10/01/2024 8:10	-34.26111	115.300091
BUS002	Wind farm point count	11/01/2024 12:10	11/01/2024 12:40	-34.26111	115.300091
BUS003	Audio recording	15/08/2023 17:15	16/08/2023 7:15	-34.238023	115.278846
BUS003	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.238376	115.279251
BUS003	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.238144	115.279125
BUS003	Opportunistic sighting	19/11/2023 10:15	19/11/2023 10:15	-34.237911	115.278841
BUS003	Site description	25/05/2023 16:14	25/05/2023 16:14	-34.238051	115.278826
BUS003	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.238051	115.278826
BUS003	Ultrasonic recording	15/08/2023 17:15	16/08/2023 7:15	-34.237992	115.278855

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS003	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.238392	115.279246
BUS003	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.238142	115.279122
BUS003	Wind farm point count	25/05/2023 16:05	25/05/2023 16:35	-34.238051	115.278826
BUS003	Wind farm point count	26/05/2023 10:30	26/05/2023 11:00	-34.238051	115.278826
BUS003	Wind farm point count	15/08/2023 11:10	15/08/2023 11:40	-34.238051	115.278826
BUS003	Wind farm point count	16/08/2023 9:40	16/08/2023 10:10	-34.238051	115.278826
BUS003	Wind farm point count	17/11/2023 10:55	17/11/2023 11:25	-34.238051	115.278826
BUS003	Wind farm point count	18/11/2023 15:00	18/11/2023 15:30	-34.238051	115.278826
BUS003	Wind farm point count	10/01/2024 10:25	10/01/2024 10:55	-34.238051	115.278826
BUS003	Wind farm point count	11/01/2024 13:30	11/01/2024 14:00	-34.238051	115.278826
BUS004	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.224579	115.307057
BUS004	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.224284	115.306511
BUS004	Site description	26/05/2023 8:04	26/05/2023 8:04	-34.224312	115.306603
BUS004	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.2243	115.306692
BUS004	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.224582	115.307064
BUS004	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.224256	115.306498
BUS004	Wind farm point count	26/05/2023 8:00	26/05/2023 8:30	-34.224281	115.306663
BUS004	Wind farm point count	26/05/2023 13:50	26/05/2023 14:20	-34.224281	115.306663
BUS004	Wind farm point count	16/08/2023 12:50	16/08/2023 13:20	-34.224281	115.306663
BUS004	Wind farm point count	17/11/2023 9:45	17/11/2023 10:15	-34.224281	115.306663
BUS004	Wind farm point count	18/11/2023 13:40	18/11/2023 14:10	-34.224281	115.306663
BUS004	Wind farm point count	10/01/2024 13:20	10/01/2024 13:50	-34.224281	115.306663
BUS004	Wind farm point count	11/01/2024 7:10	11/01/2024 7:40	-34.224281	115.306663
BUS005	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.215572	115.293678
BUS005	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.215309	115.294031
BUS005	Opportunistic sighting	26/05/2023 9:09	26/05/2023 9:09	-34.215565	115.293356
BUS005	Site description	26/05/2023 9:00	26/05/2023 9:00	-34.215623	115.293356
BUS005	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.215471	115.293463
BUS005	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.215547	115.293708
BUS005	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.21531	115.294031
BUS005	Wind farm point count	26/05/2023 8:40	26/05/2023 9:10	-34.21547	115.293463
BUS005	Wind farm point count	26/05/2023 14:25	26/05/2023 14:55	-34.21547	115.293463
BUS005	Wind farm point count	16/08/2023 12:15	16/08/2023 12:45	-34.21547	115.293463
BUS005	Wind farm point count	17/11/2023 9:10	17/11/2023 9:40	-34.21547	115.293463
BUS005	Wind farm point count	18/11/2023 13:10	18/11/2023 13:40	-34.21547	115.293463
BUS005	Wind farm point count	10/01/2024 13:55	10/01/2024 14:25	-34.21547	115.293463
BUS005	Wind farm point count	11/01/2024 7:15	11/01/2024 7:45	-34.21547	115.293463
BUS006	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.181645	115.278547
BUS006	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.181654	115.278548
BUS006	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.181989	115.278569
BUS006	Site description	25/05/2023 12:12	25/05/2023 12:12	-34.181184	115.278227
BUS006	Ultrasonic recording	25/05/2023 16:50	28/05/2023 7:34	-34.18134	115.278576
BUS006	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.181645	115.278542

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS006	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.181647	115.278548
BUS006	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.181994	115.278561
BUS006	Wind farm point count	25/05/2023 12:00	25/05/2023 12:30	-34.181171	115.278206
BUS006	Wind farm point count	26/05/2023 15:25	26/05/2023 15:55	-34.181171	115.278206
BUS006	Wind farm point count	14/08/2023 8:15	14/08/2023 8:45	-34.181171	115.278206
BUS006	Wind farm point count	15/08/2023 12:40	15/08/2023 13:10	-34.181171	115.278206
BUS006	Wind farm point count	17/11/2023 8:10	17/11/2023 8:40	-34.181171	115.278206
BUS006	Wind farm point count	18/11/2023 16:50	18/11/2023 17:20	-34.181171	115.278206
BUS006	Wind farm point count	11/01/2024 16:10	11/01/2024 16:40	-34.181171	115.278206
BUS006	Wind farm point count	12/01/2024 8:30	12/01/2024 9:00	-34.181171	115.278206
BUS007	Audio recording	15/08/2023 17:15	16/08/2023 7:15	-34.238732	115.294219
BUS007	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.238226	115.289054
BUS007	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.238533	115.289353
BUS007	Site description	25/05/2023 15:38	25/05/2023 15:38	-34.23795	115.289198
BUS007	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.23795	115.289198
BUS007	Ultrasonic recording	15/08/2023 17:15	16/08/2023 7:15	-34.238732	115.294219
BUS007	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.238197	115.289072
BUS007	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.238493	115.289364
BUS007	Wind farm point count	25/05/2023 15:25	25/05/2023 15:55	-34.237961	115.289201
BUS007	Wind farm point count	26/05/2023 9:45	26/05/2023 10:15	-34.237961	115.289201
BUS007	Wind farm point count	15/08/2023 10:15	15/08/2023 10:45	-34.237961	115.289201
BUS007	Wind farm point count	16/08/2023 8:50	16/08/2023 9:20	-34.237961	115.289201
BUS007	Wind farm point count	17/11/2023 11:45	17/11/2023 12:15	-34.237961	115.289201
BUS007	Wind farm point count	18/11/2023 14:25	18/11/2023 14:55	-34.237961	115.289201
BUS007	Wind farm point count	10/01/2024 9:30	10/01/2024 10:00	-34.237961	115.289201
BUS007	Wind farm point count	11/01/2024 14:05	11/01/2024 14:35	-34.237961	115.289201
BUS008	Audio recording	15/08/2023 17:15	16/08/2023 7:15	-34.192899	115.319341
BUS008	Audio recording	17/11/2023 18:32	18/11/2023 5:36	-34.192701	115.30771
BUS008	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.19271	115.307494
BUS008	Opportunistic sighting	24/05/2023 14:25	24/05/2023 14:25	-34.192733	115.308016
BUS008	Site description	24/05/2023 14:14	24/05/2023 14:14	-34.192733	115.308016
BUS008	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.192839	115.308422
BUS008	Ultrasonic recording	15/08/2023 17:15	16/08/2023 7:15	-34.1929	115.319348
BUS008	Ultrasonic recording	17/11/2023 18:33	18/11/2023 17:36	-34.192705	115.307511
BUS008	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.192707	115.307492
BUS008	Wind farm point count	24/05/2023 14:10	24/05/2023 14:40	-34.192733	115.308016
BUS008	Wind farm point count	25/05/2023 10:10	25/05/2023 10:40	-34.192733	115.308016
BUS008	Wind farm point count	14/08/2023 13:40	14/08/2023 14:10	-34.192733	115.308016
BUS008	Wind farm point count	15/08/2023 7:40	15/08/2023 8:10	-34.192733	115.308016
BUS008	Wind farm point count	10/01/2024 12:35	10/01/2024 13:05	-34.192733	115.308016
BUS008	Wind farm point count	11/01/2024 8:40	11/01/2024 9:10	-34.192733	115.308016
BUS009	Audio recording	17/11/2023 18:32	18/11/2023 5:36	-34.198813	115.300214
BUS009	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.198872	115.300169

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS009	Opportunistic sighting	25/05/2023 9:45	25/05/2023 9:45	-34.198939	115.300079
BUS009	Site description	24/05/2023 13:44	24/05/2023 13:44	-34.198943	115.300078
BUS009	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.198706	115.299879
BUS009	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:35	-34.198988	115.300124
BUS009	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.198881	115.300176
BUS009	Wind farm point count	24/05/2023 13:30	24/05/2023 14:00	-34.198943	115.300078
BUS009	Wind farm point count	25/05/2023 9:30	25/05/2023 10:00	-34.198943	115.300078
BUS009	Wind farm point count	17/11/2023 17:05	17/11/2023 17:35	-34.198943	115.300078
BUS009	Wind farm point count	18/11/2023 10:25	18/11/2023 10:55	-34.198943	115.300078
BUS009	Wind farm point count	10/01/2024 12:00	10/01/2024 12:30	-34.198943	115.300078
BUS009	Wind farm point count	11/01/2024 9:15	11/01/2024 9:45	-34.198943	115.300078
BUS010	Audio recording	15/08/2023 17:15	16/08/2023 7:15	-34.240178	115.301981
BUS010	Audio recording	17/11/2023 18:33	18/11/2023 5:36	-34.240181	115.302126
BUS010	Audio recording	10/01/2024 19:05	11/01/2024 5:40	-34.240207	115.302121
BUS010	Site description	25/05/2023 15:02	25/05/2023 15:02	-34.24018	115.301988
BUS010	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.24018	115.301988
BUS010	Ultrasonic recording	15/08/2023 17:15	16/08/2023 7:15	-34.240178	115.301981
BUS010	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:36	-34.240166	115.302042
BUS010	Ultrasonic recording	10/01/2024 19:05	11/01/2024 5:40	-34.240207	115.302121
BUS010	Wind farm point count	25/05/2023 14:50	25/05/2023 15:20	-34.240181	115.301992
BUS010	Wind farm point count	26/05/2023 11:15	26/05/2023 11:45	-34.240181	115.301992
BUS010	Wind farm point count	14/08/2023 15:35	14/08/2023 16:05	-34.240181	115.301992
BUS010	Wind farm point count	15/08/2023 9:40	15/08/2023 10:10	-34.240181	115.301992
BUS010	Wind farm point count	17/11/2023 16:25	17/11/2023 16:55	-34.240181	115.301992
BUS010	Wind farm point count	18/11/2023 9:40	18/11/2023 10:10	-34.240181	115.301992
BUS010	Wind farm point count	10/01/2024 11:10	10/01/2024 11:40	-34.240181	115.301992
BUS010	Wind farm point count	11/01/2024 12:50	11/01/2024 13:20	-34.240181	115.301992
BUS011	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.250675	115.295853
BUS011	Audio recording	17/11/2023 18:32	18/11/2023 17:36	-34.250865	115.295574
BUS011	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.250282	115.296521
BUS011	Opportunistic sighting	24/05/2023 16:40	24/05/2023 16:40	-34.250737	115.295831
BUS011	Site description	24/05/2023 16:31	24/05/2023 16:31	-34.250737	115.295831
BUS011	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.250867	115.29557
BUS011	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.250675	115.295853
BUS011	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:36	-34.250832	115.295817
BUS011	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.250309	115.296487
BUS011	Wind farm point count	24/05/2023 16:25	24/05/2023 16:55	-34.250741	115.29583
BUS011	Wind farm point count	25/05/2023 8:35	25/05/2023 9:05	-34.250741	115.29583
BUS011	Wind farm point count	14/08/2023 11:05	14/08/2023 11:35	-34.250741	115.29583
BUS011	Wind farm point count	15/08/2023 15:00	15/08/2023 15:30	-34.250741	115.29583
BUS011	Wind farm point count	17/11/2023 14:25	17/11/2023 14:55	-34.250741	115.29583
BUS011	Wind farm point count	10/01/2024 8:50	10/01/2024 9:20	-34.250741	115.29583
BUS011	Wind farm point count	11/01/2024 14:40	11/01/2024 15:10	-34.250741	115.29583

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS012	Audio recording	15/08/2023 17:15	16/08/2023 7:15	-34.259845	115.325214
BUS012	Site description	14/08/2023 14:43	14/08/2023 14:43	-34.259875	115.325178
BUS012	Ultrasonic recording	15/08/2023 17:15	16/08/2023 7:15	-34.259845	115.325214
BUS012	Wind farm point count	14/08/2023 14:40	14/08/2023 15:10	-34.259822	115.325095
BUS012	Wind farm point count	15/08/2023 8:55	15/08/2023 9:25	-34.259822	115.325095
BUS013	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.206563	115.255239
BUS013	Audio recording	18/11/2023 18:32	19/11/2023 5:36	-34.206755	115.255316
BUS013	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.206563	115.255167
BUS013	Opportunistic sighting	24/05/2023 10:42	24/05/2023 10:42	-34.20639	115.255177
BUS013	Site description	24/05/2023 17:11	24/05/2023 17:11	-34.206384	115.255201
BUS013	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.206385	115.255202
BUS013	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.206563	115.255239
BUS013	Ultrasonic recording	18/11/2023 18:33	19/11/2023 5:36	-34.206756	115.255316
BUS013	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.206546	115.255166
BUS013	Wind farm point count	24/05/2023 10:05	24/05/2023 10:35	-34.206389	115.255177
BUS013	Wind farm point count	25/05/2023 7:20	25/05/2023 7:50	-34.206389	115.255177
BUS013	Wind farm point count	14/08/2023 8:50	14/08/2023 9:20	-34.206389	115.255177
BUS013	Wind farm point count	15/08/2023 13:30	15/08/2023 14:00	-34.206389	115.255177
BUS013	Wind farm point count	17/11/2023 6:52	17/11/2023 7:22	-34.206389	115.255177
BUS013	Wind farm point count	18/11/2023 16:15	18/11/2023 16:45	-34.206389	115.255177
BUS013	Wind farm point count	10/01/2024 15:25	10/01/2024 15:55	-34.206389	115.255177
BUS013	Wind farm point count	11/01/2024 10:10	11/01/2024 10:40	-34.206389	115.255177
BUS014	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.160859	115.312204
BUS014	Audio recording	19/11/2023 18:32	20/11/2023 5:36	-34.160572	115.312601
BUS014	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.160746	115.312496
BUS014	Opportunistic sighting	24/05/2023 15:15	24/05/2023 15:15	-34.160783	115.312351
BUS014	Site description	24/05/2023 15:14	24/05/2023 15:14	-34.160783	115.312351
BUS014	Ultrasonic recording	24/05/2023 16:50	25/05/2023 7:34	-34.160783	115.312351
BUS014	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.160827	115.312199
BUS014	Ultrasonic recording	19/11/2023 18:33	20/11/2023 5:36	-34.160572	115.312255
BUS014	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.160746	115.312496
BUS014	Wind farm point count	24/05/2023 15:00	24/05/2023 15:30	-34.160777	115.312345
BUS014	Wind farm point count	25/05/2023 10:55	25/05/2023 11:25	-34.160777	115.312345
BUS014	Wind farm point count	14/08/2023 12:35	14/08/2023 13:05	-34.160777	115.312345
BUS014	Wind farm point count	15/08/2023 8:10	15/08/2023 8:40	-34.160777	115.312345
BUS014	Wind farm point count	18/11/2023 12:00	18/11/2023 12:30	-34.160777	115.312345
BUS014	Wind farm point count	19/11/2023 8:15	19/11/2023 8:45	-34.160777	115.312345
BUS014	Wind farm point count	11/01/2024 15:15	11/01/2024 15:45	-34.160777	115.312345
BUS014	Wind farm point count	12/01/2024 7:45	12/01/2024 8:15	-34.160777	115.312345
BUS015	Audio recording	14/08/2023 17:15	15/08/2023 7:15	-34.282869	115.288313
BUS015	Audio recording	17/11/2023 18:32	18/11/2023 5:36	-34.282672	115.288361
BUS015	Audio recording	11/01/2024 19:05	14/01/2024 5:40	-34.282871	115.288324
BUS015	Site description	25/05/2023 13:08	25/05/2023 13:08	-34.282836	115.288269

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS015	Ultrasonic recording	25/05/2023 16:50	26/05/2023 7:34	-34.282838	115.288269
BUS015	Ultrasonic recording	14/08/2023 17:15	15/08/2023 7:15	-34.282879	115.288306
BUS015	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:36	-34.282751	115.288333
BUS015	Ultrasonic recording	11/01/2024 19:05	14/01/2024 5:40	-34.282879	115.288332
BUS015	Wind farm point count	25/05/2023 13:00	25/05/2023 13:30	-34.282841	115.288261
BUS015	Wind farm point count	26/05/2023 12:50	26/05/2023 13:20	-34.282841	115.288261
BUS015	Wind farm point count	14/08/2023 10:15	14/08/2023 10:45	-34.282841	115.288261
BUS015	Wind farm point count	16/08/2023 7:55	16/08/2023 8:25	-34.282841	115.288261
BUS015	Wind farm point count	17/11/2023 13:00	17/11/2023 13:30	-34.282841	115.288261
BUS015	Wind farm point count	18/11/2023 6:55	18/11/2023 7:25	-34.282841	115.288261
BUS015	Wind farm point count	10/01/2024 6:55	10/01/2024 7:25	-34.282841	115.288261
BUS015	Wind farm point count	11/01/2024 11:30	11/01/2024 12:00	-34.282841	115.288261
BUS016	Site description	7/03/2025 10:35	7/03/2025 10:35	-34.233438	115.271067
BUS016	Wind farm point count	27/09/2024 14:45	27/09/2024 15:15	-34.233378	115.271032
BUS016	Wind farm point count	30/09/2024 10:45	30/09/2024 11:15	-34.233378	115.271032
BUS016	Wind farm point count	18/10/2024 13:50	18/10/2024 14:20	-34.233378	115.271032
BUS016	Wind farm point count	21/10/2024 11:15	21/10/2024 11:45	-34.233378	115.271032
BUS016	Wind farm point count	13/11/2024 12:50	13/11/2024 13:20	-34.233378	115.271032
BUS016	Wind farm point count	14/11/2024 9:00	14/11/2024 9:30	-34.233378	115.271032
BUS016	Wind farm point count	12/12/2024 7:50	12/12/2024 8:20	-34.233378	115.271032
BUS016	Wind farm point count	12/12/2024 12:35	12/12/2024 13:05	-34.233378	115.271032
BUS016	Wind farm point count	16/01/2025 12:40	16/01/2025 13:10	-34.233378	115.271032
BUS016	Wind farm point count	17/01/2025 11:20	17/01/2025 11:50	-34.233378	115.271032
BUS016	Wind farm point count	14/02/2025 7:40	14/02/2025 8:10	-34.233378	115.271032
BUS016	Wind farm point count	14/02/2025 12:45	14/02/2025 13:15	-34.233378	115.271032
BUS016	Wind farm point count	7/03/2025 10:20	7/03/2025 10:50	-34.233378	115.271032
BUS016	Wind farm point count	7/03/2025 15:10	7/03/2025 15:40	-34.233378	115.271032
BUS017	Site description	7/03/2025 11:01	7/03/2025 11:01	-34.224688	115.269171
BUS017	Wind farm point count	27/09/2024 14:10	27/09/2024 14:40	-34.224649	115.269174
BUS017	Wind farm point count	30/09/2024 11:20	30/09/2024 11:50	-34.224649	115.269174
BUS017	Wind farm point count	18/10/2024 13:15	18/10/2024 13:45	-34.224649	115.269174
BUS017	Wind farm point count	21/10/2024 10:35	21/10/2024 11:05	-34.224649	115.269174
BUS017	Wind farm point count	13/11/2024 13:20	13/11/2024 13:50	-34.224649	115.269174
BUS017	Wind farm point count	14/11/2024 9:35	14/11/2024 10:05	-34.224649	115.269174
BUS017	Wind farm point count	12/12/2024 7:15	12/12/2024 7:45	-34.224649	115.269174
BUS017	Wind farm point count	12/12/2024 12:00	12/12/2024 12:30	-34.224649	115.269174
BUS017	Wind farm point count	16/01/2025 13:15	16/01/2025 13:45	-34.224649	115.269174
BUS017	Wind farm point count	17/01/2025 11:52	17/01/2025 12:22	-34.224649	115.269174
BUS017	Wind farm point count	14/02/2025 7:05	14/02/2025 7:35	-34.224649	115.269174
BUS017	Wind farm point count	14/02/2025 12:10	14/02/2025 12:40	-34.224649	115.269174
BUS017	Wind farm point count	7/03/2025 10:55	7/03/2025 11:25	-34.224649	115.269174
BUS017	Wind farm point count	7/03/2025 15:45	7/03/2025 16:15	-34.224649	115.269174
BUS018	Site description	6/03/2025 9:07	6/03/2025 9:07	-34.191585	115.284558

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS018	Wind farm point count	27/09/2024 13:30	27/09/2024 14:00	-34.191476	115.284547
BUS018	Wind farm point count	30/09/2024 17:00	30/09/2024 17:30	-34.191476	115.284547
BUS018	Wind farm point count	18/10/2024 12:30	18/10/2024 13:00	-34.191476	115.284547
BUS018	Wind farm point count	21/10/2024 9:45	21/10/2024 10:15	-34.191476	115.284547
BUS018	Wind farm point count	13/11/2024 13:55	13/11/2024 14:25	-34.191476	115.284547
BUS018	Wind farm point count	14/11/2024 10:25	14/11/2024 10:55	-34.191476	115.284547
BUS018	Wind farm point count	11/12/2024 8:25	11/12/2024 8:55	-34.191476	115.284547
BUS018	Wind farm point count	11/12/2024 14:30	11/12/2024 15:00	-34.191476	115.284547
BUS018	Wind farm point count	16/01/2025 14:00	16/01/2025 14:30	-34.191476	115.284547
BUS018	Wind farm point count	17/01/2025 9:15	17/01/2025 9:45	-34.191476	115.284547
BUS018	Wind farm point count	13/02/2025 10:55	13/02/2025 11:25	-34.191476	115.284547
BUS018	Wind farm point count	13/02/2025 16:30	13/02/2025 17:00	-34.191476	115.284547
BUS018	Wind farm point count	6/03/2025 9:00	6/03/2025 9:30	-34.191476	115.284547
BUS018	Wind farm point count	6/03/2025 14:15	6/03/2025 14:45	-34.191476	115.284547
BUS019	Site description	7/03/2025 7:24	7/03/2025 7:24	-34.240158	115.321738
BUS019	Wind farm point count	27/09/2024 17:42	27/09/2024 18:12	-34.240122	115.321745
BUS019	Wind farm point count	30/09/2024 6:45	30/09/2024 7:15	-34.240122	115.321745
BUS019	Wind farm point count	17/10/2024 11:20	17/10/2024 11:50	-34.240122	115.321745
BUS019	Wind farm point count	18/10/2024 15:50	18/10/2024 16:20	-34.240122	115.321745
BUS019	Wind farm point count	13/11/2024 11:05	13/11/2024 11:35	-34.240122	115.321745
BUS019	Wind farm point count	13/11/2024 16:30	13/11/2024 17:00	-34.240122	115.321745
BUS019	Wind farm point count	11/12/2024 11:40	11/12/2024 12:10	-34.240122	115.321745
BUS019	Wind farm point count	11/12/2024 17:45	11/12/2024 18:15	-34.240122	115.321745
BUS019	Wind farm point count	16/01/2025 9:40	16/01/2025 10:10	-34.240122	115.321745
BUS019	Wind farm point count	17/01/2025 14:15	17/01/2025 14:45	-34.240122	115.321745
BUS019	Wind farm point count	14/02/2025 10:50	14/02/2025 11:20	-34.240122	115.321745
BUS019	Wind farm point count	14/02/2025 15:55	14/02/2025 16:25	-34.240122	115.321745
BUS019	Wind farm point count	7/03/2025 7:15	7/03/2025 7:45	-34.240122	115.321745
BUS019	Wind farm point count	7/03/2025 12:05	7/03/2025 12:35	-34.240122	115.321745
BUS020	Site description	7/03/2025 14:37	7/03/2025 14:37	-34.247166	115.279992
BUS020	Wind farm point count	27/09/2024 15:20	27/09/2024 15:50	-34.247119	115.279827
BUS020	Wind farm point count	30/09/2024 9:35	30/09/2024 10:05	-34.247119	115.279827
BUS020	Wind farm point count	18/10/2024 11:40	18/10/2024 12:10	-34.247119	115.279827
BUS020	Wind farm point count	18/10/2024 15:10	18/10/2024 15:40	-34.247119	115.279827
BUS020	Wind farm point count	13/11/2024 12:15	13/11/2024 12:45	-34.247119	115.279827
BUS020	Wind farm point count	14/11/2024 8:15	14/11/2024 8:45	-34.247119	115.279827
BUS020	Wind farm point count	12/12/2024 8:45	12/12/2024 9:15	-34.247119	115.279827
BUS020	Wind farm point count	12/12/2024 13:10	12/12/2024 13:40	-34.247119	115.279827
BUS020	Wind farm point count	16/01/2025 12:05	16/01/2025 12:35	-34.247119	115.279827
BUS020	Wind farm point count	17/01/2025 10:45	17/01/2025 11:15	-34.247119	115.279827
BUS020	Wind farm point count	14/02/2025 8:15	14/02/2025 8:45	-34.247119	115.279827
BUS020	Wind farm point count	14/02/2025 13:20	14/02/2025 13:50	-34.247119	115.279827
BUS020	Wind farm point count	7/03/2025 9:05	7/03/2025 9:35	-34.247119	115.279827

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS020	Wind farm point count	7/03/2025 14:30	7/03/2025 15:00	-34.247119	115.279827
BUS021	Site description	7/03/2025 9:57	7/03/2025 9:57	-34.2611	115.300126
BUS021	Wind farm point count	27/09/2024 16:00	27/09/2024 16:30	-34.261091	115.300145
BUS021	Wind farm point count	30/09/2024 8:35	30/09/2024 9:05	-34.261091	115.300145
BUS021	Wind farm point count	18/10/2024 11:00	18/10/2024 11:30	-34.261091	115.300145
BUS021	Wind farm point count	18/10/2024 14:30	18/10/2024 15:00	-34.261091	115.300145
BUS021	Wind farm point count	13/11/2024 14:45	13/11/2024 15:15	-34.261091	115.300145
BUS021	Wind farm point count	14/11/2024 7:35	14/11/2024 8:05	-34.261091	115.300145
BUS021	Wind farm point count	12/12/2024 10:45	12/12/2024 11:15	-34.261091	115.300145
BUS021	Wind farm point count	12/12/2024 15:00	12/12/2024 15:30	-34.261091	115.300145
BUS021	Wind farm point count	16/01/2025 11:25	16/01/2025 11:55	-34.261091	115.300145
BUS021	Wind farm point count	17/01/2025 12:35	17/01/2025 13:05	-34.261091	115.300145
BUS021	Wind farm point count	14/02/2025 9:00	14/02/2025 9:30	-34.261091	115.300145
BUS021	Wind farm point count	14/02/2025 14:10	14/02/2025 14:40	-34.261091	115.300145
BUS021	Wind farm point count	7/03/2025 9:40	7/03/2025 10:10	-34.261091	115.300145
BUS021	Wind farm point count	7/03/2025 13:50	7/03/2025 14:20	-34.261091	115.300145
BUS022	Site description	7/03/2025 8:46	7/03/2025 8:46	-34.250815	115.2959
BUS022	Wind farm point count	27/09/2024 16:35	27/09/2024 17:05	-34.251063	115.295824
BUS022	Wind farm point count	30/09/2024 7:55	30/09/2024 8:25	-34.251063	115.295824
BUS022	Wind farm point count	17/10/2024 12:50	17/10/2024 13:20	-34.251063	115.295824
BUS022	Wind farm point count	18/10/2024 10:25	18/10/2024 10:55	-34.251063	115.295824
BUS022	Wind farm point count	13/11/2024 15:20	13/11/2024 15:50	-34.251063	115.295824
BUS022	Wind farm point count	14/11/2024 6:55	14/11/2024 7:25	-34.251063	115.295824
BUS022	Wind farm point count	12/12/2024 9:25	12/12/2024 9:55	-34.251063	115.295824
BUS022	Wind farm point count	12/12/2024 13:45	12/12/2024 14:15	-34.251063	115.295824
BUS022	Wind farm point count	16/01/2025 10:50	16/01/2025 11:20	-34.251063	115.295824
BUS022	Wind farm point count	17/01/2025 13:10	17/01/2025 13:40	-34.251063	115.295824
BUS022	Wind farm point count	14/02/2025 9:40	14/02/2025 10:10	-34.251063	115.295824
BUS022	Wind farm point count	14/02/2025 14:45	14/02/2025 15:15	-34.251063	115.295824
BUS022	Wind farm point count	7/03/2025 8:25	7/03/2025 8:55	-34.251063	115.295824
BUS022	Wind farm point count	7/03/2025 13:15	7/03/2025 13:45	-34.251063	115.295824
BUS023	Site description	7/03/2025 7:54	7/03/2025 7:54	-34.240175	115.302017
BUS023	Wind farm point count	27/09/2024 17:10	27/09/2024 17:40	-34.240173	115.302066
BUS023	Wind farm point count	30/09/2024 7:20	30/09/2024 7:50	-34.240173	115.302066
BUS023	Wind farm point count	17/10/2024 12:15	17/10/2024 12:45	-34.240173	115.302066
BUS023	Wind farm point count	18/10/2024 9:50	18/10/2024 10:20	-34.240173	115.302066
BUS023	Wind farm point count	13/11/2024 11:40	13/11/2024 12:10	-34.240173	115.302066
BUS023	Wind farm point count	13/11/2024 15:55	13/11/2024 16:25	-34.240173	115.302066
BUS023	Wind farm point count	12/12/2024 10:00	12/12/2024 10:30	-34.240173	115.302066
BUS023	Wind farm point count	12/12/2024 14:20	12/12/2024 14:50	-34.240173	115.302066
BUS023	Wind farm point count	16/01/2025 10:15	16/01/2025 10:45	-34.240173	115.302066
BUS023	Wind farm point count	17/01/2025 13:42	17/01/2025 14:12	-34.240173	115.302066
BUS023	Wind farm point count	14/02/2025 10:15	14/02/2025 10:45	-34.240173	115.302066

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS023	Wind farm point count	14/02/2025 15:20	14/02/2025 15:50	-34.240173	115.302066
BUS023	Wind farm point count	7/03/2025 7:50	7/03/2025 8:20	-34.240173	115.302066
BUS023	Wind farm point count	7/03/2025 12:40	7/03/2025 13:10	-34.240173	115.302066
BUS024	Site description	6/03/2025 9:46	6/03/2025 9:46	-34.192968	115.308178
BUS024	Wind farm point count	27/09/2024 9:35	27/09/2024 10:05	-34.193125	115.308282
BUS024	Wind farm point count	30/09/2024 16:10	30/09/2024 16:40	-34.193125	115.308282
BUS024	Wind farm point count	17/10/2024 10:40	17/10/2024 11:10	-34.193125	115.308282
BUS024	Wind farm point count	17/10/2024 16:50	17/10/2024 17:20	-34.193125	115.308282
BUS024	Wind farm point count	13/11/2024 8:15	13/11/2024 8:45	-34.193125	115.308282
BUS024	Wind farm point count	14/11/2024 12:40	14/11/2024 13:10	-34.193125	115.308282
BUS024	Wind farm point count	11/12/2024 9:10	11/12/2024 9:40	-34.193125	115.308282
BUS024	Wind farm point count	11/12/2024 15:10	11/12/2024 15:40	-34.193125	115.308282
BUS024	Wind farm point count	17/01/2025 9:55	17/01/2025 10:25	-34.193125	115.308282
BUS024	Wind farm point count	17/01/2025 15:00	17/01/2025 15:30	-34.193125	115.308282
BUS024	Wind farm point count	13/02/2025 11:35	13/02/2025 12:05	-34.193125	115.308282
BUS024	Wind farm point count	13/02/2025 15:35	13/02/2025 16:05	-34.193125	115.308282
BUS024	Wind farm point count	6/03/2025 9:40	6/03/2025 10:10	-34.193125	115.308282
BUS024	Wind farm point count	6/03/2025 13:40	6/03/2025 14:10	-34.193125	115.308282
BUS025	Site description	6/03/2025 8:20	6/03/2025 8:20	-34.202631	115.298285
BUS025	Wind farm point count	27/09/2024 8:40	27/09/2024 9:10	-34.202664	115.298285
BUS025	Wind farm point count	30/09/2024 15:19	30/09/2024 15:49	-34.202664	115.298285
BUS025	Wind farm point count	17/10/2024 9:50	17/10/2024 10:20	-34.202664	115.298285
BUS025	Wind farm point count	17/10/2024 16:00	17/10/2024 16:30	-34.202664	115.298285
BUS025	Wind farm point count	13/11/2024 7:35	13/11/2024 8:05	-34.202664	115.298285
BUS025	Wind farm point count	14/11/2024 12:00	14/11/2024 12:30	-34.202664	115.298285
BUS025	Wind farm point count	11/12/2024 7:40	11/12/2024 8:10	-34.202664	115.298285
BUS025	Wind farm point count	11/12/2024 13:45	11/12/2024 14:15	-34.202664	115.298285
BUS025	Wind farm point count	17/01/2025 8:25	17/01/2025 8:55	-34.202664	115.298285
BUS025	Wind farm point count	17/01/2025 15:40	17/01/2025 16:10	-34.202664	115.298285
BUS025	Wind farm point count	13/02/2025 10:10	13/02/2025 10:40	-34.202664	115.298285
BUS025	Wind farm point count	13/02/2025 14:55	13/02/2025 15:25	-34.202664	115.298285
BUS025	Wind farm point count	6/03/2025 8:05	6/03/2025 8:35	-34.202664	115.298285
BUS025	Wind farm point count	6/03/2025 13:05	6/03/2025 13:35	-34.202664	115.298285
BUS026	Site description	6/03/2025 7:47	6/03/2025 7:47	-34.198106	115.317679
BUS026	Wind farm point count	27/09/2024 7:45	27/09/2024 8:15	-34.198169	115.317557
BUS026	Wind farm point count	30/09/2024 14:35	30/09/2024 15:05	-34.198169	115.317557
BUS026	Wind farm point count	17/10/2024 8:55	17/10/2024 9:25	-34.198169	115.317557
BUS026	Wind farm point count	17/10/2024 15:20	17/10/2024 15:50	-34.198169	115.317557
BUS026	Wind farm point count	13/11/2024 6:55	13/11/2024 7:25	-34.198169	115.317557
BUS026	Wind farm point count	14/11/2024 13:20	14/11/2024 13:50	-34.198169	115.317557
BUS026	Wind farm point count	11/12/2024 6:45	11/12/2024 7:15	-34.198169	115.317557
BUS026	Wind farm point count	11/12/2024 13:00	11/12/2024 13:30	-34.198169	115.317557
BUS026	Wind farm point count	16/01/2025 15:00	16/01/2025 15:30	-34.198169	115.317557

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS026	Wind farm point count	17/01/2025 7:15	17/01/2025 7:45	-34.198169	115.317557
BUS026	Wind farm point count	13/02/2025 9:30	13/02/2025 10:00	-34.198169	115.317557
BUS026	Wind farm point count	13/02/2025 14:15	13/02/2025 14:45	-34.198169	115.317557
BUS026	Wind farm point count	6/03/2025 7:25	6/03/2025 7:55	-34.198169	115.317557
BUS026	Wind farm point count	6/03/2025 14:55	6/03/2025 15:25	-34.198169	115.317557
BUS027	Site description	6/03/2025 10:32	6/03/2025 10:32	-34.225683	115.318117
BUS027	Wind farm point count	27/09/2024 10:30	27/09/2024 11:00	-34.225691	115.317954
BUS027	Wind farm point count	30/09/2024 12:05	30/09/2024 12:35	-34.225691	115.317954
BUS027	Wind farm point count	17/10/2024 6:45	17/10/2024 7:15	-34.225691	115.317954
BUS027	Wind farm point count	17/10/2024 13:20	17/10/2024 13:50	-34.225691	115.317954
BUS027	Wind farm point count	13/11/2024 9:10	13/11/2024 9:40	-34.225691	115.317954
BUS027	Wind farm point count	14/11/2024 14:05	14/11/2024 14:35	-34.225691	115.317954
BUS027	Wind farm point count	11/12/2024 9:55	11/12/2024 10:25	-34.225691	115.317954
BUS027	Wind farm point count	11/12/2024 15:55	11/12/2024 16:25	-34.225691	115.317954
BUS027	Wind farm point count	16/01/2025 7:45	16/01/2025 8:15	-34.225691	115.317954
BUS027	Wind farm point count	16/01/2025 15:35	16/01/2025 16:05	-34.225691	115.317954
BUS027	Wind farm point count	13/02/2025 7:20	13/02/2025 7:50	-34.225691	115.317954
BUS027	Wind farm point count	13/02/2025 12:20	13/02/2025 12:50	-34.225691	115.317954
BUS027	Wind farm point count	6/03/2025 10:30	6/03/2025 11:00	-34.225691	115.317954
BUS027	Wind farm point count	6/03/2025 15:30	6/03/2025 16:00	-34.225691	115.317954
BUS028	Site description	6/03/2025 11:45	6/03/2025 11:45	-34.22418	115.306055
BUS028	Wind farm point count	27/09/2024 11:05	27/09/2024 11:35	-34.224268	115.306632
BUS028	Wind farm point count	30/09/2024 13:45	30/09/2024 14:15	-34.224268	115.306632
BUS028	Wind farm point count	17/10/2024 7:20	17/10/2024 7:50	-34.224268	115.306632
BUS028	Wind farm point count	17/10/2024 13:55	17/10/2024 14:25	-34.224268	115.306632
BUS028	Wind farm point count	13/11/2024 9:45	13/11/2024 10:15	-34.224268	115.306632
BUS028	Wind farm point count	14/11/2024 14:40	14/11/2024 15:10	-34.224268	115.306632
BUS028	Wind farm point count	11/12/2024 11:05	11/12/2024 11:35	-34.224268	115.306632
BUS028	Wind farm point count	11/12/2024 17:05	11/12/2024 17:35	-34.224268	115.306632
BUS028	Wind farm point count	16/01/2025 8:20	16/01/2025 8:50	-34.224268	115.306632
BUS028	Wind farm point count	16/01/2025 16:45	16/01/2025 17:15	-34.224268	115.306632
BUS028	Wind farm point count	13/02/2025 7:55	13/02/2025 8:25	-34.224268	115.306632
BUS028	Wind farm point count	13/02/2025 12:55	13/02/2025 13:25	-34.224268	115.306632
BUS028	Wind farm point count	6/03/2025 11:40	6/03/2025 12:10	-34.224268	115.306632
BUS028	Wind farm point count	6/03/2025 16:45	6/03/2025 17:15	-34.224268	115.306632
BUS029	Site description	6/03/2025 11:15	6/03/2025 11:15	-34.21545	115.293401
BUS029	Wind farm point count	27/09/2024 11:40	27/09/2024 12:10	-34.215585	115.293307
BUS029	Wind farm point count	30/09/2024 13:10	30/09/2024 13:40	-34.215585	115.293307
BUS029	Wind farm point count	17/10/2024 8:00	17/10/2024 8:30	-34.215585	115.293307
BUS029	Wind farm point count	17/10/2024 14:30	17/10/2024 15:00	-34.215585	115.293307
BUS029	Wind farm point count	13/11/2024 10:20	13/11/2024 10:50	-34.215585	115.293307
BUS029	Wind farm point count	14/11/2024 15:15	14/11/2024 15:45	-34.215585	115.293307
BUS029	Wind farm point count	11/12/2024 10:30	11/12/2024 11:00	-34.215585	115.293307

Site name	Sample method	Date start	Date stop	Latitude	Longitude
BUS029	Wind farm point count	11/12/2024 16:30	11/12/2024 17:00	-34.215585	115.293307
BUS029	Wind farm point count	16/01/2025 8:55	16/01/2025 9:25	-34.215585	115.293307
BUS029	Wind farm point count	16/01/2025 16:10	16/01/2025 16:40	-34.215585	115.293307
BUS029	Wind farm point count	13/02/2025 8:35	13/02/2025 9:05	-34.215585	115.293307
BUS029	Wind farm point count	13/02/2025 13:30	13/02/2025 14:00	-34.215585	115.293307
BUS029	Wind farm point count	6/03/2025 11:05	6/03/2025 11:35	-34.215585	115.293307
BUS029	Wind farm point count	6/03/2025 16:10	6/03/2025 16:40	-34.215585	115.293307
BUS030	Wind farm point count	29/09/2024 10:35	29/09/2024 11:05	-34.317331	115.179621
BUS030	Wind farm point count	2/12/2024 13:00	2/12/2024 13:30	-34.317331	115.179621
BUS031	Wind farm point count	29/09/2024 8:00	29/09/2024 8:30	-34.289223	115.176383
BUS031	Wind farm point count	2/12/2024 9:50	2/12/2024 10:20	-34.289223	115.176383
BUS032	Wind farm point count	29/09/2024 9:20	29/09/2024 9:50	-34.320039	115.166109
BUS032	Wind farm point count	2/12/2024 11:15	2/12/2024 11:45	-34.320039	115.166109
BUS033	Wind farm point count	29/09/2024 9:55	29/09/2024 10:25	-34.322382	115.171192
BUS034	Wind farm point count	29/09/2024 11:30	29/09/2024 12:00	-34.316551	115.185423
BUS034	Wind farm point count	2/12/2024 12:25	2/12/2024 12:55	-34.316551	115.185423
BUS035	Audio recording	17/11/2023 18:32	18/11/2023 5:36	-34.27018	115.297746
BUS035	Ultrasonic recording	17/11/2023 18:33	18/11/2023 5:36	-34.270178	115.297749
BUS035	Wind farm point count	17/11/2023 15:45	17/11/2023 16:15	-34.270165	115.297736
BUS035	Wind farm point count	18/11/2023 8:00	18/11/2023 8:30	-34.270165	115.297736

Appendix 4 DAWE (2022) black cockatoo foraging quality scoring tool

Table A1 Foraging quality scoring tool template

Starting score		Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-Cockatoo
10		**Start at a score of 10** if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. **This tool only applies to sites equal to or larger than 1 hectare in size.**
Attribute	Sub-tractions	Context adjustor (attributes reducing functionality of foraging habitat)		
Foraging potential	**-2**	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.
Connectivity	**-2**	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	**-2**	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	**-1**	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	**-1**	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total score		*Enter score*	*Enter score*	*Enter score*
Appraisal		To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.		

Appendix 5 Bamford (2021) black cockatoo foraging quality scoring tool

Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos. Revised 4th April 2021

Bamford Consulting Ecologists

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has 3 components as detailed above. These 3 components are drawn from the DAWE offsets guide but the scoring approach was developed by BCE and includes a fourth (moderation) component.

Note that the scoring system can only be applied within the range of the species or at least where the species could reasonably be expected to occur based upon existing information.

Calculating the total score (out of 10) requires the following steps:

A. Site condition. Determining a score out of 6 for the vegetation composition, condition and structure; plus
B. Site context. Determining a score out of 3 for the context of the site; plus
C. Species stocking rate. Determining a score out of one for species density.
D. Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

The BCE scoring system places the greatest weight on site condition (scale of 0 to 6) because this has the highest influence on the foraging values of a site, which in turn is the fundamental driver in meeting ecological requirements for continued survival.

Site context has a lower weight (scale of 0 to 3) in recognition of the mobility of the species, which means they can access good foraging habitat even in fragmented landscapes, but allowing for recognition of the extent of available habitat in a region and context in relation to activity (such as breeding and roosting). The application of scoring site context is further discussed below.

Species stocking rate is given a low weight (0 to 1) as it is a means only of recognising that a species may or may not be abundant at a site, but that abundance is dependent upon site condition and context and is thus not an independent variable. The abundance of a species is also sensitive to sampling effort, and to seasonal and annual variation, and is therefore an unreliable indicator of actual importance of a site to a species.

Calculation of scores and the moderation process are described in detail below.

A. Site condition. Vegetation composition, condition and structure scoring

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g., salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes. • Mown grass	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g., dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g., dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g., infrastructure, roads, gravel pits).
1	Negligible to low foraging value. Examples: • Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; • Paddocks that are lightly vegetated with melons or other known food source weeds (e.g., *Erodium* spp.) that represent a short-term and/or seasonal food source; • Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; • Woodland with tree banksias 2-5% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Open eucalypt woodland/mallee of small-fruited species; • Paddocks that are densely vegetated with melons or other known food source weeds (e.g., *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g., Marri and Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered foraging trees.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g., Marri, Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Woodland with <10% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
3	Low to Moderate foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; • Woodland with tree banksias 5-20% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Eucalypt Woodland/Mallee of small-fruited species; • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri and Jarrah; also Pricklybark (Coastal Blackbutt) where it occurs in Banksia Woodlands) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 10-40% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; • Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability); • Orchards with highly desirable food sources (e.g., apples, pears, some stone fruits).	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 40-60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 40-60% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term). • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with > 60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term). • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have >60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium-term).

Vegetation structural class terminology follows Keighery (1994)

A. Site context.

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Black-Cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with the Department of the Environment and Energy (DEE), provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents.	
	'Local' breeding known/likely	'Local' breeding unlikely
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	1 - 5%
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15 km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (e.g. 0.5% of such habitat within 15 km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it.

B. Species density (stocking rate).

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black-cockatoos. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site context. For example, a site with a moderate condition score that is part of a network of such habitat where a black-cockatoo species is known would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

C. Moderation of scores for the calculation of a value out of 10.

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat ($\geq$3). The approach to calculating a score out of 10 can be summarised as follows:

Vegetation composition, condition and structure score	Context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special circumstances. Such as when very close to a major breeding area or if strategically located along a movement corridor.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.
- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott and Black 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.

- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black-Cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and 3 times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental', such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.
- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this.
- Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black-Cockatoos are not regularly present.

Appendix 6 Habitat Scoring System for Western Ringtail Possum (DCCEEW 2024c)

Indicator/s	Score	Description
Site condition (habitat quality)		
Vegetation condition and structure Diversity of habitat species present Habitat features	3	**Very High** – High (90-100%) canopy[1] continuity[2] for movement, ground cover for shelter, fire age >20 years, evidence of many nests/dreys/hollows, limited evidence of predators.
	2.5	**High** – High (70-89%) canopy continuity for movement, ground cover, fire age >15 years, evidence of many nests/dreys/hollows, limited evidence of predators.
	2	**Medium** – High (70-89%) canopy continuity for movement, some ground cover, fire age >10 years, evidence of some nests/dreys/hollows, some evidence of predators.
	1.5	**Low** – Some canopy (50-69%) continuity for movement, some ground cover, fire age <10 years, evidence of few nests/dreys/hollows, substantial evidence of predators.
	1.0	**Very Low** – Little canopy (30-49%) continuity for movement, little ground cover, fire age <5 years, little evidence of nests/dreys/hollows, substantial evidence of predators.
	0.5	**Marginal** – Less than 30% canopy continuity for movement, no ground cover, fire within last 5 years, no evidence of nests/dreys/hollows.
	0	**Absent** – no vegetation and/or suitable habitat on site.
Site context		
Movement patterns Proximity of the site in relation to other areas of suitable habitat Overall population or extent of a species	3	Site is connected by vegetation, including continuous canopy cover, to more than one area of contiguous[3] suitable habitat. Site is within a key management zone.
	2.5	Site is connected by vegetation, including high canopy cover (70-89%), to at least one area of contiguous suitable habitat. Site is within a key management zone.
	2	Site is connected by vegetation, including some level of canopy cover (50-69%), to more than one patch[4] of suitable habitat. Site is within a key management zone.
	1.5	Site is connected by vegetation, including limited canopy cover (30-49%), to at least one patch of suitable habitat. Records on or immediately adjacent (<500 m) to site within last 2 years. Site is located within known species distribution.
	1	Site is separated from other known suitable habitat by cleared areas or linear barrier of up to 25 m. Records on site or immediately adjacent (within 500 m) within last 3 years. Site is located within known distribution of species.
	0.5	Site is separated from other suitable habitat by cleared areas or linear barrier of up to 50 m. Records on site or adjacent (within 1 km) within last 10 years. Site is not located within known distribution of species.
	0	Site is separated from other suitable habitat by cleared areas of more than 50 m. No records on site or adjacent (within 1 km) within last 10 years. Site is not located within known distribution of species.
Species stocking rate		
Usage and/or density of a species Role of the site population regarding overall species population viability	4	Record of species presence on site in last 12 months (WRP observed on site in last 12 months and scats; evidence of nests/dreys/hollows being used; evidence of breeding); site is within 50-100 m of verified/published records in last 12 months.
	3	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 100-150 m of verified/published records in last 12 months.
	2	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 150-200 m of verified/published records in last 2 years.
	1	Record of species presence on site in last 2 years (WRP observed on site in last 2 years and scats; evidence of nests/dreys/hollows being used); site is within 150-200 m of verified/published records in last 2 years.
	0	No record of species presence on site, or within 500 m in last 3 years.

1 - canopy refers to upper and/or mid storey.

[2]continuity means canopy where tree or shrub branches are touching allowing for WRP to move from one tree to another while staying under cover. High canopy continuity means a high percentage of trees or shrubs connect; low canopy continuity means few or no trees or shrubs connect.

[3]Contiguous suitable habitat means multiple patches of native vegetation sharing borders, next to each other in sequence, comprising a larger, continuous area.

[4]A patch of suitable habitat may or may not be connected to other patches of native vegetation. Patch size is not defined and should be considered in relation to site condition and species stocking rate as indicators of patch viability for WRP.

Appendix 7 Vertebrate fauna desktop and field survey results

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Amphibians (14)															
Hylidae	*Litoria adelaidensis*	Slender Tree Frog													•
Hylidae	*Litoria moorei*	Motorbike Frog		•		•						•			•
Limnodynastidae	*Heleioporus eyrei*	Moaning Frog		•		•						•			
Limnodynastidae	*Heleioporus psammophilus*	Sand Frog													•
Limnodynastidae	*Limnodynastes dorsalis*	Western Banjo Frog		•											•
Limnodynastidae	*Neobatrachus albipes*	White-footed Trilling Frog				•									
Myobatrachidae	*Anstisia alba*	White-bellied Frog	CR (EPBC & BC Acts)			•		•					•		
Myobatrachidae	*Anstisia vitellina*	Orange-bellied Frog	VU (EPBC & BC Acts)			•		•					•		
Myobatrachidae	*Crinia georgiana*	Quacking Frog		•		•						•			•
Myobatrachidae	*Crinia glauerti*	Clicking Frog				•									•
Myobatrachidae	*Crinia pseudinsignifera*	Bleating Froglet				•									•
Myobatrachidae	*Geocrinia leai*	Ticking Frog				•									•
Myobatrachidae	*Metacrinia nichollsi*	Forest Toadlet				•									
Myobatrachidae	*Pseudophryne guentheri*	Crawling Toadlet				•									•
Birds (207)															
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			•	•				•		•		•	•
Accipitridae	*Circus approximans*	Swamp Harrier		•	•					•		•		•	•
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			•	•						•		•	•
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-eagle			•	•		•		•		•		•	
Accipitridae	*Haliastur sphenurus*	Whistling Kite			•	•						•		•	•
Accipitridae	*Hamirostra isura*	Square-tailed Kite			•										
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			•	•								•	•
Accipitridae	*Milvus migrans*	Black Kite			•	•									
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk			•	•						•		•	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk			•	•						•		•	•
Pandionidae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)		•	•		•				•	•	•	•
Anatidae	*Anas castanea*	Chestnut Teal										•			•
Anatidae	*Anas gracilis*	Grey Teal			•	•						•		•	•
Anatidae	*Anas superciliosa*	Pacific Black Duck			•	•				•		•		•	•
Anatidae	*Aythya australis*	Hardhead			•	•						•			
Anatidae	*Biziura lobata*	Musk Duck			•	•						•		•	•

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Anatidae	*Chenonetta jubata*	Australian Wood Duck			•	•				•		•		•	•
Anatidae	*Cygnus atratus*	Black Swan		•	•	•						•		•	•
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck										•			•
Anatidae	*Oxyura australis*	Blue-billed Duck	P4 (DBCA list)		•	•						•	•		
Anatidae	*Spatula rhynchotis*	Australasian Shoveler			•	•						•			•
Anatidae	*Tadorna tadornoides*	Australian Shelduck		•	•	•				•		•		•	•
Apodidae	*Apus pacificus*	Fork-tailed Swift	Mig. (EPBC & BC Acts)					•							
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			•	•				•					
Podargidae	*Podargus strigoides*	Tawny Frogmouth			•	•				•					•
Charadriidae	*Anarhynchus bicinctus*	Double-banded Plover	Mig. (EPBC & BC Acts)										•		
Charadriidae	*Anarhynchus leschenaultii*	Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)		•			•					•		
Charadriidae	*Anarhynchus mongolus*	Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)										•		
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		•	•	•		•				•		•	
Charadriidae	*Charadrius cucullatus*	Hooded Plover/Dotterel	P4 (DBCA list)		•	•		•					•		
Charadriidae	*Charadrius melanops*	Black-fronted Dotterel			•							•			•
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	Mig. (EPBC & BC Acts)		•			•					•		
Charadriidae	*Pluvialis squatarola*	Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Act)		•										
Charadriidae	*Vanellus tricolor*	Banded Lapwing			•	•						•		•	•
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher			•										
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		•	•	•								•	
Laridae	*Anous tenuirostris melanops*	Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)					•							
Laridae	*Chlidonias hybrida*	Whiskered Tern			•										
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		•	•	•						•		•	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)		•	•		•				•	•	•	
Laridae	*Larus dominicanus*	Kelp Gull			•										
Laridae	*Larus pacificus*	Pacific Gull		•	•	•		•						•	
Laridae	*Onychoprion anaethetus*	Bridled Tern	Mig. (EPBC & BC Acts)		•			•					•		
Laridae	*Stercorarius pomarinus*	Pomarine Skua (Pomarine Jaeger)	Mig. (EPBC & BC Acts)		•										
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)		•	•		•						•	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)		•	•							•	•	
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt			•										
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt			•							•			
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet			•	•									
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Mig. (EPBC & BC Acts)		•			•				•	•		

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)					•				•	•	•	
Scolopacidae	*Calidris alba*	Sanderling	Mig. (EPBC & BC Acts)		•	•		•					•	•	
Scolopacidae	*Calidris canutus*	Red Knot	VU/Mig. (EPBC Act); EN (BC Act)		•			•					•		
Scolopacidae	*Calidris falcinellus*	Broad-billed Sandpiper	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	Mig. (EPBC & BC Acts)		•			•							
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)		•			•					•	•	
Scolopacidae	*Calidris tenuirostris*	Great Knot	CR/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)		•			•					•	•	
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR/Mig./CR (EPBC Act; BC Act)					•					•		
Scolopacidae	*Numenius phaeopus*	Whimbrel	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	Mig. (EPBC & BC Acts) P4 (DBCA list)										•		
Scolopacidae	*Tringa glareola*	Wood Sandpiper	Mig. (EPBC & BC Acts)		•										•
Scolopacidae	*Tringa nebularia*	Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)		•	•		•				•	•		
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	Mig. (EPBC & BC Acts)		•										
Ardeidae	*Ardea alba*	Great Egret (Eastern Great Egret)			•	•						•			
Ardeidae	*Ardea pacifica*	White-necked Heron			•	•				•		•		•	•
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN (EPBC & BC Acts)					•							
Ardeidae	*Bubulcus coromandus*	Cattle Egret			•			•							•
Ardeidae	*Egretta garzetta*	Little Egret			•									•	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			•	•				•		•		•	•
Ardeidae	*Egretta sacra*	Eastern Reef Egret			•										
Ardeidae	*Ixobrychus flavicollis*	Black Bittern			•	•									
Ardeidae	*Nycticorax caledonicus*	Rufous Night Heron			•	•									
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill			•	•						•		•	•
Threskiornithidae	*Platalea regia*	Royal Spoonbill			•	•				•				•	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		•	•	•						•		•	•
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		•	•	•				•		•		•	•
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			•	•						•		•	•
Columbidae	*Phaps chalcoptera*	Common Bronzewing		•	•	•			•	•		•		•	•
Columbidae	*Phaps elegans*	Brush Bronzewing			•	•									
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	Introduced	•	•	•			•	•		•		•	•

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Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher			•	•				•					•
Meropidae	*Merops ornatus*	Rainbow Bee-eater		•	•	•		•							•
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			•	•				•		•		•	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			•	•				•		•			
Falconidae	*Falco berigora*	Brown Falcon			•	•				•		•		•	•
Falconidae	*Falco cenchroides*	Australian Kestrel		•	•	•				•		•		•	•
Falconidae	*Falco longipennis*	Australian Hobby		•	•	•				•		•		•	
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)		•	•				•		•	•	•	
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU (EPBC & BC Acts)			•							•		
Phasianidae	*Coturnix pectoralis*	Stubble Quail			•	•						•		•	•
Phasianidae	*Synoicus ypsilophorus*	Brown Quail			•	•				•					
Rallidae	*Fulica atra*	Eurasian Coot			•	•						•			•
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen			•	•									
Rallidae	*Porphyrio melanotus*	Australasian Swamphen			•	•						•			•
Rallidae	*Zapornia pusilla*	Baillon's Crake			•	•									
Rallidae	*Zapornia tabuensis*	Spotless Crake			•	•						•			
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza inornata*	Western Thornbill			•	•				•		•			
Acanthizidae	*Gerygone fusca*	Western Gerygone		•	•	•				•				•	•
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		•	•	•			•	•		•		•	•
Acanthizidae	*Smicrornis brevirostris*	Weebill			•	•									•
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			•	•				•		•		•	•
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			•	•				•		•		•	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird													•
Artamidae	*Cracticus torquatus*	Grey Butcherbird		•	•	•				•		•		•	•
Artamidae	*Gymnorhina tibicen*	Australian Magpie		•	•	•				•		•		•	•
Artamidae	*Strepera versicolor*	Grey Currawong		•	•	•				•					
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		•	•	•				•		•		•	•
Campephagidae	*Lalage tricolor*	White-winged Triller			•					•		•		•	•
Climacteridae	*Climacteris rufus*	Rufous Treecreeper			•	•									•
Corvidae	*Corvus coronoides*	Australian Raven		•	•	•				•		•		•	•

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Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird													•
Dicruridae	*Grallina cyanoleuca*	Magpie-lark			•	•				•		•		•	•
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		•	•	•			•	•		•		•	•
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		•	•	•				•		•		•	•
Estrildidae	*Stagonopleura oculata*	Red-eared Firetail			•	•				•					
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		•	•	•				•		•		•	•
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			•	•									
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		•	•	•				•		•		•	•
Locustellidae	*Cincloramphus cruralis*	Brown Songlark								•				•	•
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark								•				•	
Locustellidae	*Poodytes gramineus*	Little Grassbird			•	•				•		•			
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		•	•	•			•	•				•	•
Maluridae	*Malurus splendens*	Splendid Fairy-wren		•	•	•				•		•		•	•
Maluridae	*Stipiturus malachurus*	Southern Emu-wren			•	•				•		•		•	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill			•	•				•		•		•	•
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		•	•	•			•	•		•		•	•
Meliphagidae	*Anthochaera lunulata*	Western Little Wattlebird		•	•	•				•		•			
Meliphagidae	*Epthianura albifrons*	White-fronted Chat			•	•				•		•		•	•
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater		•	•	•									•
Meliphagidae	*Gliciphila melanops*	Tawny-crowned honeyeater			•	•				•					
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			•	•				•				•	•
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner													•
Meliphagidae	*Melithreptus chloropsis*	Western White-naped Honeyeater			•	•				•		•			
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			•	•				•					
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		•	•	•				•		•		•	•
Motacillidae	*Anthus australis*	Australian Pipit		•	•					•		•		•	•
Motacillidae	*Motacilla cinerea*	Grey Wagtail	Mig. (EPBC & BC Acts)					•							
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			•	•				•					
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		•	•	•				•				•	•
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		•	•	•				•		•		•	•
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			•	•				•		•			•
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		•	•	•				•					•
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		•	•	•				•				•	•
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin		•	•	•									

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Petroicidae	*Microeca fascinans*	Jacky Winter												•	
Petroicidae	*Petroica boodang*	Scarlet Robin		•	•	•				•		•		•	
Petroicidae	*Petroica goodenovii*	Red-capped Robin			•										
Petroicidae	*Quoyornis georgianus*	White-breasted Robin		•	•	•				•		•			•
Sylviidae	*Acrocephalus australis*	Australian Reed Warbler			•	•						•			
Zosteropidae	*Zosterops lateralis*	Silvereye		•	•	•			•	•		•		•	•
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			•	•						•		•	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			•	•						•		•	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant			•	•				•				•	•
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant			•	•						•		•	
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant			•	•						•		•	•
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant			•	•						•		•	
Sulidae	*Morus serrator*	Australasian Gannet			•	•									
Podicipedidae	*Podiceps cristatus*	Great Crested Grebe										•			
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			•	•						•			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			•	•						•			•
Diomedeidae	*Diomedea amsterdamensis*	Amsterdam Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea dabbenena*	Tristan Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea epomophora*	Southern Royal Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU/Mig. (EPBC & BC Acts)					•					•		
Diomedeidae	*Diomedea sanfordi*	Northern Royal Albatross	EN/Mig. (EPBC Act; BC Act)					•							
Diomedeidae	*Phoebetria fusca*	Sooty Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•							
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)		•			•							
Diomedeidae	*Thalassarche cauta*	Shy Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche chlororhynchos*	Atlantic Yellow-nosed Albatross	VU/Mig. (BC Act)			•							•		
Diomedeidae	*Thalassarche impavida*	Campbell Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche melanophris*	Black-browed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•					•		
Oceanitidae	*Pelagodroma marina*	White-faced Storm Petrel			•										
Procellariidae	*Ardenna carneipes*	Flesh-footed Shearwater	VU/Mig. (BC Act)					•							
Procellariidae	*Ardenna grisea*	Sooty Shearwater	Mig. (BC Act)					•							
Procellariidae	*Halobaena caerulea*	Blue Petrel	VU (EPBC Act)					•							
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	EN/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Macronectes halli*	Northern Giant Petrel	VU/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Pachyptila turtur*	Fairy Prion						•							

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Procellariidae	*Pterodroma mollis*	Soft-plumaged Petrel	VU (EPBC Act)					•							
Procellariidae	*Puffinus assimilis*	Little Shearwater						•							
Cacatuidae	*Cacatua sanguinea*	Little Corella													•
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)		•	•		•		•		•	•	•	•
Cacatuidae	*Calyptorhynchus* sp.	black cockatoo species	EN-VU (EPBC & BC Acts)		•										
Cacatuidae	*Calyptorhynchus/Zanda* sp.	black cockatoo species	EN-VU (EPBC & BC Acts)											•	•
Cacatuidae	*Eolophus roseicapilla*	Galah			•									•	•
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•				•	•	•	•
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•					•	•	•
Cacatuidae	*Zanda* sp.	white-tailed black cockatoo species	EN (EPBC & BC Acts)	•		•				•			•	•	•
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		•	•	•				•		•		•	•
Psittaculidae	*Neophema elegans*	Elegant Parrot			•	•				•		•		•	•
Psittaculidae	*Neophema petrophila*	Rock Parrot			•	•									
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		•	•	•				•				•	•
Psittaculidae	*Platycercus icterotis*	Western Rosella		•	•	•				•		•		•	
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot		•	•	•						•		•	
Strigidae	*Ninox boobook*	Boobook Owl			•	•								•	
Tytonidae	*Tyto javanica*	Eastern barn owl										•			•
Tytonidae	*Tyto novaehollandiae novaehollandiae*	Masked Owl (southwest)	P3 (DBCA list)		•									•	•
Dromaiidae	*Dromaius novaehollandiae*	Emu		•	•	•				•		•		•	•
Turnicidae	*Turnix varius*	Painted Button-quail										•			
Mammals (34)															
Bovidae	*Bos taurus*	European Cattle	Introduced	•											•
Suidae	*Sus scrofa*	Pig	Introduced												•
Canidae	*Canis familiaris*	Dog	Introduced												•
Canidae	*Vulpes vulpes*	Red Fox	Introduced	•		•			•			•			•
Felidae	*Felis catus*	Cat	Introduced												•
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat										•		•	•
Molossidae	*Mormopterus kitcheneri*	South-western Free-tailed Bat										•			
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		•								•		•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat		•		•						•		•	•
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	P4 (DBCA list)	•		•						•	•	•	•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat				•									

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat												•	
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat		•		•						•		•	•
Dasyuridae	*Antechinus flavipes*	Yellow-footed Antechinus							•						
Dasyuridae	*Dasyurus geoffroii*	Chuditch	VU (EPBC & BC Acts)			•		•					•		
Dasyuridae	*Phascogale tapoatafa wambenger*	South-western Brush-tailed Phascogale	CD (BC Act)			•			•				•		
Dasyuridae	*Sminthopsis gilberti*	Gilbert's Dunnart				•									
Dasyuridae	*Sminthopsis griseoventer*	Grey-bellied Dunnart		•		•									
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat	EN (EPBC & BC Acts)					•							
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo		•		•			•			•			•
Macropodidae	*Notamacropus irma*	Western Brush Wallaby	P4 (DBCA list)			•							•		
Macropodidae	*Setonix brachyurus*	Quokka	VU (EPBC & BC Acts)			•		•					•		
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum				•			•						
Potoroidae	*Bettongia penicillata ogilbyi*	Woylie	EN/CR (EPBC Act; BC Act)			•							•		
Pseudocheiridae	*Pseudocheirus occidentalis*	Western Ringtail Possum	CR (EPBC & BC Acts)	•		•	•	•	•		•		•		•
Tarsipedidae	*Tarsipes rostratus*	Honey Possum				•									
Leporidae	*Oryctolagus cuniculus*	Rabbit	Introduced	•											•
Peramelidae	*Isoodon fusciventer*	Quenda	P4 (DBCA list)			•			•			•	•		•
Muridae	*Hydromys chrysogaster*	Water-rat	P4 (DBCA list)			•							•		
Muridae	*Mus musculus*	House Mouse	Introduced	•		•			•			•			
Muridae	*Rattus fuscipes*	Western Bush Rat		•		•			•						
Muridae	*Rattus rattus*	Black Rat	Introduced	•		•			•			•			
Reptiles (25)															
Elapidae	*Echiopsis curta*	Bardick		•											
Elapidae	*Elapognathus coronatus*	Crowned Snake		•		•						•			
Elapidae	*Elapognathus minor*	Short-nosed Snake	P2 (DBCA list)			•							•		
Elapidae	*Notechis scutatus*	Tiger Snake		•		•						•			•
Elapidae	*Pseudonaja affinis*	Dugite		•		•						•			•
Elapidae	*Suta nigriceps*	Black-backed Hooded Snake				•									
Gekkonidae	*Christinus marmoratus*	Marbled Gecko		•		•						•			
Pygopodidae	*Aprasia pulchella*	Granite Worm-lizard				•									
Pygopodidae	*Pygopus lepidopodus*	Common Scaly-foot				•									
Scincidae	*Acritoscincus trilineatus*	Western Three-lined Skink		•		•						•			
Scincidae	*Ctenotus catenifer*	Chain-striped South-west Ctenotus				•									

Family	Species	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023b)	ELM (2017)	PM[1] (DCCEEW 2023a)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[2] (DBCA 2023c)	BBRAS (Phoenix 2025a)	This survey
Scincidae	*Ctenotus labillardieri*	Red-legged Ctenotus		•		•									
Scincidae	*Egernia kingii*	King's Skink				•			•						•
Scincidae	*Egernia napoleonis*	Southwestern Crevice-skink		•		•									
Scincidae	*Hemiergis gracilipes*	South-western Mulch-skink				•									
Scincidae	*Hemiergis peronii*	Peron's Earless Skink		•		•									
Scincidae	*Lerista elegans*	Elegant Slider		•		•									
Scincidae	*Lerista microtis*	South Coast Five-toed Slider		•											
Scincidae	*Liopholis pulchra*	South-western Rock Skink				•									
Scincidae	*Morethia lineoocellata*	West Coast Pale-flecked Morethia		•		•									
Scincidae	*Morethia obscura*	Shrubland Pale-flecked Morethia		•											
Scincidae	*Tiliqua rugosa*	Bobtail		•		•						•			•
Typhlopidae	*Anilios australis*	Southern Blind Snake		•		•									
Varanidae	*Varanus rosenbergi*	Heath Monitor		•								•			•
Chelidae	*Chelodina oblonga*	South-western Long-necked Turtle													•

[1]PM – Protected Matters Database. [2]TPFA – Threatened and Priority Fauna Database. [3]Species only recorded at regional BBRAS sites and not in study area. [4]Could represent red- or white-tailed black cockatoo as some desktop records predate taxonomic revision of Carnaby's and Baudins into *Zanda* genus.

Appendix 8 Detailed black cockatoo records

Audio recording data summary

Site name	Record type	Forest Red-tailed Black Cockatoo		White-tailed black cockatoo		Total	
		Aggregate minutes	# detects.	Aggregate minutes	# detects.	Aggregate mins. / hrs.	# detects.
SM4-01	Flyover	0	4	0	7	**300 mins. 5 hrs.**	**19**
	Foraging	18	1	282	12		
SM4-02	Flyover	0	3	0	9	**225 mins. 3.75 hrs.**	**17**
	Foraging	24	2	201	8		
SM4-04	Flyover	0	0	1	16	**56 mins. 0.93 hrs.**	**19**
	Foraging	0	0	55	3		
SM4-05	Flyover	0	0	1	11	**19 mins. 0.32 hrs.**	**13**
	Foraging	0	0	18	2		
SM4-06	Flyover	0	1	0	1	**13 mins. 0.22 hrs.**	**2**
	Foraging	0	0	13	1		
SM4-07	Flyover	0	1	1	12	**1 min.**	**12**
Total		**42**	**12**	**572**	**82**	**614 mins. 10.2 hrs.**	**94**

Black cockatoo species records per season and phase

Name	Vernacular	Season	Date	Abundance
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Autumn	2023-05-25	53
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Autumn	2023-05-26	3
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-14	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-15	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-15	7
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-16	8
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-16	6
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-28	3
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-28	10
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-30	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-30	2
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-31	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Winter	2023-08-31	17
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2023-10-27	4
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2023-11-18	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-06	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-08	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-08	1

Name	Vernacular	Season	Date	Abundance
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-09	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-10	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-10	2
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-11	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2023-12-11	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2024-11-27	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2024-11-27	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2024-11-28	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2024-11-29	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Spring	2024-11-29	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-04	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-04	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-04	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-09	2
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-09	2
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-12	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-13	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-23	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-25	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-28	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-31	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2024-12-31	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2025-01-04	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2025-01-04	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2025-01-10	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2025-01-14	1
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo/Karrak	Summer	2025-01-15	1
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-27	38
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-29	2
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-29	4
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-29	2
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-29	7
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-09-30	6
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-10-21	1
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-10-28	4
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-11-14	2
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-11-14	10
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-11-18	2

Name	Vernacular	Season	Date	Abundance
Calyptorhynchus/Zanda sp.	black cockatoo species	Spring	2024-11-25	1
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2024-12-02	4
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2024-12-04	1
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2024-12-04	1
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2024-12-11	2
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2025-01-13	6
Calyptorhynchus/Zanda sp.	black cockatoo species	Summer	2025-01-17	6
Zanda baudinii	Baudin's Cockatoo	Autumn	2023-05-26	1
Zanda baudinii	Baudin's Cockatoo	Winter	2023-08-15	26
Zanda baudinii	Baudin's Cockatoo	Spring	2023-10-25	10
Zanda baudinii	Baudin's Cockatoo	Spring	2023-11-19	8
Zanda baudinii	Baudin's Cockatoo	Summer	2023-12-07	9
Zanda baudinii	Baudin's Cockatoo	Summer	2023-12-07	1
Zanda baudinii	Baudin's Cockatoo	Spring	2024-09-30	2
Zanda latirostris	Carnaby's Cockatoo	Winter	2023-08-29	12
Zanda latirostris	Carnaby's Cockatoo	Winter	2023-08-30	1
Zanda latirostris	Carnaby's Cockatoo	Winter	2023-08-30	12
Zanda latirostris	Carnaby's Cockatoo	Winter	2023-08-30	4
Zanda latirostris	Carnaby's Cockatoo	Winter	2023-08-31	1
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-07	1
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-07	1
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-07	1
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-08	4
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-09	3
Zanda latirostris	Carnaby's Cockatoo	Summer	2023-12-11	1
Zanda latirostris	Carnaby's Cockatoo	Summer	2024-01-11	10
Zanda latirostris	Carnaby's Cockatoo	Summer	2024-01-12	5
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-09-30	1
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-09-30	2
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	6
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	12
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	6
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	1
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	1
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-17	2
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-18	2
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-18	2
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-18	9

Name	Vernacular	Season	Date	Abundance
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-10-18	2
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-11-13	1
Zanda latirostris	Carnaby's Cockatoo	Spring	2024-11-14	3
Zanda latirostris	Carnaby's Cockatoo	Summer	2024-12-09	2
Zanda latirostris	Carnaby's Cockatoo	Summer	2024-12-09	2
Zanda latirostris	Carnaby's Cockatoo	Summer	2025-01-16	20
Zanda latirostris	Carnaby's Cockatoo	Summer	2025-01-17	2
Zanda latirostris	Carnaby's Cockatoo	Summer	2025-01-17	4
Zanda latirostris	Carnaby's Cockatoo	Summer	2025-01-17	2
Zanda latirostris	Carnaby's Cockatoo	Summer	2025-01-17	2
Zanda latirostris	Carnaby's Cockatoo	Autumn	2025-03-07	6
Zanda latirostris	Carnaby's Cockatoo	Autumn	2025-03-07	4
Zanda sp.	white-tailed black cockatoo species	Winter	2023-08-15	6
Zanda sp.	white-tailed black cockatoo species	Winter	2023-08-15	26
Zanda sp.	white-tailed black cockatoo species	Winter	2023-08-30	2
Zanda sp.	white-tailed black cockatoo species	Summer	2024-01-11	3
Zanda sp.	white-tailed black cockatoo species	Spring	2024-11-29	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-11-29	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-03	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-04	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-04	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-04	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-04	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-06	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-06	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-08	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-08	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-09	1

Name	Vernacular	Season	Date	Abundance
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-10	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-10	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-10	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-10	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-10	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-11	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-13	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-14	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-16	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-16	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-17	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-19	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-21	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-21	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-26	1
Zanda sp.	white-tailed black cockatoo species	Summer	2024-12-31	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-02	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-05	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-05	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-05	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-05	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-09	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-11	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-11	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1

Name	Vernacular	Season	Date	Abundance
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-12	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-13	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-13	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-14	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-14	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-14	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-16	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-17	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-17	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-18	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-19	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-22	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-23	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-24	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-27	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-01-29	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-02-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-02-01	1
Zanda sp.	white-tailed black cockatoo species	Summer	2025-02-01	1

Appendix 9 Black cockatoo potential nesting trees

The PNT dataset is too large to include here and is provided as separate digital dataset.

Appendix 10 Western Ringtail Possum habitat detailed quality scores per habitat

Fauna habitat	None	Low										Moderate							High						Total
	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	Total	5	5.5	6	6.5	7	7.5	Total	8	8.5	9	9.5	10	Total	
Bluegum plantation			415.4								**415.4**							**0**						**0**	**415.4**
Cleared	2,666.00										**0**							**0**						**0**	**2666**
Cleared - degraded sumpland	8.1										**0**							**0**						**0**	**8.1**
Dam	1.7										**0**							**0**						**0**	**1.7**
Marri-Jarrah-Peppermint woodland	32.5	2.9	3.7	10.9	27.9	20.1		5.1	4.2	13.6	**88.4**	9.6	21.7	4.7	36.9	28.1	2	**103**	1.7	27.2	2.6	0.3	66.2	**98.00**	**321.9**
Open woodland of Peppermint trees (degraded)	50.7		6.3	26	3.5	8.8				3.5	**48.1**							**0**						**0**	**98.8**
Pine plantation	1.6										**0**							**0**						**0**	**1.6**
Seasonally inundated paperbark woodland (wetland)		113.8	10.5	8.5	5.2		7				**145**							**0**						**0**	**145**
Seasonally inundated sedgeland (wetland)		40.3		16.2	0.2		50.3				**107**							**0**						**0**	**107**
Seasonally inundated shrubland (wetland)	5.1	51.8	9.5	10.2	2.7		46.8				**121**							**0**						**0**	**126.1**
Total area (ha)	**2,765.7**	**208.8**	**445.4**	**71.8**	**39.5**	**28.9**	**104.1**	**5.1**	**4.2**	**17.1**	**924.9**	**9.6**	**21.7**	**4.7**	**36.9**	**28.1**	**2.0**	**103.0**	**1.7**	**27.2**	**2.6**	**0.3**	**66.2**	**98.0**	**3,891.6**
% of study area per score	**71.1%**	**5.4%**	**11.4%**	**1.8%**	**1.0%**	**0.7%**	**2.7%**	**0.1%**	**0.1%**	**0.4%**	**23.8%**	**0.2%**	**0.6%**	**0.1%**	**0.9%**	**0.7%**	**0.1%**	**2.6%**	**0.0%**	**0.7%**	**0.1%**	**0.0%**	**1.7%**	**2.5%**	**100.0%**



Attachment 4 (RSD) - Appendix L

Bird and Bat Risk Assessment – Level Two

PHOENIX
ENVIRONMENTAL SCIENCES

Bird and bat risk assessment for a proposed wind farm in Scott River – Level Two investigation

Prepared for Synergy Renewable Energy Developments Pty Ltd

August 2025

Final v1.0



Bird and bat risk assessment for a proposed wind farm in Scott River–Level Two investigation

Prepared for Synergy Renewable Energy Developments Pty Ltd

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J. Clark	K. Crews	Addressed client comments	1.0	20-Aug-25	N. Bell

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ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
AGL	Above ground-level
BACI	Before, After, Control, Impact
BC Act	*Biodiversity Conservation Act 2016*
BIA	Bird/Bat Investigation Area
BBRAS	Bird and bat risk assessment survey
CAMBA	China-Australia Migratory Bird Agreement
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EAAF	East Asian-Australasian Flyway
EIA	Environmental impact assessment
EN	Endangered
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Areas
IBRA	Interim Biogeographic Regionalisation of Australia
JAMBA	Japan-Australia Migratory Bird Agreement
Mig.	Migratory
NES	National Environmental Significance
OS	Species otherwise in need of special protection
RAMSAR	A RAMSAR site is a wetland site designated to be of international importance under the Ramsar Convention
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RSA	Rotor swept area
SP	Specially protected
TEC	Threatened Ecological Community
VU	Vulnerable
WA	Western Australia
WAPC	Western Australian Planning Commission
WFA	Wind Farm Area

EXECUTIVE SUMMARY

Synergy Renewable Energy Developments Pty Ltd is investigating the feasibility of a Proposed Wind Farm in Scott River (the Project), located approximately 15 km north-east of Augusta, Western Australia. Phoenix Environmental Sciences Pty Ltd (Phoenix) has undertaken a bird and bat risk assessment survey (BBRAS) to identify potential risks to bird and bat species from the Project.

The BBRAS comprised:

- a desktop assessment (regional overview) to define the site and species characteristics
- bird and bat utilisation surveys undertaken over 2 years between May 2023 to March 2025
- risk assessment for species identified as potentially of concern for the Project based on the regional overview and field surveys.

An adaptive approach was taken for this survey program, with adjustments made to site locations after the completion of Year 1, following review of the first year of sampling results, and the provision of proposed turbine locations. The main 'study area' for this survey was the wind farm area (WFA), within which 20 turbines are proposed to be located. Site characterisation was conducted for the study area plus a 10 km buffer, referred to as the Bird/Bat Investigation Area (BIA). Regional reference sites on the Hardy Inlet (outside the BIA, except for one site) were added to the survey program in Year 2 to collect contextual regional data for Migratory shorebirds, in response to the Year 1 survey results. The study area is 3,882.2 ha and the BIA is 86,347.9 ha.

Fixed-point counts for birds were undertaken at a total of 28 sites, comprising 9 Impact sites, 14 Reference sites and 5 Regional reference sites. Echolocation recordings for bats were undertaken at all 16 Year 1 fixed-point count sites. Audio recordings for birds were also undertaken at the 16 Year 1 sites targeting 4 conservation significant species: Masked Owl (*Tyto novaehollandiae novaehollandiae*), Baudin's Cockatoo (*Zanda baudinii*), Carnaby's Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

In addition to the BBRAS, a Basic and Targeted fauna survey was conducted for the Project that is reported separately. Bird and bat species records from that survey, however, have only been included in this report where necessary, such as for the risk assessment conducted for potential species of concern. Fauna habitat mapping undertaken for the WFA in the Basic and Targeted survey was also utilised to in this report.

The Project site is located predominantly within the Warren Interim Biogeographic Regionalisation of Australia bioregion (Warren subregion). Large areas of intact forest occur north and east of the study area, with several conservation reserves present in the BIA. One nature reserve occurs within, but is excised from, the WFA boundary. Notable surface water features include the Scott River, located directly south of the WFA and the Blackwood River, which runs through the western and northern parts of the BIA outside the WFA and flows into the Hardy Inlet. The Beenup artificial wetlands created at the old Beenup mine are located ~1 km west of the WFA.

Topography of the WFA is generally flat/undulating. Three native wetland habitats are present, a mix of seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 9.7% of its extent. Two woodland habitats, Marri-Jarrah-Peppermint woodland and degraded Open woodland of Peppermint trees, are present and cover 10.7% of the study area. The remainder of the WFA (79.6%) is highly modified and mostly cleared paddock, much of which is inundated during winter.

The species characterisation identified 41 conservation significant species that may occur in the study area. This includes species listed as Threatened and/or Migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); species listed as Threatened, Conservation

Dependent, Otherwise in need of special protection and/or Migratory under the *Biodiversity Conservation Act 1999* (BC Act); and Priority species listed by the Department of Biodiversity, Conservation and Attractions. Records of 199 bird species and 7 bat species were identified within the area of the desktop searches.

A total of 313 fixed-point count samples taken from the 28 BBRAS sites resulted in a total bird species richness of 96 and total abundance of 13,471 birds. Bird species richness was lower at Impact sites (n=60), than at Reference sites (n=74). Species richness at Regional reference sites was 31; however, sampling at those sites represented just 2.5% of total sampling effort, therefore relative to survey effort, the Regional reference sites at Hardy Inlet are more species rich than the Impact and Reference sites. Abundance was also higher at the Regional reference sites when adjusted for survey effort.

Number of bird records and abundance counts were higher in Year 2 (1,599 records, 8,315 total abundance) compared with Year 1 (1,075 records, 5,156 total abundance), but this reflects a higher sampling effort conducted in Year 2.

Seasonally, autumn in Year 1 had the highest mean bird abundance followed by summer in Year 2 and winter in Year 1. Species richness was highest in summer of Year 2, spring of Year 2 and spring of Year 1. Other than total abundance in summer Year 2, the summary parameters did not vary substantially between seasons.

Eight bat species were recorded in the BBRAS, all of which were recorded at Impact sites, and 7 of which were recorded at Reference sites. Bats were detected in most (43 of 55) recording nights but at generally low activity levels in the WFA. Recorded bat activity was considerably higher in summer than in the other 3 seasons.

Fourteen bird species of conservation significance were recorded across the BBRAS survey and/or the Basic and Targeted fauna survey, including 7 that were recorded in the WFA and/or wider BIA (and likely to occur in the WFA), and 7 that were only recorded at Regional reference sites (variable likelihood of occurrence in the WFA). One conservation significant bat species was also recorded.

Based on the findings of the site and species characterisation, and the field surveys, 29 conservation significant species were considered potential species of concern to the Project, including 8 species that were recorded in the WFA or wider BIA (7 birds, one bat) and 21 additional significant species considered likely, or to possibly occur in the WFA, or possibly occur on rare occasion only. Based on the risk assessment conducted for these species, 3 were considered at moderate risk of impact from the Project, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. Two other conservation significant species were considered at low risk, Australasian Bittern and Western False Pipistrelle. Risk was assessed as negligible for the remaining 24 conservation significant species.

In addition to the conservation significant species, 11 non-significant raptors were identified as potential species of concern, as were the 7 other (non-significant) bat species recorded. Eight of these species (6 birds and 2 bats) were assessed as at low risk from the Project, Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, Brown Goshawk, Brown Falcon, Australian Kestrel, White-striped Free-tailed Bat and Southern Forest Bat. Risk rating was assessed as negligible for the remaining 10 species.

In conclusion, while the risk to most species is considered low to negligible, the data suggests that raising the minimum blade height to 50 m above ground-level would substantially reduce the risk to most species, including black cockatoos, leading to a 54% reduction in species flying within the RSA and just 3.8% of flights occurring within the RSA. As well as raising the minimum blade height, collision risk could be further reduced by limiting the concentration of turbines and maintaining a sufficient separation distance, approximately 100 m, between turbines and important habitat, to maintain adequate open areas for bird and bat movement.

1 INTRODUCTION

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is a wholly owned subsidiary of Synergy Pty Ltd located in Perth, Western Australia (WA). SynergyRED is investigating the feasibility of a proposed wind farm in Scott River (the Project), located approximately 15 km north-east of Augusta, WAFigure 1-1. In April 2023, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by SynergyRED to undertake a bird and bat risk assessment survey (BBRAS) for the Project in accordance with the approach outlined in Brett Lane and Associates (2005).

The renewable energy sector has grown rapidly in recent years, including wind farms, with guidance on bird and bat impact studies for proposed wind farms evolving in response to emerging knowledge. At the time of engagement, no detailed government authored methodology existed for conducting bird and bat risk assessments (and the supporting studies that inform these) for proposed wind farms. Interim guidance on bird and bat management by the Australian Government (DAWE 2021) provides a broad outline of key requirements of desktop studies, field surveys and impact risk assessments for onshore wind farms, and has been considered here. For detailed methods for conducting risk assessments for birds however, including the supporting desktop and field studies, Brett Lane and Associates (2005) is a current accepted approach.

In May 2024, after completion of field surveys, the Australian Government released new draft guidance for onshore windfarms (DCCEEW 2024) that provides an overarching framework for the referral, assessment and approval process for proposed onshore wind farm projects, with a focus on bird and bat management. DAWE (2021) and DCCEEW (2024) consider it best practice to conduct at least 24 months of site utilisation surveys to provide sufficient baseline data about bird and bat usage of the site and surrounds, with surveys conducted in each relevant season over this period.

This report presents the results of a two-year survey program for the Project. The work completed represents a Level Two investigation in line with Brett Lane and Associates (2005). At the commencement of the program no turbine layout was available and as such Impact and Reference sites could not be confidently placed. Sites were therefore located in areas considered most likely to support turbines at that time. In May 2024 a proposed turbine layout was provided. In response several sites were dropped and new sites established so that a balanced mix of Impact and Reference sites were achieved. Due to a lack of Migratory species being detected in Year 1, the decision was made to survey the Hardy Inlet as it is a known local hotspot for Migratory species, to compare the assemblage there with that of the WFA. These Regional reference sites were only sampled during the migratory season.

1.1 OBJECTIVES AND SCOPE OF WORK

The scope of work for the bird and bat risk assessment survey was as follows:

- undertake a Level Two investigation, comprising
    - regional overview
    - bird and bat utilisation surveys
    - risk assessment
- ensure the works completed satisfy the following guidelines, by employing adequate survey methodology and effort by suitably qualified and experienced practitioners
    - *Wind Farms and Birds: Interim Standards for Risk Assessment, Australian Wind Energy Association Report* (Brett Lane and Associates 2005)

- *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020)
- *EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed Migratory shorebird species* (DoEE 2017)
- *Survey guidelines for Australia's Threatened birds. Guidelines for detecting birds listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DEHWA 2010)
- *Survey guidelines for Australia's Threatened bats. Guidelines for detecting bats listed as Threatened under the Environmental Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

Where possible, this assessment has considered the new draft guidance: *Onshore Wind Farm Guidance: Best practice approaches when seeking approval under Australia's national environment law* (DCCEEW 2024).

The objectives of this study were to:

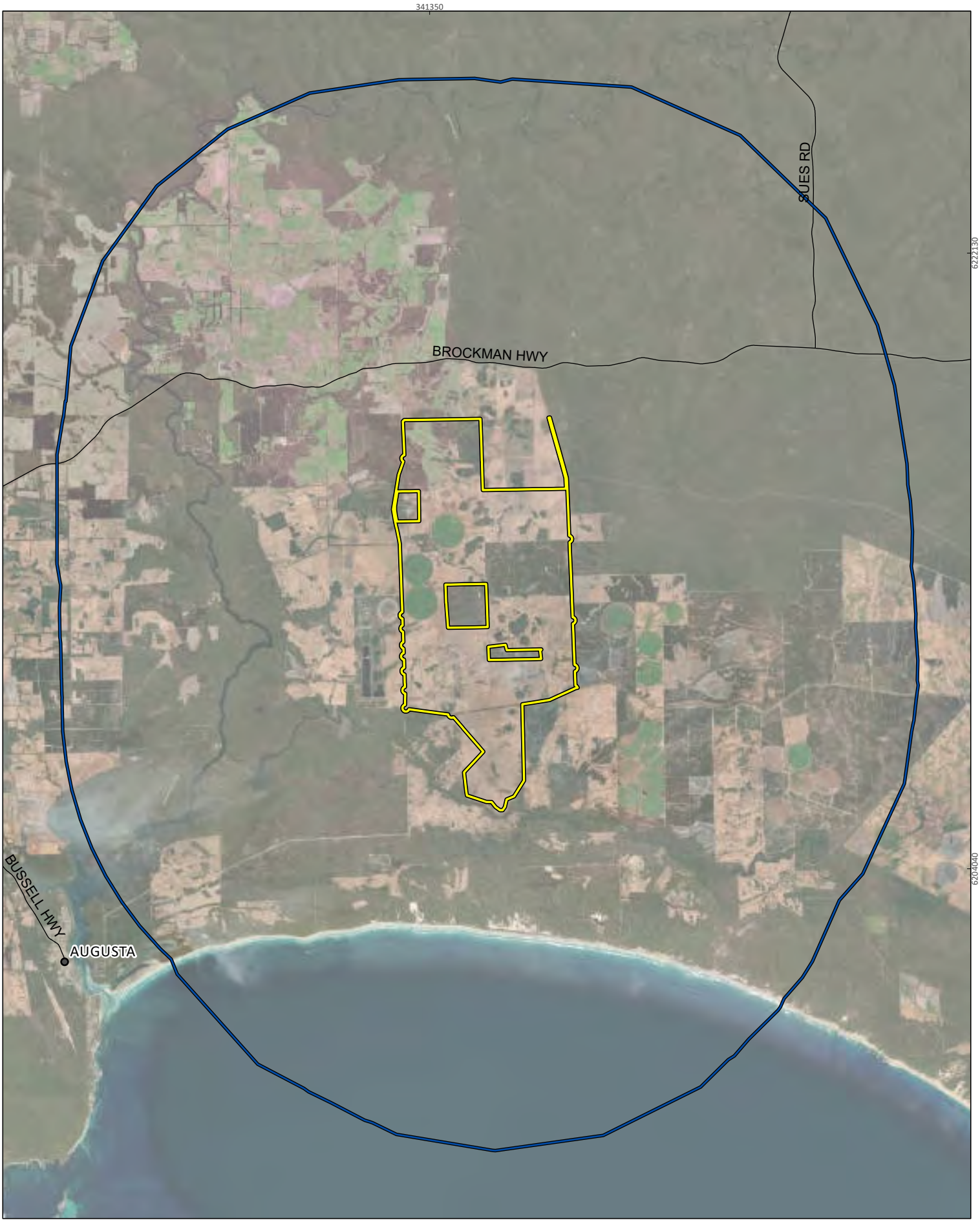
- collect sufficient information on site and species characteristics to inform a preliminary assessment of risks to birds and bats from the Project
- establish baseline monitoring sites for use in an ongoing monitoring program under a bird and bat management plan
- provide an assessment of risk to conservation significant and 'at-risk' birds and bats from the Project.

Phoenix also conducted a Basic and Targeted fauna survey for the Project in 2023/2024 (Phoenix 2025a). Species records from that survey have only been included in this report where necessary, such as for the risk assessment of conservation significant and other potential species of concern.

1.2 STUDY AREA

The main focus 'study area' for this survey was the wind farm area (WFA), within which turbines are proposed to be located (Figure 1-1). Site characterisation was conducted for the study area plus a 10 km buffer, referred to as the Bird/Bat Investigation Area (BIA; Figure 1-1). Regional reference sites on the Hardy Inlet included in Year 2 but are outside the BIA, except for 1 site further upstream, which is within the BIA but has been treated as a Regional reference site (see Section 3.2 for details).

The study area is 3,882.2 ha and the BIA is 86,347.9 ha.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	12/06/2025
Drawn by	BK
Map author	BA

0 2.5 5
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area
Roads

Figure 1-1

Project location and study area

PHOENIX ENVIRONMENTAL SCIENCES

2 LEGISLATIVE AND POLICY CONTEXT

Impacts to birds and bats from proposed wind farms need to be considered under both Federal and State environmental approval frameworks, i.e.:

- assessments of proposals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- assessments of proposals under Part IV of the State *Environmental Protection Act 1986* (EP Act).

2.1 COMMONWEALTH

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of National Environmental Significance (NES), require approval from the Australian Government Minister for the Environment (the Minister) through a formal referral process. The EPBC Act provides for the listing of both Threatened fauna, and Migratory bird species protected under international agreements, as matters of NES. When considering whether a proposed wind farm requires approval under the EPBC Act, the Minister must consider all adverse impacts to matters of NES resulting, either directly or indirectly, from the action (DCCEEW 2024).

Threatened fauna listed as matters of NES under the EPBC Act are assigned to one of 4 categories:

- Extinct in the Wild (EW)
- Critically Endangered (CR)
- Endangered (EN)
- Vulnerable (VU).

International agreements applicable to listed Migratory species are the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Convention on the Conservation of Migratory Species of Wild Animals (Bonn) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

2.2 STATE

In WA, proposals which, if implemented, are likely to have a significant impact on specified environmental factors, are assessed by the Environmental Protection Authority (EPA) and approved by the State Government Minister for the Environment under Part IV of the *Environmental Protection Act 1986* (EP Act). Assessment of potential impacts to birds and bats from proposed wind farms falls under the EPA's environmental factor 'terrestrial fauna'.

The EPA's objective for terrestrial fauna (EPA 2016) is "to protect terrestrial fauna so that biological diversity and ecological integrity are maintained". It recognises significant fauna species, habitats and assemblages as requiring consideration in environmental impact assessment (EIA). Significant fauna includes Threatened and Priority species, species with restricted distributions, species subject to historical impact from threatening processes and those providing important ecological functions. Fauna habitats may be significant if they provide habitat important to the life history of a significant species, i.e. breeding, feeding and roosting or aggregation areas, or where they are unique or isolated habitats in the landscape or region (EPA 2016).

The *Biodiversity Conservation Act 2016* (BC Act) provides for the listing of Threatened fauna species in WA under 3 categories (Government of Western Australia 2022): Critically Endangered (CR),

Endangered (EN) and Vulnerable (VU). The BC Act also provides for the listing of specially protected (SP) species under 3 categories: species of special conservation interest (conservation dependent fauna, CD), Migratory species (Mig.) including birds subject to international agreement and species otherwise in need of special protection (OS).

Priority fauna as identified by the Department of Biodiversity, Conservation and Attractions (DBCA) are not protected under the BC Act but are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna list are assigned to one of 4 Priority (P) categories, P1 (highest)–P4 (lowest), based on level of knowledge/concern.

2.3 POTENTIAL IMPACTS TO BIRDS AND BATS FROM PROPOSED WIND FARMS

Federal guidelines for wind farms (DAWE 2021; DCCEEW 2024; DEWHA 2009) identify the following as the main risks to birds and bats:

- direct impacts
    - habitat loss through clearing for turbines and other infrastructure
    - mortality or injury from collisions by birds or bats with operating wind turbines
    - mortality or injury from barotrauma (damage to body tissues from a drop in air pressure when animals fly too close to turbines)
- indirect impacts
    - displacement, when birds or bats avoid the area due to wind farm construction and operation (e.g. due to rotor movement, artificial noise or light sources), which can result in breeding disturbances or force longer flights to access feeding areas
    - alienation of important sites, such as those where Threatened species concentrate when roosting, feeding, breeding or on migration.

The potential for collision with turbines is often the most significant risk to birds and bats at wind farms. Risk to individual species is influenced by many factors including utilisation of the WFA, flight behaviour, flight heights, flight speeds, manoeuvrability, bird size and/or turbine parameters (such as turbine height, blade size-, rotor swept area) (Brett Lane and Associates 2005; Smales *et al.* 2013).

There is currently insufficient data to demonstrate barotrauma as a common cause of bird/bat mortality/injury from wind turbines. Different studies for bats have provided conflicting evidence (e.g. Baerwald *et al.* 2008; Lawson *et al.* 2020); limited research has been conducted for birds. The pressure variation necessary to cause barotrauma is so close to the blade surface that there is a higher probability of direct contact with blades (Guest & Hein 2023). Risk of barotrauma is therefore treated together here with collision risk.

Many studies have been conducted globally on the displacement effects of wind farms on birds and bats. A systematic review of 84 peer-reviewed studies (Tolvanen *et al.* 2023a) found that 63% of cases reported displacement for birds and 72% displacement for bats. Displacement effects on birds were variable across studies, groups and species, but included reduced bird density, reduced number of breeding birds, changes in flight behaviour and changes in selection of roosting and feeding areas (Tolvanen *et al.* 2023a). Waterfowl, raptors, passerines and waders were displaced on average up to 500 m in cases where displacement was observed. Bats were displaced on average up to 1 km, with responses influenced by the foraging environment and the echolocation range of particular species (Tolvanen *et al.* 2023a), for example species with short-range echolocation showed reduced abundance and activity around turbines.

Some studies have observed localised impacts (close to turbines) from turbine noise on birds or bats. For example, decline in abundance (Lehnardt *et al.* 2024) and masking of territorial defence behaviour (Zwart *et al.* 2016) has been observed in songbird species. Displacement of narrow-space foraging forest bats has also been potentially attributed to turbine noise (Ellerbrok *et al.* 2024). Lighting has been suggested to disturb birds and have adverse effects on communication (Gomez-Catasus et al 2018, 2022, Leddy et al 1999, in Tolvanen *et al.* 2023b). Red aviation lights have been also suggested as a reason for bat displacement (Barre *et al.* 2018).

EPBC Act Policy Statement 2.3 (DEWHA 2009), which provides guidance to proponents on whether referral of a wind farm proposal is required under the EPBC Act, identifies the following groups most at-risk and situations where they are most affected:

- waterbirds that are listed Threatened species, listed Migratory species, and/or part of the ecological character of a RAMSAR wetland
- seabirds that are listed Threatened species, listed Migratory species and/or part of the ecological character of a RAMSAR wetland–in the case of coastal and offshore wind farms
- listed Migratory species and listed Threatened species that migrate within Australia–where wind farms are situated on migration routes
- species that are at-risk of extinction (Endangered or Critically Endangered), particularly certain species of bats and birds where wind farms are situated on a site they frequent.

The matters of NES significant impact guidelines 1.1 (DoE 2013) and EPBC Act Policy Statement 3.21 (DoEE 2017), for Migratory shorebirds, provide guidance for assessing impacts to EPBC Act listed birds and bats.

In addition to listed Threatened or Migratory species, some non-conservation significant bird and bat species have been identified as being at-risk of impact from wind farms. Some raptor species, such as *Aquila audax* (Wedge-tailed Eagle) and *Falco cenchroides* (Australian Kestrel), are particularly vulnerable to collision risk due to their morphology, behaviour, flight type and habitat use (Dohm *et al.* 2019; Moloney *et al.* 2019a; Stark & Muir 2020b). Similarly, some bat species, such as *Austronomus australis* (White-striped Free-tailed Bat) and *Chalinolobus gouldii* (Gould's Wattled Bat), are frequently recorded in mortality monitoring at wind farms (Moloney *et al.* 2019a; Stark & Muir 2020b).

3 METHODS

The Level Two investigation was largely conducted in accordance with the methods described in Brett Lane and Associates (2005) and comprised the following:

- regional overview, entailing desktop assessment and site inspection to–
    - provide a qualitative overview of bird usage of the study area and the surrounding region
    - characterise the bird and bat species potentially occurring in or near the study area, including conservation significant species, i.e. those listed under the EPBC Act, BC Act and/or Priority species
    - define the study area characteristics and habitats in or near the study area
    - identify species or groups that are at-risk of potential impact and conduct a preliminary risk assessment
- on-ground surveys to ground-truth the results of the regional overview, including –
    - bird utilisation surveys
    - bat utilisation surveys
    - targeted species surveys.

Additional sampling was conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a) data from which was used in the risk assessment for conservation significant species and other species of potential concern.

The methods also largely comply, where applicable, with the other guidelines mentioned in the scope of work (Section 1.1) with respect to survey timing, replication, experience of practitioners and reporting standards. While Brett Lane and Associates (2005) specifically applies to birds, the overarching approach to the field surveys and risk assessment was also applied to bats, where possible. A significant departure from the bird observation methods was that bats were detected via echolocation recording rather than direct observation; therefore, it was not possible to determine flight heights, or distance and direction from the recording device. Further, basic biological attributes important to conducting a collision risk assessment for a windfarm, such as mean and maximum flight and foraging heights, are not known for many bat species.

3.1 REGIONAL OVERVIEW

3.1.1 Site characterisation

A preliminary site characterisation was undertaken by interrogating several desktop information sources on the region to identify potential habitat attributes for birds and bats in the BIA, including:

- Interim Biogeographic Regionalisation of Australia (IBRA) bioregions (DoEE 2016) and land systems (Purdie et al. 2004)
- conservation reserves
- Environmentally Sensitive Areas (ESAs) as gazetted under the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 (Government of Western Australia 2005)
- significant wetlands, including RAMSAR wetlands (DCCEEW 2019) and nationally important wetlands (DEWHA 2008)

- the occurrence of other wetlands and coastal habitats that could support listed Migratory species that could fly across the site, including geomorphic wetlands (WRC 2017)
- Threatened and Priority Ecological Communities of relevance to birds/bats
- geographical features evident on aerial photography (Google Earth®) that might concentrate bird or bat movements on or near the BIA, such as promontories, isthmuses, waterways and ridgelines with soaring birds of prey
- known or potential nesting, roosting or foraging areas for conservation significant birds/bats
- potential corridors or zones of bird/bat movement.

3.1.2 Species characterisation

Searches of several biological databases (at 10 km or 40 km buffer of the study area) were undertaken to identify and prepare a list of birds and bats, including conservation significant species, that may occur within the BIA (Table 3-1). A literature search was also conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the list developed from the database searches (Table 3-2).

Atlas of Living Australia data (ALA 2024) on Migratory shorebird records was interrogated for a larger area encompassing roughly the Cape Naturaliste to Cape Leeuwin region to determine when Migratory species arrive in the southwest.

A full potential assemblage list was developed for birds and bats from the regional overview. Desktop characterisation was undertaken for all conservation significant species. The following species characteristics were defined for each species:

- habitat preferences
- behaviour
- flight behaviour
- demographic factors.

Table 3-1 Database searches conducted for the regional overview

Database	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2023)	Approximate centre point of study area (115.300, -34.225) with 10 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2023c)	Study area plus a 10 km buffer
Dandjoo biodiversity data platform (formerly DBCA NatureMap Database) (DBCA 2023a)	Study area plus a 10 km buffer
BirdLife Birdata (Birdlife Australia 2023)	Study area plus a 10 km buffer
Index of Biodiversity Surveys for Assessment (IBSA) database (IBSA 2023) for nearby survey reports and data[1]	Study area plus a 40 km buffer

[1]No data was returned in this search.

Table 3-2 Survey reports included in the regional overview

Report author	Survey description	Project
LEC (1990)	Comprehensive fauna survey	Heavy minerals mine Beenup
Biota (2009)	Windfarm survey	Milyeannup wind farm terrestrial fauna survey

Report author	Survey description	Project
Ninox (2011)	Wetland bird monitoring	Beenup Mineral Sands Mine site 2005–2011
Litoria Ecoservices (2016)	Level 1 fauna assessment, Level 1 terrestrial vertebrate fauna	Expansion of recreational facilities at Gloucester Park, Margaret River
Litoria Ecoservices (2017)	Western Ringtail Possum habitat assessment	Augusta Boat Harbour to Dead Finish Pathway Project
ELM (2017)	Fauna assessment	Lot 2602 McDonald Road, Karridale Flora and Fauna Assessment
Harewood (2018)	Targeted vertebrate fauna survey assessment	Turner Caravan Park, Augusta
Ecosystem Solutions (2020)	Fauna significance assessment	Margaret River Senior High School (well outside BIA and therefore no records entered – reviewed for context only)

3.1.3 Initial site inspection

As it became apparent from the regional overview that potential species of concern were likely to utilise the study area, the initial site inspection was incorporated into the first bird and bat utilisation survey. The site inspection identified suitable habitat for conservation significant species, such as wetlands and remnant woodlands, and confirmed appropriate selection of survey sites.

3.2 FIELD SURVEYS

Field surveys were undertaken over 13 survey periods between May 2023 and March 2025 (Table 3-3). BBRAS survey effort per site is presented in Table 3-4. The following survey work was undertaken:

- bird utilisation surveys (section 3.2.1)
- bat utilisation surveys (section 3.2.2)
- audio recordings for Masked Owl and black cockatoos (section 3.2.3).

Table 3-3 Survey dates and personnel

Event/Round	Season	Dates	Personnel[1]	Area
1	Autumn	24–26 May 2023	J. Clark, B. Wykes	WFA, BIA
2	Winter	14–16 August 2023	J. Clark, B. Wykes	WFA, BIA
3	Spring	17–20 November 2023	B. Wykes, S. Pynt	WFA, BIA
4	Summer	10–12 January 2024	J. Clark, B. Wykes	WFA, BIA
5	Spring	27–30 September 2024	B. Wykes, A. Green	WFA, Hardy Inlet
6	Spring	17–18, 21 October 2024	B. Wykes, A. Green	WFA
7	Spring	13–14 November 2024	B. Wykes, A. Green	WFA
8	Summer	2 December 2024	B. Wykes, A. Green	Hardy Inlet
9	Summer	11–12 December 2024	B. Wykes, A. Green	WFA
10	Summer	16–17 January 2025	B. Wykes, A. Green	WFA
11	Summer	13–14 February 2025	B. Wykes, A. Green	WFA
12	Autumn	06–07 March 2025	B. Wykes, A. Green	WFA

[1]Jarrad Clark (BSc Env. Mgt), Boyd Wykes (BSc Science (Hons); PhD Zoology), Simon Pynt (BSc Zoology).

Systematic Impact and Reference sites were established for the BBRAS surveys to support a future monitoring program for the Project based on the Before-After Control-Impact (BACI) framework. At

the time of commencement of the Year 1 surveys, proposed turbine locations were not known, therefore systematic BBRAS sites were selected based on general distribution relative to key environmental values (e.g. wetlands) and proximity to the most likely turbine locations. Sites selected inside the study area were classified as Impact sites and sites outside the study area were classified as Reference sites in Year 1 of the survey program.

At the completion of Year 1 sampling, the data was reviewed and soon after that turbine locations became available. An adaptive approach was taken and the decision made to adjust sites in order to respond to identified data gaps and better reflect the BACI framework, given that Impact and Reference sites could now be confidently assigned. Impact sites were classified as any site located <500 m from a proposed turbine, and Reference sites located between 500 m and 1,500 m of turbines. Accordingly, some sites were re-classified.

The identified data gaps following Year 1 surveys were associated with Migratory shorebirds and black cockatoos. The Migratory birds were addressed in this program by sampling intensively through the migratory shorebird season within the WFA, and by expanding the survey to include Regional reference sites at the Hardy Inlet (between 10 and 14 km from the study area) to collect contextual data on Migratory shorebird activity. Further survey effort concerning black cockatoo foraging, breeding and roosting was also undertaken during the breeding season for all 3 species, and is reported in Phoenix (2025a).

A total of 28 sites were sampled over the survey program (Table 3-4; Figure 3-1; Appendix 1). Sixteen sites were sampled in Year 1 between autumn 2023 and summer 2024 (i.e., one sample event per season). Significant revisions were subsequently made to site selection following the completion of the Year 1 surveys, with 12 new sites added. Ten original sites from Year 1 were not resampled in Year 2. Changes were made in response to findings from the Year 1 surveys, and most importantly in relation to the proposed turbine placement. In total, 18 sites were sampled monthly in Year 2 between September 2024 (spring) and March 2025 (autumn; Table 3-4).

Based on the proposed turbine placement, 9 sites are classified as Impact sites (< 500 m from turbines) and 14 are classified as Reference sites (500–1,500 m from turbines), with 5 additional Regional reference sites located at the Hardy Inlet (Table 3-4; Figure 3-1). Two sites (BUS035 and BUS012; Table 3-4) were only sampled in a single season in Year 1 due to land access constraints.

In addition, the Basic and Targeted fauna survey (Phoenix 2025a) included habitat assessments, systematic avifauna censusing, additional bat echolocation recordings, acoustic surveys for Australasian Bittern and habitat assessments for black cockatoos (Table 3-5). This suite of additional work provided supplementary data for the study area in lieu of roaming surveys recommended by Brett Lane and Associates (2005). Opportunistic records of birds were also made whenever observed during both the BBRAS and basic/targeted survey.

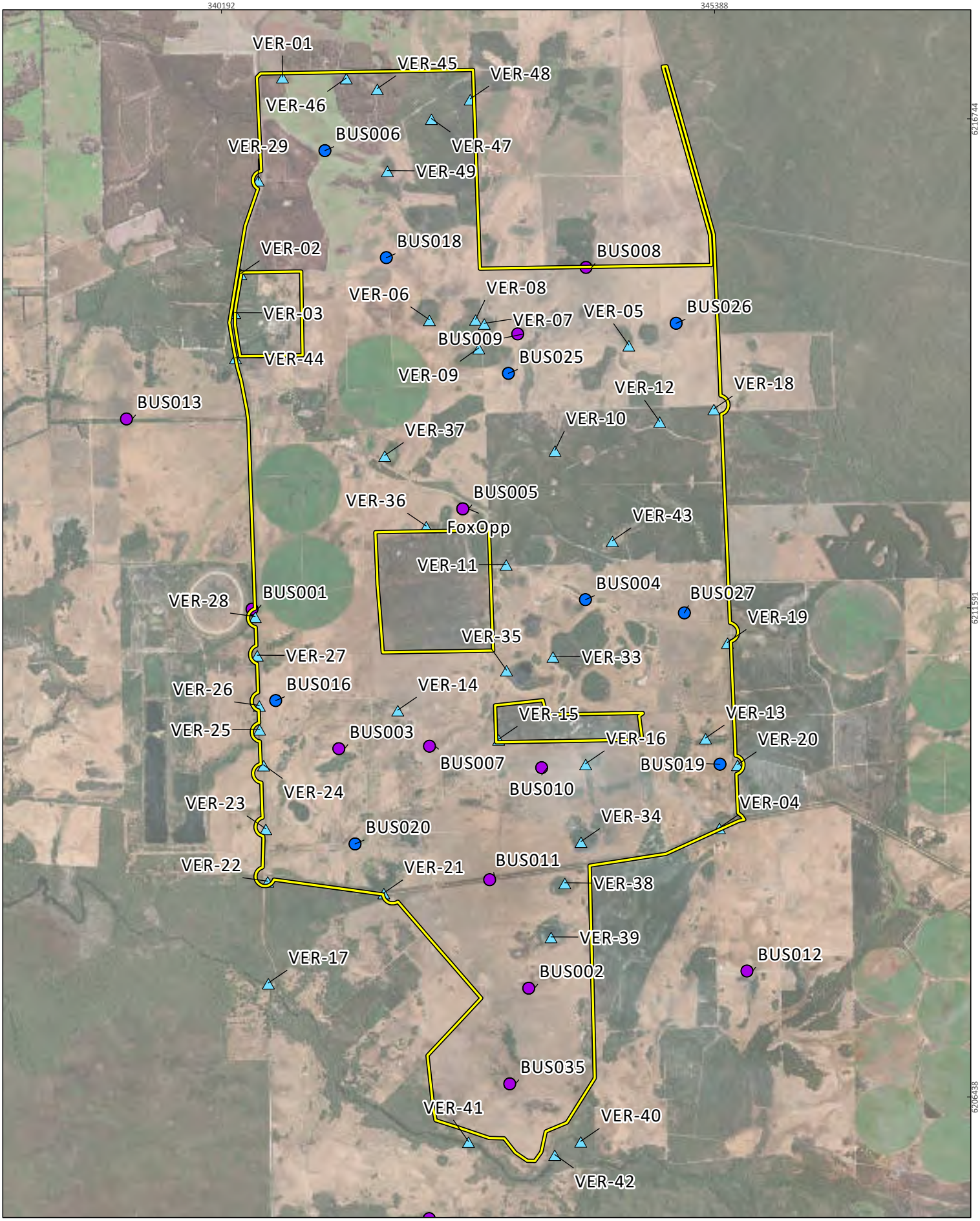
Table 3-4 Sample effort–BBRAS

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
Impact	BUS004	Yr1	Autumn	60		1
		Yr1	Winter	30		
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS006	Yr1	Autumn	60		3

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS016	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS018	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS019	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS020	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS025	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS026	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS027	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
Reference	BUS001	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS002	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS003	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS005	Yr1	Autumn	60		1
		Yr1	Winter	30		
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS007	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS008	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring		1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS009	Yr1	Autumn	60		1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS010	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS011	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	30	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS012	Yr1	Winter	60	1	1
	BUS013	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS014	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS015	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS035	Yr1	Spring	60	1	1
Regional ref.	BUS030	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS031	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS032	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS033	Yr2	Spring	30		
	BUS034	Yr2	Spring	30		

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr2	Summer	30		
Total effort				**150 hours**	**55 nights**	**71 nights**





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	KC

0 1 2
Kilometers

1:51,526 (at A4) GDA 1994 MGA Zone 50

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Study area
Basic and targeted survey sites (Phoenix 2025)

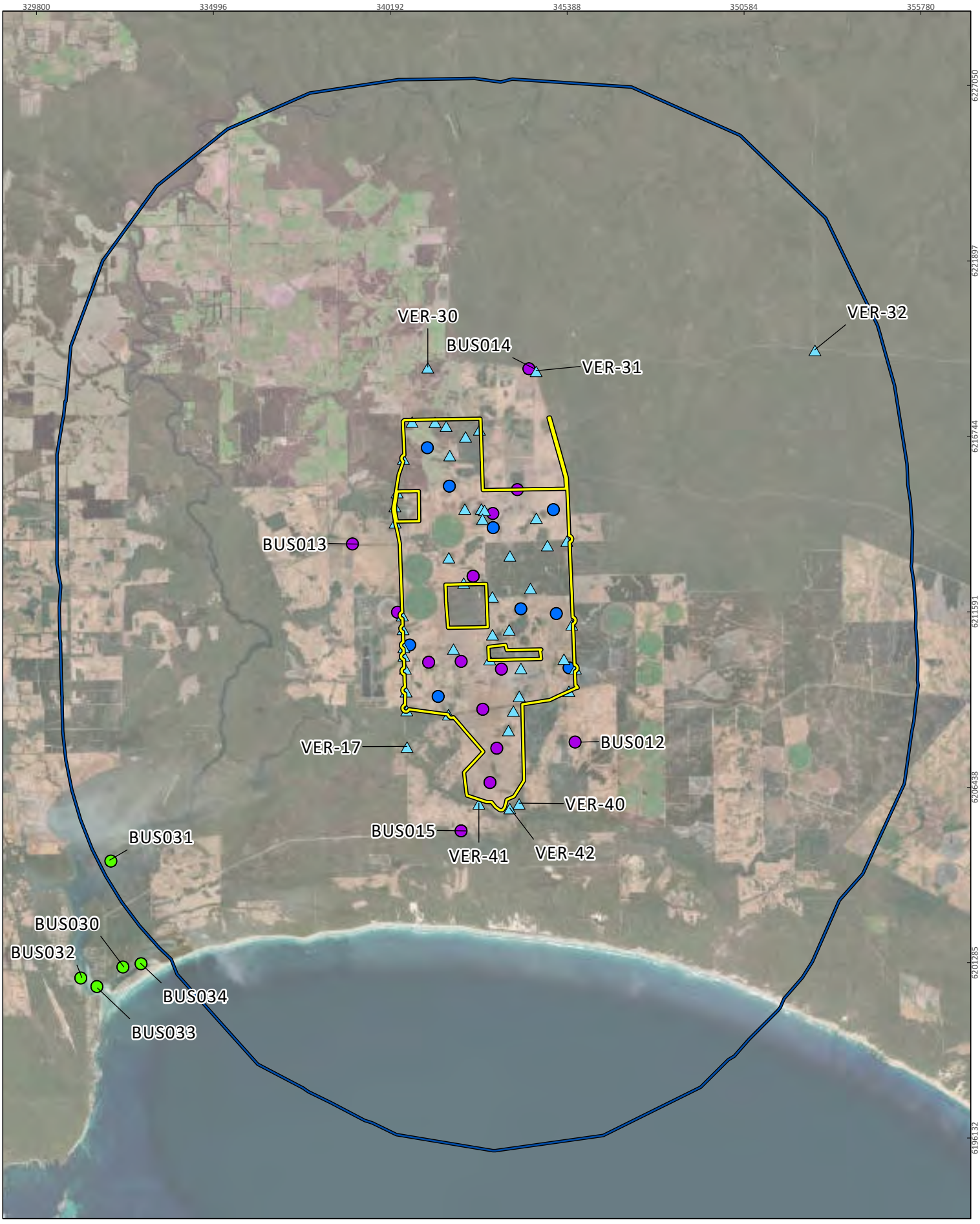
BBRAS sites

Impact
Reference

Figure 3-1a

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Scott River Wind Fam

Project No	1585
Date	12/06/2025
Drawn by	BK
Map author	KC

0 2.5 5
Kilometers

1:143,600(at A4) GDA 1994 MGA Zone 50

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- Study area
- Bird/Bat Investigation Area
- Basic and targeted survey sites (Phoenix 2025)

BBRAS sites

- Impact
- Reference
- Regional reference

Figure 3-1b

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES

3.2.1 Bird utilisation surveys

The utilisation surveys aimed to generate quantitative data on birds within the study area and surrounds. The data was used to estimate likelihood of impact and provide a ranked abundance of species use of the site, for birds at varying heights. The bird utilisation survey comprised:

- fixed-point counts at 28 locations (9 Impact sites, 14 Reference sites and 5 Regional reference sites) undertaken for 30 minutes each sample event, within a radius of 100 m for small birds and 800 m for larger birds (e.g. raptors like Wedge-tailed Eagle)
- between 2 and 6 counts conducted in each survey phase at most Impact and Reference sites, including morning and afternoon counts
- Regional reference sites were sampled once each in spring and autumn, they were accessed by boat sampled at variable times during the day dependent on tide and weather conditions.

Total survey effort of the bird utilisation surveys was 150 hours, comprising 63.5 hours from Impact sites, 82.0 hours from Reference sites and 4.5 hours at Regional reference sites (Table 3-4Table 3-4). The following parameters were recorded:

- the bird's distance from the fixed location, where a range finder was used to measure the distance to various reference points from which distance could be estimated
- estimated height so that presence and abundance can be related back to the potential rotor swept area (RSA) height – in Year 1, height was recorded within one of 5 height categories; this was changed to actual height estimates in Year 2 to inform collision risk modelling but also classified, per year 1, post-field
- the direction of each bird/flock sighted to the nearest 45 degrees of the compass
- and if flying across the landscape, the direction to and from, also to the nearest 45 degrees of the compass.

The flight height categories applied in Year 1 were:

Below the RSA

1) 0-24 m

RSA

2) 25-50 m
3) 51-75 m
4) 76-150 m
5) 151-250 m

Above RSA

6) >250 m.

Habitat descriptions were recorded at all sites (Appendix 2).

Due to the adaptive approach taken in the survey program, sample effort was variable between some sites and was therefore not consistent when analysing the data between years, seasons, and location (i.e. Impact vs Reference). To account for this most analyses and presented data uses summary statistics, such as mean and median counts, per 30-minute sample, or per species. In some cases, however, the data had to be aggregated over an entire sites' dataset.

3.2.2 Bat utilisation surveys

Bat utilisation surveys were undertaken during Year 1 of the survey program. The utilisation surveys aimed to generate quantitative data on bats within the study area and surrounds. The data was used to estimate likelihood of impact and provide a ranked abundance of species use of the site.

Echolocation recorders were placed at all 16 Year 1 sites at ~1 m high (Figure 3-1). In each sample period, the recorders were operated for one night, unless conditions were windy (~>20 knots), in which case additional nights were completed. The echolocation recorders were typically operated from 30 minutes before sunset to 30 minutes after sunrise; therefore, total recording hours changed each season. A total of 71 nights of echolocation recordings were gathered, comprising 60 nights from Reference sites and 11 nights from Impact sites (Table 3-4).

The echolocation data was analysed by Bob Bullen of WA Bat Call, with the species list and number of calls being provided per half hour, so that temporal activity could be analysed if needed, for example, where rotor management might be required to mitigate impacts to an important bat species that frequents an area at particular times. It must be noted however, that the number of bat calls detected is not the equivalent of abundance as recorded for directly observed birds. For example, 100 calls from a bat species in a 30-minute period could be 100 individuals calling once each as they fly past or could be one individual calling 100 times as it actively hunts in close proximity to the recorder. The number of calls is therefore considered a surrogate for abundance.

Level of activity for each bat species was reported as the mean number of calls, being the sum of calls divided by the number of detections. Activity level for each species was assigned to one of 3 categories, based on all sites and samples, as follows:

- Low - 0–4.0
- Moderate- 4.1–11
- High - >11.

As bat presence was only assessed using ultrasonic recorders flight height and direction data were not captured.

3.2.3 Audio recordings for significant bird species

In autumn 2023, during the Basic and Targeted fauna survey, an audio recorder opportunistically positioned on the Scott River (on the Scott River Road crossing; site Mowl01 on Figure 3-1) detected Masked Owl (*Tyto novaehollandiae novaehollandiae*; P3). Consequently, audio recorders were placed at each of the 16 sample sites for subsequent sampling periods in Year 1, with most sites sampled in each of the remaining 3 periods. The recorders were operated from 30 minutes before sunset to 30 minutes after sunriseTable 3-4.

Analysis of the audio data was undertaken by Patrick Williams and Jarrad Clark of Phoenix. The analysis focused on Masked Owl and the 3 black cockatoo species (Baudin's Cockatoo *Zanda baudinii*, EN; Carnaby's Cockatoo *Zanda latirostris*, EN and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*, VU) as the most likely and easily detected species possibly occurring.

In total, 55 nights of bird data was gathered and analysed using Kaleidoscope Pro v5.6.4. Fifty example calls of Masked Owl were utilised to create a simple classifier to identify Masked Owl calls within the raw data. For black cockatoos, the full audio dataset was analysed using cluster analysis and all sounds were grouped into clusters based on their characteristics; this analysis typically assigns one or more species to a cluster. Clusters containing black cockatoo calls were identified and the entire cluster then screened. The black cockatoo calls were identified to species level where possible.

3.2.4 Surveys conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a)

The following additional survey work relevant to birds and bats was undertaken as part of the Basic and Targeted fauna survey (Phoenix 2025a), over 3 survey phases (Figure 3-1):

Phase 1

- Site reconnaissance, wetland boundary mapping review, habitat descriptions and waterbird records at sites across the WFA (Appendix 1)

Phase 2

- systematic avifauna censusing (20-minute censuses) at 17 sites, in all main habitat types (additional 11.8 hours; Table 3-5)
- additional bat echolocation recordings (Song Meter SM2 recordings) at 4 sites, deployed for 4 nights, positioned in areas of habitat likely to have increased bat activity (additional 14 nights; Table 3-5)
- acoustic surveys for Australasian Bittern (*Botaurus poiciloptilus*; EN), with autonomous recording units (ARUs) employed at 5 sites in Phase 1 in suitable habitat for the species (additional 19 nights; Table 3-5)

Phase 3

- acoustic recordings for black cockatoos at 7 sites located in remnants that contained potential breeding trees (PNT) with hollows and/or black cockatoo records (additional 224 nights; Table 3-5)
- night roosting/breeding surveillance for black cockatoos at 19 sites over 11 evenings around the periphery of the study area to detect any movements into the WFA (additional 34.3 hours)
- breeding tree, foraging habitat quality and roosting habitat assessments for black cockatoos.

Table 3-5 Survey effort from Basic and Targeted fauna survey (Phoenix 2025a) relevant to birds and bats

Site name[4]	Phase	Sampling method			
		Avifauna census (min.)	Audio recording (nights)	Ultrasonic recording (nights)	BC roosting/ breeding surveillance (min.)
Mowl01	1		1[1]		
VER-16	2	60			
VER-17	2		3[2]	2	
VER-21	2	40			
VER-22	2	40			
VER-30	2	40			
VER-31	2	40			
VER-33	2		4[2]		
VER-35	2	40			
VER-36	2	40			
VER-37	2	40			
VER-39	2	40			
VER-40	2	50	4[2]		
VER-41	2		4[2]		
VER-42	2	40	4[2]		
VER-43	2			4	
VER-44	2			4	
VER-46	2	40		4	
VER-49	2	40			
BCRoosting01	3				240
BCRoosting02	3				60
BCRoosting03	3				120
BCRoosting04	3				210
BCRoosting05	3				65
BCRoosting06	3				150
BCRoosting07	3				90
BCRoosting09	3				65
BCRoosting10	3				105
BCRoosting11	3				80
BCRoosting12	3				60
BCRoosting13	3				60
BCRoosting14	3				60
BCRoosting15	3				70
BCRoosting16	3				70
BCRoosting17	3				90
Birding01	3				120
Birding02	3				130
Birding03	3				220
Opp20	3	20			
SM4-01	3		39[3]		
SM4-02	3		39[3]		
SM4-03	3		1[3]		
SM4-04	3		40[3]		
SM4-05	3		34[3]		

Site name[4]	Phase	Sampling method			
		Avifauna census (min.)	Audio recording (nights)	Ultrasonic recording (nights)	BC roosting/ breeding surveillance (min.)
SM4-06	3		13[3]		
SM4-07	3		38[3]		
Wetland01	3	20			
Wetland02	3	80			
Wetland03	3	40			
Total effort		**11.8 hrs**	**224 nights**	**14 nights**	**34.4 hrs**

1 - Opportunistic audio recording. 2 - Audio recording targeting Australian Bittern. 3 - Audio recording targeting black cockatoos. 4 - additional sites and species records collected through additional sampling techniques not relevant to this report.

3.3 LIKELIHOOD OF OCCURRENCE ASSESSMENT / POTENTIAL SPECIES OF CONCERN

The likelihood of occurrence for each conservation significant bird/bat species identified in the desktop review, and/or recorded in the field surveys, was assessed and assigned to one of 5 ratings:

- Recorded - species recorded within the study area by previous or current survey.
- Likely - study area within current known range of species, nearby (within 10 km) recent/relatively recent (within the last 10 years) records, suitable habitat within the study area.
- Possible - study area within current known range of species, suitable or potentially suitable habitat within the study area present, no nearby recent/relatively recent (within the last 10 years) desktop records or species has a wide home range and utilises a wide variety of habitats.
- 'Possible (rare)' - for Migratory listed species whose preferred/core foraging habitat is not present, but the study area contains marginal or rarely used habitat; species is rare in the region; occurs in very low numbers.
- Unlikely - study area outside current known range of species, no suitable habitat present in study area, very old desktop records only.

For Migratory shorebirds, the likelihood of occurrence assessment also considered the seasonal availability of suitable habitat as well as the timing of when they are likely to be present in the southwest.

Any conservation significant species that was recorded in the study area, or considered likely, or to possibly occur was classified as a potential species of concern. Species considered unlikely, or unlikely (rare), were not considered at-risk from the Project and therefore not considered further in the risk assessment. All pelagic species were discounted at the desktop review (regional overview) stage as it was determined that the study area is too far inland for any of these to occur. Likelihood of occurrence of all other species was assessed following the field surveys.

Other raptor and bat species recorded in the survey were also included as potential species of concern due to some species from these groups being known to be at-risk from turbine strike (see Section 2.3).

3.4 ANALYSIS OF SURVEY COMPLETENESS

Species accumulation curves were produced on an abundance basis using PRIMER V6 (Clarke & Gorley 2006) to obtain an estimate of survey completeness, i.e., whether the sample effort and methods used produced a dataset that can be considered representative of the bird and bat assemblage present in the study area. Three indices were calculated separately for birds (fixed-point count data) and bats (echolocation data) as the survey methods were different; Chao2, Jacknife2, Bootstrap. All samples per method were included and no data transformation was undertaken. The maximum permutations were set at 999. The resultant data for each indices was then plotted as a line graph within Primer6 and the data analysed with respect to the projected number of species each indices generated.

3.5 RISK ASSESSMENT

A risk assessment framework was developed to evaluate the potential risk of impact on potential species of concern from the Project. The approach assesses risk using a combination of likelihood and consequence of impact, in accordance with relevant Australian standards for risk management (Standards Australia 2018). While the framework is primarily based on collision risk, the risk assessment also considered other impacts of displacement/avoidance, and habitat loss.

Likelihood of direct impact from collision with turbines was classified into 5 categories, which considered desktop and survey records for each species with regard to likelihood of occurrence, utilisation of the study area, frequency of records, flock size, flight heights and available data on observed windfarm mortalities (Table 3-6). Mortality monitoring data for WA windfarms is not readily publicly available. Data on bird and bat windfarm mortalities was therefore obtained from 3 main sources that have collated post-construction mortality monitoring records from multiple windfarm sites in eastern Australia[1]:

- EcoLogical Australia (2025), memo provided for this Project, reviewed species of concern against ELA's database of available monitoring reports from windfarm operations in eastern Australia (includes monitoring reports from 16 windfarms as well as compilated studies)
- Moloney *et al.* (2019b), collated data from mortality surveys at 15 Victorian windfarms
- Stark and Muir (2020a), collated data from mortality surveys 10 windfarms in SE Australia.

For the 3 WA endemic black cockatoo species, *Zanda funerea* (Yellow-tailed Black Cockatoo) has been considered a suitable surrogate due to similarities in morphology, habitat and foraging and flight characteristics (EcoLogical Australia 2025). Consequence of impact was classified into 5 categories, from insignificant to severe based on estimated loss of individuals relative to local, regional, State or East Asian-Australasian Flyway (EAAF) population for Migratory species (Table 3-7). The consequence categories for Migratory shorebirds were established with consideration to the industry guidelines for assessment impacts to EPBC Act listed Migratory shorebirds (DoEE 2017). Collision risk modelling has not yet been completed and therefore is not considered in the risk assessment.

The risk matrix is provided in Table 3-8. Where the risk assessment for a species is determined to be low–negligible, no further action is required. Where the risk is perceived to be moderate–extreme, further studies, or mitigation actions, such as modifications to the wind farm design, should be considered to reduce the residual risk, or risk remaining after mitigation, to acceptable levels.

A risk assessment was conducted for all potential species of concern (see section 3.3) using the framework below and considering the species characterisation profile and field survey results.

[1] Note that there are overlaps between these literature sources.

Table 3-6 Likelihood of direct impact definitions

Likelihood	Birds	Bats
Almost certain	It is very probable that the risk event could happen in any year. • species recorded frequently (>5 times) and/or in large numbers (>30 individuals) within the RSA of the WFA; **AND** • has observed windfarm mortality.	It is very probable that the risk event could happen in any year. • species displays **high** activity levels[1] within the WFA; **AND** • suspected to fly at heights within the RSA of the WFA; **AND** • has observed windfarm mortality.
Likely	It is more probable that the risk event could happen in any year. • species recorded frequently (>5 times) and/or in large numbers (>30 individuals) within the RSA of the WFA; **AND** • has no observed windfarm mortality.	It is more probable that the risk event could happen in any year. • species displays **moderate** activity levels[1] within the WFA; **AND** • suspected to fly at heights within the RSA of the WFA; **AND** • has no observed windfarm mortality.
Potential	It is equally probable that the risk event could happen in any year. • species recorded infrequently within the WFA, or considered likely or to possibly occur (Section 3.3); **AND** • is known or suspected to fly within the RSA of the WFA and/or has observed windfarm mortality.	It is equally probable that the risk event could happen in any year. • species displays **low** activity levels[1] within the WFA, **OR** considered likely or to possibly occur (Section 3.3); **AND** • suspected to fly at heights within the RSA of the WFA or in open/uncluttered air spaces and/or has observed windfarm mortality.
Unlikely	It is less probable that the risk event could happen in any year. • species recorded within the WFA or considered likely or to possibly occur (Section 3.3); **AND** • is not known or suspected to fly within the RSA of the WFA and has no observed windfarm mortality. **OR** • species is considered to possibly occur within the WFA but only on rare occasions; **AND** • is known or suspected to fly within the RSA of the WFA and/or has observed windfarm mortality.	It is less probable that the risk event could happen in any year. • species has not been recorded but is considered likely or to possibly occur within the WFA (Section 3.3); **AND** • is not suspected to fly at heights within the RSA of the WFA or in open/uncluttered air spaces and has no observed windfarm mortality.
Rare	It is improbable that the risk event could happen in any year. • species has not been recorded but is considered to possibly occur within the WFA but only on rare occasions (Section 3.3); **AND**	It is improbable that the risk event could happen in any year. • species has been recorded, or considered likely or to possibly occur within the WFA (Section 3.3); **AND**

Likelihood	Birds	Bats
	• species is unlikely to fly within the RSA of the WFA and has no observed windfarm mortality.	• is unlikely to fly within the RSA of the WFA, given foraging and movement behaviour is restricted to cluttered air space, and has no observed windfarm mortality.

1 – see activity level thresholds in section 3.2.2.

Table 3-7 Consequence definitions

Consequence	Description	Group
Severe	Loss of greater than 1% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction in population viability for a period of at least 10 years.	All other birds + bats
Significant	Loss of at least 0.1% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction population viability for between 5 and 10 years.	All other birds + bats
Medium	Loss of at least 0.05% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to minor reduction in population viability for between one and 5 years.	All other birds + bats
Minor	Undetectable (<0.05%) loss of EAAF population over 10 years.	Migratory shorebirds
	Occasional loss of small numbers of individuals but no reduction in population viability.	All other birds + bats
Insignificant	Undetectable loss (<0.005%) of EAAF population over 10 years.	Migratory shorebirds
	Rare loss of individuals but no reduction in population viability.	All other birds + bats

Table 3-8 Risk matrix based on likelihood and consequence

Likelihood	Consequence				
	Insignificant	Minor	Medium	Significant	Severe
Almost certain	Negligible	Low	High	Extreme	Extreme
Likely	Negligible	Low	Moderate	High	Extreme
Potential	Negligible	Low	Moderate	High	High
Unlikely	Negligible	Negligible	Low	Moderate	Moderate
Rare	Negligible	Negligible	Negligible	Low	Moderate

4 REGIONAL OVERVIEW

4.1 SITE CHARACTERISATION

4.1.1 Regional environment

The study area is located predominantly within the Warren IBRA bioregion (Warren subregion, WAR01), with a small portion in the Southern Jarrah Forest subregion (JAF02) of the Jarrah Forest bioregion (Figure 4-1). The Warren bioregion contains low Jarrah woodlands and paperbark/sedge swamps on leached sandy soils in depressions and plains, *Agonis flexuosa* and *Banksia* woodlands and heaths, on Holocene marine dunes, Jarrah-Marri forest on laterites and Karri forest on loamy soils (May & McKenzie 2003).

The wider BIA extends more fully into the Southern Jarrah Forest subregion, with large areas of intact forest present to the north and east of the study area (Figure 1-1; Figure 4-1). This subregion contains Jarrah-Marri forest on laterite gravels, Jarrah forest mosaics with a variety of species rich shrublands on Mesozoic sediments and *Agonis* shrublands on eluvial and alluvial deposits (May & McKenzie 2003). Regional vegetation complexes mapped for the southwest forests (DBCA 2018) delineated 12 vegetation complexes within the BIA that broadly include:

- *Eucalyptus marginata* subsp*. marginata-Corymbia calophylla* woodlands and open forests, sometimes with *Banksia grandis*, *Agonis flexuosa*, *Allocasuarina fraseriana*
- tall open *Eucalyptus diversicolor* forest, sometimes with *Corymbia calophylla*
- *Melaleuca rhaphiophylla* woodland
- low open *Banksia attenuata-Nuytsia floribunda* woodland
- open *Corymbia calophylla* woodland with *Eucalyptus patens*, *E. megacarpa*, with tall shrubland of *Agonis* species
- *Eucalyptus rudis-Melaleuca rhaphiophylla* woodland
- woodland of *Eucalyptus patens- Corymbia calophylla*.

Many of these vegetation complexes contain key black cockatoo foraging, nesting and/or roosting plant species, such as *Acacia saligna*, *Agonis flexuosa*, *Banksia attenuata*, *B. grandis*, *B. littoralis*, *C. calophylla*, *Eucalyptus marginata*, *E. patens* and *E. megacarpa*.

Topography of the study area is generally flat/undulating. There are no obvious topographic features that may cause updraft areas for birds or bats.

Numerous conservation reserves, national parks and state forests occur within the BIA (DBCA 2025b) (Figure 4-2). The large area of intact remnant vegetation to the north-east of the study area (Figure 1-1) is gazetted as several contiguous reserves: Blackwood River National Park, Milyeannup National Park, Wiltshire-Butler National Park, Unnamed National Park R46400, Chester Nature Reserve, Pagett Nature Reserve, South Blackwood State Forest, Milyeannup State Forest, Timber Reserve O12925 and Timber Reserve O20125. Scott National Park is located south-west of the study area, within the BIA, and Gingilup Swamps Nature Reserve is located south-east, also within the BIA (Figure 4-2).

Nature Reserve R42377 occurs within the boundaries of the study area but is excluded from the WFA. There is also a large vegetated remnant in the centre of, but excised from, the study area that is of interested to DBCA (DBCA 2025a) (Figure 4-2).

Most of the reserves (i.e. the national parks and nature reserves) are gazetted for the purpose of conservation of flora and fauna. These provide habitat for conservation significant birds and bats.

While state forests are not specifically reserved for the conservation of fauna, they also provide habitat for conservation significant birds and bats.

One Priority Ecological Community (PEC), Subtropical and Temperate Coastal Saltmarsh, located to the south-west of the study area on the Hardy Inlet (Figure 4-2), contains features of habitat value to Migratory shorebirds. The description for the PEC includes "occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic" (DBCA 2023b).

The gazetted ESA dataset (DWER 2023), which lists areas of high conservation value, shows 61 ESAs intersecting the study area, collectively covering most (99%) of the study area (Figure 4-3). These appear to be associated with Threatened flora, TECs and wetlands, the latter being potentially relevant to conservation significant birds. The mapped polygons encompass buffers for these values, typically 50 m for Threatened flora and between 500 m – 2,000 m for TEC, therefore the extent of actual ESAs in the study area is much lower than the mapped ESA polygons.

No RAMSAR sites are located in or near the BIA. The nearest RAMSAR wetland to the BIA is the Vasse-Wonnerup system, located ~48 km to the north. The 'Blackwood River (Lower Reaches) and Tributaries System' is listed as a nationally important wetland located ~4.5 km west of the study area at its closest point, within the BIA (Figure 4-4). This site comprises the lower reaches of the Blackwood River and associated minor tributaries (DCCEEW 2022). It contains riparian vegetation that includes fringing open-forest and open/closed-scrub which supports waterfowl in modest numbers, but the listing is not specifically associated with any conservation significant bird or bat species. The next closest nationally important wetland site is the Gingilup-Jasper Wetland System, located ~14 km ESE of the BIA (Figure 4-4). The Gingilup/ Quitchup/ Jasper wetlands provide habitat for Australasian Bittern (EN) and some habitat for Migratory species, though not in nationally significant numbers.

Australia is part of the EAAF, which is one of several broad global routes that waterbirds undertake annual migrations along. The EAAF extends from the Arctic (eastern Russia and Alaska), southwards through East Asia and South-east Asia, terminating in Australia and New Zealand. Many sites in Australia are internationally important as part of the network of wetlands that support migration along the EAAF. The closest site to the BIA listed in the Directory of Important Habitat for Migratory Shorebirds in Australia (Weller *et al.* 2020) is Gnarabup Beach, roughly 35 km north-west of the BIA, where Sanderling (Mig.) have been recorded in nationally significant numbers.

The Hardy Inlet to the SW of the BIA provides habitat for Migratory shorebirds (Figure 4-4). Several Migratory species have also been recorded from the artificial wetlands created at the old Beenup mine, ~1 km west of the study area within the BIA (Figure 4-4). Approximately 10 km of coastline is also present within the BIA, south of the study area which is also likely to be utilised by Migratory shorebirds.

Many wetlands are present within the BIA according to the Augusta to Walpole Geomorphic Wetlands dataset (DBCA-017) (WRC 2017) including estuary (i.e. Hardy Inlet), floodplains, sumplands and damplands (Figure 4-4). Most of the study area is classified as palusplain (seasonally waterlogged flat), with smaller areas of dampland (seasonally waterlogged basin), floodplain (seasonally inundated flat) and sumpland (seasonally inundated basin). It is evident from aerial imagery however, that the wetland boundaries are not accurate, and that much of the single polygon that identifies palusplain wetland intersects agricultural land.

The Blackwood River, a major watercourse, runs through the western and northern parts of the BIA, and is located ~4.5 km from the study area at its closest point. The Scott River, a minor watercourse, intersects the BIA, and runs directly to the south of the study area (Figure 4-4).

The study area is situated at the junction of 3 South West Regional Ecological Linkages (SWREL; Figure 4-2). The SWREL Project identified a network of regional-scale ecological linkages throughout the southwest of the State (Molloy *et al.* 2009b). Ecological linkages were defined as "a series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape". One east-west linkage intersects the northern end of the study area connecting Pagett Nature Reserve/South Blackwood State Forest with Scott National Park (Figure 4-2). Another east-west linkage is just outside the southern boundary of the study area following the Scott River between Gingilup Swamps Nature Reserve (and surrounding coastal remnant vegetation) and Scott National Park (Figure 4-2). The 3rd linkage runs north-south on the eastern boundary of the study area connecting Pagett Nature Reserve/South Blackwood State Forest to coastal remnants south of the study area (Figure 4-2). Small to moderate sized, mobile bush bird groups are most likely to depend on the linkages for movement, either foraging or dispersal.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	BA

0 2 4
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area

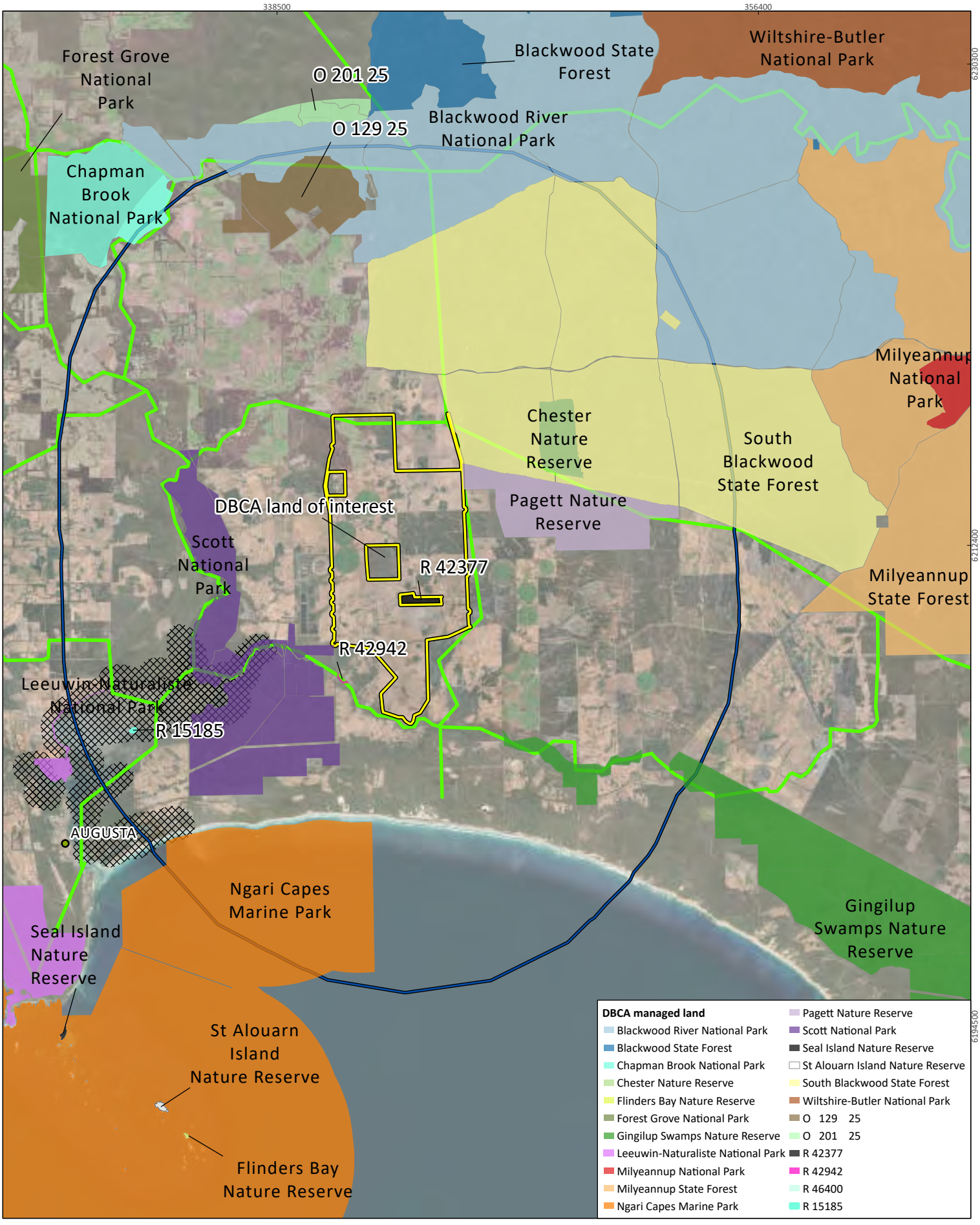
Region, subregion

Jarrah Forest, Southern Jarrah Forest
Warren, Warren

Figure 4-1

Study area in relation to IBRA regions and subregions

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	KC

0 2.5 5
Kilometers

1:181,800 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area
South West Regional Ecological Linkages

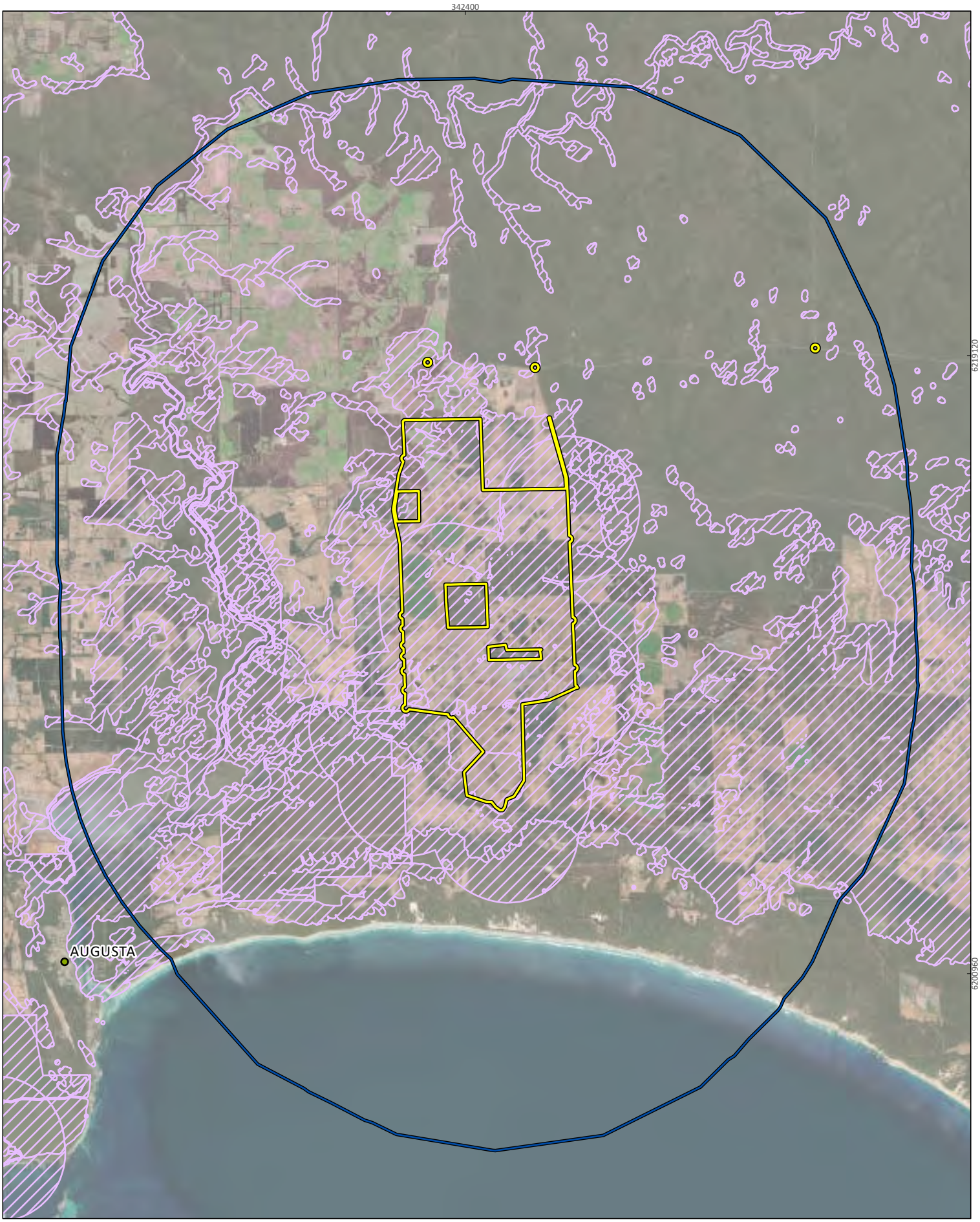
Priority ecological community

Subtropical and Temperate Coastal Saltmarsh

Figure 4-2

Conservation reserves, PEC and ecological linkages

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	12/06/2025
Drawn by	BK
Map author	KC

0 2.5 5
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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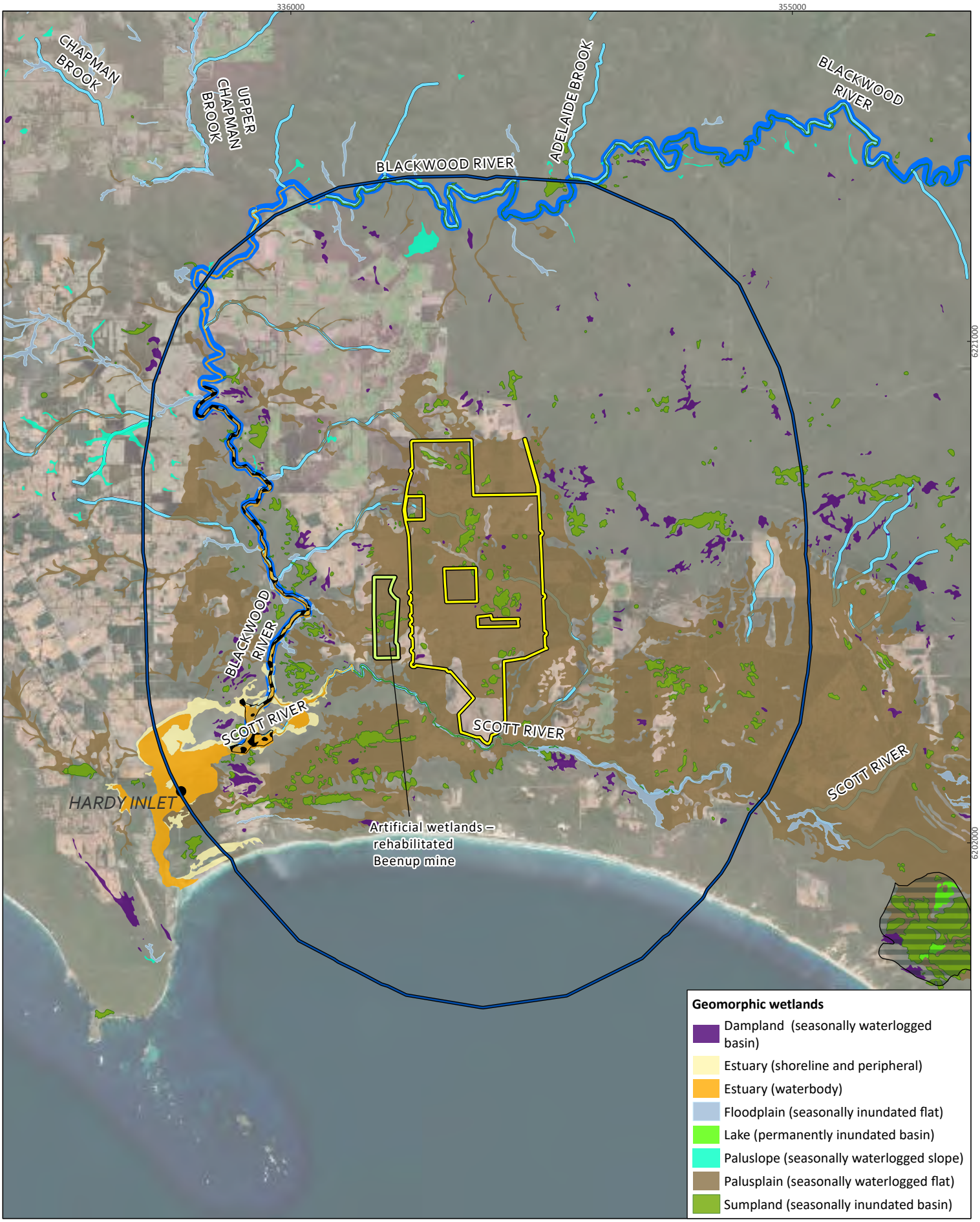
- Study area
- Bird/Bat Investigation Area
- Environmentally Sensitive Areas

Figure 4-3

Environmentally Sensitive Areas

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	JC

0 3 6
Kilometers

1:185,165 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area
Major watercourses
Minor watercourses

Nationally important wetlands
Blackwood River (Lower Reaches) and Tributaries System
Gingilup-Jasper Wetland System

Artificial wetlands
Rehabilitated Beenup mine

Figure 4-4
Wetlands and waterways

PHOENIX ENVIRONMENTAL SCIENCES

4.1.2 Climate and weather

The climate of the Warren (WAR01) subregion is described as moderate Mediterranean. The nearest Bureau of Meteorology (BoM) weather station with comprehensive data is Cape Leeuwin (no. 009518, Latitude: 34.37°S Longitude 115.14°E), located 17.8 km south-west of the study area. Cape Leeuwin records the highest mean maximum monthly temperature (23.4°C) in February and the lowest in July and August (16.5°C) (BoM 2025). The lowest mean minimum monthly temperature is in June (11.3°C) and highest in February (17.3°C; Figure 4-5). Mean annual rainfall is 947.5 mm, with July and June recording the highest mean monthly rainfall total (178.2 mm and 173.7 mm, respectively; Figure 4-5).

Daily mean maximum and minimum temperatures at Cape Leeuwin during the survey program (May 2023 to March 2025) were almost all higher than long-term averages, except June 2023 and April 2024 (Figure 4-5), in some cases substantially, e.g. monthly mean maximum temperature for October 2023 and May 2024 were 2°C and 3°C higher than the long-term averages, respectively. Across the complete survey period, monthly mean maximum and minimum temperatures were both on average 1.0°C above the long-term means, which are reflective of the warming trend occurring in south-west WA.

Monthly rainfall during the survey program did not correlate closely with long-term averages and was also variable between Year 1 and Year 2 of the survey program. Most months had below average, or close to average rainfall. Notable exclusions to this were April 2024, with 104.2 mm compared to the long-term average of 59.0 mm, and August 2024, with 228.4 mm compared to the long-term average of 135.1 mm (Figure 4-5). This is reflective of the drying trend occurring within south-west WA.

Based on long-term wind data from Cape Leeuwin weather station, prevailing winds are mainly from the NW–SW during May to September. In October, winds shift to the south, with prevailing winds coming mainly from the SE–SW during November to April. June to September is the windiest period.

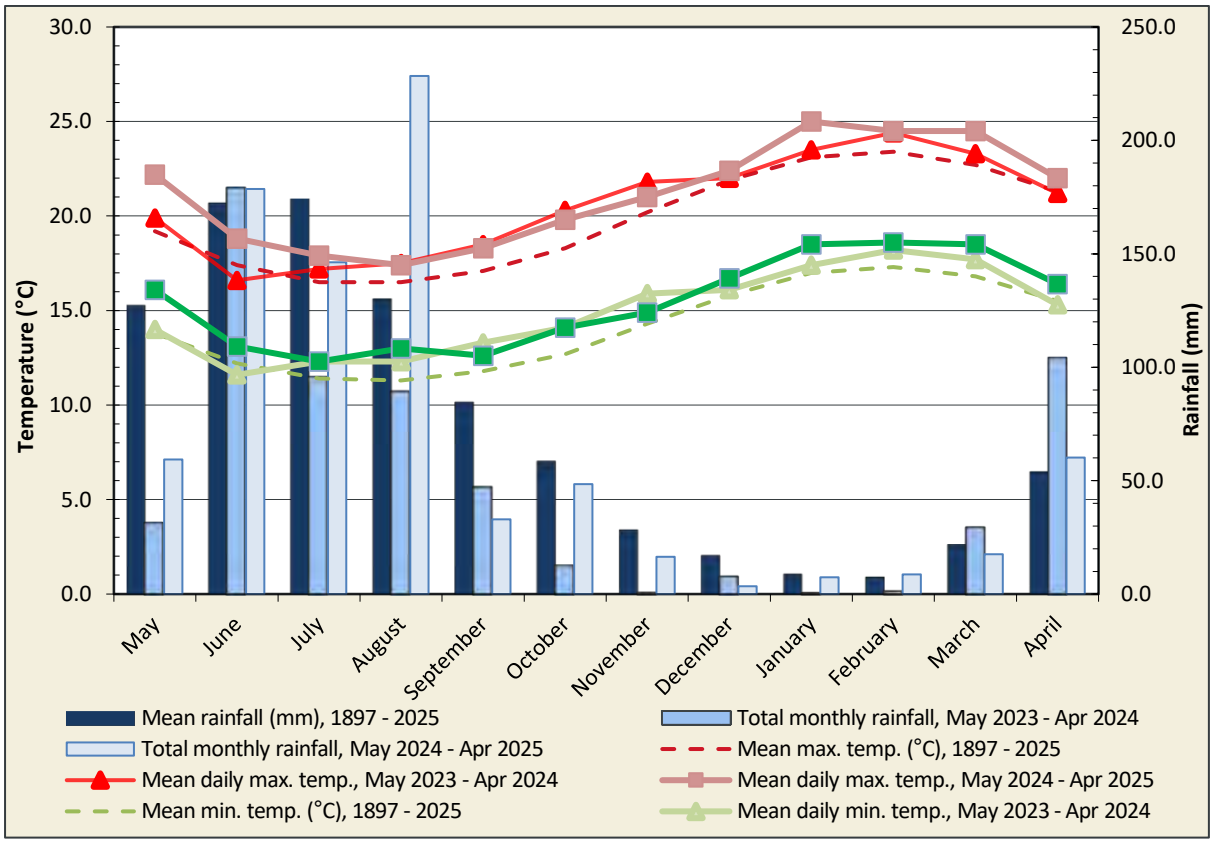


Figure 4-5 Climate data for Cape Leeuwin (no. 009518) – long-term data and for the survey period (BoM 2025)

4.1.3 Habitats in study area

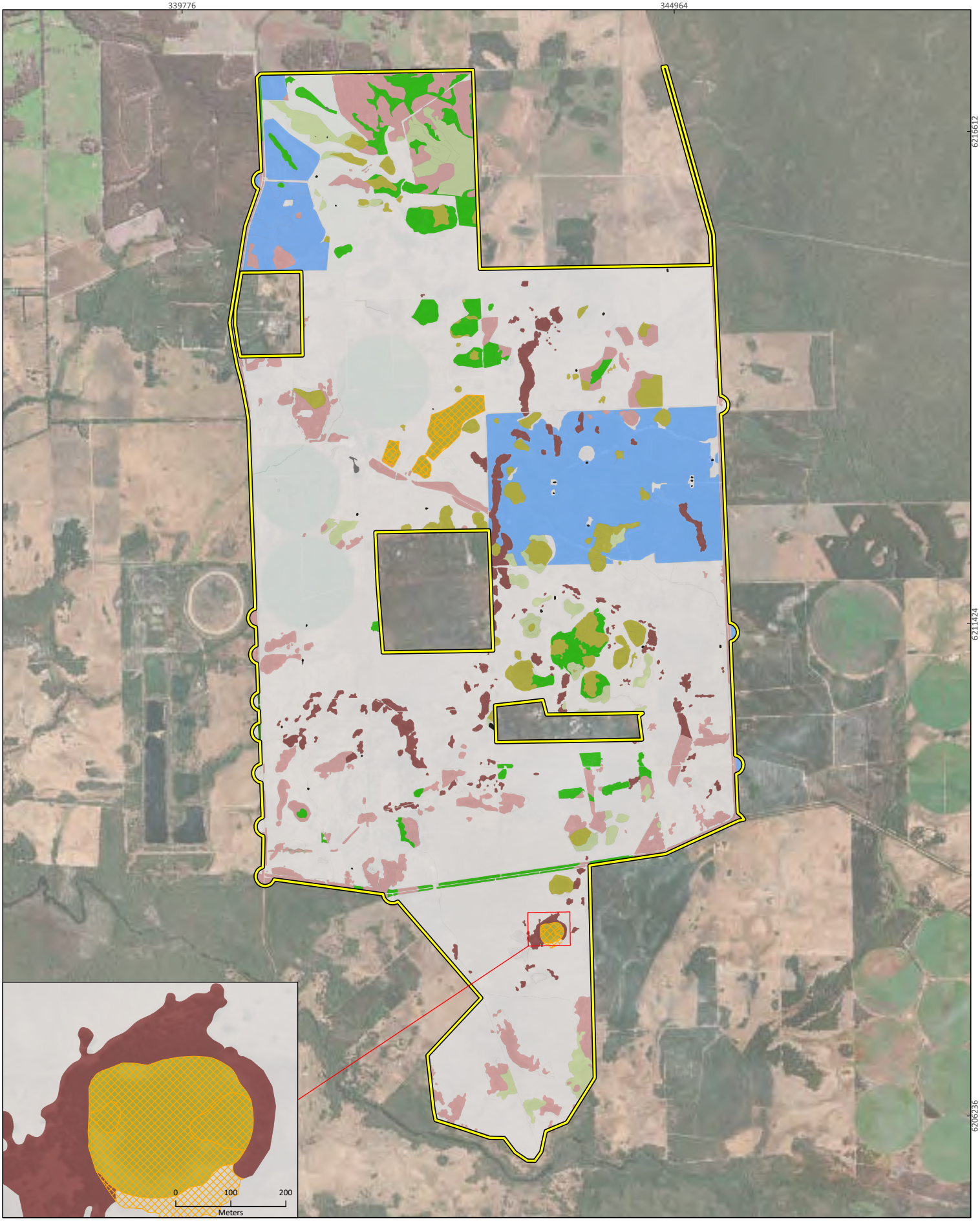
Habitat mapping from the Basic and Targeted fauna survey (Phoenix 2025a) identified 10 fauna habitat types in the study area, including 3 wetland habitats, 2 woodlands and 5 highly modified habitats (Figure 4-6; Table 4-1).

The wetlands are a mix of seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 377.7 ha (9.7%) of the study area, and are patchily distributed throughout (Figure 4-6). The condition of the wetlands was variable, with the paperbark woodlands and shrublands generally in better condition than the sedgelands, which tended to be heavily grazed. The majority of wetlands are seasonally inundated (i.e. ephemeral) and relatively shallow with water level typically less than 1 m, except for a large wetland south of Governor Broome Road and a wetland cluster in the northern part of the WFA that persisted into summer, suggesting that they have the potential to be permanently inundated (i.e. perennial); these are demarcated as 'potentially permanently inundated' in Figure 4-6.

Woodlands were in varying condition throughout the study area. These were categorised into Marri-Jarrah-Peppermint woodland and degraded Open woodland of Peppermint trees, together covering 416.6 ha (10.7%) of the study area. They occur within remnant vegetation patches and as roadside vegetation, sometimes adjacent to wetland habitats (Figure 4-6).

The highly modified habitats comprise cleared areas, dams and plantations. The study area is predominantly (68.7%) cleared areas, mainly comprising paddocks that contain little to no native vegetation but become inundated in winter for around 3 months of the year (June–August), essentially acting as floodplain grasslands. Two large Bluegum plantations are present, and a dense row of old pine trees occurs for 800 m along Scott River Road on the western boundary of the study area (Figure 4-6).

Most habitat in the study area is of low-quality with respect to the general flora assemblage (i.e. cleared areas, plantations, the degraded Open woodland of Peppermint trees, and dams) (Phoenix 2025b). There are however several small–moderate sized remnants of high-quality habitat remaining, some of which have been fenced off to prevent cattle access.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	29/05/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:51,550(at A4) GDA 1994 MGA Zone 50

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Study area

Habitat

- Bluegum plantation
- Cleared
- Cleared - degraded sumpland
- Dam
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Seasonally inundated paperbark woodland (wetland) - potentially permanently inundated

Figure 4-6

Fauna habitats in the study area

PHOENIX ENVIRONMENTAL SCIENCES

Table 4-1 Extent and description of each fauna habitat in the study area

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Wetland habitats			
Seasonally inundated paperbark woodland (wetland)	Seasonally inundated sumplands of paperbark woodlands, flora dominated by *Lemna disperma, Melaleuca rhaphiophylla, Taxandria juniperina, Taxandria inundata, Melaleuca preissiana, Callistachys lanceolata* and *Leptocarpus scariosus*. This wetland habitat is typically less floristically diverse (56 species recorded) than the shrublands, but far more diverse than the sedgelands. The tree canopy ranges from open to closed. Water is typically <50 cm deep and tannin stained, often with Duckweed at the surface and aquatic plants present. Large, old trees often present some with hollows being used by waterbirds. Habitat enhanced for fauna with log debris but can be plentiful or absent. Many examples fenced to prevent stock access. Four examples possibly perennially inundated (Figure 4-6).	144.99 ha (3.7%)	
Seasonally inundated sedgeland (wetland)	Seasonally inundated sumplands of open to dense mixed sedges, dominated by *Leptocarpus roycei*, *Machaerina juncea, Leptocarpus scariosus, Lepidosperma longitudinale* and *Melaleuca incana* subsp. *incana*. With or without occasional stands of paperbark (*Melaleuca rhaphiophylla*) typically at the periphery. Low floristic diversity. Often grazed at margins with associated weed encroachment. Can be relatively closed or with extensive open water areas. Bird presence generally limited to a handful of waterbirds that choose to nest in dense sedge stands that can form large homogenic stands.	106.7 ha (2.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Seasonally inundated shrubland (wetland)	Seasonally inundated sumplands with variable open to sparse shrublands. High floristic diversity (238 species in total). Dominated by *Taxandria inundata, Anarthria scabra, Loxocarya magna, Hypolaena caespitosa, Astartea scoparia, Leptocarpus scariosus*. Often grazed at margins with weed encroachment. Can be relatively closed or with extensive open water areas. Bird diversity generally greater compared with the 2 other wetland types (sedgelands or woodlands) due to higher diversity of flowering shrubs present offering a greater diversity of feeding and nesting opportunities. Waterbirds also present in low numbers.	126.1 ha (3.2%)	
Woodland habitats			
Marri-Jarrah-Peppermint woodland	Low to mid open woodlands dominated by *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana, Agonis flexuosa* var. *flexuosa*, *Machaerina juncea, Taxandria juniperina, Cyathochaeta equitans, Anarthria scabra, Lepidosperma leptostachyum, Platychorda applanata, Gastrolobium formosum* and *Astartea scoparia*. Habitat condition varies greatly depending on grazing history and can have excellent condition understorey through to completely degraded. Structural complexity also varies substantially with some remnants retaining many logs and debris on the floor and others with very little. The best examples are high quality habitat for the 3 black cockatoo species.	317.7 ha (8.2%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Open woodland of Peppermint trees (degraded)	Highly modified habitat dominated by a single native species, *Agonis flexuosa* var. *flexuosa*, and a variety of introduced weeds, such as **Rumex acetosella, *Hordeum leporinum and *Lolium rigidum, *Ehrharta longiflora* and **Bromus diandrus*. This habitat represents limited value to most native fauna due to the completely degraded nature of the understorey, and the fact *Agonis flexuosa* var. *flexuosa* rarely forms hollows.	98.9 ha (2.5%)	
Highly modified habitats			
Cleared	Cleared areas absent or near absent of native vegetation; agricultural paddocks and roads. May contain isolated paddock trees, generally of Peppermint (*Agonis flexuosa* var. *flexuosa*). Limited value to native fauna. Typically used by birds that tolerate and sometimes thrive in modified environments. Carnaby's Cockatoo observed on 2 occasions feeding on paddock weeds in seed.	2,667.8 (68.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Cleared–degraded sumpland	Seasonally inundated sumpland wetland that has been cleared (i.e., now paddock) and is almost completely devoid of native vegetation, excepting occasional isolated sedge plants. This habitat is essentially a highly degraded form of seasonally inundated sedgeland (wetland) habitat. As such it supports a limited number of native fauna species, including more degradation tolerant bird species. White-faced heron were regularly seen foraging in this habitat while it was inundated.	0.7 ha (<0.1%)	
Dam	Artificial pond or dam with standing water. Typically provides habitat for a handful of waterbirds only, and generally only in the largest examples. One example on Dennis Road was constructed with a sizeable rim and some rocky features affording protection and visibility limited predation and which attracted more birds than elsewhere.	1.7 ha (<0.1%)	
Bluegum plantation	Planted mid woodland of Bluegum (*_Eucalyptus globulus_ subsp. _globulus_). Monoculture which provides limited habitat value for native fauna. Carnaby's Cockatoo are known to use this habitat type on occasion but was not observed in the Bluegum plantation in the study area.	415.4 ha (10.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Pine plantation	Planted open woodland of pine (*_Pinus_ sp.) plantation. Monoculture which provides limited habitat value for native fauna. Carnaby's Cockatoo are known to feed on _Pinus_ sp. but were not observed doing so in the study area. Ninox (2012) observed a flock of Baudin's Cockatoo land in the stand of Pines on Scott River Road (in the study area) in 2006.	1.6 ha (<0.1%)	
Total		**3,881.5 ha**	

4.2 SPECIES CHARACTERISATION

The desktop review identified records of 199[2] species of bird and 7 species of bat within the desktop search extent (Appendix 3). This included a total of 58 conservation significant birds and one conservation significant bat, of which 45 are listed as Migratory under the EPBC Act and/or BC Act, 34 are listed as Threatened, Conservation Dependent or OS under the EPBC Act and/or BC Act, and 5 are Priority species listed by DBCA (many species have dual listings, e.g. as Threatened and Migratory).

Eighteen of the conservation significant species are pelagic seabirds, represented by albatrosses, petrels, shearwaters and Pomarine Jaeger (shaded grey in Appendix 3). These were considered unlikely to occur in the study area due to the distance of the study area from the coast and therefore have not been considered further. Species summary profiles for the remaining 41 conservation significant species are provided in Table 4-2.

Of these 41 conservation significant species, 3 have previously been recorded within the study area (Figure 4-7):

- Baudin's Cockatoo (EN) (Birdlife Australia 2023)
- Carnaby's Cockatoo (EN) (Birdlife Australia 2023; DBCA 2023c)
- Forest Red-tailed Black Cockatoo (VU) (DBCA 2023c).

Based on the desktop assessment, no known black cockatoo nesting or roosting sites are present in the study area. No known breeding sites were identified within the wider desktop search area but according to the DBCA Threatened and Priority Fauna database (DBCA 2024) a known roost site (from 2019, count of 19 white-tails) is located roughly 4.5 km north of the WFA. Another is located roughly 11.5 km NW of the WFA but has no bird count data.

[2] Count excludes indet. black cockatoo rows in Appendix 3 (i.e. *Calyptorhynchus* sp., *Calyptorhynchus*/*Zanda* sp. and *Zanda* sp.) as these records will belong to one of the 3 black cockatoo species listed in the appendix. Other indet. taxa detected in the desktop review have been excluded from Appendix 3 as they can be attributed to other species already listed.

Table 4-2 Desktop conservation significant species summary profiles

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Accipitridae	*Pandion haliaetus* (Osprey)	Mig. (EPBC & BC Acts)	1.2 km W	Coastal habitats, saline and freshwater wetlands.	Feeds on fish, other vertebrates, marine invertebrates. Resident or sedentary.	Mostly diurnal, mid-flying, nocturnal hunter on occasion, mostly solitary	Australian pop. size unclear Global pop. ~100,000–1.2 mil.
Anatidae	*Oxyura australis* (Blue-billed Duck)	P4 (DBCA list)	1.0 km W	Shallow freshwater sources with reedbeds and vegetation, rarely saline water.	Feeds on plants, invertebrates. Concentrates in favourable areas.	Mostly diurnal, flocking, dispersive	Australian pop. ~ 11,000–19,000
Apodidae	*Apus pacificus* (Fork-tailed Swift)	Mig. (EPBC & BC Acts)	>20 km	Occurs over a variety of habitats, is almost exclusively aerial.	Overwinters in Australia. Forages for insects in the air. Migratory - present in Australia between September–April.	High flying, diurnal, flocking, transitory	Global pop. unclear, though common in breeding range. Australian pop. Estimated in the 10,000s
Ardeidae	*Botaurus poiciloptilus* (Australasian Bittern)	EN (EPBC & BC Acts)	12 km SW	Freshwater wetlands with dense vegetation.	Forages nocturnally on tadpoles, frogs, fish, dragonfly larvae. Usually occurs singly or in pairs.	Solitary/pairs, nocturnal, dispersive	Global pop. <2,000
Cacatuidae	*Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	Within study area	Jarrah, Karri and Marri forest or woodland with >600 mm average annual rainfall.	Moves between roosts and foraging habitat at dawn and dusk.	Flocking, mid-flying diurnal	Total pop. ~17,000
Cacatuidae	*Zanda baudinii* (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Within study area	High rainfall areas of Jarrah, Marri and Karri forest or woodland.	Moves between roosts and foraging habitat at dawn and dusk. Occurs in different parts of its range according to season.	Mid-flying, flocking, diurnal	Total pop. ~5,000–8,000
Cacatuidae	*Zanda latirostris* (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	Within study area	Jarrah, Marri and Karri forest or woodland.	Moves between roosts and foraging habitat at dawn and dusk. Occurs in different parts of its range according to season.	Mid-flying, flocking, diurnal	Total pop. ~35,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Charadriidae	*Anarhynchus bicinctus* (Double-banded Plover)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal and freshwater wetlands, seldom far inland.	Feeds on invertebrates and plant matter mixing with other small shorebirds. Migratory - present in Australia between October–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~19,000.
Charadriidae	*Anarhynchus leschenaultii* (Greater Sand Plover)	VU/Mig. (EPBC Act); VU (BC Act)	1.9 km W	Coastal habitats, e.g. sheltered beaches, intertidal mudflats, estuaries.	Mixes with other shorebirds in large flocks. Feeds on marine invertebrates. Migratory - present in Australia between late July–April.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~200,000–300,000
Charadriidae	*Anarhynchus mongolus* (Siberian Sand Plover)	EN/Mig. (EPBC Act); EN (BC Act)	1.9 km W	Coastal habitats, e.g. sandflats, mudflats, beaches, brackish swamps.	Mixes with other shorebirds in large flocks. Feeds on marine invertebrates. Migratory - present in Australia between August–April.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~325,000
Charadriidae	*Charadrius cucullatus* (Hooded Plover/Dotterel)	P4 (DBCA list)	3.3 km S	Ocean coastal beaches, saline and freshwater lakes, inland salt lakes.	Feeds on invertebrates, day and night. Some local movements between coast and salt lakes. Locally migratory.	Flocking, diurnal/nocturnal	WA pop. ~2,250.
Charadriidae	*Pluvialis fulva* (Pacific Golden Plover)	Mig. (EPBC & BC Acts)	1.9 km W	Mainly coastal habitats, but also recorded from inland wetlands, paddocks.	Feeds on invertebrates, often occurring in large flocks as well as mixed flocks. Migratory - present in Australia between September–May.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~ 120,000. Aust. numbers vary greatly annually
Charadriidae	*Pluvialis squatarola* (Grey Plover)	VU/Mig. (EPBC Act); Mig. (BC Acts)	11.0 km WSW	Coastal habitats, e.g. beaches, sandflats, intertidal mudflats, saltmarshes.	Feeds on invertebrates. Often occurs in large flocks, and mixed flocks. Migratory - present in Australia between August–April.	Flocking, high flying, diurnal	EAAF pop. ~80,000 Australian pop. ~11,300
Falconidae	*Falco peregrinus* (Peregrine Falcon)	OS (BC Act)	0.9 km S	Variety of habitats incl. cliff lines, woodland, shrubland, grassland	Undertakes high-speed pursuit of prey, diving from high altitudes. Observed alone or in pairs.	Transitory, soaring, high flying, diurnal	Australian pop. ~ 6,000– 10,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Laridae	*Anous tenuirostris melanops* (Australian Lesser Noddy)	VU (EPBC Act); EN (BC Act)	Proj. dist.	Mangroves, lagoons, beaches on oceanic coral-limestone islands.	Feeds on small surface-dwelling fish, invertebrates and coral fragments.	Sedentary, hovering, most flight over water	Australian pop. ~100,000 breeding birds
Laridae	*Hydroprogne caspia* (Caspian Tern)	Mig. (EPBC & BC Acts)	1.0 km W	Coastal habitat, near-coastal saline and freshwater wetlands.	Forages for fish in open wetland margins and coastal shorelines. Circles slowly and dives for prey. Sedentary or locally migratory in Australia between nesting and non-nesting sites.	Mid-flying, diurnal	Australian pop. unknown, est. many 1000s
Laridae	*Onychoprion anaethetus* (Bridled Tern)	Mig. (EPBC & BC Acts)	11.3 km W	Offshore tropical and subtropical seas and islands.	Occurs almost entirely offshore, nesting on islands. Feeds on aquatic vertebrates and invertebrates. Migratory - present in Australia between September–April.	Flocking, mid-flying, diurnal	Global pop. ~ 610,000–1.5 mil
Laridae	*Sternula nereis nereis* (Fairy Tern)	VU (EPBC & BC Acts)	7.0 km WSW	Offshore, estuarine or lacustrine (lake) islands, wetlands, beaches and spits.	Feeds on aquatic animals and plants. Two subpopulations in WA, one migratory and one sedentary.	Flocking, mid-flying, diurnal	Australian pop. ~7,450
Laridae	*Thalasseus bergii* (Greater Crested Tern)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. estuaries, brackish rivers.	Feeds on aquatic animals, mainly fish, by dive-bombing and fully submerging. Does not migrate in Australia. Breeds between September–April and remains close to breeding sites outside the breeding season.	Flocking, mid-flying, diurnal	Global pop. ~150,000–1.1 mil Australian pop. Unknown
Megapodiidae	*Leipoa ocellata* (Malleefowl)	VU (EPBC & BC Acts)	1.2 km SSW	Semi-arid shrublands and low woodlands.	Feeds on various plant material. Forms large mounds for breeding.	Rarely flies	Total pop. ~20,000–30,000
Motacillidae	*Motacilla cinerea* (Grey Wagtail)	Mig. (EPBC & BC Acts)	Proj. dist.	Riparian woodland, farmland, wetlands.	Vagrant to Australia. Feeds on insects on/low over the ground. Wades in shallow water for	Low flying, diurnal	Global pop. ~7–20 mil.

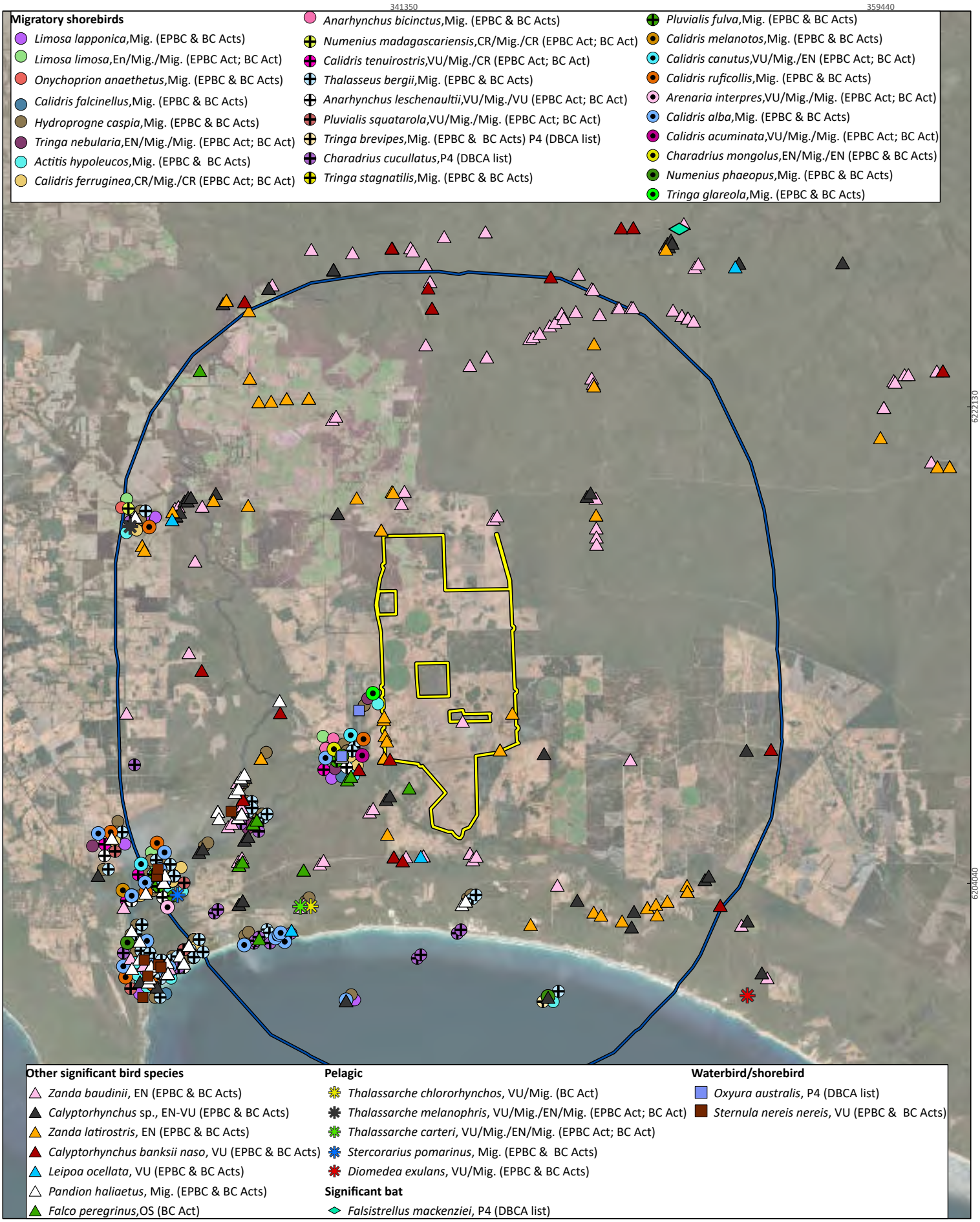
Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
					aquatic invertebrates. Migratory - present in Australia between October–April.		No reliable Australian pop. est.
Scolopacidae	*Actitis hypoleucos* (Common Sandpiper)	Mig. (EPBC & BC Acts)	0.5 km W	Coastal and inland saline and freshwater wetlands.	Forages in shallow water and mud. Often found alone or in pairs. Migratory - present in Australia between July–April.	Mid-flying, diurnal/nocturnal	Global pop. 4.9-7.5 mil. EAAF pop. ~190,000
Scolopacidae	*Arenaria interpres* (Ruddy Turnstone)	VU/Mig. (EPBC Act); Mig. (BC Act)	11.0 km SSE	Variety of coastal habitats, such as mudflats and sewerage ponds	Found singly or in pairs. Feeds nocturnally and diurnally on invertebrates. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000 Australian pop. ~19,000
Scolopacidae	*Calidris acuminata* (Sharp-tailed Sandpiper)	VU/Mig. (EPBC Act); Mig. (BC Act)	1.2 km W	Fresh, brackish and saline wetlands, lagoons, lakes and inundated paddocks.	Preys on invertebrates and plant matter from mud. Forms large mixed flocks. Migratory - present in Australia between August–April.	Mid-flying, diurnal/nocturnal, flocking	EAAF pop. / Australian pop. ~73,000
Scolopacidae	*Calidris alba* (Sanderling)	Mig. (EPBC & BC Acts)	1.9 km W	Open coastal habitats, e.g. exposed beaches.	Active forager in tight flocks, feeding on plants, seeds, and invertebrates. Migratory - present in Australia between September–May.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000
Scolopacidae	*Calidris canutus* (Red Knot)	VU/Mig. (EPBC Act); EN (BC Act)	1.9 km W	Coastal habitats, e.g. estuaries, mudflats.	Feeds on invertebrates in large mixed shorebird flocks. Less common in SW than other coastal areas. Migratory - present in Australia between August–April.	Migratory, high flying, diurnal/nocturnal, flocking	Global pop. ~1.1 mil Australian pop. ~135,000
Scolopacidae	*Calidris falcinellus* (Broad-billed Sandpiper)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. estuarine mudflats, reefs and marshes.	Feeds on invertebrates and plant matter in mud. Rare, with often only one in large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Scolopacidae	*Calidris ferruginea* (Curlew Sandpiper)	CR/Mig. (EPBC Act); CR (BC Act)	1.9 km W	Mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets	Feeds on invertebrates and plant matter in mud. Forms large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~90,000 Australian pop. ~40,000
Scolopacidae	*Calidris melanotos* (Pectoral Sandpiper)	Mig. (EPBC & BC Acts)	12.7 SWS	Fresh, brackish and saline wetlands, lagoons, lakes and inundated grasslands.	Feeds on invertebrates and plant matter in mud. Rare species, joins large mixed flocks. Migratory present in Australia between September–June.	High flying, diurnal/nocturnal, flocking	Global pop. ~25,000–100,000
Scolopacidae	*Calidris ruficollis* (Red-necked Stint)	Mig. (EPBC & BC Acts)	1.9 km W	Aquatic habitats such as mudflats, beaches and wetlands, and sometimes in inundated paddocks.	Feeds on invertebrates and plant matter in mud and water. Feeds and roosts in large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~475,000 Australian pop. ~350,000
Scolopacidae	*Calidris tenuirostris* (Great Knot)	VU/Mig. (EPBC Act); CR (BC Act)	1.9 km W	Coastal habitats, e.g. estuaries, mudflats.	Feeds on invertebrates in large mixed shorebird flocks. Mainly found in northern Australia. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~425,000 Australian pop. ~386,900
Scolopacidae	*Limosa lapponica* (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. bays, estuaries, mudflats, sandflats.	Forages for invertebrates on wide intertidal mudflats or sandflats. Observed in large mixed flocks in some locations. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~325,000
Scolopacidae	*Limosa limosa* (Black-tailed Godwit)	EN/Mig. (EPBC Act); Mig. (BC Act)	1.9 km W	Coastal habitats, e.g. bays, estuaries, mudflats, sandflats.	Forages for invertebrates on wide intertidal mudflats or sandflats. Observed in large mixed flocks in some locations. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	AAF pop. ~160,000 Australian pop. ~43,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Scolopacidae	*Numenius madagascariensis* (Eastern Curlew)	CR/Mig. (EPBC Act); CR (BC Act)	11.5 km W	Coastal habitats, e.g. mudflats, sandflats, especially those with seagrass.	Feeds on crustaceans in estuaries, mangroves, saltmarshes and intertidal flats. Migratory - present in Australia between August–April.	Mid-flying, diurnal/nocturnal, flocking	EAAF pop. ~35,000 Australian pop. ~22,500
Scolopacidae	*Numenius phaeopus* (Whimbrel)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. mudflats, sandflats, mangroves.	Forages on beaches/rocks, alone or with other shorebirds. Migratory - present in Australia between August–April.	Flocking, high flying	EAAF pop. ~65,000
Scolopacidae	*Tringa brevipes* (Grey-tailed Tattler)	Mig. (EPBC and BC Acts); P4 DBCA list	6.9 km SSE	Coastal habitat, e.g. reefs, rock platforms, mudflats.	Forages for invertebrates in shallow water, usually during the day. Migratory - present in Australia between August–April.	Mid-flying, diurnal, flocking	EAAF pop. ~70,000
Scolopacidae	*Tringa glareola* (Wood Sandpiper)	Mig. (EPBC & BC Acts)	0.5 km W	Well vegetated freshwater wetlands and water sources, as well as inundated grasslands.	Forages for invertebrates in shallow water. Often found alone, in pairs or in small flocks with other shorebirds. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~130,000
Scolopacidae	*Tringa nebularia* (Common Greenshank)	EN/Mig. (EPBC Act); Mig. (BC Act)	0.5 km W	Saline and freshwater wetlands, mudflats and inundated paddocks.	Forages for invertebrates in shallow water, often along shorelines. Observed in mixed flocks. Migratory - present in Australia between August–May.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~110,000 Australian pop. ~23,700
Scolopacidae	*Tringa stagnatilis* (Marsh Sandpiper)	Mig. (EPBC & BC Acts)	12.5 km SW	Saline and freshwater wetlands, including inundated floodplains.	Forages on invertebrates in shallow water at the edge of wetlands singly or in groups. Migratory - present in Australia between September–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~130,000
Tytonidae	*Tyto novaehollandiae novaehollandiae*	P3 (DBCA list)	1.0 km S	Tall open forests with large trees	Territorial, usually seen singly. Roosts in large trees. Feeds on a wide variety of prey. Perch and	Nocturnal, mid-flying	Population size unknown Anecdotally, there is a healthy population

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
	(Masked Owl (southwest))				drop predator that hunts on forest edges.		in the Augusta-Margaret River region[2]
Vespertilionidae	*Falsistrellus mackenziei* (Western False Pipistrelle)	P4 (DBCA list)	1.2 km W	Tall woodlands and wet or dry sclerophyll forest	Feeds on insects. Forms colonies up to 30 bats. Roosts in hollows.	High flying, nocturnal	Unknown population size. Estimated in 2014 that remaining habitat sufficient to support >10,000

1 - Refer to Appendix 4 for sources of population estimates. 2 - Pers. comm Dr Boyd Wykes.





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Drawn by	BK
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Study area
Bird/Bat Investigation Area

Figure 4-7

Desktop records of significant birds and bats

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5 FIELD SURVEY RESULTS

5.1 BIRDS

5.1.1 General summary

Results presented in section 5.1.1 are based on the BBRAS survey data from the fixed-point count sites only. Records from the Basic and Targeted fauna survey are omitted, unless otherwise stated.

A total of 310 samples taken from 28 sites resulted in a total bird species richness of 96 and total abundance of 13,471 (Table 5-1). Species richness was 60 at Impact sites, 74 at Reference sites and 31 at the Regional reference sites. Reference sites were therefore the most speciose and abundant overall. Regional reference sites comprised just 2.5% of the samples and 3.9% of species records but contributed 16% of the overall abundance and recorded a species richness that was >50% that of Impact sites, strongly distinguishing the Regional reference sites as species rich and abundant, compared with sites within the WFA and BIA.

Table 5-1 Data summary of records for fixed-point count samples between the 3 site types

Site type	No. sites	No. sample events	Species richness	No. records	Total abundance
Impact	9	125	60	988	4,750
Reference	14	177	74	1,542	6,568
Regional reference	5	8	31	104	2,153
Total	**28**	**310**	**96**	**2,634**	**13,471**

Species richness, abundance and number of records aggregated across sites in the BIA is shown for Year 1 and Year 2 in Figure 5-1, and per season in Figure 5-2. Almost twice as many samples were completed in Year 2 (202) compared with Year 1 (108). Accordingly, the number of records was much higher in Year 2 (1,599 records) compared with Year 1 (1,075 records) as was the total abundance, being 8,315 in Year 2 compared with 5,156 in Year 1. Despite the significant increase in sample effort in Year 2, species richness was only marginally higher (78 species), compared with Year 1 (72 species). The analysis of survey completeness is provided in section 5.4.

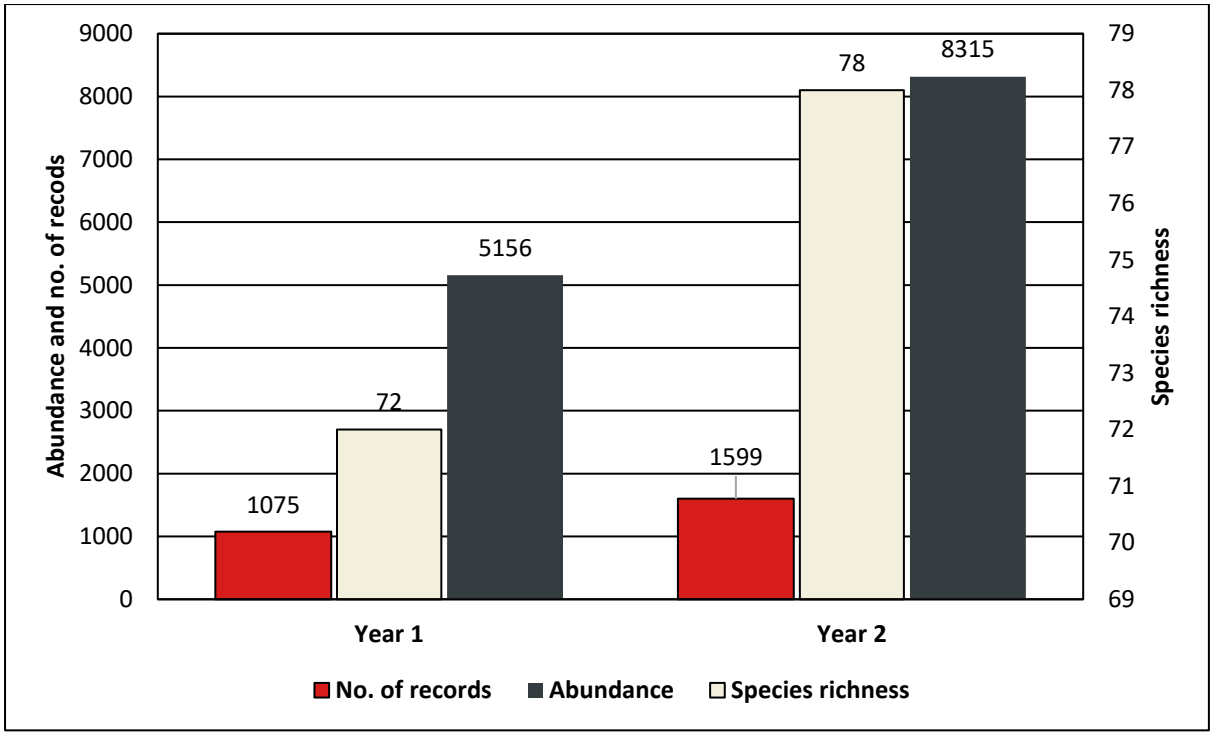


Figure 5-1 **Species richness, number of records and abundance of birds at fixed-point count sites per year**

Figure 5-2 demonstrates the effect on abundance of the additional sample effort in Year 2, which was almost twice that of Year 1 and thus at first appears a much more abundant year, by displaying the mean abundance and mean species richness per sample, per season in each year. With the data summarised per sample and the mean values calculated, the large difference in abundance between years is no longer apparent, i.e. mean abundance for all seasons in Year 2 is far more similar to that of Year 1. Autumn of Year 1 was therefore the period where mean abundance was greatest, followed by summer in Year 2.

Mean species richness per sample was highest in winter and spring of Year 1 (9.2 species). In fact, mean species richness in every season of Year 1 was higher than that of Year 2, conversely however, summer and spring of Year 2 were the most speciose periods over the 2 years, recording 68 and 66 species, respectively; and the autumn of Year 2 was the least speciose period.

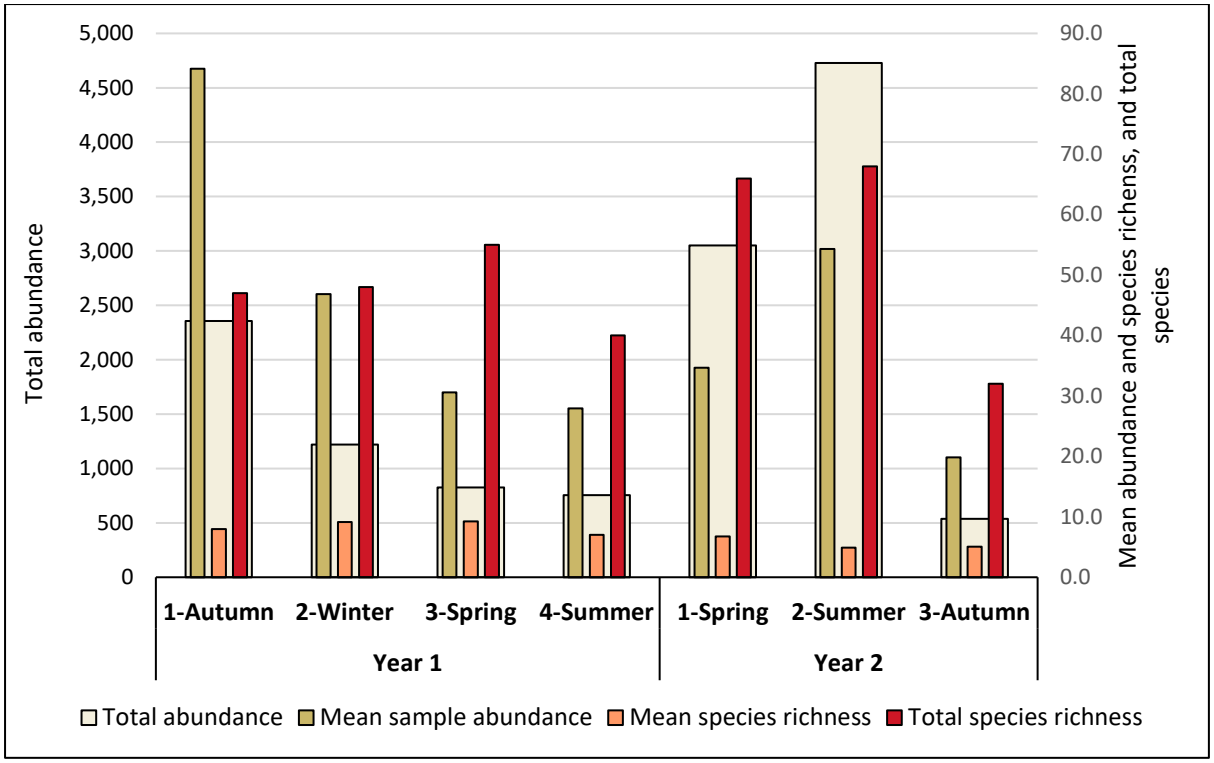


Figure 5-2 Seasonal mean species richness and mean abundance per year, based on samples

At the site level, 9 sites in the 30-minute point counts, including 4 Impact sites, recorded a species richness of just one (Table 5-2). Maximum species richness varied considerably, but sites BUS020 (Impact), BUS015 (Reference) and BUS031 (Regional reference) were the most speciose (15, 19 and 16 species, respectively) in each area. However, sites BUS006 (Impact), BUS009 (Reference) and BUS031 (Regional reference) were consistently the most speciose in each area, recording mean species richness values of 9.0, 12.0 and 14.0, respectively.

When the Impact, Reference and Regional reference sites are compared in aggregate, there is little difference between Impact and Reference sites - numerous metrics for these 2 groups were remarkably similar, for instance mean abundance was 39.2 and 38.6, respectively. The mean median abundance was 25.8 and 23.3, respectively and the standard deviation of the mean abundance was 45.7 and 48.5, respectively. Reference sites were, however, slightly more species rich than Impact sites, recording mean richness values of 8.0 and 5.9 species, respectively.

In contrast, the Regional reference sites were far more abundant (mean = 222.5) and more species rich (10.5) on average compared with Impact and Reference sites in or near the WFA. Further sampling of these sites through other periods of the year, especially when Migratory species are absent, would have undoubtedly lowered both values.

Mean abundance per sample and mean species richness per sample for each site are also displayed graphically in Figure 5-3 and spatially in Figure 5-4[3]. In both figures the much higher mean abundance per sample at Regional reference sites compared with Impact and Reference sites is very clear, particularly for 2 sites, BUS030 and BUS031. It can also be seen in Figure 5-4 that the southwest corner of the WFA supports a more abundant bird population on average. With respect to mean species richness however, both Figure 5-3 and Figure 5-4 indicate that the differences between the 3 groups are far less pronounced.

[3] In order to give visual effect to Figure 5-4, mean abundance was multiplied by 10 and mean species richness was multiplied by 50.

Table 5-2 Site-sample summary for fixed-point count sites

Area	sitename	#samples	Total sp. rich.	Total abundance	Min		Max		Range		Mean		Total		Median		Std.dev.	
					Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.
Impact sites	BUS004	21	33	468	5	4	48	11	43	7	22.3	7.3	468	33	19.0	7.0	12.5	2.1
	BUS006	8	35	383	10	4	149	13	139	9	47.9	9.0	383	35	38.5	9.5	41.9	2.9
	BUS016	14	30	736	6	3	235	13	229	10	52.6	5.6	736	30	21.0	5.0	67.4	2.8
	BUS018	13	22	459	5	3	99	9	94	6	35.3	5.1	459	22	29.0	5.0	25.1	1.7
	BUS019	14	22	253	2	1	35	9	33	8	18.1	4.6	253	22	18.0	4.5	9.6	1.8
	BUS020	14	30	1,557	6	1	792	15	786	14	111.2	7.1	1,557	30	56.5	7.0	191.7	4.2
	BUS025	14	29	334	8	1	51	11	43	10	23.9	6.3	334	29	22.0	6.5	12.6	3.3
	BUS026	13	16	228	1	1	102	6	101	5	17.5	2.6	228	16	11.0	2.0	25.6	1.5
	BUS027	14	21	332	2	2	92	9	90	7	23.7	5.1	332	21	17.0	5.0	24.8	1.9
	Sub-total	**125**	**60**	**4,750**	**1**	**1**	**792**	**15**	**786**	**14**	**39.2**	**5.9**	**4,750**	**60**	**25.8**	**5.7**	**45.7**	**2.5**
Ref. sites	BUS001	22	49	942	16	2	189	17	173	15	42.8	9.2	942	49	34.5	9.0	34.4	3.6
	BUS002	22	31	737	1	1	397	11	396	10	33.5	5.4	737	31	13.5	5.5	80.3	2.9
	BUS003	8	35	1,107	19	8	859	13	840	5	138.4	10.5	1,107	35	36.5	11.0	272.6	1.7
	BUS005	21	37	605	3	3	169	13	166	10	28.8	6.4	605	37	18.0	6.0	33.4	2.8
	BUS007	8	20	349	3	1	123	12	120	11	43.6	6.1	349	20	31.0	6.5	41.0	2.9
	BUS008	19	25	399	1	1	167	7	166	6	21.0	4.0	399	25	11.0	4.0	36.4	1.6
	BUS009	6	30	230	14	7	64	15	50	8	38.3	12.0	230	30	41.5	13.5	18.4	2.9
	BUS010	22	30	632	1	1	82	10	81	9	28.7	5.6	632	30	19.5	5.5	21.5	2.2
	BUS011	21	32	773	1	1	191	12	190	11	36.8	6.8	773	32	20.0	6.0	47.4	2.9
	BUS012	2	14	29	10	6	19	11	9	5	14.5	8.5	29	14	14.5	8.5	4.5	2.5
	BUS013	8	23	242	8	5	125	11	117	6	30.3	7.5	242	23	14.5	7.0	36.6	2.2
	BUS014	8	29	162	6	2	33	11	27	9	20.3	7.6	162	29	20.5	9.5	10.8	3.4
	BUS015	8	28	314	5	3	128	19	123	16	39.3	10.5	314	28	27.0	10.5	36.5	4.2
	BUS035	2	15	47	18	9	29	14	11	5	23.5	11.5	47	**15.0**	23.5	11.5	5.5	2.5

Area	sitename	#samples	Total sp. rich.	Total abundance	Min		Max		Range		Mean		Total		Median		Std.dev.	
					Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.
Sub-total		**177**	**74**	**6,568**	1	**1**	**859**	**19**	**840**	**16**	**38.6**	**8.0**	**6,568**	**74**	**23.3**	**8.1**	**48.5**	**2.7**
Reg. ref. sites	BUS030	2	19	769	12	9	757	13	745	4	384.5	11.0	769	19	384.5	11.0	372.5	2.0
	BUS031	2	19	1,112	435	12	677	16	242	4	556.0	14.0	1,112	19	556.0	14.0	121.0	2.0
	BUS032	1	8	45	45	8	45	8	0	0	45.0	8.0	45	8	45.0	8.0	0.0	0.0
	BUS033	1	12	57	57	12	57	12	0	0	57.0	12.0	57	12	57.0	12.0	0.0	0.0
	BUS034	2	13	170	26	6	144	9	118	3	85.0	7.5	170	13	85.0	7.5	59.0	1.5
Sub-total		**8**	**31**	**2,153**	**12**	**6**	**757**	**16**	**745**	**4**	**225.5**	**10.5**	**2,153**	**33**	**225.5**	**10.5**	**110.5**	**1.1**
Total		**310**	**96**	**13,471**	**96**	**1**	**859**	**19**	**840**	**16**	**72.1**	**7.7**	**13,471**	**96**	**60.2**	**7.8**	**58.7**	**2.4**

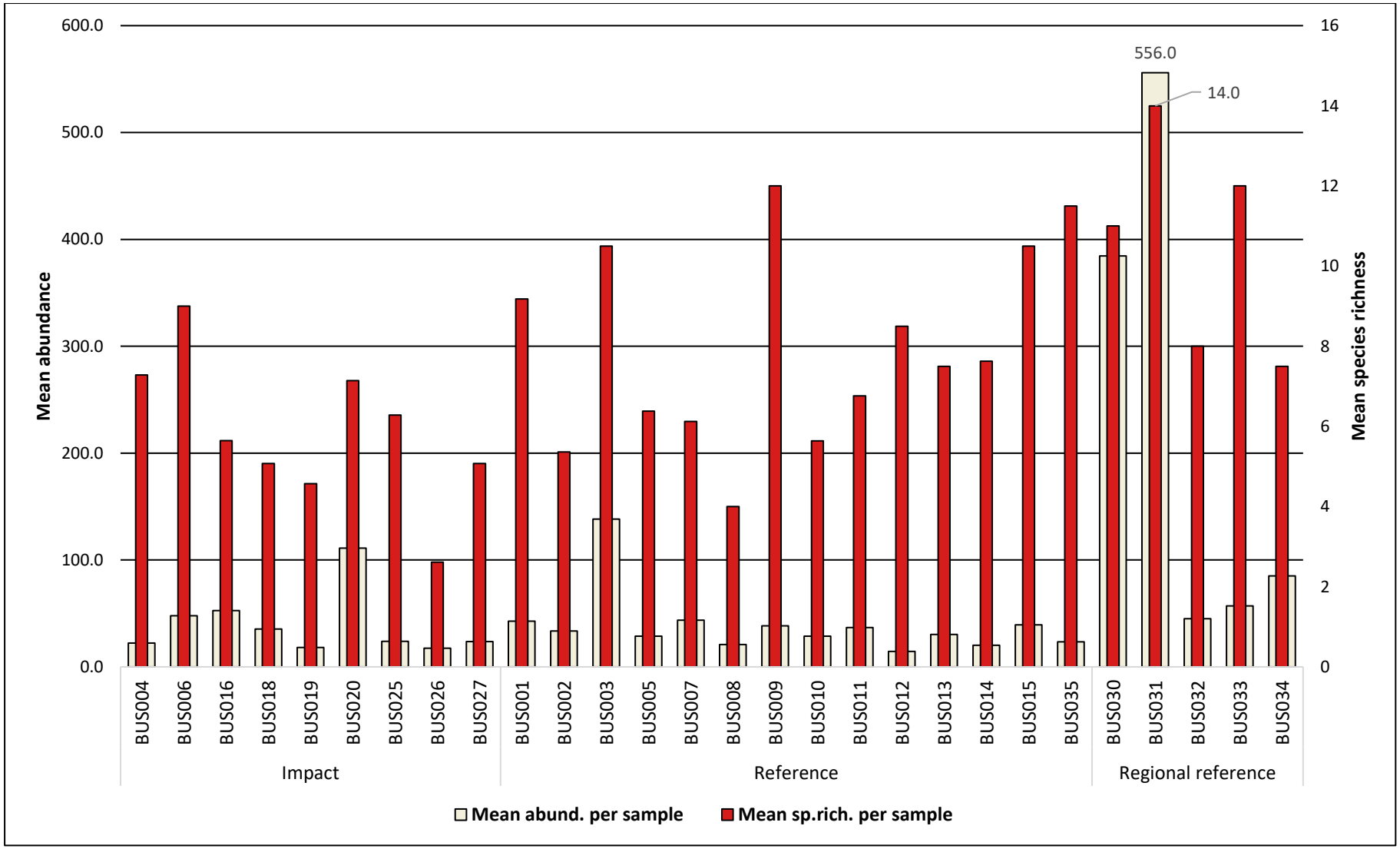
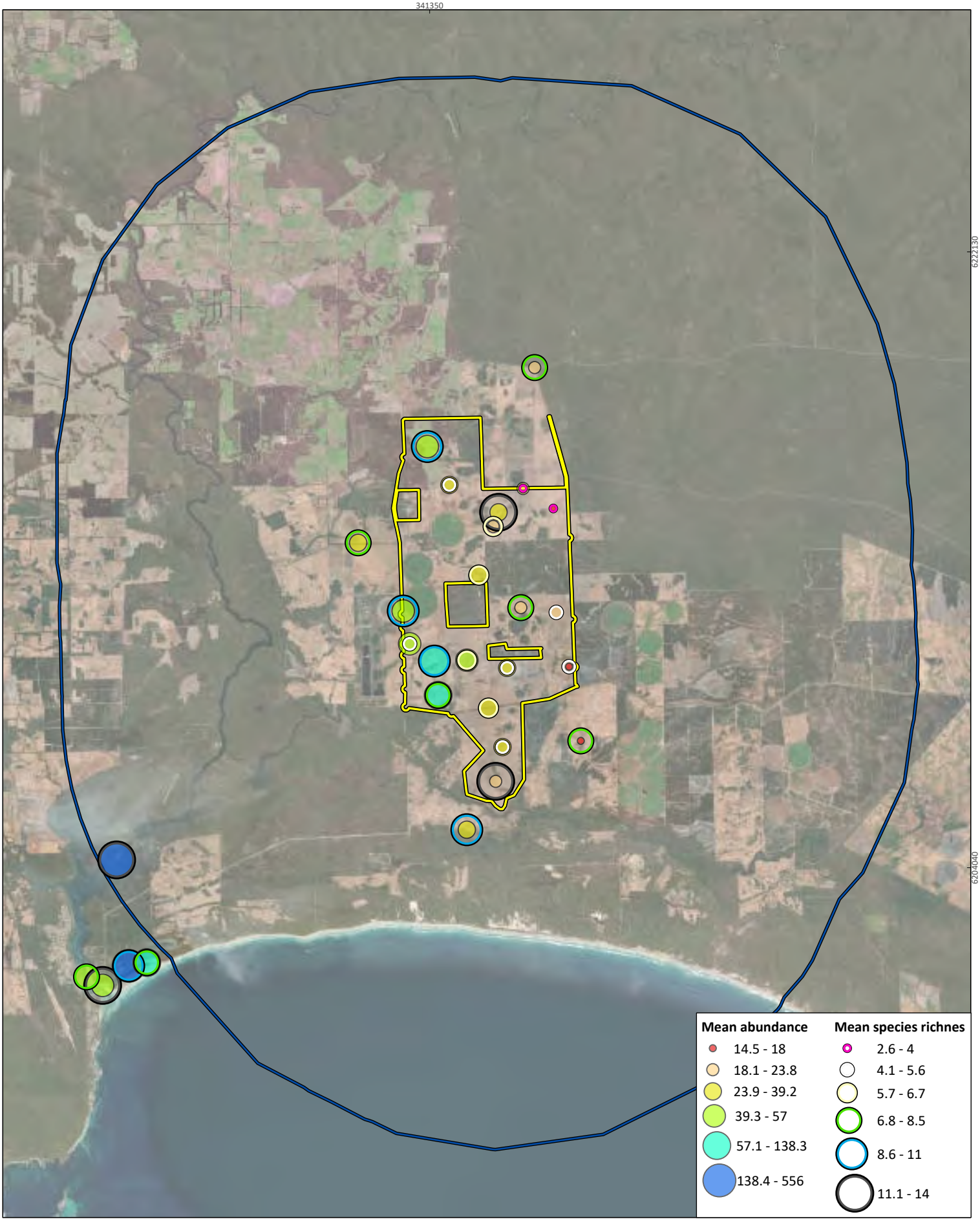


Figure 5-3 **Bar graph displaying mean species richness and abundance per sample, per site**





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	BA

0 2.5 5
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area

Figure 5-4

Mean bird abundance and mean richness per sample, per site

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5.1.2 Assemblage summary for impact and reference sites

The data presented in Section 5.1.2 relates only to fixed point counts from impact and reference sites (i.e. excludes regional reference sites). A summary of the data relating to the top 10 most abundant and dominant birds is presented in Table 5-3. The top 3, 10 and 20 most abundant species collectively represented just under 50%, 73.6% and 86.2%, respectively of the overall abundance of birds; the individual contribution and cumulative proportion is provided in Table 5-3.

The most abundant bird species recorded was Straw-necked Ibis (n = 3,519) which in relative terms contributed 31.1% of all birds and was recorded in 28.9% of all sample events. It was observed 88 times over the 2-year program, including 11 instances where the flock size was >100 individuals. Typically, it occurred in larger flocks and rarely as individuals or pairs. Abundance was relatively even between years, with Year 2 being 10% lower than Year 1 (Table 5-3).

Australian Raven was the second most abundant species (n = 1,136). It contributed 10.0% of the total abundance and was recorded in 121.6% of samples (i.e. multiple records were made in each sample event). It was far more abundant in Year 2 however, being up by 245.5% compared with Year 1. It was typically recorded in groups of 2 and 3.

Tree Martin was the third most abundant species (n = 912), contributing 8.1% of the overall abundance and being recorded in 42.3% of sample events. This species was usually recorded in small groups of 6–8 individuals and was 230.2% more abundant in Year 2, compared with Year 1.

Australian Shelduck (n = 816) contributed 7.2% of the overall abundance and was detected in 39.7% of sample events. Its abundance was relatively even between years, being just 7.1% higher in Year 2, compared with Year 1.

Australian White Ibis (Table 5-3) was also relatively abundant (n = 619), far more so in Year 2 (+343%). In fact, it was quite rare in Year 1 only being recorded 3 times, whereas in Year 2 it was recorded 50 times at an average of 10.1 individuals, and overall it contributed 5.5% of the total bird abundance for the 2 years of sampling.

Other notable species included While Willie Wagtail, which contributed just 2.2% of the total abundance, but was ubiquitous, being recorded in 56.1% of all sample events. Yellow-rumped Thornbill and White-fronted Chat declined 69.1% and 30.1%, respectively, in Year 2. While not shown in Table 5-3 as it was the 15th most abundant species, it is also noted that Emu abundance was up 235.3% in Year 2.

Three of the top 5 most abundant species were waterbirds, and of the top 20, almost all are considered either cosmopolitan or species that are advantaged by modified landscapes (e.g. Australian Raven, Tree Martin, Australian Ringneck, Yellow-rumped Thornbill, Willie Wagtail, Australian Magpie, White-fronted Chat, Grey Butcherbird, Red Wattlebird, Welcome Swallow, Magpie-lark and Splendid Fairy-wren) or favour grassland and floodplain habitats that dominate the WFA (Straw-necked Ibis, Australian Shelduck, Australian White Ibis, White-faced Heron, Emu and Inland Thornbill).

Table 5-3 Top 10 species by abundance at all fixed-point count sites

Scientific name	Vernacular	Year 1				Year 2				Pct change Year 1-2	Total abund.	Total relat. abund. (%)	Cum. abund. (%)	Total detected (%)
		Abund.	Mean abund.	No. of records	Detected (%)	Abund.	Mean abund.	No. of records	Detected (%)					
Threskiornis spinicollis	Straw-necked Ibis	1,855	74.2	25	8.2	1,664	26.4	63	20.7	-10.3%	3,519	31.1	31.1	28.9
Corvus coronoides	Australian Raven	255	2.7	93	30.5	881	3.2	278	91.1	245.5%	1,136	10.0	41.1	121.6
Petrochelidon nigricans	Tree Martin	212	6.1	35	11.5	700	7.4	94	30.8	230.2%	912	8.1	49.2	42.3
Tadorna tadornoides	Australian Shelduck	394	6.2	64	21	422	7.4	57	18.7	7.1%	816	7.2	56.4	39.7
Threskiornis molucca	Australian White Ibis	114	38	3	1	505	10.1	50	16.4	343.0%	619	5.5	61.9	17.4
Barnardius zonarius	Australian Ringneck	179	3.2	56	18.4	163	2.8	58	19	-8.9%	342	3.0	64.9	37.4
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	236	7.4	32	10.5	73	4.9	15	4.9	-69.1%	309	2.7	67.6	15.4
Rhipidura leucophrys	Willie Wagtail	127	1.6	78	25.6	126	1.4	93	30.5	-0.8%	253	2.2	69.9	56.1
Gymnorhina tibicen	Australian Magpie	126	2.3	54	17.7	110	1.8	61	20	-12.7%	236	2.1	71.9	37.7
Epthianura albifrons	White-fronted Chat	113	6.3	18	5.9	79	4.4	18	5.9	-30.1%	192	1.7	73.6	11.8
Total abundance top 10 species		**3,611**	**14.8**	**NA**	**NA**	**4,723**	**6.7**	**NA**	**NA**	**69.4%**	**8,334**	**73.6%**	**73.6**	**NA**
Total abundance top 11–20 species[1]		**4,377**	**9.3**	**NA**	**NA**	**5,376**	**5.1**	**NA**	**NA**	**35.2%**	**9,753**	**86.2%**		**NA**
Grand total abundance		**5,156**	**4.0**	**NA**	**NA**	**6,162**	**2.3**	**NA**	**NA**	**NA**	**11,318**	**NA**		**NA**

[1]Species not listed in table but summary data shown here for context.

The assemblage has been considered in terms of 'functional groups', which are essentially the Order each species belongs to (Figure 5-5). Eleven functional groups were recorded, with perching and singing birds (passerines) being the most abundant and species rich group overall and including 7 of the top 10 most abundant species (Table 5-4). Parrots and birds of prey were also relatively species rich, but birds of prey were not abundant by comparison, and were generally recorded as singletons or pairs hunting widely across the different habitats of the WFA. Parrots included the 6th most abundant species (Australian Ringneck) as well as Carnaby's Cockatoo (EN), Baudin's Cockatoo (EN) and Forest Red-tailed Black Cockatoo (VU). Most parrot records were of individuals, pairs or small groups moving between bushland remnants rather than actively using the cleared habitats that most sites were located in; although parrots were observed on occasion foraging on the ground when grasses were in seed, including Carnaby's Cockatoo.

The 3 'waterbird' groups collectively represented the 2nd most abundant group, with diversity approaching that of parrots, birds of prey and to a lesser extent perching and singing birds. Except for Banded Lapwing, shorebirds (including 'Migratory' species) were not observed during the fixed-point count sites in the WFA, and were instead restricted to the Regional reference sites. A single record of 3 Wood Sandpiper (Mig.) within the WFA was made during the Basic and Targeted fauna survey (Phoenix 2025a).

Waterbirds include all the ducks and cormorants. The 4 families represented were moderately speciose, and abundant, as would be expected for a study site that includes many ephemeral wetlands as well as large expanses of flooded grassland during the wet portion of the year. Australian Shelduck and Pacific and Black Duck were the 4th and 11th most abundant species overall, respectively (Figure 5-5; Table 5-3). These 2 species were observed foraging and breeding in wetlands and flooded grasslands. Cormorants were often observed loafing on tree branches at the periphery of wetlands.

Wading birds comprise the long-legged wetland birds, such as Straw-necked Ibis (the most abundant species), Australian White Ibis (5th most abundant) and White-faced Heron (14th most abundant) (Figure 5-5; Table 5-3). These species typically forage in flooded grasslands and in and around moderately shallow wetlands. Rarer waders included Little Egret, Royal Spoonbill and Yellow-billed Spoonbill.

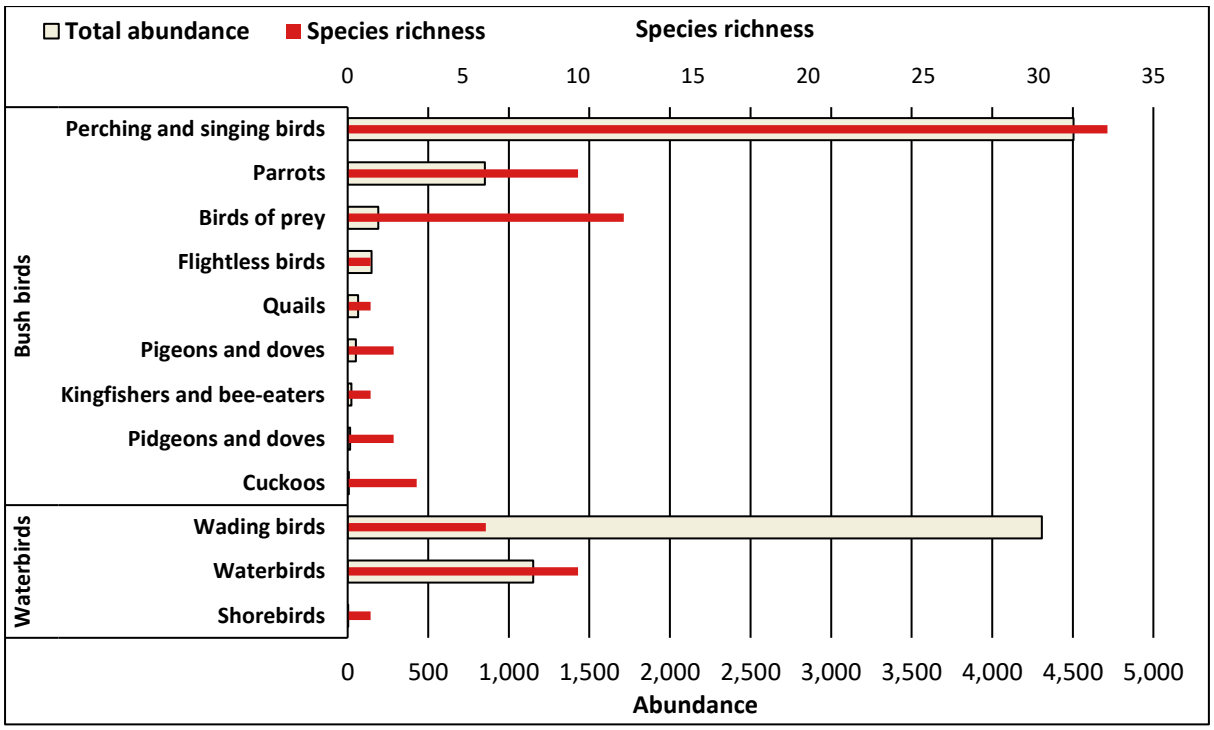


Figure 5-5 Summary by functional/taxonomic group

Table 5-4 further explores each family, providing a brief summary of each. The assemblage derived from the 305 fixed-point count samples from impact and reference sites, included members from 28 families, with some families represented by only a single species, while other families recorded several species (Table 5-4). The most speciose families were Accipitridae and Falconidae (birds of prey; 8 and 4 species each), Anatidae (ducks; 6 species), Psittacidae and Cacatuidae (parrots; 5 species each) and Meliphagidae (honeyeaters and chats; 5 species).

Threskiornithidae was the most abundant family, with records of 4,147 individuals, overwhelmingly of Straw-necked Ibis and to a lesser extent Australian White Ibis. The ducks (Anatidae) were also very abundant (1,133 individuals). Australian Raven, the only Corvidae was the second most recorded species with 1,136 individuals recorded from 371 observations (Table 5-4) and being recorded at least once in in every sample event.

There were few clear trends evident at the family level, except within the 'waterbirds'. Members of the orders Anseriformes (ducks etc) and Ciconiiformes (spoonbills and Ibis), and the family Phalacrocoracidae (cormorants) were largely or entirely restricted to the BBIA, whereas the members of Charadriiformes (families Charadriidae, Haematopodidae, Laridae and Scolopacidae) were restricted to the Regional reference sites and are not included in Table 5-3. This clear split is related to the nature of the available aquatic habitats, e.g. salinity, depth and inundation duration, and the associated food sources within WFA wetlands, compared with the tidal (marine) habitats of the Hardy Inlet.

The Order Passeriformes (perching and singing birds) included 15 families and 33 species in total. This was the most diverse group of birds recorded. However, many common 'bush birds' were not well represented in the fixed-point count data principally because the sites were typically located in open paddocks.

Table 5-4 Bird assemblage by family at fixed-point count impact and reference sites

Family name	Common names	Data summary	Summary of records
Birds of prey (Accipitriformes and Falconiformes) (13 ssp.)			
Accipitridae	Black-shouldered Kite, Brown Goshawk, Collared Sparrowhawk, Little Eagle, Swamp Harrier, Wedge-tailed Eagle, Whistling Kite, White-bellied Sea-eagle	Abundance: 114 No. records: 95 Species richness: 8	Records throughout WFA from cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mostly as singles and pairs. Also represented in Basic and Targeted fauna survey records.
Falconidae	Australian Hobby, Australian Kestrel, Brown Falcon, Peregrine Falcon	Abundance: 76 No. records: 61 Species richness: 4	Records throughout WFA from cleared and Marri-Jarrah-Peppermint woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded exclusively as singles and pairs. Also represented in Basic and Targeted fauna survey records.
Cuckoos (Cuculiformes) (3 ssp.)			
Cuculidae	Fan-tailed Cuckoo, Horsfield's Bronze Cuckoo, Shining Bronze Cuckoo	Abundance: 8 No. records: 8 Species richness: 3	Sparse records throughout WFA within cleared and MJP woodland habitat. Recorded exclusively as singletons, mainly in spring. Also represented in Basic and Targeted fauna survey records.
Flightless birds (Struthioniformes) (1 sp.)			
Dromaiidae	Emu	Abundance: 148 No. records: 26 Species richness: 1	Regular, scattered records in WFA, in cleared and MJP woodland habitats. Mostly recorded as 2 or more individuals and up to 17 recorded. Recorded in summer, autumn and spring. Also represented in Basic and Targeted fauna survey records.
Kingfishers and bee-eaters (Coraciiformes) (1 sp.)			
Halcyonidae	Laughing Kookaburra	Abundance: 23 No. records: 18 Species richness: 1	Naturalised exotic. Regular, scattered records in WFA, in cleared and MJP woodland habitats. Recorded exclusively as singletons and pairs, in all seasons. Also represented in Basic and Targeted fauna survey records, including additional member.

Family name	Common names	Data summary	Summary of records
Parrots (Psittaciformes) (11 ssp.)			
Cacatuidae	Baudin's Cockatoo, Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo,	Abundance: 254 No. records: 36 Species richness: 3	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mostly as singles and pairs, but some larger flocks from 12-53 individuals. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Psittaculidae	Australian Ringneck, Elegant Parrot, Purple-crowned Lorikeet, Red-capped Parrot, Western Rosella	Abundance: 597 No. records: 169 Species richness: 5	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded predominantly as 2 or more individuals. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Perching and singing bids (Passeriformes) (33 ssp.)			
Acanthizidae	Inland Thornbill, Spotted Scrubwren, Western Gerygone, Yellow-rumped Thornbill	Abundance: 450 No. records: 126 Species richness: 4	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded predominantly as 2 or more individuals. Most recorded in summer, spring and autumn. Also represented in Basic and Targeted fauna survey records, including additional member.
Artamidae	Australian Magpie, Black-faced Woodswallow, Dusky Woodswallow, Grey Butcherbird	Abundance: 550 No. records: 285 Species richness: 4	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Predominantly recorded as singletons and pairs (70%), but a few small flocks of <20 observed. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Campephagidae	Black-faced Cuckoo-shrike, White-winged Triller	Abundance: 94 No. records: 46 Species richness: 2	Regular, scattered records throughout the WFA, in cleared and MJP woodland habitat. Recorded almost exclusively as singletons and pairs, in all seasons. Also represented in Basic and Targeted fauna survey records.
Corvidae	Australian Raven	Abundance: 1,136 No. records: 371 Species richness: 1	The second most abundant species observed. Common throughout WFA, within cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mainly singletons and pairs (75%), but as many as 100 observed at a time. Present throughout the year. Also represented in Basic and Targeted fauna survey records.

Family name	Common names	Data summary	Summary of records
Dicruridae	Grey Fantail, Magpie-lark, Willie Wagtail	Abundance: 446 No. records: 296 Species richness: 3	Common throughout WFA, recorded from cleared and MJP woodland habitats, present throughout the year. Also recorded outside WFA in wider BIA. More than 2 individuals rarely recorded at any one time. Also represented in Basic and Targeted fauna survey records.
Hirundinidae	Tree Martin, Welcome Swallow	Abundance: 1,047 No. records: 173 Species richness: 2	Recorded throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at a Regional reference site. Tree Martin was 3rd most abundant species recorded, often seen in groups of 3 or more and up to 26. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Locustellidae	Brown Songlark, Rufous Songlark	Abundance: 23 No. records: 18 Species richness: 2	Not common, but present throughout WFA, predominantly in the south in cleared habitat. Also represented in Basic and Targeted fauna survey records.
Maluridae	Red-winged Fairy-wren, Southern Emu-wren, Splendid Fairy-wren	Abundance: 139 No. records: 59 Species richness: 3	Commonly recorded, throughout the WFA from cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Likely more prevalent in remnants, particularly with dense shrubs layers. Present in all seasons. Also represented in Basic and Targeted fauna survey records.
Meliphagidae	Brown Honeyeater, New Holland Honeyeater, Red Wattlebird, Western Spinebill, White-fronted Chat	Abundance: 423 No. records: 160 Species richness: 5	Common throughout the WFA in both cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Recorded mostly as singletons/pairs, but often in group of 3 or more, and up to 30. Recorded throughout year. Also represented in Basic and Targeted fauna survey records, including additional members.
Motacillidae	Australian Pipit	Abundance: 77 No. records: 54 Species richness: 1	Mon-specific. Recorded throughout the WFA all in cleared areas but primarily in the southern half. Nesting pairs recorded breeding in paddocks and distinctive swooping-diving breeding behaviour observed on several occasions. Recorded mostly as singletons in spring and summer. Also represented in Basic and Targeted fauna survey records.
Pachycephalidae	Grey Shrike-thrush, Western Whistler	Abundance: 16 No. records: 15 Species richness: 2	Rarely recorded in WFA during fixed-point counts, in cleared and MJP habitat. Also recorded outside WFA in wider BIA. Scattered records in throughout the study area. Recorded almost exclusively as singletons. Likely more common in native remnants. Also represented in Basic and Targeted fauna survey records, including additional member.

Family name	Common names	Data summary	Summary of records
Pardalotidae	Striated Pardalote	Abundance: 1 No. records: 1 Species richness: 1	A single record west of the WFA from a roadside remnant, in spring. Also represented in Basic and Targeted fauna survey records in the WFA, including additional member.
Petroicidae	Jacky Winter, Scarlet Robin	Abundance: 3 No. records: 3 Species richness: 2	Single records of each species, in the north and south of the WFA. Recorded from cleared and MJP woodland habitat. One additional member represented in the Basic and Targeted fauna survey.
Zosteropidae	Silvereye	Abundance: 99 No. records: 25 Species richness: 1	Mono-specific. Commonly recorded throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA. Typically recorded as 2 or more individuals. Not recorded in winter. Also represented in Basic and Targeted fauna survey records.
Pigeons and doves (Columbiformes) (3 ssp.)			
Columbidae	Common Bronzewing, Crested Pigeon	Abundance: 66 No. records: 46 Species richness: 2	Commonly recorded throughout WFA but more commonly in the southern half, in cleared habitat. Also recorded outside WFA in wider BIA. Recorded as singletons and pairs almost predominantly. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records in the WFA.
Phasianidae	Stubble Quail	Abundance: 65 No. records: 38 Species richness: 1	Commonly recorded throughout study area, in cleared habitat. Also recorded outside WFA in wider BIA. Recorded almost exclusively as singletons and pairs. Recorded in all seasons, except winter. Also represented in Basic and Targeted fauna survey records.
Waterbirds (Anseriformes, Charadriiformes and Ciconiiformes) (30 ssp.)			
Anatidae	Australian Shelduck, Australian Wood Duck, Black Swan, Grey Teal, Musk Duck, Pacific Black Duck	Abundance: 1,133 No. records: 188 Species richness: 6	Records spread throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA. Around 75% of records as singleton and pairs, but also several flocks up to >30 individuals recorded (Australian Shelduck, Black Swan, Pacific Black Duck) and up to 650. The majority of records in winter months, but members of the family present throughout the year. Also represented in Basic and Targeted fauna survey records, notably in wetland habitats.

Family name	Common names	Data summary	Summary of records
Charadriidae	Banded Lapwing	Abundance: 4 No. records: 3 Species richness: 1	Limited records in WFA, only Banded Lapwing, which was restricted to sites in the south of the WFA in Cleared habitat, absent in summer months. Red-capped plover also, but restricted to Regional reference sites. Also represented in Basic and Targeted fauna survey, including additional member and additional Banded Lapwing record, notably in wetland habitats.
Ardeidae	White-faced Heron, White-necked Heron	Abundance: 161 No. records: 50 Species richness: 2	Records throughout the WFA, from cleared areas and MJP woodland habitats. Recorded mostly as singletons and pairs, but with a few flocks also recorded, and up to 55 individuals. Most observations were of White-faced Heron. Also recorded outside WFA in wider BIA and at Regional reference sites (but much rarer). Mainly recorded in summer, some spring records. Also represented in Basic and Targeted fauna survey, including additional member.
Threskiornithidae	Australian White Ibis, Royal Spoonbill, Straw-necked Ibis, Yellow-billed Spoonbill	Abundance: 4,147 No. records: 146 Species richness: 4	Records dominated by Straw-necked Ibis and Australian White Ibis which are both in the top 10 most abundant species for the survey; the other 2 species were rare. The 2 dominant species were recorded throughout WFA, and flocks of Straw-necked Ibis >100 individuals regularly recorded. Recorded from cleared and MJP woodland habitat in the WFA. Also recorded outside WFA in wider BIA and at Regional reference sites (Australian White Ibis only). Rare in winter, mainly recorded in summer. Also represented in Basic and Targeted fauna survey.
Phalacrocoracidae	Great Cormorant, Little Black Cormorant, Little Pied Cormorant, Pied Cormorant	Abundance: 18 No. records: 14 Species richness: 4	Records throughout the WFA, from cleared areas and MJP woodland habitats. Also recorded from Regional reference sites. Little Pied Cormorant and Pied Cormorant commonly recorded. Predominantly recorded as singletons and largely restricted to spring and summer months. Also represented in Basic and Targeted fauna survey.

5.1.3 Flight heights and movements

Table 5-5 summarises flight height and movement recorded in this survey and Phoenix (2025a) for all species where flight data was recorded, including the Regional reference sites (see full dataset in Appendix 6). Figure 5-6 presents the same data with respect to the direction of observed flights. Further information with respect to conservation significant species and other species of potential concern is provided below (section 5.1.4.2).

The data in Table 5-5 shows that far fewer birds were recorded within the RSA range (25.3%) than below (74.7%) or above (0.01%). In total 71.7% of birds were stationary below the minimum RSA height. The number of records (n = 71) and abundance of 'moving' birds (4.3%) in Table 5-5 indicates that relatively few, larger flocks were observed making distinct movements within the RSA.

Table 5-5 Summary of bird height records in relation to RSA height categories for all point-count sites

Bird movement	RSA Location	Height cat.	No. of species	No. consig. species	Abund.	No. of records	Relat. abund.	Pct. rcords
Moving	Below	0-24	35	2	448	136	2.9%	5.0%
	Within	25-50	18	2	365	59	2.4%	2.2%
		51-75	5	0	123	10	0.8%	0.4%
		76-150	1	0	180	2	1.2%	0.1%
		151-250	0	0	0	0	0.0%	0.0%
	RSA	>250	0	0	0	0	0.0%	0.0%
Sub-total			**40**	**3**	**1,116**	**207**	**7.2%**	**7.6%**
Stationary	Below	0-25	91	11	11,706	2,227	75.8%	82.0%
	Within	26-50	43	5	1,757	205	11.4%	7.5%
		51-75	14	1	172	26	1.1%	1.0%
		76-150	13	0	650	41	4.2%	1.5%
		151-250	0	0	0	0	0.0%	0.0%
	RSA	>250	3	0	36	10	0.2%	0.4%
Sub-total			**120**	**5**	**14,321**	**2,509**	**92.8%**	**92.4%**
Grand total – within RSA			**52**	**8**	**3,911**	**414**	**25.3%**	**15.2%**
Grand total – outside RSA			**91**	**11**	**11,526**	**2,302**	**74.7%**	**84.8%**
Grant total			**100**	**12**	**15,437**	**2,716**	**100.0%**	**100.0%**

The following conservation significant species were recorded within the RSA (25–250 m) in the WFA:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (VU)
- Baudin's Cockatoo (*Zanda baudinii*) (EN)
- Carnaby's Cockatoo (*Zanda latirostris*) (EN)
- Peregrine Falcon (*Falco peregrinus*) (OS)
- Osprey (*Pandion haliaetus*) (Mig.).

The following conservation significant species were recorded within the RSA (25–250 m) at the Regional reference sites:

- Sharp-tailed Sandpiper (*Calidris acuminata*) (VU/Mig.)

- Sanderling (*Calidris alba*) (Mig.)
- Red-necked Stint (*Calidris ruficollis*) (Mig.)
- Caspian Tern (*Hydroprogne caspia*) (Mig.)
- Bar-tailed Godwit (*Limosa lapponica*) (Mig.)
- Fairy Tern (*Sternula nereis nereis*) (VU)
- Greater Crested Tern (*Thalasseus bergii*) (Mig.).

Figure 5-6 shows the direction of bird movements across the landscape, using abundance and number of records. The majority of distinct movements were toward the west (38.9%). This was closely followed by birds moving north, from the south (44.4%). However, a fair proportion were also moving in the opposite direction, south to north, and less so west to east. When movements are considered in either direction (east/west or north/south) the data is well balanced (abundance = 434 vs 496, respectively). Overall, the data therefore does not suggest any strong movement direction trends.

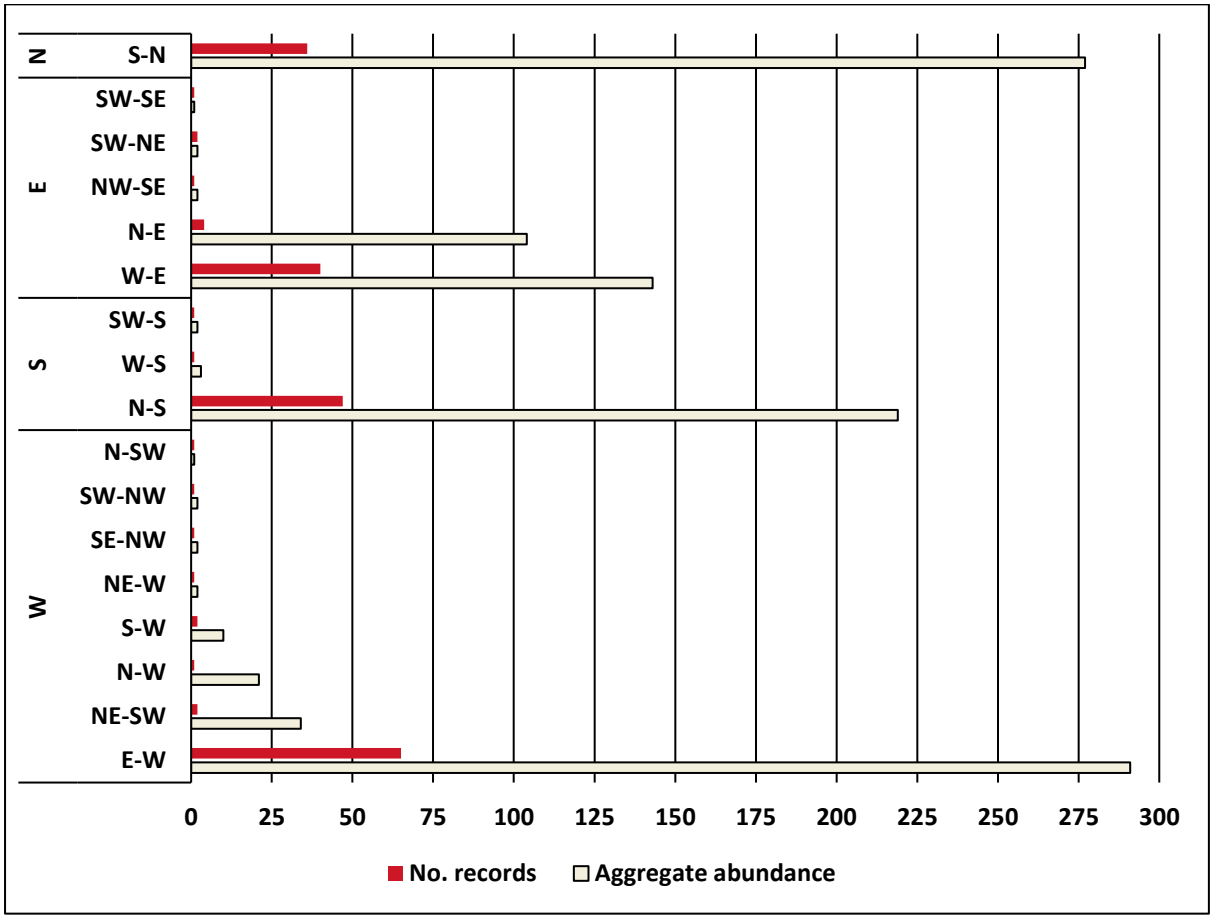


Figure 5-6 **Summary of flight direction: abundance and number of records for all point-count sites**

5.1.4 Conservation significant birds and other birds potentially of concern recorded

5.1.4.1 Species records

Fourteen bird species of conservation significance were recorded across the BBRAS survey and the Basic and Targeted fauna survey, one of which was only recorded from the latter (Wood sandpiper; Table 5-6; Figure 5-7). Seven of these species were recorded in the WFA and/or wider BIA:

- Baudin's Cockatoo (*Zanda baudinii*; EN) – recorded during both surveys, in the WFA and wider BIA
- Carnaby's Cockatoo (*Zanda latirostris*; EN) – recorded during both surveys, in the WFA and wider BIA
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU) – recorded during both surveys, in the WFA and wider BIA
- Wood Sandpiper (*Tringa glareola*; Mig.) – recorded during the Basic and Targeted survey, in the WFA only
- Osprey (*Pandion haliaetus*; Mig.) – recorded during both surveys, in the WFA and at Regional reference sites
- Peregrine Falcon (*Falco peregrinus*; OS) – recorded during the BBRAS, in the WFA only
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; P3) – recorded during the BBRAS, outside the WFA in the wider BIA.

The remaining 7 conservation significant species, all Migratory shorebirds, were recorded only at Regional reference sites, during Year 2 of the BBRAS:

- Caspian Tern (*Hydroprogne caspia*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Fairy Tern (*Sternula nereis nereis*) – recorded at Hardy Inlet, unlikely to occur in WFA
- Greater Crested Tern (*Thalasseus bergii*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Sharp-tailed Sandpiper (*Calidris acuminata*; VU; Mig.) – recorded at Hardy Inlet, may possibly occur in WFA on occasion
- Sanderling (*Calidris alba*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Red-necked Stint (*Calidris ruficollis*; Mig.) – recorded at Hardy Inlet, may possibly occur in WFA on occasion
- Bar-tailed Godwit (*Limosa lapponica*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA.

All conservation significant species recorded in the WFA or wider BIA are considered potential species of concern to the Project per Brett Lane and Associates (2005) and DCCEEW (2024). Sharp-tailed Sandpiper and Red-necked Stint are also considered potential species of concern as they may possibly occur in the WFA on occasion. Caspian Tern, Greater Crested Tern, Sanderling and Bar-tailed Godwit are not considered of concern as they are unlikely to occur in the WFA as no suitable habitat is present.

In addition to the recorded conservation significant species, non-conservation significant raptors recorded were also identified as potential species of concern as they are particularly vulnerable to collision risk due to their morphology and/or flight behaviour, though susceptibility varies between species. Eleven non-conservation significant raptors were recorded across the BBRAS survey and the Basic and Targeted fauna survey (Table 5-6; Figure 5-7).

Table 5-6 Summary of conservation significant bird records and other recorded birds potentially of concern

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Conservation significant bird species recorded																			
Pandion haliaetus (Osprey)	Mig. (EPBC & BC Acts)	WFA, Reg.	BBRAS sites – BUS030, BUS032, BUS033, BUS034 B/T sites – Osprey	Direct sighting at 'Osprey' site in WFA; opportunistic record during heritage survey, flying over a paddock. All other records from Regional sites at Hardy Inlet. Known to utilise a variety of near-coastal habitats. Study area considered minor/supplemental foraging habitat within the home range of Hardy Inlet individuals. Suitable foraging habitat is abundant outside the WFA. Unlikely to nest within the study area.	None, transitory only	6 (6)	1 (1)	S	S	S			R					0.05%	0-24 m (2) 25-50 m (3) 51-75 m (1)
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS008, BUS013 B/T sites – AQU-01, AQU-02, AQU-03, AQU-25, AQU-40, AQU-55, BC2024_01, BCForaging, BCRoosting05, BCRoosting09, FRTBC-01, FRTBC-02, FRTBC-03, FRTBC-04, FRTBC-05, FRTBC-06, Opp12, Opp13,	Audio recording, direct sighting and foraging evidence in the WFA. Records from the WFA and wider BIA. Most records of individuals and pairs, with only 9 records of >2 birds. The largest flock (53 individuals) recorded 1.5 km west of study area during the BBRAS (site BUS013). It was directly observed foraging at one site (VER-Opp04) while foraging evidence (chewed Marri nuts predominantly) was obtained from 7 sites. 15 audio detections it total, but only once from the BBRAS recorders (open paddocks). The Phase 3 audio recordings identified 12 detections, of which 6 were flyovers and 6 were foraging detections where the birds spent >1 minute at that site presumably foraging, or prospecting. All other records were of the birds moving	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	3 (55)	45 (104)	R, S	R, S	R, S	R, S	S	R		R			0.83%	0-24 m (3) 25-50 m (2) N-S

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
			Opp15, Opp19, SM4-01, SM4-02, SM4-06, SM4-07, VER-22, VER-32, VER-33, VER-40, VER-45, VER-47, VER-Opp04, VER-Opp07, VER-Opp08	through/over this habitat. No breeding or night roosting behaviour was observed. Suitable habitat within and surrounding the WFA.															
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS014, BUS015, BUS019 B/T sites – Opp11, VER-41, VER-42, VER-Opp01	Calls, direct sightings in the WFA. Records from the WFA and wider BIA. Largest flocks – 26, 10, 9 and 8 individuals. Observed foraging just once in the WFA (site VER-Opp01). All other observations were of birds moving through the landscape. No breeding or night roosting behaviour was observed. In addition to the records of Baudin's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections) for a total occupation time of 9.5 hours over ~2 months of recording, with 37 (45%) of these being birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that most of these records were Carnaby's Cockatoo given the much higher detection rate of this species over Baudin's (~4:1) during the surveys. Suitable habitat within and surrounding the WFA.	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	3 (11)	4 (46)	S	S	S	R, S	S	R	S		S		0.30%	0-24 m (3)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS001, BUS004, BUS005, BUS010, BUS014, BUS016, BUS019, BUS020, BUS026, BUS027 B/T sites – AQU-28, AQU-39, AQU-51, AQU-53, AQU-55, BCRoosting05, BCRoosting09, CarnabysCockies 02, VER-31, VER-33, VER-39, VER-41, VER-42	Calls, direct sightings in the WFA. Records from the WFA and wider BIA. Evidence of occupation via calls and direct sightings at 23 sites (36 total records), with repeated detections at a number of those sites. Predominantly recorded as singles, with only 9 records of more than one individual and flocks >10 birds observed on 3 occasions. Observed foraging in MJP woodland once outside the WFA. Two observations of foraging on the ground in the WFA eating paddock seeds. All other records were of birds moving through the landscape. In addition to the records of Carnaby's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections) for a total occupation time of 9.5 hours over ~2 months of recording, with 37 (45%) of these being birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that most of these records were Carnaby's Cockatoo given the much higher detection rate of this species over Baudin's (~4:1) during the surveys. Suitable habitat within and surrounding the WFA.	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	22 (95)	14 (55)	R, S	R, S	R, S	R, S					S	S	0.79%	0-24 m (20) 25-50 m (4)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	WFA	BBRAS sites – BUS011 B/T sites – none	Direct sighting of one individual observed hunting near Governor Broome Rd in the southern part of the WFA. Much of the WFA is suitable hunting habitat. May be a resident close to the WFA, using the available habitats for hunting. Unlikely to nest in WFA.	Foraging	1 (1)	0 (0)	S	S	S	S	S	R, S	S	S	S	S	0.01%	25-50 m (1) N-S
Hydroprogne caspia (Caspian Tern)	Mig. (EPBC & BC Acts)	Reg.	BUS031, BUS032, BUS033, BUS034	Recorded at Hardy Inlet only, in flocks.	None	6 (62)	0 (0)											0.33%	0-24 m (2) 25-50 m (2)
Sternula nereis nereis (Fairy Tern)	VU (EPBC & BC Acts)	Reg.	BUS031, BUS033, BUS034	Recorded at Hardy Inlet only, as singles.	None	1 (3)	0 (0)											0.35%	0-24 m (2) 25-50 m (1)
Thalasseus bergii (Greater Crested Tern)	Mig. (EPBC & BC Acts)	Reg.	BUS030, BUS031, BUS032, BUS033, BUS034	Recorded at Hardy Inlet only, in flocks.	None	10 (46)	0 (0)											0.24%	0-24 m (4) 25-50 m (2)
Calidris acuminata (Sharp-tailed Sandpiper)	VU/ Mig. (EPBC Act); Mig. (BC Act)	Reg.	BUS031	Single record of flock of 40 from Hardy Inlet only.	Foraging	1 (40)	0 (0)	S	S	S			S					0.21%	0-24 m (1)
Calidris alba (Sanderling)	Mig. (EPBC & BC Acts)	Reg.	BUS031	Single record of 4 from Hardy Inlet only.	None	1 (4)	0 (0)											0.02%	0-24 m (1)
Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	Reg.	BUS031, BUS034	Recorded at Hardy Inlet only, in flocks.	Foraging	2 (72)	0 (0)	S	S	S			S					0.38%	0-24 m (1)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	Reg.	BUS031	Single individual recorded at Hardy Inlet.	None	1 (1)												0.01%	0-24 m (1)
Tringa glareola (Wood Sandpiper)	Mig. (EPBC & BC Acts)	WFA	BBRAS sites – none B/T sites – VER-36	Direct sighting of 3 individuals in a SIPW wetland in the WFA. No records during BBRAS. Likely to utilise wetland habitats in WFA. Suitable habitat within and outside WFA.	Foraging	0 (0)	1 (3)	R, S	S	S								0.02%	0-24 m (1)
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	BIA	BBRAS sites – BUS014 B/T sites – Mowl01	Two audio recordings located ~2.5 km north of the WFA and ~1 km south of the WFA along the Scott River. No records in the WFA. Recorded in May and November 2023 in the BBRAS. May be resident within woodland habitats generally of the WFA, but more likely to roost and nest in such habitat along the Scott River and in nature reserve to the north where habitat is extensive.	Roosting, foraging, breeding	1 (1)	1 (1)				R, S	S	R			S		0.01%	NR, detected via audio recording only
Other potential bird species of concern recorded																			
Aquila audax (Wedge-tailed Eagle)	Not listed	WFA, BIA	BBRAS sites – BUS001, BUS004, BUS005, BUS006, BUS008, BUS009, BUS010, BUS011, BUS015, BUS016, BUS018, BUS019, BUS025 B/T sites – AQU-25, VER-21, WedgeyOpp	Regular direct sightings in WFA. Also recorded in wider BIA. Mostly singles, 3 records of a pair. All records were of birds in flight. Observed soaring and likely foraging in WFA, as well as flying over.	Foraging, roosting, breeding	34 (46)	3 (4)	S	S	R, S	R, S	S	R, S	S				0.26%	0-24 m (2) 25-50 m (12) 51-75 m (3) 76-150 m (11) 151-200 m (5) >200 m(2) E-W

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Circus approximans (Swamp Harrier)	Not listed	WFA, BIA	BBRAS sites – BUS001, BUS002, BUS003, BUS004, BUS006, BUS008, BUS010, BUS011, BUS015, BUS016, BUS018, BUS019, BUS020, BUS025, BUS026, BUS027 B/T sites – AQU-01, AQU-15, AQU-18, AQU-25, AQU-30, AQU-45, AQU-51, AQU-57, Opp07, Opp20, VER-33, VER-38	Regular direct sightings in WFA. Also recorded in wider BIA. Mostly singles, 4 records of a pair. All records were of birds in flight. Observed soaring and likely foraging in WFA, as well as flying over.	Foraging, roosting, breeding	46 (52)	11 (14)	S	S	S			S	S	S			0.35%	0-24 m (33) 25-50 m (12) 51-75 m (3) 76-150 m (3) N-S, S-N, E-W, SW-NE, W-E
Elanus axillaris (Black-shouldered Kite)	Not listed	WFA	BBRAS sites – BUS001, BUS016 B/T sites – AQU-Opp04, Opp17	Direct sightings in the WFA. All singles. All records were of birds in flight. Observed soaring in WFA.	Foraging, roosting, breeding	2 (2)	2 (2)	S	S	S	S	S	S	S	S			0.02%	0-24 m (1) 25-50 m (1)
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Not listed	WFA, Reg.	BBRAS sites – BUS018, BUS032 B/T sites – none	One direct sighting in the WFA and one at a Regional site at the Hardy Inlet. Both singles. WFA record was of the bird flying over the site. Soaring at Regional site.	Foraging	2 (2)	0 (0)	S	S	S								0.01%	76-150 m (2)
Haliastur sphenurus (Whistling Kite)	Not listed	WFA, Reg.	BBRAS sites – BUS001, BUS002, BUS016, BUS020, BUS030 B/T sites – Opp06, Opp07	Direct sightings in the WFA and at a Regional site at the Hardy Inlet. All singles except one pair. All records were of birds in flight.	Foraging, roosting, breeding	6 (6)	2 (3)	S	S	S	S	S	S	S	S			0.05%	25-50 m (3) 51-75 m (1) 76-150 m (2) W-E

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Hieraaetus morphnoides (Little Eagle)	Not listed	WFA, BIA, Reg.	BBRAS sites – BUS005, BUS030 B/T sites – VER-30	Direct sighting in the WFA, wider BIA and at a Regional site at the Hardy Inlet. All singles. All records were of birds in flight. Observed soaring in WFA.	Foraging, roosting, breeding	2 (2)	1 (1)	S	S	S	S	S	S	S	S			0.02%	76-150 m (2)
Tachyspiza cirrocephala (Collared Sparrowhawk)	Not listed	WFA	BBRAS sites – BUS005, BUS011, BUS020 B/T sites – none	Direct sightings in the WFA. All singles. All records were of birds in flight. Observed soaring in the WFA and flying over.	Foraging, roosting, breeding	4 (4)	0 (0)	S	S	S	S	S	S	S	S			0.03%	0-24 m (2) 25-50 m (1) 76-150 m (1) W-E
Tachyspiza fasciata (Brown Goshawk)	Not listed	WFA	BBRAS sites – BUS001, BUS005 B/T sites – AQU-25, VER-Opp02, VER-Opp03	Direct sightings in the WFA. Singles, one pair. All records were of birds in flight.	Foraging, roosting, breeding	3 (4)	3 (3)	S	S	S	S	S	S	S	S			0.04%	0-24 m (1) 51-75 m (1) 76-150 m (2) E-W
Falco berigora (Brown Falcon)	Not listed	WFA, BIA	BBRAS sites – BUS002, BUS003, BUS008, BUS011, BUS018, BUS025 B/T sites – Bfalcon, VER-09, VER-40	Direct sightings in the WFA and BIA. Mostly singles. All records were of birds in flight. Observed soaring in the WFA and flying over.	Foraging, roosting, breeding	14 (17)	3 (4)	S	S	S	S	S	S	S	S			0.11%	0-24 m (8) 25-50 m (4) 51-75 m (1) 76-150 m (3) W-E, E-W

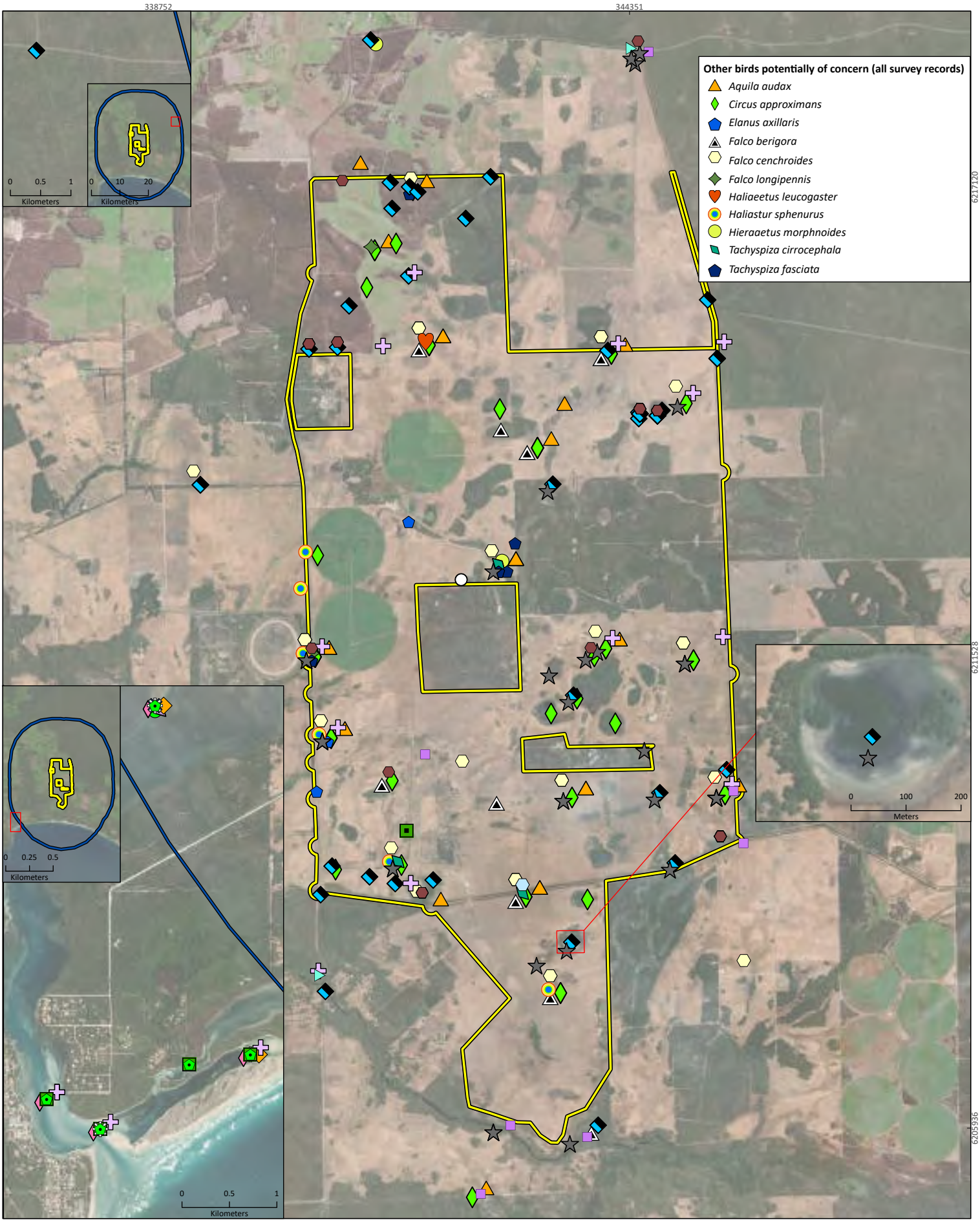
Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Falco cenchroides (Australian Kestrel)	Not listed	WFA, BIA, Reg.	BBRAS sites – BUS001, BUS002, BUS004, BUS005, BUS007, BUS008, BUS010, BUS011, BUS012, BUS013, BUS016, BUS018, BUS019, BUS020, BUS026, BUS027, BUS030, BUS034 B/T sites – VER-21, VER-45	Direct sightings in the WFA, BIA and Regional reference sites. Singles, pairs. All records were of birds in flight. Observed soaring and foraging in the WFA and flying over.	Foraging, roosting, breeding	45 (56)	2 (2)	S	S	S	S	S	S	S	S			0.30%	0-24 m (34) 25-50 m (8) 76-150 m (3) S-N
Falco longipennis (Australian Hobby)	Not listed	WFA	BBRAS sites – BUS001, BUS006 B/T sites – none	Direct sightings in the WFA. Singles, one pair. All records were of birds in flight.	Foraging, roosting, breeding	3 (4)	0 (0)	S	S	S	S	S	S	S	S			0.02%	0-24 m (2) 51-75 m (1) N-S

1 – BIA in this column refers to the BIA extent that is outside the WFA. Reg. = Regional sites.

2 – B/T sites = Basic and Targeted fauna survey sites.

3 – SIPW – seasonally inundated paperbark woodland (wetland); SISE – seasonally inundated sedgeland (wetland); SISH – seasonally inundated shrubland; MJP – Marri-Jarrah-Peppermint woodland; OWP – Open woodland of Peppermint trees (degraded); Clrd DS – Cleared–degraded sumpland; Bluegum – Bluegum plantation; Pine – Pine plantation.

4 – 'R' = Recorded from habitat. 'S' = Suitable habitat for species.



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Scott River Wind Fam

Project No	1585
Date	19/06/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:58,100 (at A4) GDA 1994 MGA Zone 50

Study area
Bird/Bat Investigation Area

Significant birds (all survey records)

- *Calidris acuminata*,VU/ Mig. (EPBC Act); Mig. (BC Act)
- *Calidris alba*,Mig. (EPBC & BC Acts)
- *Calidris ruficollis*,Mig. (EPBC & BC Acts)
- *Calyptorhynchus banksii naso*,VU (EPBC & BC Acts)
- *Calyptorhynchus/Zanda* sp.,EN-VU (EPBC & BC Acts)
- *Falco peregrinus*,OS (BC Act)
- *Hydroprogne caspia*,Mig. (EPBC & BC Acts)
- *Limosa lapponica*,Mig. (EPBC & BC Acts)
- *Pandion haliaetus*,Mig. (EPBC & BC Acts)
- *Sternula nereis nereis*,VU (EPBC & BC Acts)
- *Thalasseus bergii*,Mig. (EPBC & BC Acts)
- *Tringa glareola*,Mig. (EPBC & BC Acts)
- *Tyto novaehollandiae novaehollandiae*,P3 (DBCA list)
- *Zanda baudinii*,EN (EPBC & BC Acts)
- *Zanda latirostris*,EN (EPBC & BC Acts)
- *Zanda* sp.,EN (EPBC & BC Acts)

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Figure 5-7

Recorded conservation significant birds and other birds potentially of concern

PHOENIX ENVIRONMENTAL SCIENCES

5.1.4.2 Flight heights and movements

The flight data presented below (Table 5-7) includes records from the current survey and the Basic and Targeted fauna survey (Phoenix 2025a). Not all records for conservation significant species included flight details due to the sample method (e.g. audio recordings), or other factors, and therefore the numbers below do not necessarily match those presented in Table 5-6 above.

Seven conservation significant species were recorded flying at heights within the RSA (Table 5-7), although most records were of birds flying below the RSA (i.e., 0-24m):

- Caspian Tern (0-50 m) – Regional reference sites only
- Fairy Tern (0-50 m) – Regional reference sites only
- Greater Crested Tern (25-50 m) – Regional reference sites only
- Osprey (0-75 m) – Regional reference sites, plus recorded in the WFA but no height recorded
- Peregrine Falcon (25-50 m) – WFA
- Forest Red-tailed Black Cockatoo (0-50 m) – WFA and BIA
- Carnaby's Cockatoo (0-50 m) – WFA and BIA.

Flight direction for most observations was determined to be 'stationary', as the birds were either hovering or showing no distinct direction of movement. However, where they were recorded as moving in a distinct direction they were typically moving N-S/S-N and there is no difference in movement between conservation significant species and the broader assemblage, as presented in section 5.1.3 (Figure 5-6; Table 5-5).

Wood Sandpiper and Peregrine Falcon were recorded from only a single observation each, therefore no substantive comments can be made concerning observed behaviour, site utilisation etc for these species. Masked Owl was only recorded indirectly via nocturnal audio recording therefore no flight heights were recorded.

Table 5-7 Flight directions per record for conservation significant birds (grey rows denote RSA heights)

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
Charadriiformes						
Laridae	*Hydroprogne caspia* (Caspian Tern)	Mig. (EPBC & BC Acts)	BUS031	27	0-24	Stat.
			BUS031	22	0-24	Stat.
			BUS032	1	25-50	Stat.
			BUS032	2	25-50	Stat.
			BUS033	9	0-24	Stat.
			BUS034	1	0-24	Stat.
	Sternula nereis nereis (Fairy Tern)	VU (EPBC & BC Acts)	BUS031	40	0-24	Stat.
			BUS033	4	0-24	Stat.
			BUS034	4	25-50	Stat.
	Thalasseus bergii (Greater Crested Tern)	Mig. (EPBC & BC Acts)	BUS030	1	0-24	Stat.
			BUS031	9	0-24	Stat.
			BUS032	1	0-24	Stat.
			BUS032	6	25-50	Stat.
			BUS032	6	0-24	Stat.
			BUS032	1	25-50	Stat.

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
			BUS033	20	0-24	Stat.
			BUS034	1	0-24	Stat.
			BUS034	1	0-24	Stat.
Scolopacidae	*Calidris acuminata* (Sharp-tailed Sandpiper)	VU/Mig./Mig. (EPBC Act; BC Act)	BUS031	40	0-24	Stat.
	Calidris alba (Sanderling)	Mig. (EPBC & BC Acts)	BUS031	4	0-24	Stat.
	Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	BUS031	12	0-24	Stat.
			BUS034	60	0-24	Stat.
	Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	BUS031	1	0-24	Stat.
Falconiformes						
Accipitridae	*Pandion haliaetus* (Osprey)	Mig. (EPBC & BC Acts)	BUS030	1	0-24	Stat.
			BUS030	1	25-50	Stat.
			BUS032	4	25-50	Stat.
			BUS033	1	51-75	Stat.
			BUS033	1	25-50	Stat.
			BUS034	1	0-24	Stat.
Falconidae	*Falco peregrinus* (Peregrine Falcon)	OS (BC Act)	BUS011	1	25-50	N-S
Psittaciformes						
Cacatuidae	*Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo/Karrak)	VU (EPBC & BC Acts)	AQU-01	10	25-50	N-S
			BCForaging	1	0-24	Stat.
			BCRoosting09	2	0-24	Stat.
			BUS013	1	25-50	N-S
			BUS013	53	0-24	S-N
	Calyptorhynchus/ Zanda sp. (black cockatoo species)	EN-VU (EPBC & BC Acts)	BCRoosting01	4	0-24	Stat.
			BCRoosting06	2	0-24	Stat.
			BCRoosting16	6	0-24	Stat.
			BUS001	1	25-50	Stat.
			BUS004	38	0-24	Stat.
			BUS008	6	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS019	6	0-24	Stat.
			BUS026	10	0-24	Stat.
			BUS032	4	25-50	Stat.
			BUS032	2	25-50	Stat.
			BUS032	2	0-24	Stat.
			BUS033	7	0-24	Stat.
			BUS034	4	0-24	Stat.
			BUS014	8	0-24	NE-SW

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
	Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	BUS015	1	0-24	N-SW
			BUS019	2	0-24	Stat.
	Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	BCRoosting05	2	25-50	Stat.
			BCRoosting09	2	0-24	Stat.
			BUS001	3	0-24	Stat.
			BUS001	1	25-50	Stat.
			BUS004	2	0-24	Stat.
			BUS005	1	25-50	Stat.
			BUS010	6	0-24	Stat.
			BUS010	4	0-24	Stat.
			BUS014	5	0-24	Stat.
			BUS016	20	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS016	4	0-24	Stat.
			BUS019	12	0-24	Stat.
			BUS019	6	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS019	9	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS020	2	0-24	Stat.
			BUS020	2	25-50	Stat.
			BUS026	2	0-24	Stat.
			BUS027	1	0-24	Stat.
			BUS027	6	0-24	Stat.
			BUS027	1	0-24	Stat.
	Zanda sp. (white-tailed black cockatoo species)	EN (EPBC & BC Acts)	BUS001	3	0-24	E-W
			BUS003	26	0-24	SW-X?

5.2 BATS

5.2.1 General summary

A summary of the data for the 16 sites where ultrasonic recorders were deployed in Year 1 is presented in Table 5-8. The site level data presents a compelling and consistent theme of relatively high bat diversity, but generally low levels of activity, across the WFA. A total of 55 samples were recorded over 71 nights and bats were detected in 43 of those nights, which means over 20% of samples detected no bats at all. Further, 50% of sites (8 of 16) detected no bats at least once. Those samples where no bats were detected occurred in all seasons (seasonal trends are presented in more detail below).

Where bats were detected, all metrics presented in Table 5-8 demonstrate low bat activity, with a few exceptions. For example, a total of 1,233 detections were found from an approximate 852 hours of recording, meaning bats were detected at a rate of 1.5 per hour, or one detection every 40 minutes, on average across the Impact and Reference sites. Similarly for the number of calls, a total of 9,803 were obtained (from 852 hours of recording), resulting in just 11.5 calls per hour on average being recorded. Further, the average number of calls per detection was just 5.5 overall, with 11 sites (69% of sites) recording an average number of calls per detection of <5. These results suggest either very low numbers of individuals typically are being detected when bats are present, and/or bats are not actively hunting in the cleared areas at or near ground-level but are instead passing through on their way to more productive remnant patches; It is considered likely a combination of both scenarios.

The highest activity levels were at sites BUS002 and BUS013 (25.7 and 15.6 average number of calls per detection respectively; Table 5-8). These sites were located on a roadside remnant in the BIA west of the WFA and in a cleared area in the southern half of the WFA, respectively. Sites BUS001, BUS014 and BUS035 also recorded relatively high activity levels, based on average number of calls per detection (6–8). BUS012 was the least active site which although only sampled once before access to this area was removed, recorded a single species, from a single detection and call.

While the number of calls detected vary considerably between sites and species (Table 5-11), a rather homogenous bat assemblage was recorded for the most part across the WFA and immediate surrounds. For example, Impact sites recorded 7 species and Reference sites 8 species; both Impact and Reference sites recorded 2 families. The mean total number of calls per site was 476 at Impact sites and 632.2 at Reference sites, whereas the average number of calls per detection was 4.1 at Impact sites, 8.9 at Reference sites and 8.0 overall, suggesting almost 50% lower activity at Impact sites and low activity generally in both.

Table 5-8 Sites summary for bats

Location	Site	No. samples	No. nights	Approx. hrs recording	No. samples bats detected	Species richness	Families	Total no. of calls	No. of detects	Mean. no. of calls per detect.	No detects / hr	No. calls / hr
Impact	BUS004	3	3	36	2	7	2	111	37	3.0	1.0	3.1
	BUS006	4	8	96	3	6	2	841	197	4.3	2.1	8.8
Sub-total		**7**	**11**	**132**	**5**	**7**	**2**	**952**	**234**	**4.1**	**1.5**	**5.9**
Ref.	BUS001	4	6	72	4	7	2	1,008	131	7.7	1.8	14.0
	BUS002	4	6	72	4	6	2	1,981	77	25.7	1.1	27.5
	BUS003	4	4	48	1	2	1	6	5	1.2	0.1	0.1
	BUS005	3	3	36	3	6	2	100	40	2.5	1.1	2.8
	BUS007	4	4	48	3	3	2	22	13	1.7	0.3	0.5
	BUS008	4	4	48	3	6	2	116	63	1.8	1.3	2.4
	BUS009	3	3	36	3	6	2	48	29	1.7	0.8	1.3
	BUS010	4	4	48	1	4	2	17	13	1.3	0.3	0.4
	BUS011	4	6	72	3	6	2	135	55	2.5	0.8	1.9
	BUS012	1	1	12	1	1	1	1	1	1.0	0.1	0.1
	BUS013	4	6	72	4	7	2	2,952	189	15.6	2.6	41.0
	BUS014	4	6	72	4	8	2	1,887	236	8.0	3.3	26.2
	BUS015	4	6	72	3	8	2	410	119	3.4	1.7	5.7
	BUS035	1	1	12	1	6	2	168	28	6.0	2.3	14.0
Sub-total		**48**	**60**	**720**	**38**	**8**	**2**	**8,851**	**999**	**5.7**	**1.3**	**9.8**
Total abund.		**55**	**71**	**852**	**43**	**8**	**2**	**9,803**	**1,233**	**8.0**	**1.4**	**11.5**

When the bat data is considered spatially, a clear picture emerges, that is that bat activity at sites outside the WFA or at its borders (i.e. in proximity to native vegetation) is much higher than in the central areas (Figure 5-8). The data therefore suggests that while there may be as many species being detected over time inside the WFA, the bat activity at those sites, located in the cleared landscape of the WFA is much lower than at sites outside the WFA. Indeed, the number of calls and detections are so low at many sites (68.75% of them), the data suggests that the individuals detected were moving through the area only, and not actively foraging, which is important when considering risk to bats in general and to individual species.

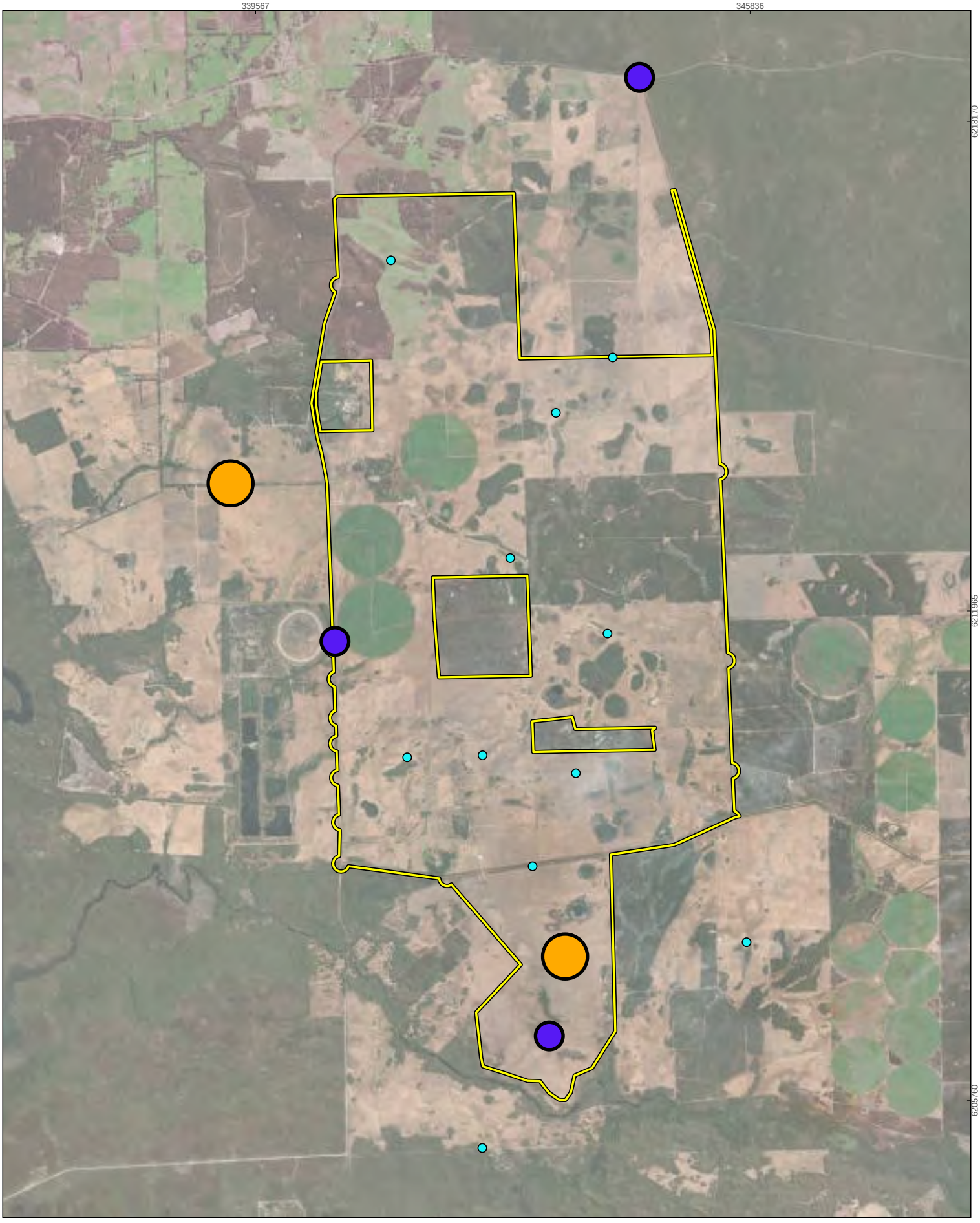
The bat data is summarised with respect to season in Table 5-9 and shown visually in Figure 5-9. While species richness stayed relatively constant over the 4 seasons (6-8 species), bat detection changed markedly, peaking in summer (634), then declining through the rest of the year, so that summer detections were 4 times that of winter (155), 3 times that of autumn (201) and over twice that of spring (283).

The 2 species not detected in winter were *Falsistrellus mackenziei* (Western False Pipistrelle; P4) and *Nyctophilus holtorum* (Holt's Long-eared Bat). While no data is available concerning the hibernation or torpor of *F. mackenziei* and *N. holtorum* specifically, seasonal fluctuation in species diversity and detection is well documented for bats in temperate climates. Bats may be homeothermic like other mammals but their high energy requirements and large surface area to volume ratio mean they expend a lot of energy and get cold easily, hence many undertake a form of hibernation or torpor each winter, and/or will dramatically reduce their activity in response to daily temperature variations. For example, Chocolate Wattled Bat is typically one of the last species to emerge from winter hibernation (Churchill 2008).

Other members of the family Vespertilionidae (such as *F. mackenziei*) as well as *Nyctophilus* species such as, *N. gouldi* and *N. geoffroyi* are also known to go into extended periods of torpor of up to 15 days (Genoud & Christe 2011; Turbill & Geiser 2008). Therefore, the declines in activity per the number detections are a response to seasonal conditions and not due to migration out of the study area to warmer climes.

Table 5-9 Summary of bat data per season

Season	No. of samples	Species richness	Family richness	No. of detections	No. of calls	Mean detections
Autumn	12	8	2	201	2,733	13.6
Winter	8	6	2	115	1,041	9.1
Spring	13	7	2	283	1,181	4.2
Summer	11	8	2	634	4,848	7.6
Total	**44**	**8**	**2**	**1,233**	**9,803**	**8.0**



Western Australia

PERTH

SynergyRED
Scott River Wind Farm

Project No	1585
Date	12/08/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:61,965 (at A4) GDA 1994 MGA Zone 50

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Study area

Mean. no. of calls per detection

- 1 - 4.3
- 4.31 - 8
- 8.01 - 25.7

Figure 5-8

Mean number of calls per detection at each BBRAS site

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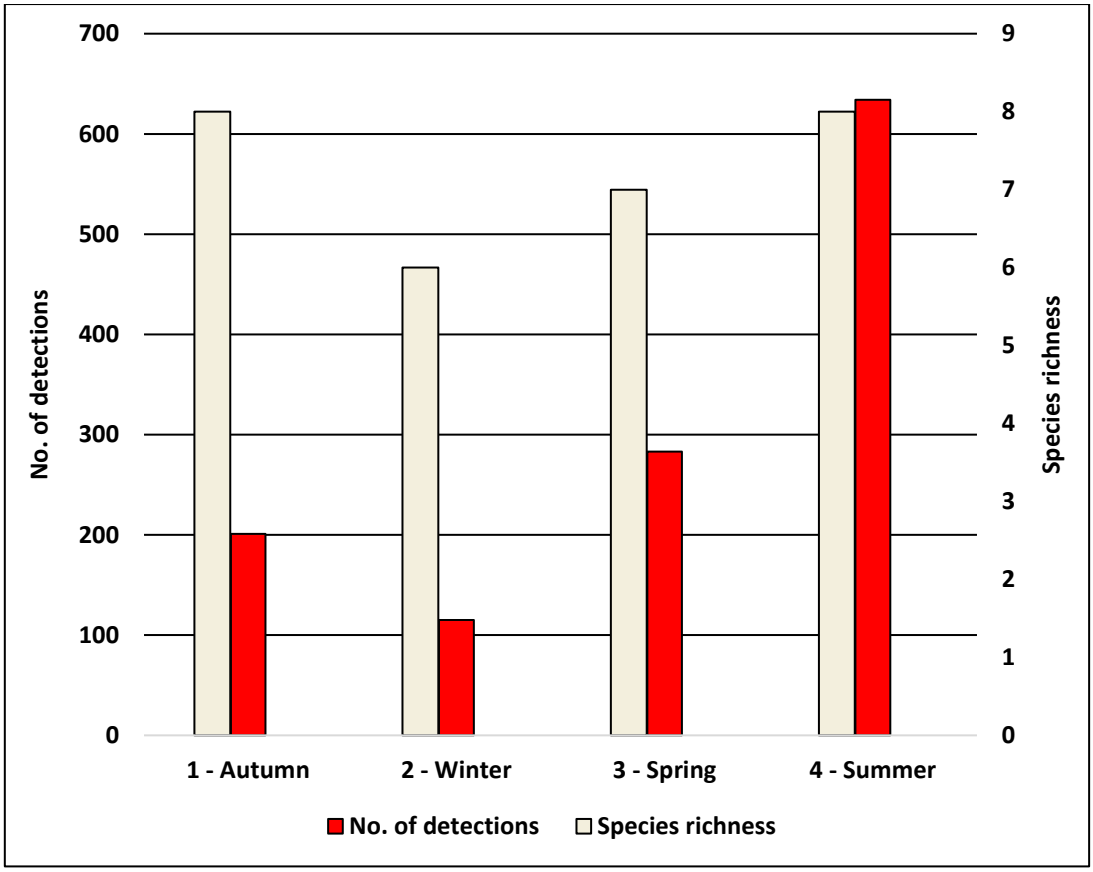


Figure 5-9 Number of bat species and detections per season at BBRAS sites

5.2.2 Assemblage summary

All bats herein are treated as species of concern. A total of 8 bat species were recorded in the current BBRAS survey and 7 in the Basic and Targeted survey (Table 5-10; Appendix 3; Appendix 5). The data presented here relates only to the current survey, unless otherwise stated. *Nyctophilus major* was not recorded by Phoenix (2025a).

Three of the recorded bat species were not identified in the desktop assessment for the species characterisation (Section 4.2), which reflects changes in Chiropteran taxonomy rather than historic or current survey efforts. The assemblage represented 2 families, Vespertilionidae (7 species) and Molossidae (one species; Table 5-10).

Table 5-10 Recorded bat assemblage, by family

Family	Species recorded	Summary of records
Molossidae	White-striped Free-tailed Bat *Austronomus australis*	Recorded at 15 of the 16 sites, mainly in cleared areas between remnants but also 2 Marri Jarrah Peppermint woodland BBRAS sites. However, the species is believed to generally be strongly tied to dense, often old-growth, forest (Churchill 2008). Second most detected species (2,939). Far more active in summer, almost absent in winter.
Vespertilionidae	Gould's Wattled Bat *Chalinolobus gouldii* Chocolate Wattled Bat *Chalinolobus morio* Western False Pipistrelle *Falsistrellus mackenziei* Lesser Long-eared Bat *Nyctophilus geoffroyi* Holt's Long-eared Bat *Nyctophilus holtorum* Greater Long-eared Bat *Nyctophilus major* Southern Forest Bat *Vespadelus regulus*	Activity of the members of this family varied greatly across 15 of the 16 sites (this family was not detected at BUS012). For example, *Falsistrellus mackenziei* (P4) was detected rarely (9 detections from 1 impact site and 5 reference sites), whereas *Vespadelus regulus* was the most detected species (5,478 detections from 14 sites). All species were recorded from both cleared and Marri Jarrah Peppermint woodland[1] BBRAS sites. Representatives were also recorded from Seasonally inundated sedgeland (wetland), Seasonally inundated shrubland (wetland), Open woodland of Peppermint trees (degraded) habitats in the Basic and Targeted fauna survey. As above, members of this family were most active in summer and least active in winter.

The aggregated bat data per species is presented as a species-site matrix in Table 5-11. Bats were recorded at all 16 sites, with just one species detected at site BUS012 (White-striped Free-tailed Bat) and all 8 species detected at sites BUS014 and BUS015, both located outside the study area. The species richness of Impact and Reference sites was similar, with only *Nyctophilus major* being absent from Impact sites.

The activity levels were high for White-striped Free-tailed Bat (overall mean = 12.9) and Southern Forest Bat (overall mean = 11.4) (Table 5-11; Figure 5-10) despite being absent from one and 2 sites, respectively. Activity levels of Southern Forest Bat were however moderate within the WFA but high outside this in the wider BIA.

The activity levels of all other species were low, recording mean call numbers of between 1.0 and 3.5, over all records. Holt's Long-eared Bat and Western False Pipistrelle were the rarest species, being present from 4 and 6 sites and having mean call numbers of 1.1 and 1, respectively. The results suggest that other than for White-striped Free-tailed Bat and Southern Forest Bat, the other 6 species infrequently foraged within the detection circumference of the recorders, and were mostly passing by as either individuals, pairs or small groups.

Table 5-11 Number of bat calls per BBRAS site (C – Calls, D – Detections, M – Mean)

Location	Site	Chocolate Wattled Bat			Gould's Wattled Bat			Greater Long-eared Bat			Holt's Long-eared Bat			Lesser Long-eared Bat			Southern Forest Bat			Western False Pipistrelle			White-striped Free-tailed Bat		
		C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M
Impact	BUS004	3	2	1.5	12	7	1.7	4	3	1.3				2	2	1.0	79	18	4.4	1	1	1.0	10	4	2.5
	BUS006	80	41	2.0	48	30	1.6	15	7	2.1				45	19	2.4	333	75	4.4				320	25	12.8
Sub-total per species		**83**	**43**	**1.9**	**60**	**37**	**1.6**	**19**	**10**	**1.9**	**0**	**0**		**47**	**21**	**2.2**	**412**	**93**	**4.4**	**1**	**1**	**1.0**	**330**	**29**	**11.4**
Impact activity level		**Low**			**Low**			**Low**			**Low**			**Low**			**Moderate**			**Low**			**High**		
Ref.	BUS001	51	26	2.0	5	3	1.7	1	1	1.0				12	9	1.3	828	68	12.2	1	1	1.0	110	23	4.8
	BUS002	1	1	1.0	5	4	1.3	2	2	1.0				9	6	1.5	75	19	3.9				1,889	45	42.0
	BUS003				5	4	1.3										1	1	1.0						
	BUS005	16	10	1.6	2	2	1.0	2	2	1.0				4	3	1.3	67	17	3.9				9	6	1.5
	BUS007	5	4	1.3	9	6	1.5																8	3	2.7
	BUS008	9	8	1.1	24	15	1.6	4	4	1.0				4	4	1.0	44	18	2.4				31	14	2.2
	BUS009	10	7	1.4	16	8	2.0				2	2	1.0	3	1	3.0	9	6	1.5				8	5	1.6
	BUS010	5	3	1.7	8	6	1.3										2	2	1.0				2	2	1.0
	BUS011	2	2	1.0	12	6	2.0							5	3	1.7	81	31	2.6	1	1	1.0	34	12	2.8
	BUS012																						1	1	1.0
	BUS013	283	38	7.4	38	21	1.8				1	1	1.0	186	29	6.4	2,297	72	31.9	1	1	1.0	146	27	5.4
	BUS014	152	29	5.2	134	42	3.2	2	2	1.0	6	5	1.2	44	27	1.6	1,365	97	14.1	3	3	1.0	181	31	5.8
	BUS015	40	18	2.2	12	10	1.2	10	8	1.3	1	1	1.0	14	12	1.2	284	52	5.5	2	2	1.0	47	16	2.9
	BUS035	2	2	1.0	6	4	1.5	2	1	2.0				2	2	1.0	13	6	2.2				143	13	11.0
Sub-total activity		**576**	**148**	**3.9**	**276**	**131**	**2.1**	**23**	**20**	**1.2**	**10**	**9**	**1.1**	**283**	**96**	**2.9**	**5,066**	**389**	**13.0**	**8**	**8**	**1.0**	**2,609**	**198**	**13.2**
Ref. activity level		**Low**			**Low**			**Low**			**`Low**			**Low**			**High**			**Low**			**High**		
Grand total activity		**659**	**191**	**3.5**	**336**	**168**	**2.0**	**42**	**30**	**1.4**	**10**	**9**	**1.1**	**330**	**117**	**2.8**	**5,478**	**482**	**11.4**	**9**	**9**	**1.0**	**2,939**	**227**	**12.9**
No. sites detected		**14**	**14**	**14**	**15**	**15**	**15**	**9**	**9**	**9**	**4**	**4**	**4**	**12**	**12**	**12**	**14**	**14**	**14**	**6**	**6**	**6**	**15**	**15**	**15**
Overall activity level		**Low**			**Low**			**Low**			**Low**			**Low**			**High**			**Low**			**High**		

Bat activity was also analysed by 30-minute intervals to investigate whether there were any periods of particularly high activity as bats typically show strong site fidelity and consistent nightly movement patterns. As can be seen in Figure 5-10 all bats were present throughout the night, although generally less active in the first and last 1–2 hours each night. And, with the exceptions of White-striped Free-tailed Bat and Southern Forest Bat, activity was typically low throughout the night.

Calls of Southern Forest Bat typically peaked between 7–730pm each night, then showed a steady decline throughout the night (Table 5-10; Appendix 7). White striped Free-tailed Bat was generally not active until 8–830pm, after which activity steadily increased until 1130–12pm, then steadily declined toward dawn each night. Chocolate Wattled Bat was the 3rd most active species. It was active from 830pm–4am, being most active at around 2am.

The delayed arrivals and early departures of most species suggest, as would be excepted, that bats are not roosting in the open paddock habitats in which the recorders were located and the proposed impact would take place, but are instead roosting elsewhere in native remnant habitats and moving into the cleared paddocks after foraging near their roost sites. This is certainly the case for the only significant bat recorded, Western False Pipistrelle, which was only detected a handful of times from 1–2 calls per detection (also see section 5.2.3; Table 5-12).

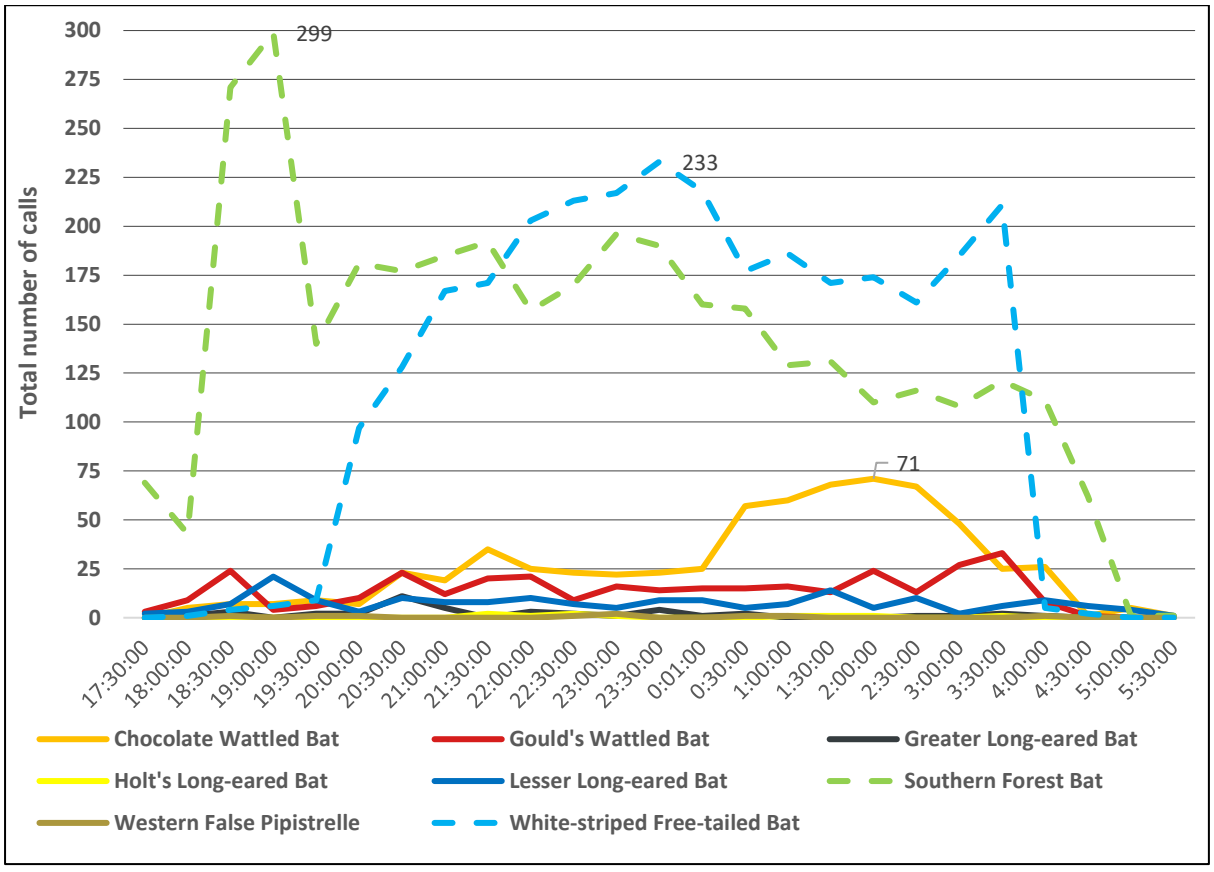


Figure 5-10 Total number of calls per 30-minute time interval

5.2.3 Conservation significant bats

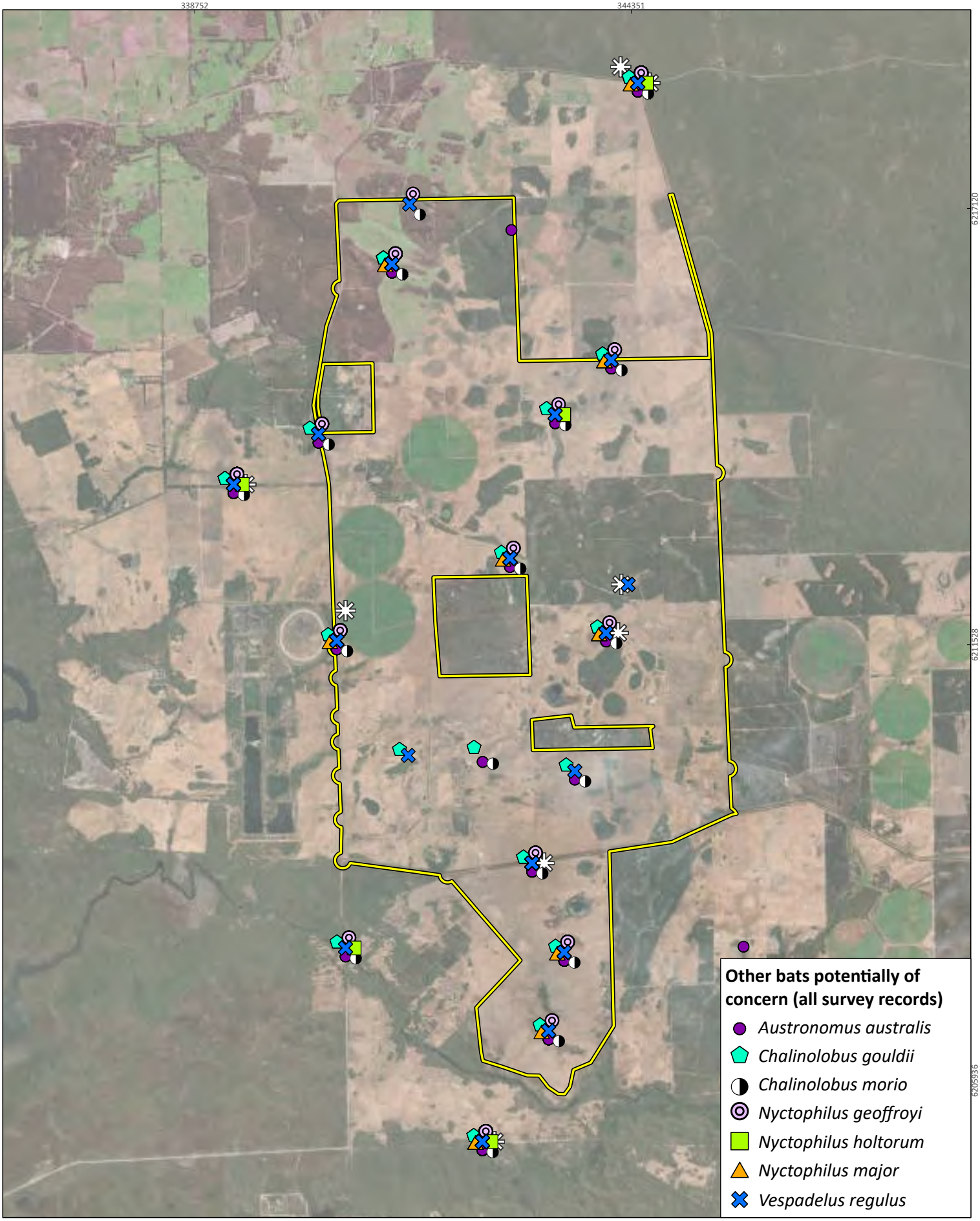
A single conservation significant bat species, Western False Pipistrelle (*Falsistrellus mackenziei*; P4), was recorded across both the BBRAS and the Basic and Targeted fauna survey (Phoenix 2025a). The species was detected once each from 4 BBRAS sites within the WFA and twice at site BUS015 and in 3 consecutive nights at BUS014, both of which are located outside the WFA (within Chester National Park and on the Scott River respectively). It was also detected at site VER-43 on one occasion (Table 5-12). It was recorded from 3 habitat types, Marri-Jarrah-Peppermint woodland, seasonally inundated sedgeland (wetland) and Cleared areas (Figure 5-7).

The timing of the calls for Western False Pipistrelle display no obvious pattern with sparse records throughout the night. Detections were rare, and occurred at sporadic times, over several seasons, primarily in summer (Table 5-12). On this basis it is difficult to say whether or not it is resident in the WFA. The literature suggests it has a strong preference for dense 'old-growth'/mature wet sclerophyll forests of Karri, Jarrah and Tuart (Churchill 2008), from which it rarely ventures far, and this data tends to support that understanding. Within the WFA suitable nesting/roosting habitat occurs in the hollow-supporting MJP woodland, located primarily on the northern boundary, and near Governor Broome Road in the southeast, south and southwest. Abundant, suitable roosting habitat is present in the forested conservation reserves and the Scott River outside the WFA, where this species was most frequently detected.

Table 5-12 Western False Pipistrelle detections

Area	Site	Site description	Season	Date	Time	No. detections
Impact	BUS004	Cleared, open paddock, near several small remnants, in study area.	Spring	18/11/2023	01:00	1
Reference	BUS001	Cleared paddock, directly adjacent narrow roadside Marri-Jarrah-Peppermint woodland, in study area.	Spring	18/11/2023	23:00	1
	BUS011	Cleared roadside, directly adjacent narrow roadside seasonally inundated shrubland, in study area.	Summer	13/01/2024	20:00	1
	BUS013	Narrow roadside remnant vegetation directly adjacent paddock, outside (west of) study area.	Autumn	24/05/2023	19:30	1
	BUS014	Cleared, roadside, directly adjacent large contiguous woodland (conservation reserve), outside (north of) study area.	Summer	12/01/2024	22:30	1
			Summer	13/01/2024	00:30	1
			Summer	14/01/2024	04:00	1
	BUS015	Cleared paddock, directly adjoining vegetation remnant outside (south of) study area.	Autumn	25/05/2023	18:30	1
			Summer	12/01/2024	23:00	1
	VER-43[1]	Seasonally inundated sedgeland (wetland), in study area; within Bluegum plantation stand.	Summer	10/12/2023	00:00	1

[1]Site from the basic/targeted fauna survey (Phoenix 2025a).





SynergyRED
Scott River Wind Fam

Project No	1585
Date	19/06/2025
Drawn by	BK
Map author	JC

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Kilometers

1:62,703 (at A4) GDA 1994 MGA Zone 50

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Study area

Significant bats (all survey records)

Falsistrellus mackenziei, P4 (DBCA list)

Figure 5-11

Recorded conservation significant bats and other bats potentially of concern

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5.3 LIKELIHOOD OF OCCURRENCE ASSESSMENT

Aside from the 7 conservation significant bird and one significant bat species that were recorded in the WFA or wider BIA (sections 5.1.4 and 5.2.3), the likelihood of occurrence assessment for the remaining 33 significant species identified in the regional overview as potentially relevant to the Project (section 4.2) determined 2 were likely to occur in the WFA, 9 may possibly occur and 10 may also possibly occur on rare occasions (Table 5-13). The remaining 12 significant species were considered unlikely to occur in the WFA and therefore are not considered potential species of concern to the Project (Table 5-13).

The 7 conservation significant Migratory shorebirds that were recorded in the survey only at Hardy Inlet Regional sites (section 5.1.4) are included in Table 5-13 so that comment can be made on their likelihood of occurrence in the WFA.

Table 5-13 Likelihood of occurrence assessment for significant species not recorded in the WFA/BIA

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Oxyura australis Blue-billed Duck	P4 (DBCA list)	Likely	Previously recorded near the WFA from multiple sources. Desktop records are greater than 10 years old (some <15 years) but there are close records from several sources, and suitable habitat in the WFA, particularly the larger lakes. Therefore, is it considered likely to occur, at least on occasion.	●									
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Acts)	Possible	WFA within species distribution but no previous records within 10 km. Known to occur in a wide range of habitats. Aerial feeder, may feed over the WFA on occasion.	●	●	●	●	●	●	●	●		
Botaurus poiciloptilus Australasian Bittern	EN (EPBC & BC Acts)	Possible	WFA is within known range and potentially suitable habitat is present. No previous records within 10 km (nearest desktop records from Hardy Inlet ~12 km SW and Gingilup/ wetlands ~30 km SE, dates unknown). While targeted searches and ARUs deployed did not detect the species during the surveys, potential for occasional presence cannot be discounted. Potential for rare use of the larger wetlands in the WFA but unlikely a regular visitor or regularly transit through the WFA.	●	●	●							
Anarhynchus bicinctus Double-banded Plover	Mig. (EPBC & BC Acts)	Possible (rare)	Previous desktop records within 10 km of WFA but old (1979-80) and from a single site near the artificial wetlands. No other desktop records returned. While the species is known to use terrestrial wetlands and pasture near the coast, it occurs rarely in WA. Therefore, considered unlikely to occur except as possibly a very rare visitor.	●	●	●			●	●			
Anarhynchus leschenaultii Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)	Unlikely	Suitable habitat not present in WFA, occurs in littoral and estuarine habitats large intertidal mudflats or sandbanks. There are desktop records from a single site near the artificial wetlands but old (1980).										

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Anarhynchus mongolus Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)	Possible (rare)	Previous old (1980) desktop record within 10 km of WFA but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare use of wetlands in WFA.	●	●	●							
Charadrius cucullatus Hooded Plover/Dotterel	P4 (DBCA list)	Unlikely	Nearby record but is from sandy beach habitat. Suitable habitat not present in WFA, generally a beach and salt lake species.										
Pluvialis fulva Pacific Golden Plover	Mig. (EPBC & BC Acts)	Possible	Previous desktop record within 10 km of WFA, though not recent. Mainly uses coastal habitats but also recorded from wetlands, paddocks. Potential for occasional use of the larger wetlands in the WFA but unlikely a regular visitor to the WFA when present in the southwest. Very limited overlap between species arrival in region (desktop records indicate December) and when most wetlands in WFA have suitable foraging habitat.	●	●	●			●	●			
Pluvialis squatarola Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Acts)	Possible (rare)	No previous record within 10 km of WFA. Suitable main habitat not present, prefers coastal habitats. Potential for rare use of wetlands, paddocks in WFA.	●	●	●			●	●			
Anous tenuirostris melanops Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)	Unlikely	Desktop record is projected distribution only. No nearby records, and no suitable habitat in WFA.										
Hydroprogne caspia Caspian Tern	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible (rare) in WFA	Previous desktop records within 10 km of WFA and was recorded in survey only at Hardy Inlet Regional sites. Mainly found in sheltered coastal embayments. May also occur in near-coastal terrestrial wetlands; however, the wetlands present in the WFA are shallow and unlikely to provide the species' preferred food sources (hunts for fish). Habitat in WFA therefore considered marginal. May occur as rare visitor or transit through but unlikely to utilise the WFA.	●	●	●							

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Onychoprion anaethetus Bridled Tern	Mig. (EPBC & BC Acts)	Unlikely	No previous records within 10 km of WFA. Mainly offshore species. No suitable habitat in WFA.										
Sternula nereis nereis Fairy Tern	VU (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Desktop record was projected distribution only but was recorded in the survey at Hardy Inlet Regional sites only. Occurs in coastal habitats and on offshore islands. Suitable habitat not present in WFA. Species is unlikely to utilise WFA.	●	●	●							
Thalasseus bergii Greater Crested Tern	Mig. (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Desktop records within 10 km but not recent. All recent desktop records associated with the Hardy Inlet and the coast. Survey records only from Hardy Inlet Regional sites. No suitable habitat present in WFA. species is unlikely to utilise the WFA.										
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	Unlikely	Locally extinct.										
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	Possible (rare)	Desktop record is projected distribution only. Suitable habitat is present but occurs in a wide range of habitats. Very few records of this species from the region. May occur in the WFA on rare occasion only.	●	●	●			●	●	●		
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	Possible	Previous recent desktop records within 10 km of WFA. Uses variety of coastal and inland wetlands. Suitable habitat present when species arrives in the region (September-October). Occasional use of the larger wetlands in the WFA possible, but unlikely a regular visitor or regular transit through the WFA.	●	●	●							
Arenaria interpres Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)	Unlikely	Few desktop records none within 10 km (i.e. from Hardy Inlet and over open ocean). Species mainly uses coastal habitats.										

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Calidris acuminata Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)	Recorded Regional sites, Possible in WFA	Previous desktop records within 10 km of WFA, not recent. Uses shallow fresh or brackish wetlands, with inundated or emergent vegetation and inundated paddocks. Suitable habitat present in early spring when it arrives in the southwest (from September). Occasional occurrence in the WFA possible, but unlikely a regular visitor or regular transit through.	●	●	●			●	●	●		
Calidris alba Sanderling	Mig. (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All other desktop records are associated with the Hardy Inlet and the coast. Survey records also only from Hardy Inlet Regional sites. Almost always prefers coastal habitats. Suitable habitat not present in WFA.										
Calidris canutus Red Knot	VU/Mig. (EPBC Act); EN (BC Act)	Unlikely	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Mainly uses coastal habitats. Suitable habitat not present.										
Calidris falcinellus Broad-billed Sandpiper	Mig. (EPBC & BC Acts)	Possible (rare)	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Mainly uses sheltered coastal habitats, favouring estuarine mudflats. Only occasional records from swamps and lakes. Arrives in southwest in September, but rare.	●	●	●							
Calidris ferruginea Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)	Possible	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Uses intertidal and wetland habitats, sometimes forages in flooded paddocks. Desktop records indicate arrival in region from September. Suitable habitat present. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●	●		

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	Possible	No previous records within 10 km from WFA; however, desktop record just outside the BIA SW of the WFA on the Hardy Inlet. Uses a variety of wetland habitats and inundated grasslands. Arrives in southwest in spring. Suitable habitat present. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●			
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible in WFA	Old (1980) desktop records within 10 km of WFA from a site near the artificial wetlands, and another near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet. Survey records also only from Hardy Inlet Regional sites. Found across a wide range of open mudflat-like habitats in salt and freshwater systems. Uses coastal and wetland habitats and inundated paddocks. Arrives in the southwest in spring. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●	●		
Calidris tenuirostris Great Knot	VU/Mig. (EPBC Act); CR (BC Act)	Possible (rare)	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers sheltered coastal habitats with large intertidal flats. Rarely uses swamps near the coast and saltlakes. Uncommon in the Southwest.	●	●	●							
Limosa lapponica Bar-tailed Godwit	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible (rare) in WFA	Old (1980) desktop records within 10 km of WFA from a site near the artificial wetlands, and another near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet and coast. Survey records also only from Hardy Inlet Regional sites. Occurs almost entirely in coastal habitats such as intertidal sandflats, mudflats and estuaries. It has been observed on occasion on inland wetlands and paddocks but potential presence in the WFA is considered likely very rare.		●	●			●				

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Limosa limosa Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)	Possible (rare)	Old (1981) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers coastal habitats but will use shallow and sparsely vegetated, near-coastal wetlands, such as river pools, swamps and floodplains on occasion.	●	●	●			●				
Numenius madagascariensis Eastern Curlew	CR/Mig. (EPBC Act); CR (BC Act)	Unlikely	Old (1981) desktop records within 10 km of WFA from a site near the Blackwood River. No other desktop records. Mainly uses sheltered intertidal sandflats/ mudflats with no vegetation. No suitable habitat present in the WFA.										
Numenius phaeopus Whimbrel	Mig. (EPBC & BC Acts)	Unlikely	Old (1981) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Inhabits coastal habitats. Suitable habitat not present in the WFA.										
Tringa brevipes Grey-tailed Tattler	Mig. (EPBC and BC Acts); P4 DBCA list	Possible (rare)	Three old (1978) desktop records within 10 km of WFA but offshore. No other desktop records returned. Inhabits coastal habitats, and occasionally found around near-coastal wetlands, such as lakes. Inland records for the species are rare.	●	●	●							
Tringa nebularia Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)	Likely	Several recent records within 10 km of WFA. Uses variety of wetlands and coastal habitats, as well as inundated paddocks. Habitat present in WFA when species arrives in early spring.	●	●	●				●	●		
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	Possible	No previous desktop records within 10 km of study area, last record in December 2000 (BirdLife 2023) at Swan Lake which is part of the Hardy Inlet. Inhabits a range of permanent or ephemeral wetlands and inundated floodplains. Suitable habitat present when species arrives in southwest in early spring.	●	●	●			●	●	●		

[1]SIPW – seasonally inundated paperbark woodland (wetland); SISE – seasonally inundated sedgeland (wetland); SISH – seasonally inundated shrubland; MJP – Marri-Jarrah-Peppermint woodland; OWP – Open woodland of Peppermint trees (degraded); Clrd DS – Cleared–degraded sumpland; Bluegum – Bluegum plantation; Pine – Pine plantation.

5.4 ESTIMATE OF SURVEY COMPLETENESS

In order to gauge whether the survey effort completed can be considered adequate to capture the seasonal diversity of the 2 assemblages present in the study area, 2 sets of species accumulation curves were produced based on the Chao2, Jacknife2, Sobs and Bootstrap indices, one set for birds (Figure 5-12) and one set for bats (Figure 5-13); as each group was systematically surveyed using different methods. For birds, the curves were based on the fixed-point method only. While for bats the curves were derived from echolocation recordings completed at the same BBRAS sites in Year 1.

For birds all 3 curves came close to a horizontal asymptote, indicating that few species remain undetected (Figure 5-12). The Chao2, Jacknife2 and Bootstrap indices calculated an expected species richness of 110, 118 and 106, respectively, compared with a recorded species richness of 97. The results therefore indicate that the effort undertaken is adequate to characterise the avian assemblage.

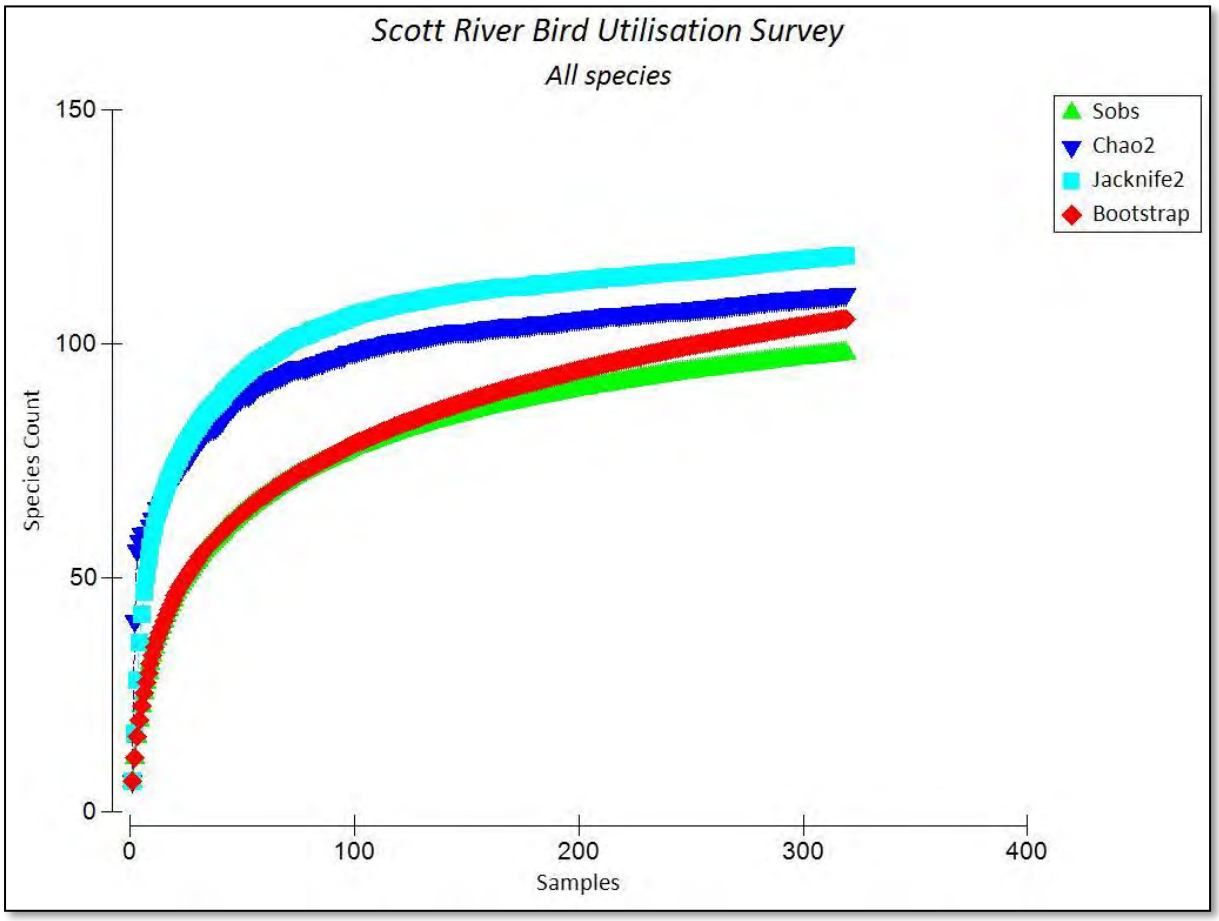


Figure 5-12 Species accumulation curve of bird data for BBRAS survey

The species accumulation curves derived from the Chao1, Jacknife1, Sobs and Bootstrap indices for bats all reached the asymptote at approximately 32 samples (Figure 5-13), with no additional species being detected after that. The curves therefore strongly indicate that is it unlikely any additional bat species would be detected with additional sampling using the echolocation sampling method. This is also evident when the assemblage per site is compared, which showed a largely homogenous assemblage across all sites (Table 5-8).

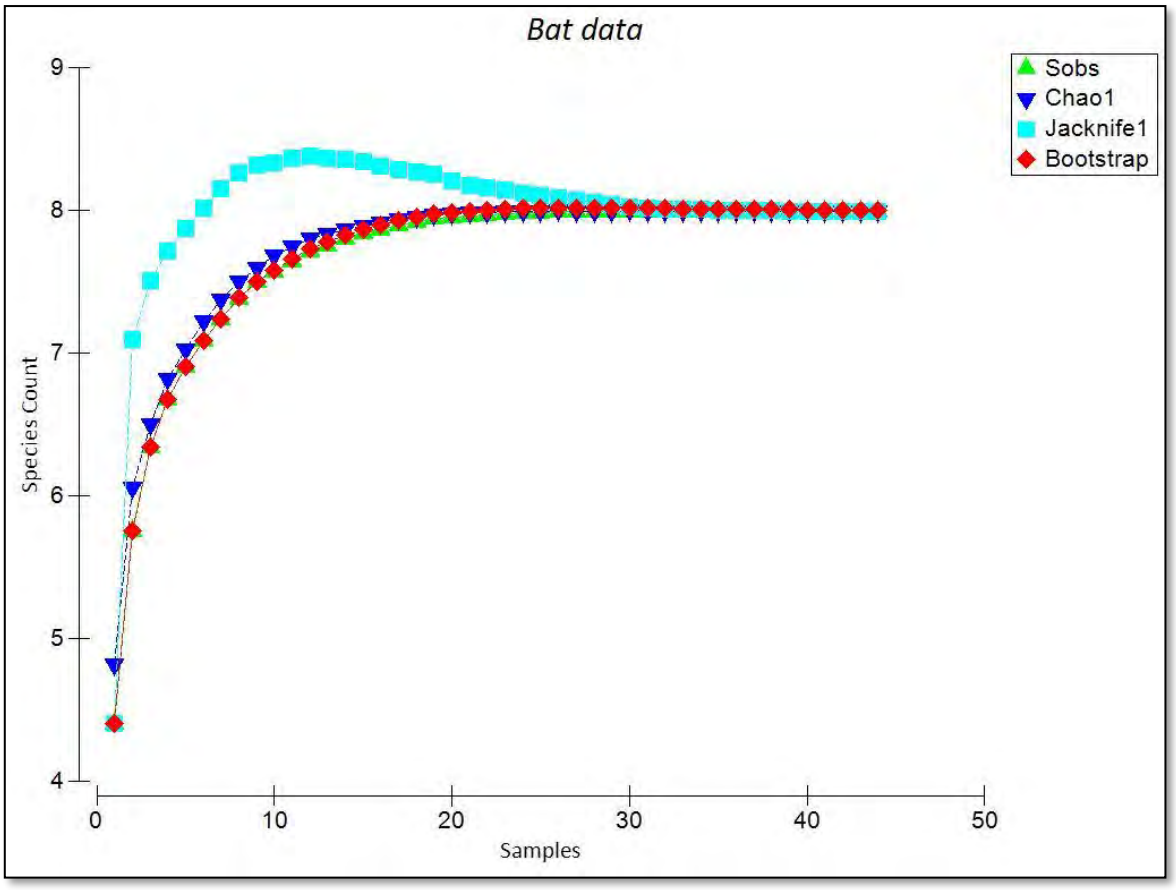


Figure 5-13 Species accumulation curve of bat data for BBRAS survey

5.5 SURVEY LIMITATIONS

The limitations of the survey have been considered in accordance with EPA (2020) and are presented in Table 5-14.

Table 5-14 Consideration of potential survey limitations

Limitations	Comments
Availability of contextual information at a regional and local scale	Database searches and previous surveys within the vicinity of the Project provided a comprehensive species list for birds within the region. There was not a comprehensive species list for bats available, and as such several species were detected during the surveys that were not returned by the database and literature searches.
Competency/experience of the team carrying out the survey	The survey team members all have extensive experience conducting fauna surveys.
Scope and completeness	Sampling effort was adequate for the size of the study area and to meet the objectives of the BBRAS. The basic/targeted fauna survey provided supplemental data to define the bird and bat assemblages of the study area. As bats were detected via echolocation recording rather than direct observation, it was not possible to determine flight heights, or distance and direction from the recording device.
Proportion of fauna recorded and/or collected, any identification issues	Based on species accumulation curves the sample effort was considered adequate to characterise the bird and bat assemblages present in the period the survey was conducted (Section 5.4). Well below average rainfall between July and November may have influenced the number and diversity of Migratory bird records in the spring 2024 sampling event.
Access within the study area	All parts of the study area were accessible for most of the year. Some sites had to be sampled a hundred or so metres from the initial location when the study area was inundated over winter in Year 1. Two sites were on land that was not accessible due to land holder restrictions that took effect in early Year 1 and were not surveyed again (BUS012 and BUS035).
Timing, rainfall, season	Year 1 sampling was completed across all 4 seasons (four sampling events). In Year 2, sampling concentrated on the drier period of the year targeting species of concern identified during Year 1 (i.e., migratory shorebirds and breeding period of the 3 black cockatoo species). Year 2 involved monthly sampling between September 2024 and March 2025. This resulted in a total of 12 sampling events over 2 consecutive years satisfying the relevant guidance (Brett Lane and Associates 2005; DCCEEW 2024). All efforts were made to undertake fixed-point bird sampling during favourable weather conditions.
Disturbance that may have affected the results of the survey	No disturbances affected the results of the survey.

6 RISK ASSESSMENT FOR POTENTIAL SPECIES OF CONCERN

6.1 POTENTIAL IMPACTS

The main risks to birds and bats from wind farms (Section 2.3) have been considered for relevance to the current Project below in Table 6-1.

Table 6-1 Consideration of potential impacts

Potential impact	Comments
Habitat loss through clearing for turbines and other infrastructure	Minimal clearing of native vegetation proposed – no more than 2 ha total (at the time of this assessment), and less than 1 ha of black cockatoo foraging habitat. No removal of PNTs. No clearing of any native vegetation growing in association with wetlands., Proposed maximum number of turbines is 20, all within the WFA. Proposed site placement of turbines is within cleared paddock areas or Bluegum plantation that is scheduled to be harvested prior to construction and will not be replanted (Figure 6-1).
Mortality or injury from collision with turbine blade or as a result of barotrauma[1]	Birds or bats that fly within heights of the RSA at-risk of rotor strike and/or barotrauma. Potential RSA height is within the range of 25–250 m. Encompasses 4 of the flight height categories recorded in the surveys (see section 3.2.1): • 25-50 m • 51-75 m • 76-150 m • 151-250 m.
Alienation of important sites, e.g. key roosting, feeding or breeding areas	No important roosting or breeding sites for birds or bats have been detected within the WFA. Black cockatoos however were observed to forage widely in the WFA principally within MJP woodland, and raptors were observed to forage widely across the entire site. There is therefore potential for the turbines to deter some birds from continuing to forage within the WFA, including the excised areas within the study area of which one is a conservation reserve (Figure 4-2). However, it is not clear how relevant or impactful such a deterrence would be with respect to conservation significant species and other species of potential concern recorded, due to a paucity of such data with respect to WA species.
Displacement leading disruption to feeding or breeding patterns, e.g. from wind turbine noise and/or artificial light sources	May affect birds or bats that would usually use the WFA to move between (for example) roosting sites and foraging habitat. Birds/bats may have to fly longer distances to get to foraging/breeding areas. For example, black cockatoos moving between roost sites in conservation reserves north of the WFA to foraging habitat in Scott National Park/Hardy Inlet, or coastal vegetation south of the WFA. Directional movements of most birds, including black cockatoos, show movements are mainly S-N/N-S and E-W/W-E, though a very limited number of distinct movements were detected and thus no clear trends could be determined. Construction activities are likely to generate the loudest noise (e.g. from vehicle and machinery operation), but will be temporary, the construction period likely to be between 18-24 months. During operations, the wind turbines will be the primary noise source, followed by the substation. The aerodynamic noise generated by a turbine typically increases with rotor speed, which is directly correlated to wind speed. Maximum predicted noise levels at each turbine range from 35-55dB(A), dependent on wind

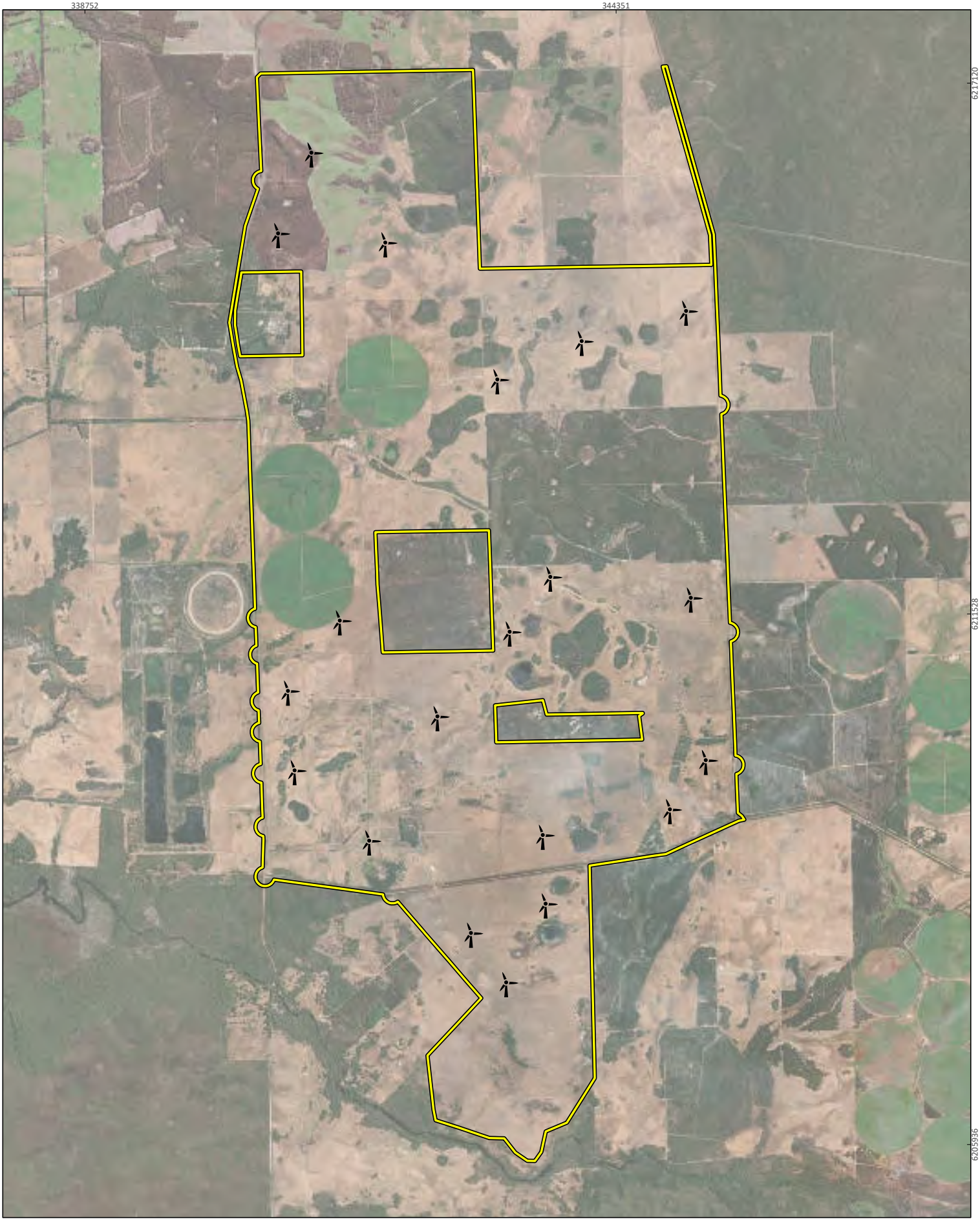
Potential impact	Comments
	speed, and reducing with distance. Existing background noise as measured in the vicinity of the proposed wind farm ranged from 20-50dB(A). Sources of artificial light during construction are expected to be minimal, assuming construction activities will be restricted to daylight hours. Mobile lighting towers may be used to ensure safe work environment in certain situations. Light sources during operations will primarily be associated with night lighting around the perimeter of buildings and substation for security and emergency purposes. SynergyRED advises consultation to date has suggested aviation obstruction lighting will not be required; however, this may change if the Civil Aviation Safety Authority determines there to be suitable risk to aviation safety. Generally, aviation lighting involves the installation of red LED lights on the nacelle of turbines around the perimeter of the Project. Overall, lighting for the Project is unlikely to be of a scale that would cause significant displacement of birds or bats.

[1]Risk of barotrauma treated together here with collision risk, as noted in Section 2.3.

6.2 POTENTIAL SPECIES OF CONCERN

Based on the findings of the site and species characterisation (Section 3.1.1 and Section 3.1.2), and the field surveys (Section 5), 29 conservation significant species are considered potential species of concern, including the 8 species that were recorded in the WFA or wider BIA (7 birds, Section 5.1.4 and one bat, Section 5.2.3) and the 21 additional species considered likely, possibly or possibly (rare) to occur in the WFA (Section 5.3). Detailed profiles for the conservation significant species are provided in Appendix 4.

In addition, the 11 non-significant raptors and 7 non-significant bat species recorded during the survey were also identified as potential species of concern (Section 5.1.4 and Section 5.2.2) and are therefore included in the risk assessment (Section 6.3).





SynergyRED
Scott River Wind Fam

Project No	1585
Date	13/08/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:51,525 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 13/08/2025. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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Study area

Proposed turbine locations

Figure 6-1

Preliminary turbine locations

PHOENIX ENVIRONMENTAL SCIENCES

6.3 RISK ASSESSMENT OUTCOMES

A risk assessment was conducted for all potential species of concern in accordance with the risk assessment framework defined in Section 3.5. The risk assessment outcomes for conservation significant species are detailed in Table 6-2. From this assessment, 3 conservation significant species were considered at moderate risk of impact from the Project, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. Two species were considered at low risk, Australasian Bittern and Western False Pipistrelle. Risk was assessed as negligible for the remaining 24 conservation significant species (Table 6-2).

The risk assessment for other potential species of concern (i.e. non-conservation significant) is detailed separately in Table 6-3. None of the other potential species of concern assessed received a high or moderate risk rating. Six birds and 2 bats were assessed as at low risk from the Project, Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, Brown Goshawk, Brown Falcon, Australian Kestrel, White-striped Free-tailed Bat and Southern Forest Bat. The risk rating was found to be negligible for the remaining species (Table 6-3).

Table 6-2 Risk assessment for conservation significant potential species of concern

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Pandion haliaetus (Osprey)	Mig. (EPBC & BC Acts)	Occasional foraging	7 (7)	0-75 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded only once in WFA across all surveys. Recorded flying within RSA heights at Regional reference sites. No mortalities recorded in carcass monitoring from reviewed sources at Australian sites, but collision deaths have been reported overseas. Common and widely distributed in coastal regions across most of the country. Many individual Osprey are known in the Busselton to Augusta region (pers. comm. B. Wykes). The population is limited by viable nest sites, not biological factors. Desktop records are nearly all SW of the WFA associated with Hardy Inlet, Augusta beaches, Scott and Blackwood Rivers. Sampling at the Regional reference sites supports this, with several records made during the Year 2 surveys at the Hardy Inlet coastal sites. Unlikely to utilise habitats in study area regularly because it primarily feeds on fish, though may be an occasional foraging site. Potential for rare loss of individuals but no reduction in population viability.
Oxyura australis (Blue-billed Duck)	P4 (DBCA list)	Foraging Roosting Breeding	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys; however, although considered likely to occur within the WFA on occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Potential for occasional use of the larger wetlands in the WFA but unlikely to be a regular visitor. A few records from the artificial wetlands west of the WFA but limited desktop records returned within 10 km, and all from 2010 or older. Potential for rare loss of individuals but no reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Apus pacificus (Fork-tailed Swift)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. Only one mortality recorded in carcass monitoring from reviewed sources. Common species, considered to possibly occur on occasion. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Botaurus poiciloptilus (Australasian Bittern)	EN (EPBC & BC Acts)	Foraging Roosting	-		Direct collision/ barotrauma	Unlikely	Medium	Low	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Known from Hardy Inlet ~12 km SW of the WFA and the Gingilup/Quitchup/Jasper wetlands ~30 km SE (dates of records unknown). Latter is an important wetland suite for the species. Potential for rare use of the larger wetlands in the WFA but unlikely a regular visitor or regularly transit through the WFA. WA population very small therefore any loss of individuals may have temporary impact on local population viability.
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	45 (159)	0-50 m	Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA in low numbers (mostly singles). A large flock (53 individuals) recorded west of WFA so may also occur in WFA in large flocks on occasion. Heights not recorded for many observations, mostly observed at or below tree height but 2 of 5 records at RSA height. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the excised

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									areas in the centre of the WFA one of which is a conservation reserve. No known breeding or roost sites within BIA. Minor foraging habitat loss only. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	7 (57)	0-25 m	Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA in low numbers (singles, small flocks). No records within the RSA of the WFA but suspected to fly at RSA height. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the excised areas in the centre of the WFA one of which is a conservation reserve. Minor foraging habitat loss only. No known breeding sites within BIA but 2 known *Zanda* sp. roosts located within 12 km of the WFA; black cockatoos known to forage in areas up to 20 km from night roosting habitat during the non-breeding season. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	36 (150)		Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA, in low numbers (mostly singles). Recorded within the RSA of the WFA (2 records), though most recorded heights below the RSA. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the WFA. Minor habitat loss only. No known breeding sites within BIA but 2 known Zanda sp. roosts located within 12 km of the WFA; black cockatoos known to forage in areas up to 20 km from night roosting habitat during the non-breeding season. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.
Anarhynchus bicinctus (Double-banded Plover)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous desktop records within 10 km of WFA but old (1979-80). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Anarhynchus mongolus (Siberian Sand Plover)	EN/Mig. (EPBC Act); EN (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous old (1980) desktop record within 10 km of WFA but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Pluvialis fulva (Pacific Golden Plover)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Desktop records all SW of the WFA associated with the Hardy Inlet and Scott River. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly uses coastal habitats. Potential for occasional use of the larger wetlands in the WFA but unlikely a regular visitor to the WFA when present in the region, noting very limited overlap between species arrival in region (December) and persistence of suitable foraging habitat in the WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Pluvialis squatarola (Grey Plover)	VU/Mig. (EPBC Act); Mig. (BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but potential for rare use of wetlands/paddocks in WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	Foraging	1 (1)	26-50 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in WFA only once across all surveys. Recorded flying at height within RSA of the WFA. Recorded mortalities in carcass monitoring from reviewed sources. WFA considered foraging habitat within a resident bird's home range. Unlikely to nest in WFA. Several desktop records, nearly all SW of the WFA, mainly associated with the Hardy Inlet and Scott River. Individuals/pairs may hunt in the WFA on occasion as part of their large home range, and or transit through. Potential for rare loss of individuals but unlikely to lead to reduction in population viability.
Hydroprogne caspia (Caspian Tern)	Mig. (EPBC & BC Acts)	None	6 (62)		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Previous desktop record within 10 km of WFA . Known to utilise near-coastal terrestrial wetlands. May occur as a visitor but the wetlands present in the WFA are too shallow to provide the species' preferred food source (fish). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Motacilla cinerea (Grey Wagtail)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. No previous desktop records within 10 km of WFA. Occurs in a wide range of habitats. Potential for rare loss of individuals but no reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Actitis hypoleucos (Common Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Most desktop records associated with the Hardy Inlet SW of the study area. Does not form large flocks (mainly occurs singly or in pairs). Potential for occasional use of the larger wetlands in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival (September-October) and when wetlands in WFA have suitable foraging habitat. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Calidris acuminata (Sharp-tailed Sandpiper)	VU/Mig. (EPBC Act); Mig. (BC Act)	Foraging	1 (40)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in survey only from Regional site. Record is from Hardy Inlet in much more suitable and extensive habitat than WFA. Considered to possibly occur within the WFA (Table 5-13). Desktop records all SW of the WFA associated with Hardy Inlet and Scott River, with one record from the artificial wetlands west of the WFA. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. May arrive in Augusta area from September. Potential for occasional occurrence in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival and when wetlands/paddocks in WFA have suitable foraging habitat. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Calidris falcinellus (Broad-billed Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but occasional records from swamps and lakes so potential for rare use of wetlands in WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris ferruginea (Curlew Sandpiper)	CR/Mig. (EPBC Act); CR (BC Act)	Foraging	-		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records nearly all SW of the WFA associated with Hardy Inlet, which aligns with its preferred foraging habitats. Desktop records indicate arrival from September. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival and when wetlands/ paddocks in WFA have suitable foraging habitat. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris melanotos (Pectoral Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Desktop records just outside the BIA SW of the WFA on the Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									a regular visitor or regular transit through the WFA when present in the region. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	Foraging	2 (72)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in survey only from Regional site. Records are from Hardy Inlet in much more suitable and extensive habitat than WFA. Desktop records also mainly SW of the WFA, associated with Hardy Inlet. Considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Calidris tenuirostris (Great Knot)	VU/Mig. (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands. Occurs mostly in coastal intertidal habitats, but rare use of swamps. Potential presence in the WFA is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	Foraging	1 (1)		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands and at Blackwood River. Occurs mostly in coastal habitats but occasionally observed at inland wetlands and paddocks. Potential presence in the WFA is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Limosa limosa (Black-tailed Godwit)	EN/Mig. (EPBC Act); Mig. (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands. Occurs mostly in coastal habitats but occasionally uses near-coastal wetlands and floodplains. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa brevipes (Grey-tailed Tattler)	Mig. (EPBC and BC Acts); P4 DBCA list	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1981) desktop records within 10 km of the WFA. Occurs mostly in coastal habitats but occasionally observed at near-coastal wetlands. Potential presence in the WFA is considered likely very rare.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa glareola (Wood Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	1 (3)	0-25 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Three individuals recorded in a single observation within the WFA, across all surveys. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records (only 2 just west of WFA). Mainly occurs singly, in pairs or small flocks. Arrives in southwest in spring, though more common from summer to autumn when habitat in WFA mainly unsuitable (largely dried out). Occasional use of wetlands in WFA and transit through WFA by small numbers of birds. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa nebularia (Common Greenshank)	EN/Mig. (EPBC Act); Mig. (BC Act)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, however considered likely to occur within the WFA (Table 5-13). Desktop records within 10 km of WFA. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records all SW of the WFA, mainly associated with Hardy Inlet, Scott River, but also recorded from the artificial wetlands directly west of the WFA. Arrives in the southwest in early spring. Occasional use of the paddocks/wetland habitats in the WFA.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%).
Tringa stagnatilis (Marsh Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No records from surveys, although considered to possibly occur within the WFA (Table 5-13). Suitable habitat present in the WFA when they arrive in early spring. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records, SW of WFA at Augusta. Occasional use of paddocks, wetland habitats in the WFA. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	Foraging Roosting Breeding	2 (2)	NR[3]	Direct collision/ barotrauma, Displacement	Unlikely	Insignificant	Negligible	Recorded at 2 locations outside the WFA, as singles. Only likely to fly at RSA heights when displaying courtship over a prospective nest site of which none are present in study area. Unlikely to fly within RSA while hunting. No mortality monitoring data available for this species. No other Masked Owl mortalities from reviewed sources. May hunt in woodland habitats of the study area and transit through but not likely to utilise extensively. Potential for rare loss of individuals but unlikely to lead to reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Falsistrellus mackenziei (Western False Pipistrelle)	P4 (DBCA list)	Foraging Roosting Breeding	Low	NR[3]	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently detected in WFA and low number of calls (1 mean detection per night). Suspected to fly at heights within RSA. No mortality monitoring data available for this species but there are reported mortalities in carcass monitoring for closely related species Falsistrellus tasmaniensis. Consistent single detections suggest rare/occasional movement through cleared habitats between remnant patches, and thus foraging typically close to vegetation, rather than open paddocks. May possibly roost and breed in best examples of MJP woodland, where the PNT assessment (Phoenix 2025a) recorded most trees with hollows, many of which would be considered suitably sized to support the species. Occasional loss of small numbers of individuals possible but unlikely to lead to reduction in local population viability.

[1]No. records (no. individuals) for birds; activity level for bats (see section 3.2.2). [2]Breeding NCS – study area contains PNTs but none with hollows currently suitable for breeding. [3]NR – not recorded; species detected via audio recording only.

Table 6-3 Risk assessment for other potential species of concern

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Aquila audax (Wedge-tailed Eagle)	Not listed	Foraging Roosting Breeding	37 (50)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles/pairs. Frequently recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Lower avoidance rate than other raptors. Likely uses the WFA regularly for foraging. Potential for breeding but no known nest sites in WFA. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Circus approximans (Swamp Harrier)	Not listed	Foraging Roosting Breeding	57 (66)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely uses the WFA regularly for foraging. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Elanus axillaris (Black-shouldered Kite)	Not listed	Foraging Roosting Breeding	4 (4)		Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in WFA, as singles. Recorded flying at RSA height. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Widespread, abundant species. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Not listed	Foraging	2 (2)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Only one record in WFA of a bird flying over. Recorded flying at RSA height. Only one recorded mortality in carcass monitoring from reviewed sources. Mostly occurs in coastal habitats. May hunt for waterbirds in the WFA on occasion, or transit through but no breeding and unlikely to be a regular visitor. Territorial and occur sparsely across their range. Rare loss of individuals possible but reduction in population viability unlikely.
Haliastur sphenurus (Whistling Kite)	Not listed	Foraging Roosting Breeding	8 (9)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles, one pair. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Hieraaetus morphnoides (Little Eagle)	Not listed	Foraging Roosting Breeding	3 (3)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles. Recorded flying at RSA height. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Tachyspiza cirrocephala (Collared Sparrowhawk)	Not listed	Foraging Roosting Breeding	4 (4)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Highly manoeuvrable species. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species,

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									therefore unlikely to lead to reduction in population viability.
Tachyspiza fasciata (Brown Goshawk)	Not listed	Foraging Roosting Breeding	6 (7)		Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in WFA, as singles, one pair. Recorded flying at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco berigora (Brown Falcon)	Not listed	Foraging Roosting Breeding	17 (21)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Relatively heavy slow flight. Likely to forage in WFA regularly. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco cenchroides (Australian Kestrel)	Not listed	Foraging Roosting Breeding	47 (58)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Observed foraging in WFA and likely to hunt there regularly. Potential for breeding but no known nest sites in WFA. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco longipennis (Australian Hobby)	Not listed	Foraging Roosting Breeding	3 (4)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles, one pair. Recorded flying at height within RSA. Only 1 mortality in carcass monitoring from reviewed sources. Occasional foraging in WFA likely but not a regular inhabitant.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Austronomus australis (White-striped Free-tailed Bat)	Not listed	Foraging Roosting Breeding	High		Direct collision/ barotrauma	Almost certain	Minor	Low	Activity levels highest within the WFA. Second highest total number of calls recorded, overall. Largely absent in winter and autumn. Suspected to fly at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Often represents the species with highest documented mortality. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the WFA and surrounds, therefore unlikely to lead to reduction in population viability.
Chalinolobus gouldii (Gould's Wattled Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Chalinolobus morio (Chocolate Wattled Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA overall. Far more active in summer by a factor of 10-20 compared with other seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10-100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Nyctophilus geoffroyi (Lesser Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Nyctophilus holtorum (Holt's Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, present in summer and autumn only. Suspected to fly at heights within RSA. No data found on wind farm mortalities but was previously classified within C. gouldii (Parnaby *et al.* 2021) therefore assume similar mortality risk to this species (moderate mortalities). Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Nyctophilus major (Greater Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year, almost absent in winter. Suspected to fly at heights within RSA. No data found on wind farm mortalities. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Vespadelus regulus (Southern Forest Bat)	Not listed	Foraging Roosting Breeding	Mod. (WFA) High (BIA)		Direct collision/ barotrauma	Almost certain	Minor	Low	Moderate activity levels in the WFA and high activity levels in the BIA. Highest total number of calls recorded, but also highest number of detections, so activity lower than for A. australis. Active all seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10-100) in carcass monitoring from reviewed sources. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the WFA and surrounds, therefore unlikely to lead to reduction in population viability.

[1]No. records (no. individuals) for birds; activity level for bats (see section 3.2.2).

7 DISCUSSION

This report documents the results of the two-year BBRAS, commencing in autumn 2023 and finishing in autumn 2025. Most analyses presented in this report (Section 5) have focused on the data collected in the fixed-point counts (birds) and 'ultrasonic recordings' (bats) from the BBRAS survey sites. The risk assessment (Section 6) also incorporates results from the Basic and Targeted fauna survey undertaken for the Project, with respect to birds and bats, as this provided additional data for potential species of concern (Phoenix 2025a).

The survey work completed to date represents a bird and bat utilisation survey program equivalent to a Level Two investigation in accordance with Brett Lane and Associates (2005). The risk assessment completed serves to evaluate the potential environmental impacts to birds and bats associated with the Project.

7.1 REGIONAL OVERVIEW

The climate of the WFA is moderate Mediterranean, with a strong seasonal rainfall gradient where over 65% of annual rainfall occurs between May and August each year. As such, the WFA has a distinct wet-dry regime over the course of a year. For around 3–4 months of the year (May–August), surface water is present across much of the Cleared areas, which essentially act as flooded grassland habitat, but which dissipates rapidly thereafter. Many of the wetlands retain surface water into spring, with at least one wetland, located south of Governor Broome Road, retaining water into summer and possibly permanently. This hydrologic regime is not as evident in the assemblage data as would be expected.

The study area is situated in a region of high floristic diversity (Phoenix 2025b) and is surrounded by a variety of bird and bat attracting landscape features/habitats, some occurring within the BIA outside the WFA boundary, such as dense forests (some of which are preserved in State Forest and National Park) and regionally important rivers (such as the Blackwood River and associated Hardy Inlet, and Scott River). Forest and woodland vegetation complexes mapped in the BIA (DBCA 2018) contain black cockatoo foraging, nesting and roosting plant species (e.g. *Acacia saligna*, *Agonis flexuosa*, *Banksia attenuata*, *B. grandis*, *B. littoralis*, *C. calophylla*, *E. marginata*, *E. patens* and *E. megacarpa*).

There are a number of ESAs associated with Threatened flora, TECs and wetlands, and a PEC present either in the WFA or the wider BIA. Artificial wetlands are present immediately west of the WFA which contain desktop records for a diversity of birds, including several conservation significant species in low numbers that were not recorded in this survey (Ninox 2011). There are no RAMSAR sites or internationally important wetlands located within the BIA; however, the 'Blackwood River (Lower Reaches) and Tributaries System' located ~4.5 km west of the WFA at its closest point (within the BIA) is listed as a nationally important wetland. The WFA is situated at the junction of 3 regional ecological linkages (Molloy *et al.* 2009a).

The topography of the WFA is generally flat to undulating. There are no outstanding topographic features that may cause updraft areas for soaring birds for example (though many soaring bird observations were made), or unique nesting opportunities, such as on cliffs tops or faces. This is important as the availability of nesting resources is often the limiting factor for raptor breeding, such as for Wedge-tailed Eagle, Peregrine Falcon and Osprey.

The regional overview found a diverse bird and bat assemblage as potentially occurring (199 and 7 species, respectively), that included 58 conservation significant birds and one conservation significant bat. Most of the conservation significant birds were listed as Migratory under the EPBC Act and/or BC Act. Three conservation significant species, the 3 Threatened black cockatoo species, had previously been recorded within the WFA (Figure 4-7), although the nature of how the cockatoos were using the site was not noted in the desktop records.

Fauna habitat mapping generated from the Detailed flora and vegetation survey (Phoenix 2025b) and the Basic and Targeted fauna survey (Phoenix 2025a) found 10 fauna habitat types in the WFA, including 3 wetland habitats, 2 woodlands and 5 highly modified habitats (comprising cleared areas, plantations and dams), with 68.7% of the WFA mapped as Cleared areas. The native habitats largely align with the habitats described for the Warren bioregion in which the majority of the WFA is located (May & McKenzie 2003).

7.2 FIELD SURVEY RESULTS

The fixed-point counts from the BBRAS field surveys recorded 96 bird species, which represents 49% of those identified in the desktop review. Eight bat species were recorded, which is one more than identified in the desktop review.

Despite the variety of habitats present in the WFA, and the BIA more broadly, just 6 of the 58 conservation significant birds from the regional overview were detected in the WFA during the surveys, including 5 in this BBRAS survey and Wood Sandpiper (Mig.) only during the Basic and Targeted fauna surveys Phoenix (2025a). The 3 Threatened black cockatoo species, Forest Red-tailed Black Cockatoo (VU), Baudin's Cockatoo (EN) and Carnaby's Cockatoo (EN), including those where the species could not be determined) were overwhelmingly the dominant conservation significant species recorded, collectively contributing 98% of such records in the WFA. All 3 black cockatoo species were directly observed feeding and were recorded from old feeding debris. However, while the PNT assessment conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a) identified PNTs with hollows suitable for breeding in the WFA, no evidence of roosting or breeding was recorded.

The remaining 3 significant birds recorded in the WFA, Wood Sandpiper (Mig.), Osprey (Mig.) and Peregrine Falcon (OS), were all recorded from single observations, suggesting they are uncommon in the WFA. For Osprey and Peregrine Falcon, the data suggests the WFA forms a portion of a much larger home range and that breeding is taking place outside the WFA. This is supported by multiple records of Osprey that were obtained from the Regional reference sites at the Hardy Inlet. Another conservation significant bird, Masked Owl (southwest; P3), was recorded outside but near to the WFA, again only in low numbers (twice). One conservation significant bat species, Western False Pipistrelle, was recorded in the WFA, in this survey and Basic and Targeted fauna surveys Phoenix (2025a), from only 4 ultrasonic call detections.

Additional sites included in Year 2 of the BBRAS at the Hardy Inlet (Regional reference sites) recorded a further 7 conservation significant species (only at those sites), all Migratory. Five of these species were considered unlikely to occur within the WFA due to absence of suitable habitats and dietary preferences. The remaining 2 species, Sharp-tailed Sandpiper and Red-necked Stint may possibly occur in the WFA on occasion.

The likelihood of occurrence assessment for conservation significant species identified during the regional overview that were not detected during the surveys (see Section 5.3) determined an additional 2 conservation significant species to be likely to occur (1 Migratory species and one Priority species) on the basis of the proximity and recency of desktop records and presence of suitable habitat. Nine species were determined to possibly occur (all Migratory species, except for Australasian Bittern which is Endangered) and a further 10 were considered to possibly occur on rare occasion only.

In consideration of the survey records from 2 years of systematic bird surveys, the WFA supports few conservation significant bird species. Those that were recorded represent only a small portion of both the recorded bird assemblage and overall bird abundance. The various wetlands present, many of which retain water into the start of the migratory bird season were essentially absent Migratory species, with just the Wood Sandpiper being recorded, and only once. Banded Lapwing was the only 'shorebird' recorded (on 3 occasions) from wetland habitat; this species is not Migratory or otherwise conservation significant. Wetland habitats were instead found to support an array of ducks and

cormorants, and wading birds, such as Australian White Ibis, Straw-necked Ibis, and rarely Royal Spoonbill and Yellow-billed Spoonbill. The various remnant woodlands in the WFA, with their larger array of flowering plants were the habitats of primary value, as they support feeding for the 3 black cockatoo species.

As shown in section 5.1.2 the 10 most abundant species collectively represented 73.6% of the overall abundance of birds and the top 20 species represented 86.2%. Throughout the year Straw-necked Ibis and Australian White Ibis were pervasive, with small and large flocks regularly seen foraging in paddocks, or moving within, and in and out of, the WFA. Australian Raven was seen moving between sites and many nests were seen in degraded Peppermint woodlands and MJP woodland. Tree Martins, Australian Ringneck, Yellow-rumped Thornbill and Willie Wagtail dominated the records in open paddocks at or near ground-level often coming in close to observers. Pacific Black Duck and Australian Shelduck were commonly observed foraging in flooded paddocks over winter–spring months and in the wetlands for the remainder of the year. All 10 are species that are advantaged by modified habitats. Bird diversity and abundance did not correlate with seasons or the amount of standing water in the WFA (Figure 5-2).

Importantly, the wet period only partially overlaps the arrival of EAAF Migratory species, which start arriving in southwest WA in late spring, at which point the modified floodplain has dried (or is close to dry), but which would likely attract several Migratory species if it remained inundated. Further, despite the pronounced wet period where large areas of flooded grasslands are present, no overwintering Migratory bird species have been observed to date. Some of the basin wetlands (particularly those with a canopy of *Melaleuca* species) remain inundated through to early summer when Migratory species have arrived; however, they do not appear to be utilised by these species, with only a single species (Wood Sandpiper) being observed (3 individuals from single observation) during the Basic and Targeted fauna survey (Phoenix 2025a). It is considered most likely that the wetlands simply are not productive enough, or do not support the preferred food sources of many of the Migratory shorebirds.

Notwithstanding the above, minor incursions of Migratory species to the basin wetlands are likely to occur from time to time. The data therefore suggests that despite the abundance of 'wetland' habitats that could be expected to support a range of Migratory species, the inundation cycle, low productivity and available food sources precludes their presence, and instead the largely highly-modified environment favours species that respond positively to such environments, such as Pacific Black Duck, Australian Shelduck, Black Swan, and to a lesser extent species of cormorant and heron.

Bird flight height and direction of travel data was captured so that movements could be analysed within the context of the proposed turbine locations and modelled against the RSA airframe in support of any future collision risk modelling. The flight height and direction data however showed no clear trends, with movement N–S and E–W being fairly well balanced (Table 5-5). Further, movements, such as between habitat patches or into and out of the WFA were limited, being just 7.7% of all 2,634 observations. Therefore, the utility and importance of the WFA as a linkage between the large tracts of forest to the north and east, the Hardy Inlet at Augusta and the Proteaceous woodlands and shrublands to the south is not strongly supported. The data and general observations do however more strongly support the assumption that the habitats within the WFA, particularly the north-south chain of remnant bushland and wetlands (largely in the central area) act as internal stepping stones for small-moderate bush birds, such as Australian Raven, Australian Ringneck, Willie Wagtail, Australian Magpie, White-fronted Chat and Grey Butcherbird, which were regularly seen crossing paddocks from one remnant to the next. Raptors were observed hunting from <10 m to 800 m above ground-level, moving over open paddocks and remnants. Raptors comprised the two Orders most recorded within the RSA height range and had the highest mean flight height (Appendix 6). The importance of remnants in the maintenance of biodiversity and as stepping stones in agricultural landscapes for birds (and bats) is well documented (Arnold *et al.* 1987; Bentley & Catterall 1997;

Collard *et al.* 2009; Donald & Evans 2006; Fischer & Lindenmayer 2002a, b; Johnson *et al.* 2007; Major *et al.* 2001).

7.3 RISK ASSESSMENT

Four potential impacts to birds and bats arise from wind farms, including habitat loss, mortality or injury from collision with wind turbine blades, and alienation or displacement leading to disruption to feeding or breeding behaviour (Table 6-1). In consideration of these potential impacts a risk assessment was undertaken for all conservation significant species recorded or considered likely or potentially occurring (Table 6-2), as well as for all other potential species of concern, that is, non-conservation significant species that are particularly vulnerable to collision risk due to their morphology, behaviour, flight type and/or habitat use (i.e. birds of prey and bats; Table 6-3).

The assessment found no species to be at high risk from the Project, but 3 species to be at moderate risk, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. The risk profile and reasoning was similar for all 3 black cockatoo species: all were recorded on multiple occasions in the WFA and within the RSA (except Baudin's Cockatoo), they all have small total population estimates, are slow breeding and display strong pair bonding. No mortality monitoring data was available for these species; however, the related *Zanda funerea* from south-eastern Australia, which may be considered a suitable surrogate due morphological, habitat and movement characteristics, had no reported mortalities from the reviewed literature sources. However, both Forest Red-tailed Black Cockatoo and Carnaby's Cockatoo were recorded flying at heights within the RSA of the WFA, but only twice each. This is similar to the results of (BCE 2025) which found just 1.9% of Carnaby's Cockatoo flights were above 18 m (within the original RSA) and that increasing the minimum rotor height to 50 m would reduce the number of flight within the RSA to 0.13%. (BCE 2025) also notes personal observations of Carnaby's Cockatoo adjusting flight heights as they approach turbines, perhaps suggested a learnt behaviour response.

While Baudin's Cockatoo was not recorded at RSA heights, it is suspected to reach RSA heights on occasion. Given that, and the lack of species-specific data on turbine strike risk for the 3 WA species, a precautionary assessment is warranted. It is noted that the RSA flight heights for Forest Red-tailed Black Cockatoo and Carnaby's Cockatoo were limited to the lowest RSA category of 26-50 m.

The mortality risk for the 3 black cockatoo species is reduced by the relatively low numbers recorded in the WFA, considering the number of sampling phases, survey effort and duration of the survey program. The abundance data indicates that their local populations are small and any mortality experienced is unlikely to have a significant impact on the total population, with the risk assessment finding potential for minor reduction in population viability for between one and 5 years from loss of individuals from turbine strike. The risk is also reduced by the lack of breeding or roosting sites within the WFA or wider BIA. While there is high and moderate quality foraging habitat in WFA, the proposed cleared of the small amount (<1 ha) of this habitat is unlikely to affect the local populations when extensive suitable foraging habitat is present outside the WFA.

Risk was assessed as negligible for the remaining 4 conservation significant bird species recorded in the WFA (Wood Sandpiper, Osprey, Peregrine Falcon) or wider BIA (Masked Owl (southwest)). Direct collision with turbine blades is considered the primary potential impact to these species but they are considered at negligible risk principally because they were recorded so rarely (once or twice each) and as single birds (Osprey, Peregrine Falcon, Masked Owl) or small groups (Wood Sandpiper, flock of 3), indicating likely only occasional occurrence in the WFA. Even for the 2 species recorded at RSA heights (Osprey and Peregrine Falcon), their limited presence and lack of breeding on site means the associated risk from the proposed wind farm is negligible.

The risk assessment for Western False Pipistrelle (P4), the only conservation significant bat species detected, determined that the proposed wind farm represents a low risk to this species. This species

was the least recorded bat species. Direct turbine blade strike is again considered the most likely impact from the Project; however, it is noted that the literature suggests it typically stays close to remnant vegetation, rarely venturing out into open paddocks. This is supported by the survey data, of the 6 recorded sites, only one is in open paddock, and was located between a cluster of remnants. The other 5 sites were in or at the edge of larger native remnants or roadside remnants. A precautionary approach has been taken as so little is known of this species, therefore, it has been assumed the species will fly at RSA heights and so has the potential to be at strike-risk, but due primarily to the lack of knowledge was determined to be at low risk, rather than negligible risk.

The Australasian Bittern (EN), which was also rated low risk. It was not recorded within the WFA or wider BIA, despite audio recordings taken at suitable habitat through the breeding season (Phoenix 2025a). However, it has been reported from Hardy Inlet (12 km west) and Gingilup/Quitchup/Jasper wetlands (~30 km SE) and limited information was available on the local population distribution. As the WA population of Australasian Bittern is very small, any loss of individuals may have a temporary impact on local population viability. Given this, and because of its potential to occasionally use the larger wetlands in the WFA and potentially fly within the height of the RSA, it was assigned a risk rating of low.

For the 2 undetected conservation significant species considered likely to occur (Blue-billed Duck, P4 and Common Greenshank, Mig.) the risk was determined to be negligible. For Blue-billed Duck there are no records from the WFA and no mortalities have been reported from carcass monitoring. Similarly, Common Greenshank has no records in the WFA, however suitable habitat is present in the form of flooded paddocks and wetlands. No mortalities have been reported in carcass monitoring and its population size means losses would be expected to be undetectable.

The risk to the 18 additional undetected conservation significant species considered to possibly occur, or possibly occur on rare occasion, was also found to be negligible. Most of these are Migratory shorebirds, many of which largely favour marine/intertidal habitats but cannot be discounted from occurring on occasion, with none considered likely to utilise the WFA on a regular basis during the Migratory shorebird season. The 2 non-shorebird species, Fork-tailed Swift and Grey Wagtail, are typically more northern species and their presence in the desktop is a function of 'modelled distribution' rather than actual records.

Curlew Sandpiper (CR, Mig.) Sharp-tailed Sandpiper (VU, Mig.) have not been recorded close to the WFA in a long time (1979/1980) from the adjacent artificial wetlands. All other records are from to the Hardy Inlet. Inland freshwater wetlands are not their preferred habitats, but they will use them on occasion in southwest WA. As such the risk to these two species is negligible.

For the non-significant bird species of concern (11 raptor species; Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, White-bellied Sea-Eagle, Whistling Kite, Little Eagle, Collared Sparrowhawk, Brown Goshawk, Brown Falcon, Australian Kestrel and Australian Hobby) the risk assessment found the risk to be low to negligible. While the likelihood of a collision for the majority of those 11 species ranged from potential to almost certain, the consequence of strike was considered insignificant to minor as the loss of small numbers of individuals is unlikely to impact local and regional populations. Those individuals would be readily replaced by individuals already occupying the abundant habitat available outside the WFA.

The preliminary risk assessment for non-significant bats found the risk to be negligible for 5 of the 7 species present (Gould's Wattled Bat, Chocolate Wattled Bat, Lesser Long-eared Bat, Holt's Long-eared Bat and Greater Long-eared Bat). Southern Forest Bat and White-striped Free-tailed bat were found to be at low risk. Similarly to the non-significant bird species of concern, the likelihood of collision for these species ranged from potential to almost certain; and the consequence of collisions was considered insignificant to minor. For the Southern Forest Bat and White-striped Free-tailed bat the

consequence was assessed as minor due to the combination of their higher activity level in the WFA and their high recorded mortality from reviewed sources.

Based on the flight heights recorded, the data suggests that increasing the minimum blade height to 50 m would reduce the total number of birds species recorded flying within the RSA from 52 to 24 species, a 54% reduction. This includes the 3 black cockatoos and Western False Pipistrelle but excludes raptors, which were often recorded flying above 50 m. Further, with the RSA minimum raised to 50 m, only 3.8% of all flight where height observations were recorded would be from within the RSA. As well as increasing the minimum RSA height, collision risk could be further reduced by limiting the concentration of turbines and increasing the separation distance of turbines from important habitat to maintain adequate open areas for bird and bat movement.

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Appendix 1 Survey site locations

BBRAS sites (current survey)

Site	Latitude	Longitude
BUS001	-34.22466	115.26917
BUS002	-34.26111	115.30009
BUS003	-34.23805	115.27883
BUS004	-34.22428	115.30666
BUS005	-34.21547	115.29346
BUS006	-34.18121	115.27773
BUS007	-34.23796	115.2892
BUS008	-34.19273	115.30802
BUS009	-34.19894	115.30008
BUS010	-34.24018	115.30199
BUS011	-34.25074	115.29583
BUS012	-34.25982	115.3251
BUS013	-34.20639	115.25518
BUS014	-34.16078	115.31235

Site	Latitude	Longitude
BUS015	-34.28284	115.28826
BUS016	-34.23337	115.27104
BUS018	-34.19148	115.28455
BUS019	-34.24013	115.32174
BUS020	-34.24712	115.27984
BUS025	-34.20266	115.29829
BUS026	-34.19817	115.31756
BUS027	-34.22569	115.31795
BUS030	-34.31733	115.17962
BUS031	-34.28922	115.17638
BUS032	-34.32004	115.16611
BUS033	-34.32238	115.17119
BUS034	-34.31655	115.18542
BUS035	-34.27017	115.29774

Basic and Targeted fauna survey sites (Phoenix 2025a) with bird/bat survey effort and/or bird/bat records

Site	Latitude	Longitude
AQU-01	-34.2475	115.2713
AQU-02	-34.2487	115.2761
AQU-03	-34.2495	115.2794
AQU-15	-34.1805	115.2805
AQU-18	-34.1852	115.2766
AQU-25	-34.1748	115.2828
AQU-28	-34.2349	115.3125
AQU-30	-34.2323	115.3077
AQU-39	-34.2578	115.2982
AQU-40	-34.2561	115.3021
AQU-45	-34.2311	115.2995
AQU-51	-34.2251	115.3052
AQU-53	-34.2267	115.3004
AQU-55	-34.207	115.3006
AQU-57	-34.1984	115.2935
AQU-Opp04	-34.2387	115.2695
BC2024_01	-34.1993	115.3148
BCForaging	-34.1994	115.3119
BCRoosting01	-34.1926	115.2777
BCRoosting03	-34.1985	115.3015
BCRoosting04	-34.2242	115.3068
BCRoosting05	-34.2402	115.3138
BCRoosting06	-34.2502	115.2801
BCRoosting07	-34.1982	115.3156
BCRoosting09	-34.2478	115.3156
BCRoosting10	-34.1738	115.291
BCRoosting11	-34.1766	115.2949
BCRoosting12	-34.2379	115.3231
BCRoosting13	-34.2443	115.3233

Site	Latitude	Longitude
BCRoosting14	-34.2619	115.2944
BCRoosting15	-34.1746	115.2741
BCRoosting16	-34.1927	115.3217
BCRoosting17	-34.2565	115.3011
BCRoosting18	-34.2243	115.3209
Bfalcon	-34.2402	115.2936
Birding01	-34.1971	115.3075
Birding02	-34.2285	115.3093
Birding03	-34.2426	115.3207
Black Cockatoos	-34.2593	115.2679
CarnabysCockies02	-34.1601	115.3133
FRTBC-01	-34.2379	115.3224
FRTBC-02	-34.2492	115.2843
FRTBC-03	-34.1994	115.3119
FRTBC-04	-34.2609	115.2702
FRTBC-05	-34.1875	115.2747
FRTBC-06	-34.1844	115.2825
Mowl01	-34.2597	115.2701
Opp06	-34.2166	115.2693
Opp07	-34.2138	115.2696
Opp11	-34.2343	115.2812
Opp12	-34.2001	115.3119
Opp13	-34.1875	115.321
Opp15	-34.1938	115.3221
Opp17	-34.21	115.282
Opp19	-34.1772	115.2804
Opp20	-34.2568	115.3016
Osprey	-34.2438	115.281
Raven01	-34.2377	115.3226

Site	Latitude	Longitude
SM4-01	-34.1998	115.3143
SM4-02	-34.1996	115.312
SM4-03 (failed)	-34.2375	115.3203
SM4-04	-34.2455	115.3215
SM4-05	-34.251	115.2829
SM4-06	-34.1919	115.2732
SM4-07	-34.192	115.2695
Tawny01	-34.2377	115.3223
VER-09	-34.2002	115.2949
VER-16	-34.2399	115.3064
VER-17	-34.2602	115.2697
VER-21	-34.2518	115.283
VER-22	-34.2505	115.2698
VER-30	-34.1598	115.2783
VER-31	-34.1613	115.3128
VER-32	-34.1569	115.4017
VER-33	-34.2296	115.3028
VER-35	-34.2308	115.2975
VER-36	-34.217	115.2886
VER-37	-34.2103	115.284

Site	Latitude	Longitude
VER-38	-34.2511	115.3038
VER-39	-34.2563	115.3021
VER-40	-34.2757	115.3051
VER-41	-34.2756	115.2922
VER-42	-34.2769	115.3021
VER-43	-34.2187	115.3099
VER-44	-34.2007	115.2671
VER-45	-34.1754	115.2838
VER-46	-34.1743	115.2803
VER-47	-34.1783	115.29
VER-49	-34.1832	115.2848
VER-Opp01	-34.2457	115.3229
VER-Opp04	-34.159	115.2781
VER-Opp07	-34.1743	115.2803
VER-Opp08	-34.1739	115.2933
WedgeyOpp	-34.1728	115.2743
Wetland01	-34.2513	115.3033
Wetland02	-34.2568	115.3023
Wetland03	-34.1803	115.2816
White-tail_Foraging	-34.1848	115.2819

Appendix 2 Survey site descriptions

Site details			
Site	**BUS001**	**Position (WGS84)**	115.2692, -34.2247
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
2	Opportunistic sighting	25 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	21 Oct 2024	21 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	14 Nov 2024	14 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	17 Jan 2025	17 Jan 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	14 Feb 2025	14 Feb 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
22	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (24 May 2023)			
Paddock with autumn-early spring pools and small stream; completely degraded. Beenup constructed wetlands across the road to the West. Roadside vegetation condition weed infested and in completely degraded condition.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS002**	**Position (WGS84)**	115.3001, -34.2611
Slope	negligible	**Topography**	floodplain
Soil colour	black	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	18 Oct 2024	18 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	14 Nov 2024	14 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	17 Jan 2025	17 Jan 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	14 Feb 2025	14 Feb 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
22	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (25 May 2023)			
Paddock, with small water body containing no fringing native vegetation. Dead Melaleuca sp. trees pushed over and into piles. Some water birds using waterbody, including nesting black swans.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS003**	**Position (WGS84)**	115.2788, -34.2381
Slope	negligible	**Topography**	floodplain
Soil colour	black, grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
1	Opportunistic sighting	19 Nov 2023	19 Nov 2023
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock, with a few stands of Agonis sp. (peppermint) trees present, and no understorey. Completely degraded.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS004**	**Position (WGS84)**	115.3067, -34.2243
Slope	negligible	**Topography**	floodplain
Soil colour	grey, brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Fixed-point count	26 May 2023	26 May 2023
1	Site description	26 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	16 Aug 2023	16 Aug 2023
4	Fixed-point count	17 Nov 2023	17 Nov 2023
1	Audio recording	18 Nov 2023	19 Nov 2023
2	Ultrasonic recording	18 Nov 2023	19 Nov 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
8	Fixed-point count	27 Sep 2024	27 Sep 2024
9	Fixed-point count	30 Sep 2024	30 Sep 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	17 Oct 2024	17 Oct 2024
12	Fixed-point count	13 Nov 2024	13 Nov 2024
13	Fixed-point count	14 Nov 2024	14 Nov 2024
14	Fixed-point count	11 Dec 2024	11 Dec 2024
15	Fixed-point count	11 Dec 2024	11 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	13 Feb 2025	13 Feb 2025
19	Fixed-point count	13 Feb 2025	13 Feb 2025
20	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
21	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (26 May 2023)			
Open paddock, with blue gum plantation to the north, wetlands to the south, Peppermint parkland to the north-east.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS005**	**Position (WGS84)**	115.2935, -34.2155
Slope	negligible	**Topography**	floodplain
Soil colour	black, grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Fixed-point count	26 May 2023	26 May 2023
1	Site description	26 May 2023	26 May 2023
1	Opportunistic sighting	26 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	16 Aug 2023	16 Aug 2023
4	Fixed-point count	17 Nov 2023	17 Nov 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
1	Audio recording	18 Nov 2023	19 Nov 2023
2	Ultrasonic recording	18 Nov 2023	19 Nov 2023
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	16 Jan 2025	16 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (26 May 2023)			
Paddock site surrounded by excellent condition remnant vegetation, including narrow a strip of quality Banksia/Peppermint woodland immediately to the north; and a large, connected remnant of Eucalypt-wetland and Peppermint/Melaleuca bushland to the west, east and south.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS006**	**Position (WGS84)**	115.2777, -34.1812
Slope	gentle	**Topography**	floodplain
Soil colour	black	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Site description	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	28 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	12 Jan 2024	12 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Paddock, with Blue gum plantation 120m to the west. High quality remnant woodland to the NW and various sumplands in vicinity.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS007**	**Position (WGS84)**	115.2892, -34.2380
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock with isolated peppermint trees. Gently undulating.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS008**	**Position (WGS84)**	115.3080, -34.1927
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	24 May 2023	24 May 2023
1	Site description	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
5	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	11 Jan 2024	11 Jan 2024
7	Fixed-point count	27 Sep 2024	27 Sep 2024
8	Fixed-point count	30 Sep 2024	30 Sep 2024
9	Fixed-point count	17 Oct 2024	17 Oct 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	13 Nov 2024	13 Nov 2024
12	Fixed-point count	14 Nov 2024	14 Nov 2024
13	Fixed-point count	11 Dec 2024	11 Dec 2024
14	Fixed-point count	11 Dec 2024	11 Dec 2024
15	Fixed-point count	17 Jan 2025	17 Jan 2025
16	Fixed-point count	17 Jan 2025	17 Jan 2025
17	Fixed-point count	13 Feb 2025	13 Feb 2025
18	Fixed-point count	13 Feb 2025	13 Feb 2025
19	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
20	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (24 May 2023)			
Open paddock, near flat, under powerlines, adjacent small degraded seasonally inundated shrubland.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS009**	**Position (WGS84)**	115.3001, -34.1989
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	25 May 2023	25 May 2023
3	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Ultrasonic recording	17 Nov 2023	18 Nov 2023
1	Audio recording	17 Nov 2023	18 Nov 2023
4	Fixed-point count	18 Nov 2023	18 Nov 2023
5	Fixed-point count	10 Jan 2024	10 Jan 2024
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (24 May 2023)			
Paddock alongside small, fenced wetland with windmill feeding small dam - attracting birds. Small degraded remnants of Peppermint woodland to the east and northeast, and excellent condition wetlands to the southwest.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS010**	**Position (WGS84)**	115.3020, -34.2402
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	17 Oct 2024	17 Oct 2024
12	Fixed-point count	18 Oct 2024	18 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	13 Nov 2024	13 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	17 Jan 2025	17 Jan 2025
18	Fixed-point count	14 Feb 2025	14 Feb 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (25 May 2023)			
Open, flat paddock, with isolated peppermint low trees and tall shrubs. Completely degraded.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS011**	**Position (WGS84)**	115.2958, -34.2507
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Site description	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	27 Sep 2024	27 Sep 2024
9	Fixed-point count	30 Sep 2024	30 Sep 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	13 Nov 2024	13 Nov 2024
13	Fixed-point count	14 Nov 2024	14 Nov 2024
14	Fixed-point count	12 Dec 2024	12 Dec 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	17 Jan 2025	17 Jan 2025
18	Fixed-point count	14 Feb 2025	14 Feb 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025

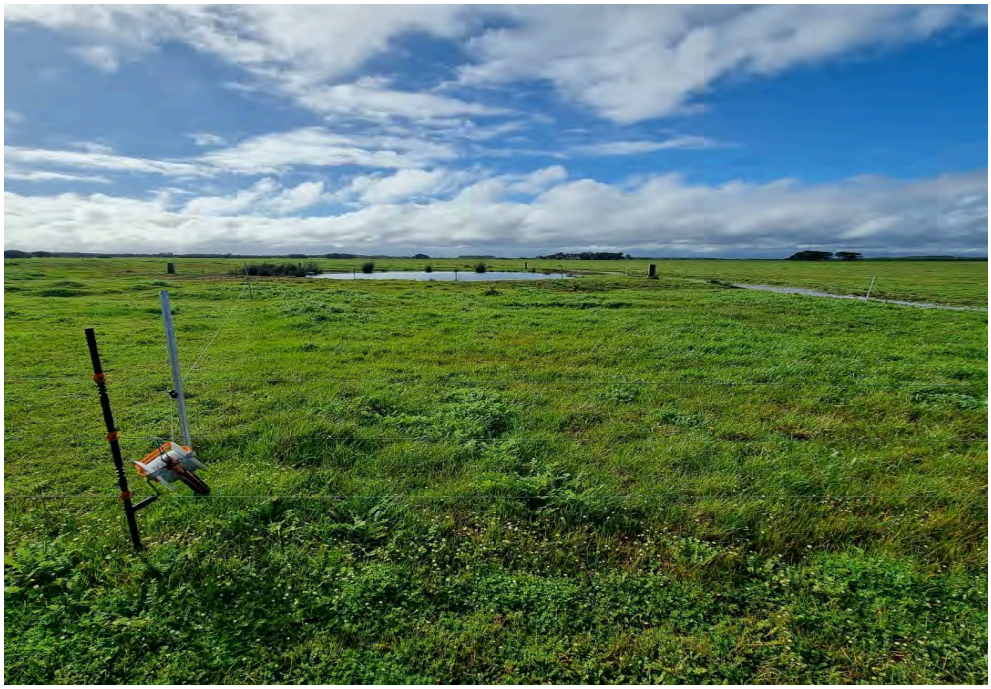
Site description - Sample no. 1 (24 May 2023)			
Open, flat paddock adjacent excellent condition roadside shrubland. Paddock gently slopes south toward the coast and Scott River.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS012**	**Position (WGS84)**	115.3251, -34.2598
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Site description	14 Aug 2023	14 Aug 2023
2	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
1	Ultrasonic recording	15 Aug 2023	16 Aug 2023

Site description - Sample no. 1 (14 Aug 2023)			
Open paddock, adjacent small dam to the north and degraded peppermint woodland remnants to the south.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS013**	**Position (WGS84)**	115.2552, -34.2064
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Fixed-point count	24 May 2023	24 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024

Site description - Sample no. 1 (24 May 2023)			
Flat, open paddock, with few trees present. Adjacent roadside Jarrah-Marri forest remnant in excellent good condition for the most part.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS014**	**Position (WGS84)**	115.3123, -34.1608
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	sand, clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	19 Nov 2023	20 Nov 2023
3	Ultrasonic recording	19 Nov 2023	20 Nov 2023
6	Fixed-point count	19 Nov 2023	19 Nov 2023
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	12 Jan 2024	12 Jan 2024

Site description - Sample no. 1 (24 May 2023)

Open paddock with no trees remaining. Adjacent high-quality roadside remnant of Jarrah-Marri woodland, so the east and north. And with large expanse of National Park and Reserves also to the east and north.

Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS015**	**Position (WGS84)**	115.2883, -34.2828
Slope	gentle	**Topography**	floodplain
Soil colour	grey	**Soil texture**	sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Site description	25 May 2023	25 May 2023
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock gently sloping down toward a Scott River to the north. Stands of degraded Peppermint woodland present, devoid of vegetated understorey, but with excellent condition native vegetation immediately to the south.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	101	**Litter distribution**	none
Tree cover (%)	1	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS016**	**Position (WGS84)**	115.2710, -34.2334
Slope	negligible	**Topography**	floodplain
Soil colour	red-brown	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	21 Oct 2024	21 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	12 Dec 2024	12 Dec 2024
8	Fixed-point count	12 Dec 2024	12 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)			
Open, flat paddock. Nearest trees are a strip of mature Pine, 200m to the west.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS018**	**Position (WGS84)**	115.2845, -34.1915
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	21 Oct 2024	21 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Open, gently undulating paddock. Nearest native vegetation is approximately 450m to the northeast and is a degraded Jarrah-Marri woodland. A Bluegum plantation occurs 650m to the west.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS019**	**Position (WGS84)**	115.3217, -34.2401
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	18 Oct 2024	18 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	13 Nov 2024	13 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)

Open, gently undulating paddock, dissected by track. Excellent condition Jarrah-Marri-Peppermint woodland 240m to the north. Eucalypt plantation 160m to the east. A few old Peppermint shade trees in southern paddock, but no trees in the northern paddock.

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	98	**Herb cover (%)**	0



Site details			
Site	**BUS020**	**Position (WGS84)**	115.2798, -34.2471
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	18 Oct 2024	18 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	12 Dec 2024	12 Dec 2024
8	Fixed-point count	12 Dec 2024	12 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)

Open, flat paddock intersected by track and drain. The area is generally highly degraded. The nearest trees occur as a windbreak line of introduced Eucalypts to the NW

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS025**	**Position (WGS84)**	115.2983, -34.2027
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	17 Jan 2025	17 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Paddock with seasonally wet depression containing small Melaleuca-grove, mostly dead 100m to the north. An excellent condition seasonally inundated shrubland occurs 100m to the north, and excellent condition Jarrah-Marri woodland 200m to the east.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS026**	**Position (WGS84)**	115.3176, -34.1982
Slope	negligible	**Topography**	floodplain
Soil colour	grey	**Soil texture**	sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)

Open, flat paddock, with only a few remaining small trees present. The nearest native remnant is excellent condition bushland 230m to the west.

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS027**	**Position (WGS84)**	115.3180, -34.2257
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	5	**Rock type**	laterite

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	16 Jan 2025	16 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Open, gently undulating paddock with scattered Peppermint Trees. The closest remnant vegetation is a Peppermint-Melaleuca woodland with a wetland, 350m to the southwest.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS030**	**Position (WGS84)**	115.1796, -34.3173
Slope	negligible	**Topography**	tidal wetland
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Relatively deep section of Swan Lake, margins vegetated for the most part. With areas of varying water column depth present due to sandbars, offering a variety of feeding opportunities for waterbirds.			
Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS031**	**Position (WGS84)**	115.1764, -34.2892
Slope	negligible	**Topography**	river - sand bar
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)

Sandbar in Blackwood River channel, approximately 5km north of the river mouth. This bar holds abundant small to large waterbirds over the summer months, but overwintering birds are also common. It is often completely inundated on higher tides at which time only larger birds remain. Feeding and roosting/loading take place on mid-low tides.

Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS032**	**Position (WGS84)**	115.1661, -34.3200
Slope	negligible	**Topography**	inlet
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Sandbar 800 north of the Blackwood River mouth. As with others, this bar also holds abundant small to large waterbirds over the summer months, but overwintering birds are also common. It is often completely inundated on higher tides at which time only larger birds remain. Feeding and roosting/loading take place on mid-low tides.			
Habitat	beach		
Disturbance			
Vegetation condition		**Fire age**	
Total veg. cover (%)	0	**Litter distribution**	
Tree cover (%)		**Litter depth (cm)**	0.0
Shrub cover (%)		**Litter cover (%)**	0
Grass cover (%)		**Herb cover (%)**	



Site details			
Site	**BUS033**	**Position (WGS84)**	115.1712, -34.3224
Slope	negligible	**Topography**	inlet
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Sandbar at the confluence of Blackwood River and 'dead water' entrances. The bar is usually flooded at high tide and offers feeding and roosting opportunities at lower tides for a variety of waterbirds.			
Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS034**	**Position (WGS84)**	115.1854, -34.3166
Slope	negligible	**Topography**	embayment
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Shallow embayment at the eastern end of 'dead water'. Algal mat covering surface. Lots of birds feeding. Open water to the west, opens into Hardy Inlet and the Blackwood River mouth.			
Habitat	beach		
Disturbance			
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Appendix 3 Desktop and field survey bird and bat species records

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Birds (207)															
Anatidae	*Anas castanea*	Chestnut Teal										•		•	
Anatidae	*Anas gracilis*	Grey Teal			•	•						•		•	•
Anatidae	*Anas superciliosa*	Pacific Black Duck			•	•				•		•		•	•
Anatidae	*Aythya australis*	Hardhead			•	•						•			
Anatidae	*Biziura lobata*	Musk Duck			•	•						•		•	•
Anatidae	*Chenonetta jubata*	Australian Wood Duck			•	•				•		•		•	•
Anatidae	*Cygnus atratus*	Black Swan		•	•	•						•		•	•
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck										•		•	
Anatidae	*Oxyura australis*	Blue-billed Duck	P4 (DBCA list)		•	•						•	•		
Anatidae	*Spatula rhynchotis*	Australasian Shoveler			•	•						•		•	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		•	•	•				•		•		•	•
Apodidae	*Apus pacificus*	Fork-tailed Swift	Mig. (EPBC & BC Acts)					•							
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			•	•				•					
Podargidae	*Podargus strigoides*	Tawny Frogmouth			•	•				•				•	
Charadriidae	*Anarhynchus bicinctus*	Double-banded Plover	Mig. (EPBC & BC Acts)										•		
Charadriidae	*Anarhynchus leschenaultii*	Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)		•			•					•		
Charadriidae	*Anarhynchus mongolus*	Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)										•		
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		•	•	•		•				•			•[4]
Charadriidae	*Charadrius cucullatus*	Hooded Plover/Dotterel	P4 (DBCA list)		•	•		•					•		
Charadriidae	*Charadrius melanops*	Black-fronted Dotterel			•							•		•	
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	Mig. (EPBC & BC Acts)		•			•					•		
Charadriidae	*Pluvialis squatarola*	Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Act)		•										
Charadriidae	*Vanellus tricolor*	Banded Lapwing			•	•						•		•	•
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher			•										
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		•	•	•									•[4]
Laridae	*Anous tenuirostris melanops*	Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)					•							
Laridae	*Chlidonias hybrida*	Whiskered Tern			•										
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		•	•	•						•			•[4]
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)		•	•		•				•	•		•[4]
Laridae	*Larus dominicanus*	Kelp Gull			•										
Laridae	*Larus pacificus*	Pacific Gull		•	•	•		•							•[4]
Laridae	*Onychoprion anaethetus*	Bridled Tern	Mig. (EPBC & BC Acts)		•			•					•		
Laridae	*Stercorarius pomarinus*	Pomarine Skua (Pomarine Jaeger)	Mig. (EPBC & BC Acts)		•										
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)		•	•		•							•[4]
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)		•	•							•		•[4]
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt			•										
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt			•							•			
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet			•	•									
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Mig. (EPBC & BC Acts)		•			•				•	•		
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)					•				•	•		•[4]
Scolopacidae	*Calidris alba*	Sanderling	Mig. (EPBC & BC Acts)		•	•		•					•		•[4]

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Scolopacidae	*Calidris canutus*	Red Knot	VU/Mig. (EPBC Act); EN (BC Act)		•			•					•		
Scolopacidae	*Calidris falcinellus*	Broad-billed Sandpiper	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	Mig. (EPBC & BC Acts)		•			•							
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)		•			•					•		•[4]
Scolopacidae	*Calidris tenuirostris*	Great Knot	VU/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)		•			•					•		•[4]
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR/Mig. (EPBC Act); CR (BC Act)					•					•		
Scolopacidae	*Numenius phaeopus*	Whimbrel	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	Mig. (EPBC & BC Acts) P4 (DBCA list)										•		
Scolopacidae	*Tringa glareola*	Wood Sandpiper	Mig. (EPBC & BC Acts)		•									•	
Scolopacidae	*Tringa nebularia*	Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)		•	•		•				•	•		
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	Mig. (EPBC & BC Acts)		•										
Ardeidae	*Ardea alba*	Great Egret (Eastern Great Egret)			•	•						•			
Ardeidae	*Ardea pacifica*	White-necked Heron			•	•				•		•		•	•
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN (EPBC & BC Acts)					•							
Ardeidae	*Bubulcus coromandus*	Cattle Egret			•			•						•	
Ardeidae	*Egretta garzetta*	Little Egret			•										•[4]
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			•	•				•		•		•	•
Ardeidae	*Egretta sacra*	Eastern Reef Egret			•										
Ardeidae	*Ixobrychus flavicollis*	Black Bittern			•	•									
Ardeidae	*Nycticorax caledonicus*	Rufous Night Heron			•	•									
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill			•	•						•		•	•
Threskiornithidae	*Platalea regia*	Royal Spoonbill			•	•				•					•
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		•	•	•						•		•	•
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		•	•	•				•		•		•	•
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			•	•						•		•	•
Columbidae	*Phaps chalcoptera*	Common Bronzewing		•	•	•			•	•		•		•	•
Columbidae	*Phaps elegans*	Brush Bronzewing			•	•									
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	Introduced	•	•	•			•	•		•		•	•
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher			•	•				•				•	
Meropidae	*Merops ornatus*	Rainbow Bee-eater		•	•	•		•						•	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			•	•				•		•			•
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			•	•				•		•			
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			•	•				•		•		•	•
Accipitridae	*Circus approximans*	Swamp Harrier		•	•					•		•		•	•
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			•	•						•		•	•
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle			•	•		•		•		•			•
Accipitridae	*Haliastur sphenurus*	Whistling Kite			•	•						•		•	•
Accipitridae	*Hamirostra isura*	Square-tailed Kite			•										
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			•	•								•	•
Accipitridae	*Milvus migrans*	Black Kite			•	•									

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Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)		•	•		•				•	•	•	•
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk			•	•						•			•
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk			•	•						•		•	•
Falconidae	*Falco berigora*	Brown Falcon			•	•				•		•		•	•
Falconidae	*Falco cenchroides*	Australian Kestrel		•	•	•				•		•		•	•
Falconidae	*Falco longipennis*	Australian Hobby		•	•	•				•		•			•
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)		•	•				•		•	•		•
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU (EPBC & BC Acts)			•							•		
Phasianidae	*Coturnix pectoralis*	Stubble Quail			•	•						•		•	•
Phasianidae	*Synoicus ypsilophorus*	Brown Quail			•	•				•					
Rallidae	*Fulica atra*	Eurasian Coot			•	•						•		•	
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen			•	•									
Rallidae	*Porphyrio melanotus*	Australasian Swamphen			•	•						•		•	
Rallidae	*Zapornia pusilla*	Baillon's Crake			•	•									
Rallidae	*Zapornia tabuensis*	Spotless Crake			•	•						•			
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza inornata*	Western Thornbill			•	•				•		•			
Acanthizidae	*Gerygone fusca*	Western Gerygone		•	•	•				•				•	•
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		•	•	•			•	•		•		•	•
Acanthizidae	*Smicrornis brevirostris*	Weebill			•	•								•	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			•	•				•		•		•	•
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			•	•				•		•			•
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird												•	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		•	•	•				•		•		•	•
Artamidae	*Gymnorhina tibicen*	Australian Magpie		•	•	•				•		•		•	•
Artamidae	*Strepera versicolor*	Grey Currawong		•	•	•				•					
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		•	•	•				•		•		•	•
Campephagidae	*Lalage tricolor*	White-winged Triller			•					•		•		•	•
Climacteridae	*Climacteris rufus*	Rufous Treecreeper			•	•								•	
Corvidae	*Corvus coronoides*	Australian Raven		•	•	•				•		•		•	•
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird												•	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark			•	•				•		•		•	•
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		•	•	•			•	•		•		•	•
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		•	•	•				•		•		•	•
Estrildidae	*Stagonopleura oculata*	Red-eared Firetail			•	•				•					
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		•	•	•				•		•		•	•
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			•	•									
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		•	•	•				•		•		•	•
Locustellidae	*Cincloramphus cruralis*	Brown Songlark								•				•	•
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark								•					•
Locustellidae	*Poodytes gramineus*	Little Grassbird			•	•				•		•			
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		•	•	•			•	•				•	•
Maluridae	*Malurus splendens*	Splendid Fairy-wren		•	•	•				•		•		•	•
Maluridae	*Stipiturus malachurus*	Southern Emu-wren			•	•				•		•			•

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Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill			•	•				•		•		•	•
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		•	•	•			•	•		•		•	•
Meliphagidae	*Anthochaera lunulata*	Western Little Wattlebird		•	•	•				•		•			
Meliphagidae	*Epthianura albifrons*	White-fronted Chat			•	•				•		•		•	•
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater		•	•	•								•	
Meliphagidae	*Gliciphila melanops*	Tawny-crowned honeyeater			•	•				•					
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			•	•				•				•	•
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner												•	
Meliphagidae	*Melithreptus chloropsis*	Western White-naped Honeyeater			•	•				•		•			
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			•	•				•					
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		•	•	•				•		•		•	•
Motacillidae	*Anthus australis*	Australian Pipit		•	•					•		•		•	•
Motacillidae	*Motacilla cinerea*	Grey Wagtail	Mig. (EPBC & BC Acts)					•							
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			•	•				•					
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		•	•	•				•				•	•
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		•	•	•				•		•		•	•
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			•	•				•		•		•	
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		•	•	•				•				•	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		•	•	•				•				•	•
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin		•	•	•									
Petroicidae	*Microeca fascinans*	Jacky Winter													•
Petroicidae	*Petroica boodang*	Scarlet Robin		•	•	•				•		•			•
Petroicidae	*Petroica goodenovii*	Red-capped Robin			•										
Petroicidae	*Quoyornis georgianus*	White-breasted Robin		•	•	•				•		•		•	
Sylviidae	*Acrocephalus australis*	Australian Reed Warbler			•	•						•			
Zosteropidae	*Zosterops lateralis*	Silvereye		•	•	•			•	•		•		•	•
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			•	•						•			•[4]
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			•	•						•			•[4]
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant			•	•				•				•	•
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant			•	•						•			•
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant			•	•						•		•	•
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant			•	•						•			•
Sulidae	*Morus serrator*	Australasian Gannet			•	•									
Podicipedidae	*Podiceps cristatus*	Great Crested Grebe										•			
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			•	•						•			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			•	•						•		•	
Diomedeidae	*Diomedea amsterdamensis*	Amsterdam Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea dabbenena*	Tristan Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea epomophora*	Southern Royal Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU/Mig. (EPBC & BC Acts)					•					•		
Diomedeidae	*Diomedea sanfordi*	Northern Royal Albatross	EN/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Phoebetria fusca*	Sooty Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•							
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)		•			•							
Diomedeidae	*Thalassarche cauta*	Shy Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche chlororhynchos*	Atlantic Yellow-nosed Albatross	VU/Mig. (BC Act)			•							•		

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Diomedeidae	*Thalassarche impavida*	Campbell Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche melanophris*	Black-browed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•					•		
Oceanitidae	*Pelagodroma marina*	White-faced Storm Petrel			•										
Procellariidae	*Ardenna carneipes*	Flesh-footed Shearwater	VU/Mig. (BC Act)					•							
Procellariidae	*Ardenna grisea*	Sooty Shearwater	Mig. (BC Act)					•							
Procellariidae	*Halobaena caerulea*	Blue Petrel	VU (EPBC Act)					•							
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	EN/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Macronectes halli*	Northern Giant Petrel	VU/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Pachyptila turtur*	Fairy Prion						•							
Procellariidae	*Pterodroma mollis*	Soft-plumaged Petrel	VU (EPBC Act)					•							
Procellariidae	*Puffinus assimilis*	Little Shearwater						•							
Cacatuidae	*Cacatua sanguinea*	Little Corella												•	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)		•	•		•		•		•	•	•	•
Cacatuidae	*Calyptorhynchus* sp.	black cockatoo species[5]	EN-VU (EPBC & BC Acts)		•										
Cacatuidae	*Calyptorhynchus/Zanda* sp.	black cockatoo species	EN-VU (EPBC & BC Acts)											•	•
Cacatuidae	*Eolophus roseicapilla*	Galah			•									•	•
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•				•	•	•	•
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•					•	•	•
Cacatuidae	*Zanda* sp.	white-tailed black cockatoo species	EN (EPBC & BC Acts)	•		•				•			•	•	•
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		•	•	•				•		•		•	•
Psittaculidae	*Neophema elegans*	Elegant Parrot			•	•				•		•		•	•
Psittaculidae	*Neophema petrophila*	Rock Parrot			•	•									
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		•	•	•				•				•	•
Psittaculidae	*Platycercus icterotis*	Western Rosella		•	•	•				•		•			•
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot		•	•	•						•			•
Strigidae	*Ninox boobook*	Boobook Owl			•	•									•
Tytonidae	*Tyto javanica*	Eastern barn owl										•		•	
Tytonidae	*Tyto novaehollandiae novaehollandiae*	Masked Owl (southwest)	P3 (DBCA list)		•									•	•
Dromaiidae	*Dromaius novaehollandiae*	Emu		•	•	•				•		•		•	•
Turnicidae	*Turnix varius*	Painted Button-quail										•			
Bats (10)															
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat										•		•	•
Molossidae	*Mormopterus kitcheneri*	South-western Free-tailed Bat										•			
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		•								•		•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat		•		•						•		•	•
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	P4 (DBCA list)	•		•						•	•	•	•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat				•									
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat													•
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat		•		•						•		•	•

[1]Species shaded in grey are pelagic seabirds and unlikely to occur in the study area. [2]PM – Protected Matters Database. [3]TPFA – Threatened and Priority Fauna Database. [4]Species only recorded at regional sites and not in study area in either the BBRAS or Basic and Targeted fauna survey. [5]Could represent red- or white-tailed black cockatoo as some desktop records predate taxonomic revision of Carnaby's and Baudins into *Zanda* genus.

Appendix 4 Profiles for conservation significant species of concern

Osprey (*Pandion cristatus*; Mig. EPBC & BC Acts)

Information gathered from Bierregaard (2020) and DCCEEW (2024f).

Behaviour

Ospreys primarily feed on fish, especially mullet, but may also eat molluscs, crustaceans, insects, reptiles, birds, and mammals. They mostly forage during the day, sometimes hunting at night, by soaring, quartering, or circling above water to locate prey. Once prey is spotted, they hover briefly before diving feet first to capture it. Hunting also occurs from perches when necessary. This behaviour is typical of their hunting style and is largely focused on locating fish near the surface of bodies of water.

Habitat

Ospreys occur in littoral and coastal habitats, as well as terrestrial wetlands across tropical and temperate Australia and offshore islands. They are found in a variety of wetland habitats, including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, exposed reeds, and along major rivers. They show a preference for coastal cliffs and elevated islands in some areas but may also inhabit low sandy, muddy, or rocky shores and coral cays. Additionally, they may travel through heath, woodland, or forest habitats when moving between foraging sites.

Movement

Ospreys are classified as migratory in some parts of the world, where they move north and south depending on weather conditions. However, the species is considered a resident in Australia. They do not typically migrate long distances within the country but may move locally in response to changes in weather or food availability.

Flight behaviour

Most flight occurs during the day during hunting and movement between nesting and foraging habitat. Ospreys generally search for prey by soaring, quartering or circling above a body of water (possibly within RSA height) and scanning below for fish. They occasionally search for prey by scanning from a perch. When a prey item is located while soaring or circling, they hover momentarily and then dive down, sometimes in stages.

Demographic factors

The Australian population size is unclear, but they are common and widely distribution in coastal regions across most of the country. There are estimated to be approximately 100,000–1,200,000 mature individuals globally.

Blue-billed Duck (*Oxyura australis*; P4 DBCA list)

Information gathered from Birdlife International (2024).

Habitat

Blue-billed Ducks occur in shallow freshwater marshes, swamps and lakes with extensive bordering reedbeds and other dense vegetation (e.g. Typha). Outside breeding season, they are also found on larger lakes, sewage ponds, lagoons and wide rivers, including saltwater bodies. They infrequently occur on marine waters.

Movement

Not truly migratory, though relatively dispersive as breeding grounds are generally abandoned after breeding is completed. They concentrate in a few favourable areas where they undergo moult and stay until just before the start of next breeding season. Widespread dispersal follows exceptional flooding events.

Behaviour

Breeding occurs between September – March. They feed on seeds and vegetative parts of aquatic plants and aquatic insects and their larvae, mostly by sieving bottom debris while (usually for <10 seconds). They also dabble on surface and strips seeds from overhanging plants.

Flight behaviour

Flight is mostly diurnal. They form large, loose flocks, especially in non-breeding season, and can travel long distances. This long distance flight is likely higher than normal flight, which is relatively low and direct over water.

Demographic factors

The population size in Australia is estimated to be between 11,000–19,000 with 15,000 mature individuals

Fork-tailed Swift (*Apus pacificus*; Mig. EPBC & BC Acts)

Information gathered from DAWE (2021a).

Habitat

In Australia, Fork-tailed Swifts are found across a variety of habitat. They mostly occur over inland plains but sometimes above foothills or in coastal areas, as well as over cliffs, beaches, islands and sometimes well out to sea. Over land, they mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They also occur over settled areas.

Fork-tailed Swifts probably roost aerially but are occasionally observed to land. They were once recorded roosting in trees, using a bare exposed branch emergent above the foliage. Breeding does not occur in Australia.

Movement

Fork-tailed Swifts are a widespread migratory species that overwinters in Australia. They are transitory across all habitat types. In WA, there are sparsely scattered records of the Fork-tailed Swift along the south coast. They are widespread in coastal and subcoastal areas between on the lower and mid-west coast, including on nearshore and offshore islands.

Fork-tailed Swifts usually arrive in Australia around October; some rarely arriving early in September. Most observations of arrival occur in the south due to a lack of observers in the north of the country. Some birds have been sighted in WA arriving from Indonesia between October–November. In north and north-west WA, most have departed by the end of April.

They are highly mobile within Australia, and large flocks often precede or follow low pressure systems as they cross the country in search of food. In WA, they are common in Broome, with maximum numbers occurring in February.

Behaviour

Fork-tailed Swifts are exclusively aerial (1–300 m above ground). Foraging occurs in the air, often along the edge of low-pressure systems. Often occur in areas of updraughts, especially around cliffs.

Flight behaviour

Feeding flight is characterized by circular flight patterns throughout areas of high prey concentration, whilst dispersal flight is more direct. They feed in flocks ranging from 10–1,000 birds, but the largest recorded flock in Australia was 90,000 birds.

Demographic factors

The global population size has not been quantified, but they are reported to be generally common throughout most of the breeding range. The species is highly transitory, and the Australian population is estimated as at least in the tens of thousands.

Australasian Bittern (*Botaurus poiciloptilus*; EN EPBC & BC Acts)

Information gathered from DCCEEW (2022) and Marchant and Higgins (1990).

Habitat

Australasian Bitterns occur mainly in freshwater wetlands in the temperate southeast and southwest of Australia. They also rarely occur in estuaries or tidal wetlands. Their preferred habitat comprises wetlands with dense vegetation, especially where there is a mosaic of cover, from 0.5–3.5 m in height, where they forage in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. They favour freshwater habitats with permanent or seasonal water, particularly those dominated by sedges, rushes and/or reeds growing over a muddy or peaty substrate. In south-western Australia, they also occur in wetlands where thickets of wetland shrubs (e.g. *Melaleuca*, *Agonis* spp.).

Movement

Australasian Bitterns will move long distances between habitats when according to changes in suitability, but generally do not move seasonally. During wet years, they occur in high densities in temporary or infrequently filled wetlands and utilise ephemeral wetlands when moving from areas that are drying out. During non-breeding season from April to October, there are an influx of birds in regularly monitored wetlands in the Melbourne area.

Behaviour

The Australasian Bittern breeds from October to February in solitary pairs, or polygamously with up to three nesting females per booming male. Usually nocturnal. Feeds on tadpoles, frogs, fish and dragonfly larvae in wetland habitat.

Flight behaviour

The Australasian Bittern occurs solitarily, in pairs or dispersed aggregations of up to 34 birds. Flies with steady, slow wing-beats that are owl-like. Long-distance flight is likely higher than normal flight, though heights are unclear.

Demographic factors

The estimated number of mature individuals is <2,000 globally with approximately 1,300 (range 750–1,800) in Australia. The WA population is considered to comprise fewer than 100 individuals.

Pacific Golden Plover (*Pluvialis fulva*; Mig. EPBC & BC Acts)

Information gathered from DAWE (2021b); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Johnson OWP *et al.* (2024) and Hansen *et al.* (2016).

Habitat

In non-breeding grounds in Australia, Pacific Golden Plovers usually inhabit coastal habitats and occasionally occurs around inland wetlands. They occur on beaches, mudflats, sandflats, mangroves, low saltmarsh, beds of seagrass in sheltered areas, harbours, estuaries, lagoons, and evaporation ponds in saltworks. They are also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less common in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans. Other terrestrial habitats inhabited include short or long grass in paddocks, crops, airstrips, ploughed and recently burnt areas. They are very occasionally recorded well away from water.

Movement

Migratory. Pacific Golden Plovers occur at non-breeding grounds in Australia mostly between September and May, with highest numbers in eastern and south-eastern Australia. They generally arrive in the Kimberley coast in late September and in southern areas such as south-eastern South Australia in October and November. Those arriving in the Kimberley Division of WA occur on passage in October. Birds begin to migrate directly without stopping northwards along the east coast of Australia in late February and March. In northern WA, they occur on passage in February and March and leave the Kimberley Division in late April. Small numbers of birds remain in the non-breeding range throughout the Australian winter, though generally not in the extreme south of the country.

Behaviour

Pacific Golden Plovers are both diurnal and nocturnal. They feed on molluscs, polychaete worms, insects and insect larvae, spiders and crustaceans in non-breeding season, using a combination of picking and run-picking based on visual stimulus. Very occasionally eat seeds, leaves, lizards, birds' eggs and small fish.

Flight behaviour

Pacific Golden Plovers can forage in flocks of 100 or more, and also occur in mixed-species shorebird flocks. Flocks are usually of 20 to 50 birds, though single birds are sometimes seen. The species is capable of swift and extended flight, and are considered the fastest flying shorebirds. Tracking records suggest an average ground speed of around 50 kph during long transoceanic flights.

Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

The EAAF population is estimated at 120,000 and the global population is estimated at about 170,000–220,000. The number of birds recorded in Australia can vary significantly between years.

Peregrine Falcon (*Falco peregrinus*; OS BC Act)

Information gathered from BirdLife Australia (2023); Debus (2012); Department for Environment and Heritage (2024); White (2024).

Habitat

Peregrine Falcons are highly adaptable, breeding across diverse habitats from the tropics to cold deserts and high-altitude areas up to 3300 m. They have been recorded flying up to 4,000 m during long-distance flight and can be found in various habitats. Preferred nesting sites include cliffs, ledges, rocky outcrops, and occasionally tall trees. Cliff edges and wooded watercourses are particularly favoured, with nests often placed on ledges or repurposed from other large bird species.

Movement

Peregrine Falcons display site specific behaviours, mainly appearing in areas during transitory flights or while foraging. They undergo long distance natal dispersal, though once a nest is established site fidelity is high. The Australian subspecies does not migrate.

Behaviour

As diurnal hunters, Peregrine Falcons display varied flight patterns based on feeding needs and conditions. Most prey are birds (around 75–100% of all prey). Hunting behaviours include aggressive pursuits, ambushes from perches, and even occasional ground approaches. They also often feed by ambushing from low perches in the morning and late afternoon. During the breeding season, it perches on cliffs or vantage points near nests, scanning large airspaces where other birds fly. From these perches, it can dive easily onto low-flying prey or climb to intercept high-flying birds. Aerial hunting is less common in poor weather, when perching-based hunts prove more successful.

Flight behaviour

The species typically hunts from high perches or while soaring to spot prey below. Flight altitude varies with seasonal factors and during localized migrations. They are known to soar several hundred metres high, enhancing their vantage over hunting grounds. Flight types used by the species include:

- Flapping Flight - During migration or travel between hunting areas, Peregrine Falcons use a normal cruising wing beat with speeds between 40–55 km/h and can reach altitudes up to 240 m. When pursuing prey, the wing beat becomes faster and more powerful. Pursuit may include low-altitude, contour-following flights or direct tail-chasing.
- Soaring - Static soaring is observed as young individuals begin to fledge, with wings held motionless while moving parallel to a cliff face or similar terrain, often at heights of 3–100 m. As they develop, young individuals soar on thermals within weeks of fledging, occasionally joined by adults.
- Stoop - The stoop is a high-speed dive where the birds fold their wings close to their bodies to reach maximum speeds, braking abruptly by rising or leveling out before striking prey. Their speeds depend on their mass and wing structure. Typical dives are executed from heights of 215–320 m.

Demographic factors

It is estimated that there are 6,000–10,000 individuals within Australia.

Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso*; VU EPBC & BC Acts)

Information gathered from DCCEEW (2024e); DAWE (2022) and Garnett and Baker (2021) .

Habitat

Forest Red-tailed Black Cockatoos inhabit the dense Jarrah, Karri and Marri forests of South-west WA, favouring forests receiving more than 600 mm average rainfall annually in the hilly interior. Although most records are in Jarrah-Marri forests, they have been observed in a range of other forest and woodland types. These include Blackbutt, Wandoo, Tuart, Albany Blackbutt, Yate and Flooded gum. They are also now seen feeding in more open agricultural areas and in the Perth metropolitan area, where they will also breed.

Breeding habitats are generally in woodland or forest but may also breed in partially cleared woodland or forest, including isolated trees. Nest in hollows in live or dead trees (many eucalypt species may provide suitable hollows), particularly Marri, Karri, Wandoo, Bullich, Blackbutt Tuart and Jarrah.

Movement

Forest Red-tailed Black Cockatoos roost in trees at night, leaving trees at sunrise before separating in smaller groups to bask and feed for 10–12 hours. They also travel between feeding habitat and water sources to drink. They return to their roost at dusk.

Forest Red-tailed Black Cockatoos are predicted to have a breeding home range of 116-187 ha. Their movements are generally influenced by available water and foraging resources. Changes in foraging preferences due to habitat alteration have led more regular movement of birds in the northern Darling plateau area onto the Swan Coastal Plain and around the Perth metropolitan area, to feed on cape lilac. Birds on the have also been recorded moving across the wheatbelt since 2010, possibly driven by lack of resources, where previously there had not been records.

Behaviour

Forest Red-tailed Black Cockatoos roost in any tall trees, but especially on tall Jarrah, Marri, Blackbutt Tuart and introduced eucalypt trees or large trees on the edges of forests. Breeding can occur in Autumn and Spring, sometimes twice in one year, with a single chick raised per breeding event. Around 90% of their diet consists of the seeds of Marri and Jarrah, and the species relies heavily on both trees during breeding periods. However, they also consume other native trees and have been increasingly observed feeding on Cape Lilac.

Flight behaviour

They usually occur in family flocks of 10 birds, though groups of 25 or more birds occasionally occur. Flight is mainly crepuscular, with travel between foraging and roosting habitat occurring during the dawn and dusk hours. However, movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats.

Demographic factors

The subspecies' population is estimated to be around 17,000 birds. Population trends are unclear.

Baudin's Cockatoo (*Zanda baudinii*; EN EPBC & BC Acts)

Information gathered from Department of Agriculture (2021a); (Johnstone & Kirkby 2008) and (Garnett & Baker 2021).

Habitat

Baudin's Cockatoos' breeding habitat is generally in Jarrah, Marri and Karri woodland or forest of higher rainfall areas in south-west Western Australia. However, they may also breed in partially cleared woodland or forest, including isolated trees. They nest in hollows in live or dead trees (many eucalypt species may provide suitable hollows), particularly Karri, Marri, Jarrah, Wandoo, Bullich and Tuart. Night roosting habitat includes tall trees such as Jarrah, Flooded Gum, Blackbutt, Tuart and introduced eucalypts. These roosting habitats are ideally around riparian environments, natural water sources or artificial permanent water sources.

Movement

Baudin's Cockatoos breed in spring and into summer (October - January), primarily in the south of the range. Once breeding season ends in January, many birds depart from nesting areas and move northward, forming larger foraging flocks in response to changing food resources. In early February and March, the flocks arrive at non-breeding traditional roosts in the central and northern parts of the Darling plateau (from about Collie north to Mundaring). During non-breeding season, birds in the Perth hills districts move westward onto the southern Swan Coastal Plain in mid-August just before heading south to breed. By mid-October, most birds are either back in their breeding quarters in the south or heading there. Breeding adults that migrate probably return to the same nesting areas each year, though no pairs have been observed returning hollows in successive years.

Behaviour

They mainly feed on the seeds of Marri and rarely Jarrah, as well as seeds of native proteaceous plant species such as *Banksia* spp. and *Hakea* spp.). They also consume insects and insect larvae; pith of Kangaroo Paw ; tips of *Pinus* spp., tips of *Macadamia* spp., and almonds, pecans, seeds of apples, seeds of pears and seeds of persimmons from orchards. Marri is the primary food source with the birds using its seeds, flowers, nectar and buds. A single offspring is raised per breeding event.

Flight behaviour

Although flocks of up to 900 have been recorded, they most commonly move about in small groups of 3, consisting of the adult pair and a dependent juvenile. These flocks base themselves at roost sites and use the roosts to access the local foraging resources. Numbers tend to be largest at the roost site between dusk and dawn. Movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats, though flight over long distances between foraging and breeding parts of the range may be higher.

Demographic factors

The total population of the species is estimated to be 5,000–8,000. It was estimated as 10,000–15,000 from 1995–2004 with a declining trend.

Carnaby's Cockatoo (*Zanda latirostris*; EN EPBC & BC Acts)

Information gathered from Department of Agriculture (2021b) and Garnett and Baker (2021).

Habitat

Breeding habitat of Carnaby Cockatoos is generally in heaths, woodland or forest of south-western Western Australia. They also breed in partially cleared woodland or forest, including isolated trees. Nesting habitat is inland, though increasing numbers are breeding closer to the coast due to habitat loss in the Wheatbelt. Nesting habitat includes in hollows in live or dead Eucalypts. Night roosting habitat includes tall trees such as Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines. Roosting habitats ideally occur around riparian environments, natural permanent water sources and artificial permanent water sources. Birds will forage in woodlands used for breeding. Outside of breeding season, Carnaby's Cockatoos will feed in Banksia woodlands on the Swan Coastal Plain, the Perth area and in Banksia heath on the southern coast.

Movement

Carnaby's Cockatoos are partly resident and partly migratory. In high rainfall areas, with high quantities of native vegetation, they are resident. However, in areas that are drier or have been cleared, they become breeding migrants. Populations that breed in drier areas of the range arrive at breeding localities in late winter and spring. Once their summer breeding is complete, they move into areas of high rainfall. For example, birds breeding in Badgingarra, Dandaragan and Moora regions tend to move west after breeding, into higher rainfall areas especially near coastal banksia scrubs (e.g. at Wanagarren Nature Reserve, Nilgen Nature Reserve and Yanchep area), then south onto the southern Swan Coastal Plan, including the Perth Metropolitan Area, Lake Clifton and Myalup.

Behaviour

Carnaby's Cockatoos feed on seeds, flowers and nectar of native proteaceous plant species as well as *Callistemon* spp. and Marri. They will also feed on seeds of introduced species including Pines, *Erodium* spp., wild radish, canola, almonds, macadamia and pecan nuts; insects and insect larvae; occasionally apples and persimmons; and liquidambar. They have been reported to feed on canola crops. One chick is raised per breeding event, from eggs laid in large eucalypt hollows.

Flight behaviour

When not breeding, Carnaby's Cockatoos tend to aggregate in large flocks and move through the landscape in search of food. These flocks base themselves at roost sites, which are usually the tallest trees in an area and often located in or near riparian environments or permanent water. Different roosts may be used by birds during the non-breeding period and by non-breeding birds during the breeding period. Numbers tend to be largest at the roost site between dusk and dawn and surveys for roosts should occur at these times, as birds are leaving or returning to roost sites, over several days. Movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats, though flight over long distances may be higher altitude.

Demographic factors

The population is estimated at around 35,000 birds. It was estimated at 40,000 in 2013, though the species is undergoing ongoing population decline.

Common Sandpiper (*Actitis hypoleucos*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024c); Hansen *et al.* (2016) and Geering *et al.* (2007).

Habitat

Common Sandpipers utilise a wide range of coastal wetlands and some inland wetlands of varying salinity. The species is mostly found around muddy margins or rocky shores and rarely on mudflats. They have been recorded in estuaries, deltas of streams, as well as on banks farther upstream, around lakes, pools, billabongs, reservoirs, dams, claypans, occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep.

Foraging occurs in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. However, they sometimes venture into grassy areas adjoining wetlands. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. They are known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or loaf on rocks.

Behaviour

They are diurnal feeding shorebirds that feed on low-flying insects and terrestrial insects. They are very active and are often observed following prey bobbing their tail. The species is solitary and is most commonly observed alone or in small flocks.

Movement

Migratory. They breed in Eurasia and move south for the boreal winter. Post-breeding, the southward migration usually begins July–November, with individuals arriving from July onwards in South Australia, WA and the Northern Territory. The non-breeding movements of the species within Australia are poorly known.

Flight behaviour

Common Sandpipers do not form large flocks like other shorebirds during migration and are often found alone or in pairs. Flight during the southern migration passage is mostly diurnal, whereas the northern passage mainly occurs by night. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

When flushed, they fly low over water often in direct straight lines.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population is estimated as 190,000. The global population is estimated to number 4,950,000–7,500,000 individuals.

Ruddy Turnstone (*Arenaria interpres*; VU/Mig. EPBC Act; Mig. BC Act)

Information gathered from DCCEEW (2024g); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

Ruddy Turnstones occur in a wide variety of coastal habitats, including exposed rock coastlines, coral reefs, shallow tidal pools, beaches, estuaries, harbours, bays, coastal lagoons, low saltmarsh, exposed beds of seagrass, sewage ponds and mudflats. In northern Australia they may prefer wide mudflats. In southern Australia, they prefer rockier coastlines and are less numerous on large embayments with extensive mudflats.

Movement

Ruddy Turnstones are migratory, with 6 recognised populations. They move south to non-breeding areas with a partial overlap of populations on passage. There may be 2 routes of migration to Australia, with birds occurring in east Australia and New Zealand arriving from a migration south across the Pacific from east Asia and returning north via the east coast of Asia. The birds in the western areas of Australia may come from populations migrating south from east Asia who then return north via east Asia. The species enters Australia from August onwards, and movements into and through Australia continue until at least October. When returning to breeding grounds, Ruddy Turnstones leave sites in the south of Australia from mid-March. Some birds may fly over north Australia and/or touch down in north-west or north Australia though some adults in north-west Australia are thought to be capable of flying non-stop to the south coast of China.

Behaviour

Nocturnally and diurnally feed mainly on insects, worms, crustaceans, molluscs, and spiders. They have also been occasionally recorded feeding on eggs and carrion. During the non-breeding season, their only food source is maggots and larvae obtained from picking decomposing seaweed.

Flight behaviour

They are commonly seen singly or, more usually, in loose groups of 20–100 among mixed shorebird flocks, along coasts and occasionally inland. They tend to fly in tight coordinated flocks when moving locally, but in loose lines when migrating. Migratory shorebirds typically fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Migratory flight heights are also variable based on weather. The mean ground speed of migratory bird flights passing a pacific island was 63 kph.

Demographic factors

The Australasian East Asian Flyway (EAAF) population is estimated at 30,000. The Australian population is estimated at ~19,000 based on extrapolation of the EAAF estimate and other data. The population is undergoing rapid decline.

Sharp-tailed Sandpiper (*Calidris acuminata*; VU/Mig. EPBC Act; Mig. BC Act)

Information sourced from DCCEEW (2024a); Mlodinow *et al.* (2024) Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

Sharp-tailed Sandpipers forage in fresh and hypersaline environments, feeding along water edges on mudflats, coastal and inland wetlands, and sewage ponds. After rainfall, they may also feed on agricultural pastures. During migration, they roost and forage on rocky and sandy beaches, freshwater habitats, and inland saltwater areas.

Movement

Sharp-tailed Sandpipers breed in northern Siberia from June to August and migrate in flocks to their non-breeding areas south of the Equator. Small numbers arrive in Australia by mid-August and the majority by September. Their northward migration for the breeding season begins by April, and they are among the first migratory shorebirds to leave Australia. In wet years in northern Australia, inland birds do not migrate to southern Australian and remain in ephemeral wetlands.

Behaviour

Sharp-tailed Sandpipers are omnivorous, primarily feeding on seeds, worms, molluscs, crustaceans, and insects, which they hunt by pecking and jabbing their beak into the muddy substrate. They often form large mixed flocks with other migratory shorebirds in suitable foraging and roosting habitats.

Flight behaviour

Birds migrating from Siberia travel in flocks of fewer than 1,000 individuals. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

In Australia, they form large mixed flocks with other shorebird species at wetlands and salt lakes which can disperse rapidly when disturbed. When flushed, they exhibit rapid, zigzag flight patterns. During migration or when changing feeding locations, their flight is more leisurely with loose, measured wing beats.

Demographic factors

Their estimated population in the East Asian - Australasian Flyway (EAAF) in 2016 was 85,000 birds, all believed to migrate to Australia. By 2020, the population was estimated to have decreased to ~73,000 mature individuals, based on extrapolation from 2016 data and trends from related studies.

Sanderling (*Calidris alba*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024h); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

In Australia, Sanderlings are usually found on the coast, mostly on open sandy beaches exposed to open sea-swell and on exposed sandbars and spits and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. They also occur on beaches that may contain rocky outcrops. They more rarely occur on more sheltered sandy shorelines and in near coastal wetlands, such as lagoons, hypersaline lakes, salt ponds and samphire flats. There are also rare inland records from sandy shores of ephemeral brackish lakes and brackish river pools. They will roost on or behind bare sand high on the beach, clumps of washed-up kelp, coastal dunes, and on rocky reefs and ledges.

Movement

Migratory. Sanderlings breed in the holarctic region and move south to broad non-breeding areas. They arrive in Australia during September, mostly occurring in north-western Australia. They move through the northern regions in September–November and cross the continent to the south Australia coast. Small numbers regularly arrive during late August and early September at Rottnest Island, south-west WA. Between March to May, they depart the non-breeding range in south-east Australia. They apparently move west along the south coast of Australia and across the continent before moving north, with at least some birds stopping on the north coast. A few birds, particularly young birds, remain in Australia during winter with other non-breeding areas during the breeding season, though numbers may vary at a site between days indicating birds are nomadic at this time.

Behaviour

Sanderlings are omnivorous, foraging on plants, seeds, worms, crustaceans, spiders, insects, medusae, fish, larger molluscs and crustaceans. They are very active when foraging, often in tightly synchronised flocks, darting onto moist sand between breaking waves picking up food items from the surface of the wet beach. Foraging may also occur at the edges of shallow pools on sandspits and on nearby mudflats. Individuals may also defend a feeding territory during the non-breeding period.

Flight behaviour

Sanderlings tend to migrate in long flights, overflying large areas, typically in small flocks of less than a thousand. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000 – 5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph. Normal, non-migratory flight is rapid and low.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population is estimated to be 30,000. The number during the non-breeding period in Australia is estimated to be 10,000.

Curlew Sandpiper (*Calidris ferruginea*; CR/Mig. EPBC Act; Mig (BC Act)

Information is gathered from DCCEEW (2023); Hansen *et al.* (2016); Geering *et al.* (2007); Newton (2008); Hansen *et al.* (2016); Higgins and Davies (1996) and Garnett and Baker (2021).

Habitat

Curlew Sandpipers are found in brackish lagoons, estuaries, mudflats, sandflats, saltmarshes and to a lesser extent exposed coral, rocky shores and sandy beaches. Foraging occurs in mudflats and nearby shallow water, at the edges of shallow pools, drains and along sandy shores, often following the receding tide to feed near the water's edge. They also forage on mudflats that have been exposed for longer periods, typically in small groups. At high tide, they tend to forage in areas of low, sparse emergent vegetation, such as saltmarsh, and sometimes in flooded paddocks or inundated salt flats. Roosting typically occurs around intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. They also roost in non-tidal swamps, lakes, and lagoons near the coast. Occasionally, they are found near ponds in saltworks or sewage farms, and individuals are occasionally recorded inland around ephemeral and permanent water sources with bare mud or sand edges.

Movement

Curlew Sandpipers migrate from Siberia and occur in Australia from late August – April. Males arriving earlier than females to non-breeding habitat. In Australia, the first adults arrive in the northwest during mid-August and in the southeast during late August, and most adults have arrived by the end of September. The species begins its northward migration during early March, with most birds having departed by early April and nearly all migrants having left by the end of April. Many juveniles do not return to breeding territory in their first year of life, remaining in non-breeding locations. Within Australia in the non-breeding season, birds do not move long distances between habitat.

Behaviour

Curlew Sandpipers are gregarious, often found in large flocks in both fresh and brackish waters. They forage in mixed flocks with other shorebird species, pecking at invertebrates on the surface of mudflats or making shallow probes below the surface.

Flight behaviour

Curlew Sandpipers form large mixed flocks with other shorebird species, sometimes travelling in these large flocks between roosting and foraging habitats. Roosting and foraging flight activities occur during the day and night. Migratory shorebirds typically fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Flight speed during migration has been estimated at 70–75 km per hour. When flushed, Curlew Sandpiper flight has been described as "swift and low".

Demographic factors

The estimated population in the East Asian-Australasian Flyway (EAAF) in 2016 was 90,000 birds, of which 45,500 were thought to come to Australia. The estimated Australian population in 2020 was ~40,000 mature individuals, with a rapidly declining population trajectory.

Pectoral Sandpiper (*Calidris melanotos*; Mig EPBC & BC Acts)

Information gathered from DCCEEW (2024c); Mlodinow *et al.* (2024); Wetlands International (2024); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Higgins and Davies (1996) and Hansen *et al.* (2016).

Habitat

In Australasia, they forage and roosts in shallow wetlands, ranging from fresh to saline. They are typically found in coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands. Breeding does not occur in Australia.

Movement

Migratory, present in Australia from September–June. One of the first species to depart breeding grounds, males leave before females and juveniles. Only a small proportion of the total population visits Australia, with most occurring in South America during the non-breeding season. Nearly all individuals travel north during the breeding season, with very few overwintering records.

Behaviour

Pectoral Sandpipers are omnivorous, consuming algae, seeds, crustaceans, arachnids and insects in shallow fresh to saline wetlands. While feeding, they move slowly, probing with rapid strokes. They form large mixed flocks in suitable foraging and roosting habitat with other migratory shorebirds.

Flight behaviour

Pectoral Sandpipers form large mixed flocks with other shorebird species in suitable habitats. The timing of flight between roosting and foraging areas is dependent on tides, and they roost and forage both during the day and at night. The exact timing of their migratory flight, whether diurnal or nocturnal, is unclear. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

When flushed, Pectoral Sandpiper flight is rapid, characterized by many turns and a zigzag pattern, similar to snipe. However, when migrating or changing feeding locations, flight is more leisurely, with loose, measured wingbeats.

Demographic factors

The global population has been estimated to be around 25,000–100,000 individuals. Accurate population estimates do not exist for the EAAF pop.

Red-necked Stint (*Calidris ruficollis*; Mig. EPBC & BC Acts)

Information sourced from DCCEEW (2024j); (Geering *et al.* 2007); (Newton 2008); (Kloeckner *et al.* 1982); (Hansen *et al.* 2016); (Van Gils *et al.* 2020) and (Garnett & Baker 2021).

Habitat

Red-necked Stints primarily forage on bare wet mud in intertidal mudflats, sandflats, or in very shallow water, typically in areas with a thin film of surface water near the water's edge. During high tides, they may forage in non-tidal wetlands. They are also found foraging in samphire, though they tend to avoid seagrass beds, feeding along their edges instead. They sometimes forage in beach-cast seaweed on sandy ocean beaches and in flooded paddocks or freshly cropped lucerne paddocks near lagoons. For roosting, Red-necked Stints prefer sheltered beaches, spits, banks, or islets of sand, mud, coral, or shingle, and occasionally in saltmarsh or other vegetation. They may also roost on exposed reefs or shoals. Large numbers may roost on ocean beaches, although this is likely not a preferred habitat unless high numbers are present. They have also been recorded roosting up to 1.5 km from an inland lake, in close-cropped grass, and among beach-cast seaweed, clods of mud, or dried cow-pats. During very high tides, they may use sand dunes or claypans, with large groups recorded roosting at an inland claypan near Roebuck Bay in north-west Western Australia.

Movement

Present in Australia from August–April, likely moving in large flocks during migratory flight. AAustralia is reached by late August and arrivals continue until November, with departure mainly March and April. Immature birds usually remain in Australia throughout first year, often moving inland after rains fill wetlands. Adults show high fidelity between years to non-breeding sites.

Behaviour

Red-necked Stints are omnivorous and forage in intertidal and near coastal wetlands in Australia. They use their bill to jab and probe into soft mud to capture small invertebrates and gleans from plants in saltmarshes and water. They are often seen feeding in dense flocks, which spread out as the tide recedes, and frequently forage alongside other shorebird species.

Flight behaviour

Red-necked Stints travel in large flocks and has been observed feeding in dense groups. The timing of flights between roosting and foraging habitats is tide-dependent in marine environments, and the species roosts and forages both during the day and night. The exact diurnal or nocturnal timing of migratory flight is unclear, as is the size of the flocks migrating to and from Australia. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

Their estimated population in the East Asian-Australasian Flyway (EAAF) was 475,000 individuals as of 2016, of which 389,200 were expected to come to Australia. The estimated population as of 2020 was ~350,000 mature individuals in Australia, with a declining population trajectory.

Wood Sandpiper (*Tringa glareola*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024d); Hansen *et al.* (2016) and (Geering *et al.* 2007).

Habitat

Wood Sandpipers inhabit well-vegetated, shallow freshwater wetlands, swamps, billabongs, lakes, pools, and waterholes. These areas are typically associated with emergent aquatic plants or grasses and are often surrounded by tall fringing vegetation. They are also frequently found in inundated grasslands, short herbage, wooded floodplains, and irrigated crops, and are also known to appear in small wetlands as they dry out. They rarely visit brackish wetlands and dry stunted saltmarsh. They occur in artificial wetlands, such as open sewage ponds, reservoirs, large farm dams, and bore drains. In some wetlands in Western Australia, individuals are often observed near each other, concentrating at specific areas within the wetland.

Movement

Wood Sandpipers are a migratory species that breeds across Eurasia. It is likely that the Australian non-breeding population originates from eastern Siberia. Within Australia, they exhibit some dispersive movements between appropriate wetland habitat, though their movements within Australia remain largely unstudied. Although regularly observed at many sites in Australia, they also appear unpredictably in summer at inland storm pools.

Only a small portion of the Asian population reaches Australia, where most sightings occur between August and April. After arrival, some of them move southward across the continent. They are common in southwestern Western Australia, from summer to autumn.

Behaviour

Wood Sandpipers are observed either singly, in pairs, or in small flocks, and very occasionally in groups numbering in the hundreds. They often associate with other wader species and typically feed in loosely scattered groups. They tend to be wary, nervous, and excitable, especially in larger groups, although solitary individuals may sometimes allow a closer approach. They are carnivorous, feeding mainly on insects and molluscs in Australia. The species wades in shallow freshwater, often up to its belly, gleaning prey from the water's surface. They are also known to probe with their bill, sometimes submerging their head and neck, sweeping the bill side to side underwater in search of food.

Flight behaviour

When disturbed, Wood Sandpipers fly quickly in a zigzag pattern, gliding gracefully close to the ground. Their flight involves a swaying motion with rapid wingbeats, often rising high and moving at great speed when startled. Flight ecology during migration is more unclear. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights passing a pacific island was 63 kph.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population was estimated at approximately 130,000 in 2016.

Common Greenshank (*Tringa nebularia*; EN/Mig. EPBC Act; Mig. BC Act)

Information gathered from DCCEEW (2024b); Hansen *et al.* (2016); Geering *et al.* (2007); Newton (2008) and Kloeckner *et al.* (1982) .

Habitat

Common Greenshanks forage at the edges of wetlands, in soft mud on mudflats, in channels, or in shallow waters around the edges of waterbodies. These feeding areas are often located around mangroves or other sparse, emergent vegetation like sedges or saltmarsh. They may also occasionally feed in seagrass beds. They roost in a variety of coastal and inland habitats. These habitats include estuaries, mudflats, mangroves, lagoons, billabongs, swamps, sewage farms, and flooded crops.

Movement

Migratory. Common Greenshanks arrive in Australia from August, primarily passing through Western Australia and the Torres Strait. Numbers slowly increase at both inland and coastal sites between August and September. Common Greenshanks overwinter at a few selected locations, with numbers reaching expected wintering levels in late April and early May. The proportion of the population that overwinters in Australia can vary from year to year. During the non-breeding season, most of them do not appear to move long distances within Australia, although some dispersive movements may occur.

Behaviour

Common Greenshanks are carnivorous, with a diet that primarily consists of insects (such as beetles), along with crustaceans, annelids, molluscs, amphibians, small fish (such as mullet, clinids, and tilapia), and occasionally rodents. They are both diurnal and nocturnal. They feed by picking from the surface, probing, sweeping, and lunging at the edges of mudflats or shallow waters. They may also walk along shorelines and even chase small fish in shallow water. Breeding typically occurs in widely dispersed pairs. Males often build multiple nests, lining them with feathers and vegetation, from which the female will choose one.

Flight behaviour

During non-breeding season, Common Greenshanks do not seem to move long distances within Australia, although dispersive movements may occur. Normal flight when flushed is low, rapid and often zigzagging. Generally, migratory shorebirds fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

Their estimated population in the East Asian-Australasian Flyway (EAAF) in 2016 was 110,000 birds, of which 27,500 were thought to come to Australia. As of 2020, the total number of mature individuals is estimated to be 23,700 (range 16,300–33,400), with a declining trajectory.

Marsh Sandpiper (*Tringa stagnatilis*; Mig. EPBC Act)

Information gathered from (DCCEEW 2024i) and (Hansen *et al.* 2016).

Habitat

Marsh Sandpipers inhabit permanent and ephemeral wetlands of varying salinity. Wetlands include swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats. The species is also commonly found at sewage farms and saltworks, and is less frequently recorded at reservoirs, waterholes, soaks, bore-drain swamps, and flooded inland lakes. In northern Australia, they favour intertidal mudflats. Three of the 5 sites with the highest recorded numbers of Marsh Sandpipers are saltwater habitats, including Port Hedland saltworks in Western Australia, though generally in Western Australia they prefer freshwater environments.

Marsh Sandpipers typically forage in shallow water at the edges of wetlands, probing the wet mud of mudflats or feeding among marshy vegetation. They have also been recorded roosting or loafing on tidal mudflats, near low saltmarshes, and around inland swamps.

Movement

Migratory. Marsh Sandpipers depart from breeding grounds from the first half of July to early September. Birds arrive in Australia from September and apparently move south across the continent from September – December. In the Australian summer, some (possibly dispersive) movements have been observed. The species begins to migrate north in March–April. Within Australia, they may move away from coast after rains and, disperse among temporary inland wetlands.

Behaviour

Marsh Sandpipers are primarily carnivorous, feeding on insects, molluscs, and crustaceans. While plant material has occasionally been found in its stomach, it is likely ingested incidentally. The species typically feeds in shallow water, often wading deeper than the level of its tarsus. It walks briskly and steadily, or may dash about in half-circles, and sometimes swims. Marsh Sandpipers generally forage by picking at the surface of water or mud and may also glean food from vegetation. They feed both singly and in groups, and has been observed following ducks, egrets, and other waders to feed on prey disturbed by these birds.

Flight behaviour

Marsh Sandpipers are known to feed in groups as large as several hundreds and often flocks during migration. Migration typically occurs at high altitude to ensure energy efficiency, as they fly long distances with few stops during migration. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population was estimated at around 130,000 in 2016.

Masked Owl (Southwest) (*Tyto novaehollandiae novaehollandiae*; P3 DBCA list)

Information gathered from Marks (2020).

Habitat

The Australian Masked Owl (southwest) inhabits tall open forest dominated by large trees suitable for nesting and roosting, favouring sites with access to more open areas. They occur in higher numbers where greatest local forest and woodland diversity occurs, such as forest types with dry, open understorey that provide a variety of ground cover. Smaller numbers are patchily distributed away from coastal regions in wooded farmland, riparian woodland and isolated stands of large trees. They also occur in pine plantations. In South Australia, relic populations of the species have adapted to treeless plains, using caves and rock clefts for nesting and roosting. When foraging, they are often found in and at the edge of small patches (<20 ha) of forest with little or no understorey.

Movement

Australian Masked Owls (southwest) are sedentary, with high site fidelity. Most movements may be post-breeding dispersal of juveniles, and opportunistic exploitation by adults of recently disturbed habitats or changes in prey abundance, including rodent plagues. In Southwest Australia, some records have been attributed to seasonal movements, but this is possibly due to post-breeding dispersal or unrecorded breeding. Their estimated territory size is 1,000–1,200 ha and foraging ranges have been found at 1,800–2,500 ha.

Behaviour

Australian Masked Owls generally are considered territorial and are usually observed as a single individual or occasionally in pairs. Nesting sites are large hollows 40–500 cm deep in living or dead trees, at heights of 12–25 m, usually in trunk but also in vertical branch spouts. They favour isolated trees or trees higher than surrounding ones, with same sites used for many years. They may breed at any time of year with most eggs being laid between March and July. The species is carnivorous, feeding on a wide range of prey such as large possums, mice, small to medium birds, reptiles, beetles and large moths. They prey on arboreal species, but most prey are captured on ground.

Flight behaviour

Flight is typically low and gliding above the ground or through trees. Hunting occurs both on wing and from perches. After dusk, hunting styles change from low hunting flights over open ground to perch-hunting.

Demographic factors

The population size of the subspecies is unclear.

Wedge-tailed Eagle (*Aquila audax*; not listed)

Information gathered from Cherriman (2024); Debus (2020) and (Nature Advisory 2023).

Habitat

Wedge-tailed Eagles occur over most terrestrial habitats, from sea level up to 2000 m, but avoid areas with dense human population, e.g. cities, intensive agriculture. They occupy open forest, woodland, scrub, savanna, plains and deserts, typically in rough or remote country, though avoid dense rainforest. Nesting occurs in all wooded habitats, provided sufficient distance from human activity. Roosts and nests usually are built in live or dead trees with commanding views, 2–73 m (typically 12–30 m) above ground, though often near ground in remote deserts; typically on a rise or hillside. Wedge-tailed Eagles also occasionally on cliff ledges, or among rocks, and even on ground on islands, in areas inaccessible to humans.

Movement

Most Wedge-tailed Eagles are highly faithful to their nesting sites, with high site fidelity. The same nest is often used year after year, potentially for decades. Juvenile Wedge-tailed Eagles, especially in Western Australia, can undertake long-distance dispersal to find territory, with satellite-tagged individuals travelling up to 1,200 km shortly after leaving their natal territories.

Behaviour

Wedge-tailed Eagles forage by low, slow quartering, high soaring or still-hunting from a perch. They seize prey on the ground or sometimes in tree canopies, after a swift, stealthy glide or dive which may become short chase. The species rarely takes prey in flight. Wedge-tailed Eagles occasionally remove mammals such as possums from tree hollows, and pairs or groups attack large prey cooperatively.

Flight behaviour

Wedge-tailed Eagles undertake mostly diurnal flight around peak raptor time (when reptile prey is active), at heights up to 2,000 m. They are known to fly within the Rotor Sweep Area and are hit by turbines regularly at wind farms on the eastern coast of Australia. The species is most exposed to collision risk due to a common habit of soaring and circling at height while foraging. Flight behaviour does not appear to be altered by wind farm development, with records of successful breeding as 200 m from operating wind turbines.

Demographic factors

The estimated population size varies depending on location and subspecies. However, it is one of the most widespread raptors in Australia and the national population is likely stable due to their extensive range across various habitats.

White-bellied Sea-Eagle (*Haliaeetus leucogaster*; not listed)

Information gathered from Birdlife Australia (2017); BirdLife International (2020); DCCEEW (2025); Marchant and Higgins (1993); NSW Office of Environment and Heritage (2019)

Habitat

Habitats of this species are characterised by the presence of large areas of open water, such as the ocean, larger rivers, lakes and swamps. Foraging habitat consists of coastal seas, rivers, fresh and saline lakes, lagoons and reservoirs. May also forage in adjacent terrestrial habitats such as grasslands.

Breeding habitat consists of mature open forest or woodland and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. May also nest in cliffs.

Movement

Resident. High site fidelity to successful nesting trees. Resident pairs are territorial and occupy territories of hundreds of hectares.

Behaviour

Diurnal. Hunts mainly aquatic animals, such as fish, turtles and waterbirds. Also feeds on mammals, reptiles and carrion. Will harass smaller birds to force them to drop their prey.

May be solitary or live in pairs or small family groups consisting of a pair of adults and dependent young. Birds form permanent pairs that inhabit territories throughout the year.

Flight behaviour

Highly maneuverable in flight. Hunts prey from a perch, whilst circling slowly in flight or gliding along 10–20 m above shorelines. Often catches a fish by flying low over the water and grasping it in its talons. May also dive at a 45-degree angle from its perch and briefly submerge to catch fish near the water surface. Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground.

Demographic factors

Occurs throughout coastline regions in most of southeastern and eastern Asia. Distributed around the Australian coastline. Also occurs along some inland rivers in eastern Australia.

Whistling Kite is not globally or nationally threatened, however a 16% decline in reporting rate over the past two decades has been recorded nationally.

Not threatened. Population estimated between 2,600 and 41,000 mature individuals. In Australia, based on a population density of one pair per 40 km, the population is thought to number at least 500 pairs, but this is likely to be a significant underestimate.

Western False Pipistrelle (*Falsistrellus mackenziei*; P4 DBCA list)

Information gathered from Kitchener (1986); IUCN (2024) and (Woinarski *et al.* 2014).

Habitat

The Western False Pipistrelle occurs extensively in tall woodlands and wet or dry sclerophyll forest of south-western Australia. It is associated with Karri, Jarrah and Tuart old-growth forests. The species roosts in tree hollows, branches and stumps.

Movement

Site fidelity and movement patterns are unclear.

Behaviour

It occurs in roosting colonies of up to 30 bats. The species forages between the canopy and understory of tall trees. It is mainly insectivorous.

Flight behaviour

The behaviour of the species in flight is described as quick and straight. Most flight occurs approximately 15 m above ground. Echolocation calls end at low frequencies (30 kHz), with most energy at 32 – 34 kHz, and lasting for 12 ms.

Demographic factors

The population size is unknown. There is likely enough suitable habitat remaining in the area of occupancy to support more than 10,000 individuals.

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Appendix 5 Species by site matrix

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Birds (121)																															
Anatidae	*Anas castanea*	Chestnut Teal																													4
Anatidae	*Anas gracilis*	Grey Teal					4	4									9								50	45					422
Anatidae	*Anas superciliosa*	Pacific Black Duck	55	41	1		1			3		2		3	5	2	14	6	1		34	17			650	2					632
Anatidae	*Biziura lobata*	Musk Duck	1																												5
Anatidae	*Chenonetta jubata*	Australian Wood Duck						6				2					42					2										19
Anatidae	*Cygnus atratus*	Black Swan	56	6																					4	649					310
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck																													1
Anatidae	*Spatula rhynchotis*	Australasian Shoveler																													7
Anatidae	*Tadorna tadornoides*	Australian Shelduck	85	14	14	6	131	5	5	124	22	132	4	2	33	3		1	27		179	18	6	7	12		12				568
Podargidae	*Podargus strigoides*	Tawny Frogmouth																													7
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover																								6		2	83		
Charadriidae	*Charadrius melanops*	Black-fronted Dotterel																													23
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1										1																2	1
Scolopacidae	*Tringa glareola*	Wood Sandpiper																													3
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher																							1	42	1	2	1		
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull																							7	70	22	5	3		
Laridae	*Hydroprogne caspia*	Caspian Tern																								49	3	9	1		
Laridae	*Larus pacificus*	Pacific Gull																							4	3	12		1		
Laridae	*Sternula nereis nereis*	Fairy Tern																								40		4	4		
Laridae	*Thalasseus bergii*	Greater Crested Tern																							1	9	14	20	2		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper																								40					
Scolopacidae	*Calidris alba*	Sanderling																								4					
Scolopacidae	*Calidris ruficollis*	Red-necked Stint																								12			60		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit																								1					
Ardeidae	*Ardea pacifica*	White-necked Heron			1	6		1					1																		15
Ardeidae	*Bubulcus coromandus*	Cattle Egret																													10
Ardeidae	*Egretta garzetta*	Little Egret																							1						
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	4	5	1	3	17	85		4	2						3	2	12	2	3	7	1	1	2						141
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		4																	4										1
Threskiornithidae	*Platalea regia*	Royal Spoonbill	1																												
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis	5	6	3	6	14	110		50		50	9					62	144		119	44			12	4	10				337
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	268	428	1,089			5	94	1	2	73	314		2	3	16	389	53		998	4		140							1,421
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	3	1	1				5		1	1	26		2			2			2	7		3						3	2
Columbidae	*Phaps chalcoptera*	Common Bronzewing	2			1					4						2														2
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	2		2	4	7	1		1		3				1	1	1				1									9
Halcyonidae	Todiramphus sanctus	Sacred Kingfisher																													6
Meropidae	Merops ornatus	Rainbow Bee-eater																													1
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			1																										
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo				1																									5
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo	1			1		1			1					1													1	3

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	5			3	7	2		3	2	6	5				1	3	5	2		2									4
Accipitridae	*Circus approximans*	Swamp Harrier	11	3	1	3		3		3		1	3				1	6	4	2	1	7	1	2							14
Accipitridae	*Elanus axillaris*	Black-shouldered Kite	1															1													2
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle																	1								1				
Accipitridae	*Haliastur sphenurus*	Whistling Kite	2	1														1			1				1						3
Accipitridae	*Hieraaetus morphnoides*	Little Eagle					1																		1						1
Accipitridae	*Pandion haliaetus*	Osprey																							2		4	2	1		1
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk					2						1								2										
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk	2				2																								3
Falconidae	*Falco berigora*	Brown Falcon		1	3					8			1						1			3									4
Falconidae	*Falco cenchroides*	Australian Kestrel	4	2		1	2		1	3		7	9	1	1			5	9	2	2		1	4	1				1		2
Falconidae	*Falco longipennis*	Australian Hobby	2					2																							
Falconidae	*Falco peregrinus*	Peregrine Falcon											1																		
Phasianidae	*Coturnix pectoralis*	Stubble Quail	6	13	1	1			1	3	6	5	4				1	9	2	1	4	4	1	3							3
Rallidae	*Fulica atra*	Eurasian Coot																													3
Rallidae	*Porphyrio melanotus*	Australasian Swamphen																													3
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill	17		8	19	10	2		3	5		28		7	11	11														9
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	58	25	4		92		29	13	12		4	1	12	2			5			48						2	6
Acanthizidae	*Gerygone fusca*	Western Gerygone									1					1															5
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren	2			3				2	5		8		2		1														6
Acanthizidae	*Smicrornis brevirostris*	Weebill																													2
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		12	3	5				8	4	11	10					2			5	7		2							2
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6	12			2	25		21	2				3														4	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird																													2
Artamidae	*Cracticus torquatus*	Grey Butcherbird	19	16	4	28	4	4	8	16	6	13	15	5	11	1	9	2	1	3	4	3		2							8
Artamidae	*Gymnorhina tibicen*	Australian Magpie	15	1	13	18	8	4		11	3		36	1	10	9	18	14		42	6	18	3	8							14
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	4	5	4		5	4	39	1	3	2			5		2	3		1		1		3						6	5
Campephagidae	*Lalage tricolor*	White-winged Triller			2				1																					3	1
Climacteridae	*Climacteris rufus*	Rufous Treecreeper																													2
Corvidae	*Corvus coronoides*	Australian Raven	81	66	8	31	182	16	15	48	6	65	95	4	24	32	9	77	58	69	53	30	148	18	13			1	4	5	28
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird																													1
Dicruridae	*Grallina cyanoleuca*	Magpie-lark	5	2	23	10		2	4		15	8	6	1	8	4		6			2	7	4	4						1	6
Dicruridae	*Rhipidura albiscapa*	Grey Fantail	14		7	14	8	3		4	11		3	1		14	8														20
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail	14	25	13	24	3	9	20	6	17	8	22	4	7	6	6	9	6	9	11	4		27						3	16
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	21	11	1	6	14	1			3	5		2	13		9		1	7	27	7	1	7					5		18
Hirundinidae	*Petrochelidon nigricans*	Tree Martin	201	17	4	51	41	9	3	80	19	61	70		13	11	23	86	49	35	35	66	32	6							5
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		3									6	1					3				2								3
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark			2				1			3																		3	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren	2				3						8			8															6
Maluridae	*Malurus splendens*	Splendid Fairy-wren	9			33	16	11		3	14		12			6	5														5
Maluridae	*Stipiturus malachurus*	Southern Emu-wren	9																												
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill					3									1															2
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	7	3	6	37	20	19	1	2	4	9	1	1	14	4	14	2		4	1	12	3	1							10

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Meliphagidae	*Epthianura albifrons*	White-fronted Chat	38	17	1				22			84						9	8		5									8	6
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater																													3
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			1		30						4									1									3
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner																													1
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater	2		1		4	8					3			2						7									4
Motacillidae	*Anthus australis*	Australian Pipit	2	15				1	5			19						1	8	2	1		3	19						1	2
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush						1																							1
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler	5		2		4				2					1	1														8
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler																													1
Pardalotidae	Pardalotus punctatus	Spotted Pardalote																													1
Pardalotidae	*Pardalotus striatus*	Striated Pardalote													1																7
Petroicidae	*Microeca fascinans*	Jacky Winter		1																											
Petroicidae	*Petroica boodang*	Scarlet Robin														2															
Petroicidae	*Quoyornis georgianus*	White-breasted Robin																													1
Zosteropidae	*Zosterops lateralis*	Silvereye	37		2	7	17						16			5	3			2		10									13
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter																							4						
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican																								124	2				
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant	2			2	1												1			2			1	3	1	1			20
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant																			1					8					
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant						1																			26				1
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant					2				1							1				4			2	1	8	2			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe																													2
Cacatuidae	*Cacatua sanguinea*	Little Corella																													1
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak								1					54																103
Cacatuidae	*Calyptorhynchus/Zanda* sp.	black cockatoo species	1			38				6								2		8			10				8	7	4		15
Cacatuidae	*Eolophus roseicapilla*	Galah																									5	2			1
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo														8	1			2											46
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	4			2	1					10				5		28		31	4		2	8							55
Cacatuidae	*Zanda* sp.	white-tailed black cockatoo species	3		26																										321
Psittaculidae	*Barnardius zonarius*	Australian Ringneck	13		28	65	19	11	2	7	18	15	14	2	19	9	31	3		20	4	38	10	19						2	11
Psittaculidae	*Neophema elegans*	Elegant Parrot	12	8		8	3	11	5		12	17			1			1	18		9	1								3	3
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet	2			6	10	17							8	6	61			3	16										8
Psittaculidae	*Platycercus icterotis*	Western Rosella	2				2	2			2	1			1	4				2											
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot						1																							
Strigidae	*Ninox boobook*	Boobook Owl		1				13			1	2	1		238	1															
Tytonidae	*Tyto javanica*	Eastern barn owl																													2
Tytonidae	*Tyto novaehollandiae novaehollandiae*	Masked Owl (southwest)														1															1

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Dromaiidae	*Dromaius novaehollandiae*	Emu	20		3		3	19		2		4	27						47	4	19										20
Bats (8)																															
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat	•	•		•	•	•	•	•	•	•	•	•	•	•	•													•	•
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	•	•	•	•	•	•	•	•	•	•	•		•	•	•													•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	•	•		•	•	•	•	•	•	•	•		•	•	•													•	•
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	•			•							•		•	•	•														•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	•	•		•	•	•		•	•		•		•	•	•													•	•
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat									•				•	•	•														•
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat	•	•		•	•	•		•						•	•													•	
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat	•	•	•	•	•	•		•	•	•	•		•	•	•													•	•

Number records for birds represent aggregated data, i.e. all counts across all seasons and sample events. Bats are recorded as positive detection at site.

Appendix 6 Bird flight height data

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	3	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3	3	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	3	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	5	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	6	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		4		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		12		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		5		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m	SE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	0	0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	0	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	1	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	2	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	2	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	2	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	2	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6	2	0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	3	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	3	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	3	0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	4	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	4	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	4	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2	4	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2	5	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1	6	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		14		0-24 m	S	S-N
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	NE-W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m	N-S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		8		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		21		0-24 m	N-W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		21		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		30		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		23		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SW	
Acanthizidae	*Gerygone fusca*	Western Gerygone		1		0-24 m	N	
Acanthizidae	*Gerygone fusca*	Western Gerygone		1		0-24 m	SE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1	1	0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2	1	0-24 m	E	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2	2	0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	S	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m		
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	375	>250 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	800	>250 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	0	0-24 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	0	0-24 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	200	151-250 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		3	200	151-250 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	200	151-250 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	250	151-250 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	200	151-250m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	30	25-50 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	50	25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	50	25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	50	25-50 m		
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m	S	E-W
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		25-50 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		25-50 m	E-W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m		
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	60	51-75 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	70	51-75 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		51-75 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	80	76-150 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	100	76-150 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	120	76-150 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	120	76-150 m	NE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	150	76-150 m	E	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	150	76-150 m	E	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		3	150	76-150 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		76-150 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	2	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	2	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		2	3	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		1	5	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	5	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	SE	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		2	20	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	NW	SW-NE
Accipitridae	*Circus approximans*	Swamp Harrier		2		0-24 m	NE	S-N
Accipitridae	*Circus approximans*	Swamp Harrier		2		0-24 m	E	S-N
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	E	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	N	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	NE	E-W
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	W-E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	SW	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	50	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	50	25-50 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	SW	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1		51-75 m	ESE	
Accipitridae	*Circus approximans*	Swamp Harrier		1		51-75 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		2		51-75 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		2	100	76-150 m	SE	
Accipitridae	*Circus approximans*	Swamp Harrier		2	150	76-150 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		2		76-150 m	SE	

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Accipitridae	*Elanus axillaris*	Black-shouldered Kite		1	20	0-24 m	NE	
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		1	30	25-50 m	SW	
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		1	80	76-150 m	E	
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		1	150	76-150 m	N	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	35	25-50 m	NE	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	50	25-50 m	N	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1		25-50 m	S	W-E
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	60	51-75 m	W	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	80	76-150 m	NW	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	80	76-150 m	S	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle		1	80	76-150 m	N	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle		1		76-150 m	SE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	1	0-24 m	NE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	20	0-24 m	E	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	40	25-50 m	NE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	40	25-50 m	SW	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	4	50	25-50 m	W	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	60	51-75 m	SE	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		0-24 m	E	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		0-24 m	N	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		25-50 m	S	W-E
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		2	100	76-150 m	SE	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		2		0-24 m	E-W	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1		51-75 m	S	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1	125	76-150 m	S	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1	150	76-150 m	SE	
Anatidae	*Anas gracilis*	Grey Teal		50	0	0-24 m	NE	
Anatidae	*Anas gracilis*	Grey Teal		4		0-24 m	E	
Anatidae	*Anas gracilis*	Grey Teal		2		0-24 m	W	
Anatidae	*Anas gracilis*	Grey Teal		9		0-24 m	N	
Anatidae	*Anas gracilis*	Grey Teal		2		0-24 m	S	
Anatidae	*Anas gracilis*	Grey Teal		5		0-24 m	S	
Anatidae	*Anas gracilis*	Grey Teal		45	30	25-50 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		650	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		4	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		16	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Anas superciliosa*	Pacific Black Duck		30	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		8	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		450	0	0-24 m		
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	SW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	3	0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	20	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	E	W-E
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	SW	N-S
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	E	N-S
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	S	E-W
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		4		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		13		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		14	25	25-50 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		25-50 m	E	S-N
Anatidae	*Anas superciliosa*	Pacific Black Duck		26		25-50 m	E-W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		25-50 m	E-W	
Anatidae	*Biziura lobata*	Musk Duck		1		0-24 m	W	
Anatidae	*Biziura lobata*	Musk Duck		1		0-24 m		
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2	15	0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2		0-24 m	N	E-W
Anatidae	*Chenonetta jubata*	Australian Wood Duck		6		0-24 m	S	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		1		0-24 m	E	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		4		0-24 m	NE	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		3		0-24 m	E	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2		0-24 m	S	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		1		0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		27		0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		6		0-24 m	W	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		4		0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Cygnus atratus*	Black Swan		60	0	0-24 m		
Anatidae	*Cygnus atratus*	Black Swan		370	0	0-24 m	NW	
Anatidae	*Cygnus atratus*	Black Swan		279	0	0-24 m	W	
Anatidae	*Cygnus atratus*	Black Swan		4	0	0-24 m	NE	
Anatidae	*Cygnus atratus*	Black Swan		1	15	0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		1	20	0-24 m	NE	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	S	W-E
Anatidae	*Cygnus atratus*	Black Swan		6		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		3		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		1		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		20		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		4		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		1		0-24 m	S	
Anatidae	*Cygnus atratus*	Black Swan		6		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	S	
Anatidae	*Cygnus atratus*	Black Swan		9	30	25-50 m	S	
Anatidae	*Cygnus atratus*	Black Swan		2		25-50 m	S	W-E
Anatidae	*Cygnus atratus*	Black Swan		1		25-50 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		6	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		8	0	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		150	0	0-24 m		
Anatidae	*Tadorna tadornoides*	Australian Shelduck		30	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20	0	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		13	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		18	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	1	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	2	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	2	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	2	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	3	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	3	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	3	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	5	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	6	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	8	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	10	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	10	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	12	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	15	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7	15	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	20	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	S	W-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	SW-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	W	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	NW	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	N	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20		0-24 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		9		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		31		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		40		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N-E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		54		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		29		0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16	25	25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	25	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	25	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7	25	25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		70	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	30	25-50 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	35	25-50 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	40	25-50 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	40	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	40	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		6	40	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		100	50	25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	50	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	SE	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	W	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20		25-50 m	W	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	SW	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		8		25-50 m	W	N-S

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	E	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		25-50 m	N	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		25-50 m	NW	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	S-N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		54		25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N-S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		18		25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7		25-50 m	W-E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3		51-75 m	NW	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		51-75 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		51-75 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		14		51-75 m	E-W	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		3	0	0-24 m	NE	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		1	20	0-24 m	NE	
Ardeidae	*Ardea pacifica*	White-necked Heron		6		0-24 m	S	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		0-24 m	SE	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		25-50 m	W	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		25-50 m	W	
Ardeidae	*Egretta garzetta*	Little Egret		1	0	0-24 m		
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		4	0	0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		8	0	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	2	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		4	20	0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		3	20	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W	N-S
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	S	E-W
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W-E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		8		0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		20		0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	25	25-50 m	NW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	30	25-50 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		6	30	25-50 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	30	25-50 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	35	25-50 m	NW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	35	25-50 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	40	25-50 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	50	25-50 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	50	25-50 m	SE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		55		51-75 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	1	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3	1	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	1	0-24 m		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	1	0-24 m	SW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	1	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	2	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	2	0-24 m	N	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	2	0-24 m	N	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	3	0-24 m	NE	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3	3	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	3	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	4	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	4	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	4	0-24 m	SW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		6	4	0-24 m	SE	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	5	0-24 m	NW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	10	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	15	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3		0-24 m	N	E-W
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	25	25-50 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	30	25-50 m	NE	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		7		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m		
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		4		0-24 m	E	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		20		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	NW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		5		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		3		0-24 m	NW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		5		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	E	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		3		25-50 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	0	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3	1	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	2	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		4	3	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	4	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3	4	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	4	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	4	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	4	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	5	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	5	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	5	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	6	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	6	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	10	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	10	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	12	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	12	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	15	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		4		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	25	25-50 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	25	25-50 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		7		25-50 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SE	

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Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	1	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	2	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	2	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	2	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	2	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	4	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	4	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	5	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	5	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	5	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	5	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	5	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	6	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	8	0-24 m	SW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	8	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	8	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	15	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	15	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	15	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	15	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	20	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	SE	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	N-S
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	E-W
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		9		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		7		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		6		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		25-50 m	SW	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		25-50 m	W	N-S
Artamidae	*Gymnorhina tibicen*	Australian Magpie		10		25-50 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		51-75 m	NE	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1	0	0-24 m		
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	2	20	0-24 m		
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	53		0-24 m	S-N	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1		25-50 m	N-S	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	10		25-50 m	N-S	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	1	0-24 m	NW	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	2	0-24 m	W	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	38	4	0-24 m	N	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	10	5	0-24 m	E	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	7	8	0-24 m	NE	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	8	0-24 m	E	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	8	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	10	0-24 m	SE	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	12	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	30	25-50 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	1	30	25-50 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	40	25-50 m	S	
Cacatuidae	*Eolophus roseicapilla*	Galah		2	3	0-24 m	N	
Cacatuidae	*Eolophus roseicapilla*	Galah		5	35	25-50 m	W	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m	N	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	8		0-24 m	NE-SW	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	1		0-24 m	N-SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	12		0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2		0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	2	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	3	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	4	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	3	4	0-24 m	N	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	5	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	9	5	0-24 m	S	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	6	0-24 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	6	0-24 m	N	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	7	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	4	12	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	15	0-24 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	4	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	20	20	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	5		0-24 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	25	25-50 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	25	25-50 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	30	25-50 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	30	25-50 m	SE	
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	3		0-24 m	S	E-W
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	26		0-24 m	NE-SW	
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	1	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	4	0-24 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	5	0-24 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	6	0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	10	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2	15	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	15	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	15	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2	20	0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	S-N
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		3		0-24 m	W	S-N
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	N-S
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	N	E-W
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	N	E-W
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	W-E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		12		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		4		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	SW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	SW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	NE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	E-W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S-N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		22		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		3	25	25-50 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	25	25-50 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	S	
Campephagidae	*Lalage tricolor*	White-winged Triller		2		0-24 m	E	
Campephagidae	*Lalage tricolor*	White-winged Triller		1		0-24 m	SW	
Campephagidae	*Lalage tricolor*	White-winged Triller		2		0-24 m	W	
Campephagidae	*Lalage tricolor*	White-winged Triller		1		0-24 m	S	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		2	0	0-24 m	SW	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		70	0	0-24 m	E	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		13	0	0-24 m	E	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		6	0	0-24 m	N	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		2		0-24 m	S	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1		25-50 m	NE	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1		25-50 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	0	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	0	0-24 m	SE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	0	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	2	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	SE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	4	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	4	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	5	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	5	0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	6	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	8	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	12	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	15	0-24 m	SW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	15	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	15	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	N	W-E
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	N-E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		5		0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	N	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1	15	0-24 m	W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	E-W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	E-W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		2		0-24 m	N	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	NE	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	NW	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	N-S	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		15	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		8	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		10	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		20	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		14	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		7	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		9	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		38	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		9	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		10	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		9	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	1	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	1	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		3	2	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		5	3	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4	5	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	5	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	5	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	5	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	5	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	6	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	6	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		100	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	7	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	7	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		4	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	8	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		30	8	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	9	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	9	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	10	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		20	10	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	12	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	12	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	12	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	12	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		10	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	15	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		5	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	20	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	20	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		8	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		16	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	24	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	W-S
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SE	W-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	W-E
Corvidae	*Corvus coronoides*	Australian Raven		4		0-24 m	N	W-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	SW-SE
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	S-N
Corvidae	*Corvus coronoides*	Australian Raven		9		0-24 m	E	S-N
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	S-N
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		5		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	N-S

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	N-S
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	N-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		54		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		5		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E-W	
Corvidae	*Corvus coronoides*	Australian Raven		8		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		14		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW-SE	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S-N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W-E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3	25	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		16	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		4	25	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	25	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		24	25	25-50 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	26	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		4	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	30	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		7	30	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		4	40	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	40	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	40	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	45	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		12	45	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	50	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	W	S-N
Corvidae	*Corvus coronoides*	Australian Raven		5		25-50 m	W	S-N
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	E	N-S
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	NW	E-W
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m		
Corvidae	*Corvus coronoides*	Australian Raven		5		25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4		25-50 m	S-N	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo		1		0-24 m	SE	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo		1	8	0-24 m	W	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	E	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	W	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	NW	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	S	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	0	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	0	0-24 m	E	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	0	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		4	0	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	1	0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3	1	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	3	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	3	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	4	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	4	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	5	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	5	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	6	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	6	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	10	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	10	0-24 m	E	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	12	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	15	0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	15	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	N	E-W
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SE-NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SW-NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3		0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	E-W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		7		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m		
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		10		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m		
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		6		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	25	25-50 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	2	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	3	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	3	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	4	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	4	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	5	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	5	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	12	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	15	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW-NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m		
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m		
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		51-75 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		10	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	4	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	4	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	5	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	5	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	6	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	6	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	8	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	8	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	15	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	15	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		6		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		5	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		17	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		12	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		9	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	N	
Dromaiidae	*Dromaius novaehollandiae*	Emu		6	0	0-24 m	NE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		8	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		5	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		14	0	0-24 m	N	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		3	0	0-24 m	NE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		6	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		15	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		7	0	0-24 m	SW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		8	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2		0-24 m	N	
Falconidae	*Falco berigora*	Brown Falcon		2	2	0-24 m	NE	
Falconidae	*Falco berigora*	Brown Falcon		1	4	0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	8	0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	10	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1	10	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1	15	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1		0-24 m	N	W-E
Falconidae	*Falco berigora*	Brown Falcon		1		0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	30	25-50 m	N	
Falconidae	*Falco berigora*	Brown Falcon		1		25-50 m	S	
Falconidae	*Falco berigora*	Brown Falcon		2		25-50 m	EW	
Falconidae	*Falco berigora*	Brown Falcon		2		25-50 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1		51-75 m	N	E-W
Falconidae	*Falco berigora*	Brown Falcon		1	100	76-150 m	NW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	1	0-24 m	E	

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Falconidae	*Falco cenchroides*	Australian Kestrel		3	1	0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	2	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	3	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	3	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	4	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	4	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	10	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		3	10	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	10	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	15	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	NE	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	15	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m		
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	S	W-E
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	NW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	SE	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	NE	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	25	25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	25	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	30	25-50 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	30	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	40	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	40	25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	50	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	E	S-N
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	80	76-150 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	80	76-150 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Falconidae	*Falco cenchroides*	Australian Kestrel		1	150	76-150 m	NW	
Falconidae	*Falco longipennis*	Australian Hobby		1	15	0-24 m	SE	
Falconidae	*Falco longipennis*	Australian Hobby		1		0-24 m	E	N-S
Falconidae	*Falco longipennis*	Australian Hobby		2		51-75 m		
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)	1		25-50 m	SW	N-S
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		2	0	0-24 m	SW	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	SE	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	E	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		18	0	0-24 m	N	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	NE	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		24	0	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	0	0-24 m	NW	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	4	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	5	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	7	0-24 m	NW	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	8	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	8	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	10	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	12	0-24 m	N	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	15	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	S	E-W
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	SE	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	SE	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m		
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2		0-24 m	S	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	NW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	1	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	1	0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	2	0-24 m	NE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	2	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	2	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	2	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	2	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	3	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	3	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		10	3	0-24 m	SE	

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Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	3	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	4	0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	5	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	6	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	6	0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	12	0-24 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	15	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	15	0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	15	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	E	N-S
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	N	E-W
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	E	E-W
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		12		0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	E-W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	NW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		21		0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W-E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	25	25-50 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	1	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	1	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	1	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	2	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	4	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	5	0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	5	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	5	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	5	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		9	5	0-24 m	N	

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Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	6	0-24 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	6	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	8	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	8	0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		30	8	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	8	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		25	10	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		22	10	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	10	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		19	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		32	12	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	12	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	12	0-24 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	12	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	15	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	15	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	15	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	15	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	15	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	15	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		13	15	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	20	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		30	20	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	20	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		22	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	N	W-E
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16		0-24 m	N	W-E
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		18		0-24 m	E	N-S
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	N	E-W
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	S-N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		9		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15		0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	E-W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	25	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	25	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	25	25-50 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	25	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	25	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		33	25	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	30	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	30	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		21	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	30	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	30	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	30	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	30	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	35	25-50 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	40	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15	40	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		18	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	40	25-50 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	45	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	45	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	50	25-50 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16	50	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m	S	N-S
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		26		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		11		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15	70	51-75 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	70	51-75 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		51-75 m	N	E-W
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		5	0	0-24 m	SW	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	NE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	0	0-24 m	NE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		2	0	0-24 m		
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		20	0	0-24 m	W	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		50	0	0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	5	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		6	5	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	20	0-24 m	S	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	20	0-24 m	SW	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		3	25	25-50 m	E	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	9	0	0-24 m	SW	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	27	0	0-24 m	N	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	22	0	0-24 m	W	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	1	5	0-24 m	N	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	1	30	25-50 m	E	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	2	40	25-50 m	SW	
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	NE	
Laridae	*Larus pacificus*	Pacific Gull		2	0	0-24 m		
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	E	
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	NE	
Laridae	*Larus pacificus*	Pacific Gull		7	0	0-24 m	SE	
Laridae	*Larus pacificus*	Pacific Gull		2	15	0-24 m	S	
Laridae	*Larus pacificus*	Pacific Gull		3	20	0-24 m	N	
Laridae	*Larus pacificus*	Pacific Gull		3	40	25-50 m	SE	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	4	0	0-24 m	SW	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	40	0	0-24 m	N	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	4	30	25-50 m	NW	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	20	0	0-24 m	SW	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	0	0-24 m	SE	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	0	0-24 m	N	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	3	0	0-24 m	N	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	5	0-24 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	10	0-24 m		
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	10	0-24 m	SE	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	25	25-50 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	30	25-50 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	40	25-50 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	0	0-24 m	NW	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		2	1	0-24 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	NE	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		0-24 m		
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		0-24 m	N	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		3		0-24 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	N	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		2		0-24 m	N	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	E	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	NE	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		2		0-24 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	W	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	W	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		1	1	0-24 m	NE	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		4	1	0-24 m	NE	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		1		0-24 m		
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		3		0-24 m		
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		6		0-24 m	E	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4	0	0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	0	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	0	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4	1	0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	2	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		5		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	

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Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		5		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m		
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4		0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	SW	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	S	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		3	1	0-24 m	W	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	SW	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1	1	0-24 m	S	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1	1	0-24 m	E	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1		0-24 m	N	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	2	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	3	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	4	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	4	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	5	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	5	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	5	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	6	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	8	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4	10	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	10	0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	12	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	12	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	12	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	15	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		5	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	S	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	S-N
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	NW	N-S
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		6		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		8		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W-E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m		
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S-N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E-W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	25	25-50 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	25	25-50 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4	30	25-50 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		25-50 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		25-50 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		25-50 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	0	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4	0	0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	1	0-24 m	NE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		3	1	0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	2	0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	3	0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		7	3	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	4	0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		6	7	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	8	0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	10	0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		30	10	0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	15	0-24 m	NE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		3	15	0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	15	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		9	15	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	20	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	S	E-W
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m		
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		10		0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		5		0-24 m		
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		6		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	30	25-50 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		25-50 m	S	W-E
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		8		25-50 m	E-W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		25-50 m	S-W	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		3	2	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		3	3	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	4	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	4	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1	4	0-24 m	SE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1	5	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		5		0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	SW	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	NW	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		3	3	0-24 m	N	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		7	4	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1	10	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1		0-24 m	W	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2		0-24 m	N	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1		0-24 m	SE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		8		0-24 m	W	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		3	0	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		3	0	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	1	0-24 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	3	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		2	4	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	6	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		2	10	0-24 m	NW	

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Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	12	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		1	15	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	18	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		1	20	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1	20	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		3		0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m		
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		6		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S-N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	25	25-50 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	25	25-50 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	30	25-50 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		1	40	25-50 m	NW	
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		1		0-24 m	NW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1	3	0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1	15	0-24 m	SE	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	E	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		2		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	S	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	NE	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SE	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		1		0-24 m	E	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		32	0	0-24 m	W	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		50	0	0-24 m	NE	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		42	1	0-24 m	NE	

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Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		1	3	0-24 m	E	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		1	8	0-24 m	N	
Petroicidae	*Microeca fascinans*	Jacky Winter		1		0-24 m	W	
Petroicidae	*Petroica boodang*	Scarlet Robin		1		0-24 m	N	
Petroicidae	*Petroica boodang*	Scarlet Robin		1		0-24 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		2	0	0-24 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	0	0-24 m		
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	1	0-24 m	SE	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	2	0-24 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	20	0-24 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	30	25-50 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	40	25-50 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	45	25-50 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	50	25-50 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		2	60	51-75 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	70	51-75 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	80	76-150 m	N	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		7	10	0-24 m	N	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		1	30	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		1	80	76-150 m	S	
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		26	10	0-24 m	NW	
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		1		25-50 m	E	N-S
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	1	0-24 m	SE	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	2	0-24 m	SW	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	3	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	4	0-24 m	E	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		5	4	0-24 m	E	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	5	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		2	10	0-24 m		
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	10	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1		0-24 m	E-W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	25	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	25	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		4	30	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1		51-75 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		3	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	N	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	NW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	1	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	1	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	2	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m		
Phasianidae	*Coturnix pectoralis*	Stubble Quail		3		0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2		0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		6		0-24 m	NE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m		
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	0	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	0	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	0	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	0	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	0.5	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	1	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	1	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	2	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5	2	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		25	4	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	4	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	4	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	4	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	4	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	5	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	5	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	5	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	5	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	6	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	7	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	8	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	8	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	8	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	15	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	N	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		9		0-24 m	N	N-S
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	W	N-S
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	N	E-W
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	E-W
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		7		0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	S-N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		15		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		10		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NE	

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Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S-N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E-W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		10		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		7		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E-W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		18	0	0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	8	0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	20	0-24 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		9		0-24 m	SW	S-W
Psittaculidae	*Neophema elegans*	Elegant Parrot		2		0-24 m	N	S-N
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		5		0-24 m	W-E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		7		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		12		0-24 m	NW	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	25	25-50 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	30	25-50 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	30	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	30	25-50 m	NE	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	40	25-50 m	SE	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4	40	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	40	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	50	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	50	25-50 m	E	

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Psittaculidae	*Neophema elegans*	Elegant Parrot		2		25-50 m	N	W-E
Psittaculidae	*Neophema elegans*	Elegant Parrot		1		25-50 m	E	S-N
Psittaculidae	*Neophema elegans*	Elegant Parrot		5		25-50 m		
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		25-50 m	E-W	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		6	10	0-24 m	NW	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		3	20	0-24 m	NE	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		10	20	0-24 m	N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		8		0-24 m	S	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		1		0-24 m	E	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		3		0-24 m	N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		0-24 m	S-N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		10	30	25-50 m	S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		6	30	25-50 m	S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		18		25-50 m	S	W-E
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		25-50 m	W	S-N
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		8		25-50 m	N	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		25-50 m	W	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		7		25-50 m	N-S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		27		51-75 m	S	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		16		51-75 m	EW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2	3	0-24 m	NE	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1	4	0-24 m	SW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2	8	0-24 m	S	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	E	S-N
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	S	S-N
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	E	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	SW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	NE	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	W	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	SW	
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot		1		0-24 m	N	E-W
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)	40	0	0-24 m	N	
Scolopacidae	*Calidris alba*	Sanderling	Mig. (EPBC & BC Acts)	4	0	0-24 m	N	
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)	60	0	0-24 m	E	
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)	12	0	0-24 m	N	
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)	1	20	0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		2	0	0-24 m	NE	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		2	15	0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		1		0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		3		0-24 m	N	
Threskiornithidae	*Platalea regia*	Royal Spoonbill		1	40	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	0	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		10	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	0	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		10	0	0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		24	0	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		12	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		22	0	0-24 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		20	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		7	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		60	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	0	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		9	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		5	1	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		5	1	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		41	4	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	4	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	5	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		16	5	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		30	6	0-24 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	8	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	10	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	10	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	10	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		15	10	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	12	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	15	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		6	20	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	20	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	20	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	20	0-24 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	20	0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3		0-24 m		
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		70		0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3		0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1		0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		110		0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		9	170	151-250 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		18	25	25-50 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	30	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	30	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		6	35	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	35	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	35	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		18	40	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	40	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	40	25-50 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		14	40	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		50	50	25-50 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	80	76-150 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		39	120	76-150 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		20	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		5	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		5	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	0	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	0	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60	0	0-24 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		50	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		25	0	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		400	0	0-24 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		40	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		6	4	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		20	6	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	7	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	10	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	10	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	15	0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	15	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	15	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	20	0-24 m	S	

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Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	20	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	20	0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		15	20	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	20	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		0-24 m	S	W-E
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		16		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		24		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		240		0-24 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		208		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		34		0-24 m	W-E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		125		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3		0-24 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	200	151-250 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		16	250	151-250 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30	25	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	25	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	30	25-50 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	30	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		35	30	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	30	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		18	30	25-50 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	30	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		26	30	25-50 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	40	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		4	40	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	40	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	40	25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		6	40	25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	50	25-50 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	50	25-50 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	50	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		25-50 m	S	W-E
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60		25-50 m	W	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		100		25-50 m	N	N-E

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3		25-50 m	W-E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		25-50 m	N-S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		700		25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		13	55	51-75 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		11	60	51-75 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	70	51-75 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	70	51-75 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		51-75 m	NW	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		28		51-75 m	SW	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		43		51-75 m	E	E-W
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		51-75 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		51-75 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30		51-75 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		76-150 m	S	S-N
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60		76-150 m	N	E-W
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		14		76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		18		76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		382		76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		80	80	76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	80	76-150 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		33	80	76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	100	76-150 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	120	76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		14	120	76-150 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		17	150	76-150 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		8	0	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	1	0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		4	1	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	1	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		6	1	0-24 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	2	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	3	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		4	3	0-24 m	W	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	3	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		6	4	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		5	4	0-24 m	W	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	4	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	5	0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	8	0-24 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		4		0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		1		0-24 m	NE	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Zosteropidae	*Zosterops lateralis*	Silvereye		1		0-24 m	SW	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	S	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m		
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	SW	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m		
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	NW	

Appendix 7 Mean number of calls of each recorded bat species per 30-minute time interval

Start time[1]	Chocolate Wattled Bat	Gould's Wattled Bat	Greater Long-eared Bat	Holt's Long-eared Bat	Lesser Long-eared Bat	Southern Forest Bat	Western False Pipistrelle	White-striped Free-tailed Bat
17:30	1.00	1.50	-	-	1.50	23.33	-	-
18:00	1.25	1.50	1.00	-	38.25	227.00	-	1.00
18:30	1.75	4.00	1.00	-	1.75	22.58	1.00	2.00
19:00	1.75	2.00	-	-	7.00	49.83	-	2.00
19:30	2.25	1.00	1.00	-	1.80	8.24	1.00	2.25
20:00	1.40	1.67	1.00	-	1.00	7.24	1.00	13.86
20:30	1.92	1.92	3.67	-	1.67	5.71	-	12.80
21:00	2.38	1.50	1.25	-	1.60	6.17	-	11.13
21:30	3.18	2.22	-	1.00	1.33	6.40	-	11.40
22:00	2.50	1.75	1.50	1.00	1.25	5.23	-	11.28
22:30	2.09	1.29	1.00	2.00	1.75	8.10	1.00	11.83
23:00	2.44	1.78	1.00	1.00	1.00	7.84	1.00	15.50
23:30	2.56	1.56	2.00	-	1.13	6.55	-	12.94
0:00	4.17	1.88	-	-	1.80	7.62	-	11.47
0:30	5.70	1.67	-	-	1.25	6.58	1.00	11.06
1:00	5.00	1.78	-	-	1.17	5.38	1.00	12.40
1:30	4.86	2.17	1.00	1.00	1.27	5.95	-	14.25
2:00	5.07	2.18	1.00	1.00	1.67	4.78	-	13.38
2:30	6.09	1.30	1.00	-	1.43	4.46	-	17.89
3:00	4.00	2.70	1.00	-	1.00	4.91	-	23.13
3:30	2.08	5.50	-	1.00	1.00	5.04	-	30.14
4:00	4.33	2.00	-	-	2.25	5.84	1.00	5.00
4:30	1.00	1.00	-	-	1.50	7.75	-	1.00
5:00	5.00	-	-	-	2.00	1.00	-	-
Total	**3.45**	**2.00**	**1.40**	**1.11**	**2.82**	**11.37**	**1.00**	**12.95**

[1]Aggregated data across all seasons and sample events.

Appendix 8 Bat species by site per time interval mean and maximum detections

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
BUS035	**1.00**	**1.00**	**1.50**	**3.00**	**2.00**	**2.00**			**1.00**	**1.00**	**2.17**	**6.00**			**11.00**	**25.00**	**6.00**	**25.00**
1:00:00											1.00	1.00			23.00	23.00	12.00	23.00
Wh1:30:00															6.00	6.00	6.00	6.00
2:00:00															1.00	1.00	1.00	1.00
2:30:00											2.00	2.00			2.00	2.00	2.00	2.00
3:00:00			1.00	1.00											1.00	1.00	1.00	1.00
20:30:00			1.00	1.00							1.00	1.00					1.00	1.00
21:00:00															10.00	10.00	10.00	10.00
21:30:00			3.00	3.00							6.00	6.00			18.00	18.00	9.00	18.00
22:00:00	1.00	1.00									2.00	2.00			8.00	8.00	3.67	8.00
22:30:00	1.00	1.00													5.00	5.00	3.00	5.00
23:00:00									1.00	1.00					25.00	25.00	13.00	25.00
23:30:00					2.00	2.00			1.00	1.00	1.00	1.00			21.00	21.00	6.25	21.00
0:00:00			1.00	1.00											11.00	11.00	6.00	11.00
0:30:00															12.00	12.00	12.00	12.00
BUS013	**7.45**	**23.00**	**1.81**	**5.00**			**1.00**	**1.00**	**6.41**	**150.00**	**31.90**	**2000.00**	**1.00**	**1.00**	**5.41**	**30.00**	**15.62**	**2000.00**
1:00:00	6.33	10.00	1.00	1.00			1.00	1.00	1.00	1.00	3.00	9.00			2.00	2.00	3.08	10.00
1:30:00	9.67	20.00							2.50	3.00	3.50	9.00			1.00	1.00	4.90	20.00
2:00:00	15.00	23.00							1.50	2.00	3.25	9.00			1.00	1.00	5.22	23.00
2:30:00	15.00	23.00	2.00	2.00					1.00	1.00	4.00	9.00					5.56	23.00
3:00:00	8.33	16.00	1.00	1.00					1.00	1.00	4.67	9.00					5.13	16.00
3:30:00	7.00	7.00							1.00	1.00	5.67	9.00			1.00	1.00	4.33	9.00
4:00:00	7.00	7.00							1.00	1.00	5.00	9.00					4.50	9.00
4:30:00									1.00	1.00	5.00	9.00					3.67	9.00
5:00:00									1.00	1.00	1.00	1.00					1.00	1.00
17:30:00									1.00	1.00	1.00	1.00					1.00	1.00
18:00:00	1.00	1.00	2.00	2.00					150.00	150.00	1,000.50	2,000.00					430.80	2000.00
18:30:00	2.00	2.00	2.00	3.00							23.00	23.00					7.25	23.00
19:00:00	1.00	1.00							4.00	4.00	33.00	33.00					12.67	33.00
19:30:00			1.00	1.00					1.00	1.00	2.00	4.00	1.00	1.00			1.43	4.00
20:00:00			1.00	1.00							2.00	2.00			1.00	1.00	1.40	2.00
20:30:00	4.50	7.00	2.00	2.00					1.00	1.00	4.00	9.00					3.25	9.00
21:00:00	5.00	7.00	3.00	3.00							4.00	9.00			3.00	3.00	4.00	9.00
21:30:00	11.00	15.00							1.00	1.00	2.80	9.00			3.67	5.00	4.36	15.00
22:00:00	5.67	7.00	2.33	5.00					1.00	1.00	3.67	9.00			7.67	20.00	4.29	20.00
22:30:00	6.00	7.00							1.00	1.00	3.00	9.00			9.33	25.00	5.30	25.00
22:00:00	4.00	7.00	2.33	4.00					1.00	1.00	4.00	9.00			8.25	30.00	4.64	30.00
22:30:00	5.50	7.00	1.00	1.00					1.00	1.00	4.33	9.00			14.00	27.00	5.09	27.00
0:00:00	8.00	9.00	2.00	2.00					1.50	2.00	3.67	9.00			3.33	7.00	3.79	9.00
0:30:00	11.50	16.00	1.00	1.00					1.00	1.00	2.80	9.00			1.50	2.00	3.82	16.00
BUS014	**5.24**	**20.00**	**3.19**	**26.00**	**1.00**	**1.00**	**1.20**	**2.00**	**1.63**	**4.00**	**14.07**	**65.00**	**1.00**	**1.00**	**5.84**	**61.00**	**8.00**	**65.00**

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
1:00:00	7.33	20.00	2.00	3.00					1.00	1.00	16.25	27.00			1.00	1.00	7.31	27.00
1:30:00	7.67	20.00	3.50	5.00			1.00	1.00	1.00	1.00	14.20	31.00			3.00	5.00	7.33	31.00
2:00:00	20.00	20.00	3.75	10.00			1.00	1.00	2.00	2.00	9.75	27.00			14.00	14.00	7.58	27.00
2:30:00	10.50	20.00	1.33	2.00					1.00	1.00	11.75	27.00			3.33	6.00	6.00	27.00
3:00:00	4.00	6.00	4.75	14.00					1.00	1.00	7.80	27.00			17.50	34.00	7.29	34.00
3:30:00	1.00	1.00	9.67	26.00	1.00	1.00			1.00	1.00	9.00	27.00			61.00	61.00	9.40	61.00
4:00:00	6.00	8.00	2.50	4.00					2.67	4.00	10.50	27.00	1.00	1.00	5.00	5.00	5.62	27.00
4:30:00			1.00	1.00					1.00	1.00	12.00	27.00			1.00	1.00	5.71	27.00
17:30:00			1.00	1.00													1.00	1.00
18:00:00	1.00	1.00	2.00	2.00							5.00	8.00					2.80	8.00
18:30:00	2.00	2.00	13.00	13.00	1.00	1.00			2.00	3.00	13.00	22.00					6.57	22.00
19:00:00	2.00	2.00									15.50	19.00			1.00	1.00	8.50	19.00
19:30:00	2.00	2.00	1.00	1.00					1.00	1.00	19.00	53.00			2.00	2.00	9.00	53.00
20:00:00	1.50	2.00	1.00	1.00							15.80	27.00					10.38	27.00
20:30:00	1.00	1.00	1.00	1.00					1.00	1.00	14.50	27.00			2.00	2.00	9.20	27.00
21:00:00	3.00	3.00	2.00	2.00					2.00	2.00	17.83	50.00			7.00	12.00	10.83	50.00
21:30:00	4.00	4.00	4.00	4.00			1.00	1.00	1.50	2.00	18.33	50.00			2.00	2.00	9.62	50.00
22:00:00			1.00	1.00					1.00	1.00	13.20	27.00			1.00	1.00	7.10	27.00
22:30:00			1.00	1.00			2.00	2.00	3.00	3.00	18.75	27.00	1.00	1.00	4.00	7.00	8.27	27.00
23:00:00			1.50	2.00							13.83	30.00					10.75	30.00
23:30:00	1.00	1.00	2.00	3.00					1.50	2.00	19.67	65.00			1.50	2.00	9.36	65.00
0:00:00			3.00	3.00					4.00	4.00	13.60	27.00			2.67	5.00	7.82	27.00
0:30:00	11.50	20.00	3.00	5.00					1.00	1.00	12.80	27.00	1.00	1.00	3.00	3.00	8.17	27.00
BUS015	**2.22**	**6.00**	**1.20**	**2.00**	**1.25**	**2.00**	**1.00**	**1.00**	**1.17**	**2.00**	**5.46**	**14.00**	**1.00**	**1.00**	**2.94**	**10.00**	**3.45**	**14.00**
1:00:00	6.00	6.00	1.00	1.00							6.50	8.00			2.00	2.00	4.40	8.00
1:30:00	5.00	5.00							1.00	1.00	6.50	8.00					4.00	8.00
2:00:00	3.00	3.00	1.00	1.00							6.50	8.00			2.00	3.00	3.14	8.00
2:30:00	2.00	3.00	1.00	1.00							6.50	8.00					3.33	8.00
3:00:00	2.00	2.00			1.00	1.00					6.50	8.00					4.00	8.00
3:30:00							1.00	1.00	1.00	1.00	6.50	8.00					3.75	8.00
4:00:00	1.00	1.00			1.00	1.00					6.50	8.00					3.75	8.00
4:30:00											6.50	8.00					6.50	8.00
17:30:00											14.00	14.00					14.00	14.00
18:00:00									1.00	1.00	3.00	3.00					2.00	3.00
18:30:00	1.00	1.00									4.50	7.00	1.00	1.00			2.75	7.00
19:30:00	2.00	2.00									1.00	1.00					1.50	2.00
20:00	1.00	1.00	1.00	1.00	1.00	1.00					4.25	8.00			1.00	1.00	2.63	8.00
20:30:00			1.50	2.00					2.00	2.00	6.00	8.00			4.00	6.00	3.88	8.00
21:00:00	1.00	1.00							1.00	1.00	3.75	8.00			2.00	2.00	2.71	8.00
21:30:00									1.00	1.00	3.75	8.00			2.00	3.00	2.86	8.00
22:00:00					2.00	2.00			1.00	1.00	5.25	8.00					3.57	8.00
22:30:00	1.00	1.00									6.50	8.00			3.00	3.00	3.60	8.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
23:00:00			2.00	2.00	1.00	1.00			1.00	1.00	4.67	8.00	1.00	1.00	3.00	3.00	2.75	8.00
23:30:00	1.00	1.00	1.00	1.00	2.00	2.00					4.67	8.00			5.50	10.00	3.63	10.00
0:00:00	3.50	4.00			1.00	1.00			1.00	1.00	6.50	8.00			7.00	7.00	4.14	8.00
0:30:00	2.00	2.00	1.00	1.00	1.00	1.00			2.00	2.00	6.50	8.00			1.00	1.00	2.63	8.00
BUS001	**1.96**	**6.00**	**1.67**	**3.00**	**1.00**	**1.00**			**1.33**	**3.00**	**12.18**	**210.00**	**1.00**	**1.00**	**4.78**	**22.00**	**7.69**	**210.00**
1:00:00	4.50	6.00							1.00	1.00	4.67	10.00			2.50	4.00	3.63	10.00
1:30:00	1.50	2.00							1.00	1.00	4.33	8.00					2.83	8.00
2:00:00	2.67	4.00									5.25	11.00			1.00	1.00	3.75	11.00
2:30:00	3.50	6.00									3.40	8.00			1.00	1.00	3.13	8.00
3:00:00	2.50	4.00									4.00	7.00			1.00	1.00	3.00	7.00
3:30:00	1.00	1.00	1.00	1.00							3.75	7.00					2.83	7.00
4:00:00			1.00	1.00							3.33	8.00					2.75	8.00
18:00:00											8.00	8.00					8.00	8.00
18:30:00									1.00	1.00	75.50	150.00			3.00	3.00	38.75	150.00
19:00:00			3.00	3.00							210.00	210.00					106.50	210.00
19:30:00	2.00	2.00							3.00	3.00	53.00	53.00					19.33	53.00
20:00:00											4.00	4.00					4.00	4.00
20:30:00	1.00	1.00									2.75	4.00			3.00	5.00	2.38	5.00
21:00:00											4.75	6.00			22.00	22.00	8.20	22.00
21:30:00	1.00	1.00									4.50	11.00			10.50	18.00	5.71	18.00
22:00:00	1.00	1.00							2.00	2.00	3.00	8.00			2.67	6.00	2.60	8.00
22:30:00	1.00	1.00			1.00	1.00			1.00	1.00	13.25	39.00			5.50	6.00	7.44	39.00
23:00:00	1.00	1.00							1.00	1.00	17.25	49.00	1.00	1.00	2.50	4.00	7.18	49.00
23:30:00	1.67	3.00							1.00	1.00	6.00	9.00			3.50	6.00	3.70	9.00
0:00:00											11.75	26.00			8.00	14.00	10.50	26.00
0:30:00	1.50	2.00							1.00	1.00	11.00	36.00			3.00	3.00	6.38	36.00
BUS002	**1.00**	**1.00**	**1.25**	**2.00**	**1.00**	**1.00**			**1.50**	**2.00**	**3.95**	**17.00**			**41.98**	**45.00**	**25.73**	**45.00**
1:00:00											1.00	1.00			32.25	45.00	26.00	45.00
1:30:00			1.00	1.00											42.67	45.00	32.25	45.00
2:00:00			2.00	2.00							6.00	6.00			42.67	45.00	27.20	45.00
2:30:00											1.00	1.00			42.67	45.00	32.25	45.00
3:00:00											4.00	4.00			42.67	45.00	33.00	45.00
3:30:00	1.00	1.00									12.00	12.00			42.67	45.00	28.20	45.00
4:00:00											17.00	17.00					17.00	17.00
4:30:00									1.00	1.00							1.00	1.00
18:00:00											5.00	5.00					5.00	5.00
18:30:00											14.00	14.00					14.00	14.00
19:00:00									1.00	1.00							1.00	1.00
19:30:00			1.00	1.00	1.00	1.00					1.00	1.00					1.00	1.00
20:00:00											3.00	3.00			44.00	45.00	30.33	45.00
20:30:00											1.00	1.00			44.00	45.00	22.50	45.00
21:00:00											1.50	2.00			44.00	45.00	22.75	45.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
21:30:00			1.00	1.00					1.50	2.00					44.00	45.00	18.40	45.00
22:00:00									2.00	2.00	1.50	2.00			42.67	45.00	22.17	45.00
22:30:00					1.00	1.00			2.00	2.00					42.67	45.00	26.20	45.00
23:00:00															42.67	45.00	42.67	45.00
23:30:00											1.00	1.00			42.67	45.00	26.00	45.00
0:00:00															42.67	45.00	42.67	45.00
0:30:00											1.00	1.00			42.67	45.00	32.25	45.00
BUS003			**1.25**	**2.00**							**1.00**	**1.00**					**1.20**	**2.00**
18:00:00			2.00	2.00													2.00	2.00
18:30:00			1.00	1.00													1.00	1.00
20:00:00											1.00	1.00					1.00	1.00
21:00:00			1.00	1.00													1.00	1.00
23:00:00			1.00	1.00													1.00	1.00
BUS004	**1.50**	**2.00**	**1.71**	**4.00**	**1.33**	**2.00**			**1.00**	**1.00**	**4.39**	**15.00**	**1.00**	**1.00**	**2.50**	**5.00**	**3.00**	**15.00**
1:00:00			2.00	2.00							3.00	3.00	1.00	1.00			2.00	3.00
1:30:00	2.00	2.00	2.00	2.00							4.00	4.00					2.67	4.00
2:00:00	1.00	1.00															1.00	1.00
2:30:00					1.00	1.00			1.00	1.00	2.00	2.00					1.33	2.00
3:00:00			1.00	1.00							2.00	2.00					1.50	2.00
3:30:00											3.00	3.00					3.00	3.00
4:00:00											3.00	3.00					3.00	3.00
18:00:00			1.00	1.00													1.00	1.00
19:00:00															2.00	2.00	2.00	2.00
19:30:00			1.00	1.00							4.50	8.00			2.00	2.00	3.00	8.00
20:00:00			4.00	4.00	1.00	1.00			1.00	1.00	15.00	15.00					5.25	15.00
20:30:00					2.00	2.00					1.00	1.00					1.50	2.00
21:00:00											3.00	3.00					3.00	3.00
21:30:00											4.00	4.00					4.00	4.00
22:00:00			1.00	1.00							15.00	15.00			1.00	1.00	5.67	15.00
22:30:00											3.00	3.00					3.00	3.00
23:00											2.00	2.00					2.00	2.00
23:30:00											4.00	4.00					4.00	4.00
0:00:00											3.00	3.00			5.00	5.00	4.00	5.00
0:30:00											3.00	3.00					3.00	3.00
BUS005	**1.60**	**5.00**	**1.00**	**1.00**	**1.00**	**1.00**			**1.33**	**2.00**	**3.94**	**10.00**			**1.50**	**3.00**	**2.50**	**10.00**
1:00:00	1.00	1.00									2.00	2.00					1.50	2.00
1:30:00	1.00	1.00							1.00	1.00	3.00	3.00					1.67	3.00
2:00:00	1.00	1.00									6.00	6.00					2.67	6.00
2:30:00	1.00	1.00							2.00	2.00	3.00	3.00					2.00	3.00
3:00:00			1.00	1.00							10.00	10.00					5.50	10.00
3:30:00											1.00	1.00			1.00	1.00	1.00	1.00
19:30:00											2.00	2.00			1.00	1.00	1.50	2.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
20:00:00									1.00	1.00	8.00	8.00					4.50	8.00
20:30:00	1.00	1.00									3.00	3.00					2.00	3.00
21:00:00	1.00	1.00			1.00	1.00					2.00	3.00			1.00	1.00	1.33	3.00
21:30:00											8.00	8.00					8.00	8.00
22:00:00	1.00	1.00									4.00	4.00			2.00	2.00	2.33	4.00
22:30:00			1.00	1.00							4.00	4.00					2.50	4.00
23:00:00	5.00	5.00									5.00	5.00					5.00	5.00
23:30:00											2.00	2.00			3.00	3.00	2.50	3.00
0:00:00															1.00	1.00	1.00	1.00
0:30:00	3.00	3.00									2.00	2.00					2.50	3.00
BUS006	**1.95**	**5.00**	**1.60**	**4.00**	**2.14**	**8.00**			**2.37**	**16.00**	**4.44**	**55.00**			**12.80**	**20.00**	**4.27**	**55.00**
1:00:00	1.50	2.00	3.00	4.00					2.00	2.00	2.25	3.00			10.50	20.00	3.73	20.00
1:30:00	1.50	2.00	2.00	2.00					1.00	1.00	2.25	4.00			20.00	20.00	3.89	20.00
2:00:00	1.50	2.00	1.33	2.00							2.00	3.00			20.00	20.00	3.50	20.00
2:30:00	2.00	2.00	1.50	2.00							1.75	3.00			20.00	20.00	4.00	20.00
3:00:00	2.00	3.00	2.00	2.00							1.67	3.00			20.00	20.00	3.89	20.00
3:30:00	2.75	5.00	2.00	2.00					1.00	1.00	2.33	3.00			20.00	20.00	3.82	20.00
4:00:00	3.00	5.00									3.00	4.00					3.00	5.00
4:30:00	1.00	1.00							3.00	3.00	3.00	3.00					2.33	3.00
5:00:00	5.00	5.00							3.00	3.00							4.00	5.00
17:30:00			2.00	2.00					2.00	2.00	55.00	55.00					19.67	55.00
18:00:00			1.00	1.00	1.00	1.00			1.00	1.00	15.00	15.00					3.33	15.00
18:30:00	2.00	2.00			1.00	1.00			2.00	2.00	22.50	28.00					8.50	28.00
19:00:00	2.00	3.00	1.00	1.00					16.00	16.00	21.00	21.00					8.40	21.00
19:30:00	3.00	3.00			1.00	1.00			3.00	3.00	2.50	4.00					2.43	4.00
20:00:00	2.00	2.00							1.00	1.00	5.25	13.00			3.00	5.00	3.75	13.00
20:30:00	2.33	4.00	2.00	2.00	8.00	8.00			1.50	2.00	7.00	16.00			11.50	20.00	5.46	20.00
21:00:00	2.00	2.00	1.00	1.00	2.00	2.00			1.50	2.00	3.25	7.00			11.00	20.00	3.67	20.00
21:30:00	1.20	2.00	1.00	1.00							2.50	5.00			11.50	20.00	3.15	20.00
22:00:00	1.50	2.00	1.50	2.00	1.00	1.00			1.00	1.00	3.20	5.00			7.67	20.00	3.36	20.00
22:30:00	2.00	3.00	1.50	2.00							1.67	3.00			20.00	20.00	4.00	20.00
23:00:00	1.00	1.00	2.00	2.00							1.50	3.00			10.50	20.00	3.75	20.00
23:30:00	2.00	2.00	2.00	2.00							1.80	3.00			10.50	20.00	3.60	20.00
0:00:00	1.00	1.00	1.50	2.00					1.00	1.00	2.33	3.00			20.00	20.00	3.67	20.00
0:30:00			1.50	2.00							3.75	7.00			20.00	20.00	5.43	20.00
BUS007	1.25	2.00	1.50	4.00											2.67	4.00	1.69	4.00
19:00:00															3.00	3.00	3.00	3.00
19:30:00			1.00	1.00											4.00	4.00	2.50	4.00
20:30:00			1.00	1.00													1.00	1.00
21:00																		
21:00:00			1.00	1.00													1.00	1.00
21:30:00			4.00	4.00													4.00	4.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
22:00:00	1.00	1.00	1.00	1.00													1.00	1.00
22:30:00	1.00	1.00															1.00	1.00
23:30:00			1.00	1.00													1.00	1.00
0:30:00	2.00	2.00													1.00	1.00	1.50	2.00
BUS008	**1.13**	**2.00**	**1.60**	**7.00**	**1.00**	**1.00**			**1.00**	**1.00**	**2.44**	**10.00**			**2.21**	**9.00**	**1.84**	**10.00**
1:00:00			1.00	1.00					1.00	1.00	6.00	6.00					2.25	6.00
1:30:00									1.00	1.00	2.00	3.00			2.00	2.00	1.60	3.00
2:00:00	1.00	1.00									1.00	1.00			3.00	3.00	1.67	3.00
2:30:00			1.00	1.00							1.00	1.00					1.00	1.00
3:00:00											6.00	6.00					6.00	6.00
3:30:00	1.00	1.00	1.00	1.00	1.00	1.00					1.50	2.00					1.17	2.00
4:00:00			2.00	2.00							1.00	1.00					1.33	2.00
17:30:00	1.00	1.00															1.00	1.00
18:00:00	2.00	2.00															2.00	2.00
18:30:00											1.00	1.00					1.00	1.00
20:00:00			1.00	1.00							10.00	10.00					5.50	10.00
20:30:00	1.00	1.00	4.00	7.00	1.00	1.00					2.00	2.00			1.00	1.00	2.00	7.00
21:00:00			1.00	1.00	1.00	1.00					2.00	2.00			1.00	1.00	1.20	2.00
21:30:00			1.00	1.00							1.00	1.00			1.00	1.00	1.00	1.00
22:00:00											2.00	2.00					2.00	2.00
22:30:00			1.00	1.00											1.00	1.00	1.00	1.00
23:00:00															2.00	2.00	2.00	2.00
23:30:00			1.00	1.00							1.00	1.00			2.50	4.00	1.75	4.00
0:00:00			1.50	2.00											5.50	9.00	3.50	9.00
0:30:00	1.00	1.00	2.00	2.00	1.00	1.00									1.50	2.00	1.40	2.00
BUS009	**1.43**	**3.00**	**2.00**	**4.00**			**1.00**	**1.00**	**3.00**	**3.00**	**1.50**	**3.00**			**1.60**	**3.00**	**1.66**	**4.00**
1:00											2.00	2.00					2.00	2.00
1:30:00	2.00	2.00													2.50	3.00	2.33	3.00
2:00:00	3.00	3.00													1.00	1.00	2.00	3.00
2:30:00									3.00	3.00							3.00	3.00
3:00:00			2.00	2.00							1.00	1.00					1.50	2.00
18:00:00											1.00	1.00					1.00	1.00
18:30:00			2.00	2.00													2.00	2.00
19:30:00			1.00	1.00													1.00	1.00
20:00:00											1.00	1.00					1.00	1.00
20:30:00			1.00	1.00													1.00	1.00
21:00:00	1.00	1.00															1.00	1.00
21:30:00	1.00	1.00	4.00	4.00							3.00	3.00					2.67	4.00
22:00:00	1.00	1.00	2.50	4.00			1.00	1.00			1.00	1.00					1.60	4.00
22:30:00	1.00	1.00													1.00	1.00	1.00	1.00
23:00:00	1.00	1.00					1.00	1.00									1.00	1.00
0:30:00			1.00	1.00											1.00	1.00	1.00	1.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
BUS010	**1.67**	**3.00**	**1.33**	**2.00**							**1.00**	**1.00**			**1.00**	**1.00**	**1.31**	**3.00**
1:00:00															1.00	1.00	1.00	1.00
1:30:00			1.00	1.00													1.00	1.00
2:00:00			1.00	1.00							1.00	1.00					1.00	1.00
20:30:00	1.00	1.00	2.00	2.00							1.00	1.00					1.33	2.00
21:00:00	1.00	1.00															1.00	1.00
22:00:00			2.00	2.00													2.00	2.00
23:00:00			1.00	1.00													1.00	1.00
23:30:00	3.00	3.00															3.00	3.00
0:00:00															1.00	1.00	1.00	1.00
0:30:00			1.00	1.00													1.00	1.00
BUS011	**1.00**	**1.00**	**2.00**	**4.00**					**1.67**	**3.00**	**2.61**	**11.00**	**1.00**	**1.00**	**2.83**	**8.00**	**2.45**	**11.00**
1:00:00											1.00	1.00					1.00	1.00
1:30:00															3.00	3.00	3.00	3.00
2:00:00											2.00	2.00			1.00	1.00	1.50	2.00
2:30:00			1.00	1.00							3.50	6.00					2.67	6.00
3:00:00											2.00	2.00					2.00	2.00
3:30:00											2.50	4.00					2.50	4.00
4:00:00											5.00	5.00					5.00	5.00
18:00:00															1.00	1.00	1.00	1.00
18:30:00			4.00	4.00							2.00	2.00					3.00	4.00
19:00:00											4.00	4.00					4.00	4.00
19:30:00											1.00	1.00					1.00	1.00
20:00:00	1.00	1.00	2.00	2.00							6.00	11.00	1.00	1.00			3.67	11.00
20:30:00									3.00	3.00	3.00	5.00					3.00	5.00
21:00:00			2.00	2.00							2.33	5.00			1.50	2.00	2.00	5.00
21:30:00	1.00	1.00	1.00	1.00							1.50	2.00			3.00	3.00	1.60	3.00
22:00:00											1.00	1.00			8.00	8.00	4.50	8.00
22:30:00			2.00	2.00							2.50	4.00			2.67	5.00	2.50	5.00
23:00:00									1.00	1.00	1.67	3.00					1.50	3.00
23:30:00									1.00	1.00	1.00	1.00			6.00	6.00	2.25	6.00
0:20:00											2.00	2.00			1.00	1.00	1.50	2.00
BUS012															**1.00**	**1.00**	**1.00**	**1.00**
18:30:00															1.00	1.00	1.00	1.00
Grand Total	**3.45**	**23.00**	**2.00**	**26.00**	**1.40**	**8.00**	**1.11**	**2.00**	**2.82**	**150.00**	**11.37**	**2000.00**	**1.00**	**1.00**	**12.95**	**61.00**	**7.95**	**2000.00**



Attachment 4 (RSD) - Appendix M

Desktop Assessment of Short Range Endemic Fauna

Desktop assessment of Short Range Endemic Fauna for a Proposed Wind Farm in Scott River – Western Australia.



Report by *Invertebrate Solutions Pty Ltd*
for SynergyRED Pty Ltd

September 2024

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Prepared for: SynergyRED Pty Ltd

Frontispiece: The windfarm at Sandpatch near Albany

Image Copyright Invertebrate Solutions 2024.

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Executive Summary

SynergyRED Pty Ltd (SynergyRED) are proposing to develop and construct an onshore wind farm in the Scott River Region (the Project). The subject site is approximately 15 km northeast of the town of Augusta within the South West region of Western Australia. SynergyRED proposes to construct up to 20 wind turbines (total maximum capacity of up to 100MW across the site). The indicative locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment.

Turbine foundations vary in size dependent upon the imposed loading, ground conditions, construction methodology and drainage requirements of the subject site. It is anticipated that each turbine will require approximately 600 - 800m³ of buried reinforced concrete foundation. This will be confirmed through the detailed design phase as turbine manufacturers have individual foundation requirements that must be adhered to (considering geotechnical conditions and the turbine model).

The wind turbine sites are planned to be in existing farmland areas, and excavations up to five metres below ground level are anticipated for the turbine bases and associated temporary dewatering. Invertebrate Solutions Pty Ltd (Invertebrate Solutions) has been engaged by SynergyRED to undertake a desktop assessment for Short Range Endemic (SRE) invertebrates for the Project.

The Desktop Study Area contains seven Confirmed SRE species, five Likely, and one Possible SRE species, however, the majority of these taxa are known to occur only within the LNR, where moist habitat isolates that foster the presence of SRE taxa are prevalent. The Development Envelope occurs mainly on cleared or highly modified landscapes, does not contain substantial freshwater streams and the native vegetation it does contain is widespread in the landscape and does not form habitat isolates, thus limiting the likely presence of such taxa. All Confirmed or Likely SRE species, or any conservation significant invertebrates are considered to have a Low or Very Low likelihood of occurrence within the Development Envelope.

No further investigation for SRE or conservation significant invertebrates is considered necessary in order to meet 'Technical guidance - Sampling of short range endemic invertebrate fauna' (EPA 2016).

1. Introduction

SynergyRED Pty Ltd (SynergyRED) are proposing to develop and construct an onshore wind farm in the Scott River Region (the Project). The subject site is approximately 15 km northeast of the town of Augusta within the South West region of Western Australia. SynergyRED proposes to construct up to 20 wind turbines (total maximum capacity of up to 100MW across the site). The indicative locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment.

Turbine foundations vary in size dependent upon the imposed loading, ground conditions, construction methodology and drainage requirements of the subject site. It is anticipated that each turbine will require approximately 600 - 800m³ of buried reinforced concrete foundation. This will be confirmed through the detailed design phase as turbine manufacturers have individual foundation requirements that must be adhered to (considering geotechnical conditions and the turbine model).

The wind turbine sites are planned to be in existing farmland areas, and excavations up to five metres below ground level are anticipated for the turbine bases and associated temporary dewatering. Invertebrate Solutions Pty Ltd (Invertebrate Solutions) has been engaged by SynergyRED to undertake a desktop assessment for Short Range Endemic (SRE) invertebrates for the Development envelope in accordance with Technical Guidance Sampling of short range endemic invertebrate fauna (EPA 2016).

1.1 Purpose of this Report

Invertebrate Solutions was engaged to undertake the following scope of works for the proposed Scott River Windfarm, south west Western Australia:

- Undertake a desktop assessment for SRE invertebrates to identify known SRE fauna in the area, as well as habitats in which they are likely to occur.
- Summarise previous SRE fauna surveys for the Development Envelope and other relevant studies from the region as part of the desktop assessment.
- Provide all spatial data in electronic format and data packages in accordance with the Index of Biodiversity Surveys for Assessments (IBSA) (EPA 2018).
- The desktop assessment will be undertaken with regard to Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

1.2 Background Environmental Information

The Project is located approximately 15 km northeast of Augusta, Western Australia (Figure 1).

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information (DCCEEW 2022). The Project is located within the Warren bioregion and a very small area in the north within the Southern Jarrah Forest subregion. The

Development Envelope is predominately comprised of dissected undulating country of the Leeuwin Complex and Albany Orogen with loamy soils supporting Karri forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting paperbark/sedge swamps, and Holocene marine dunes with *Agonis flexuosa* woodlands. (Environment Australia 2000).

The land tenure for the Development Envelope is private freehold, across various landowners. The localised climate is classified as moderate Mediterranean with an average annual rainfall of 948 mm recorded at the Bureau of Meteorology (BoM) Station 009518 at Cape Leeuwin (BoM 2024), located 40 km south of the Development Envelope. Annual rainfall is seasonal with most rainfall occurring during the winter months, linked to low pressure systems in the Southern Ocean (May to August) (Plate 1).

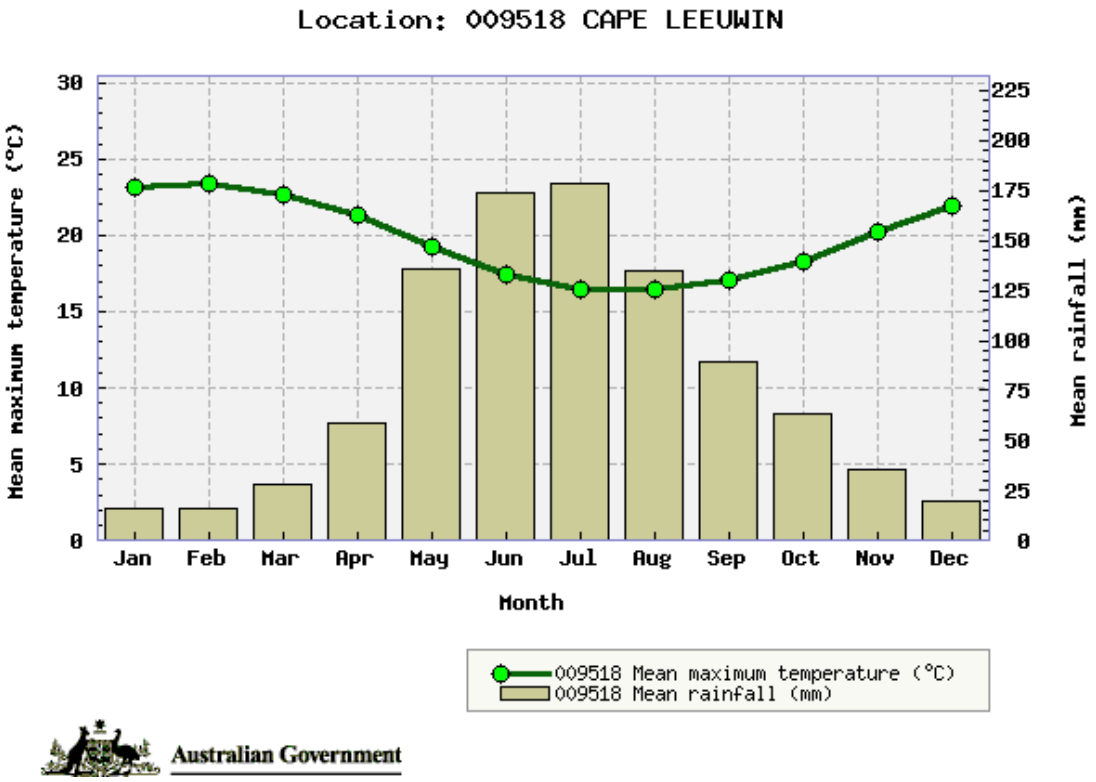
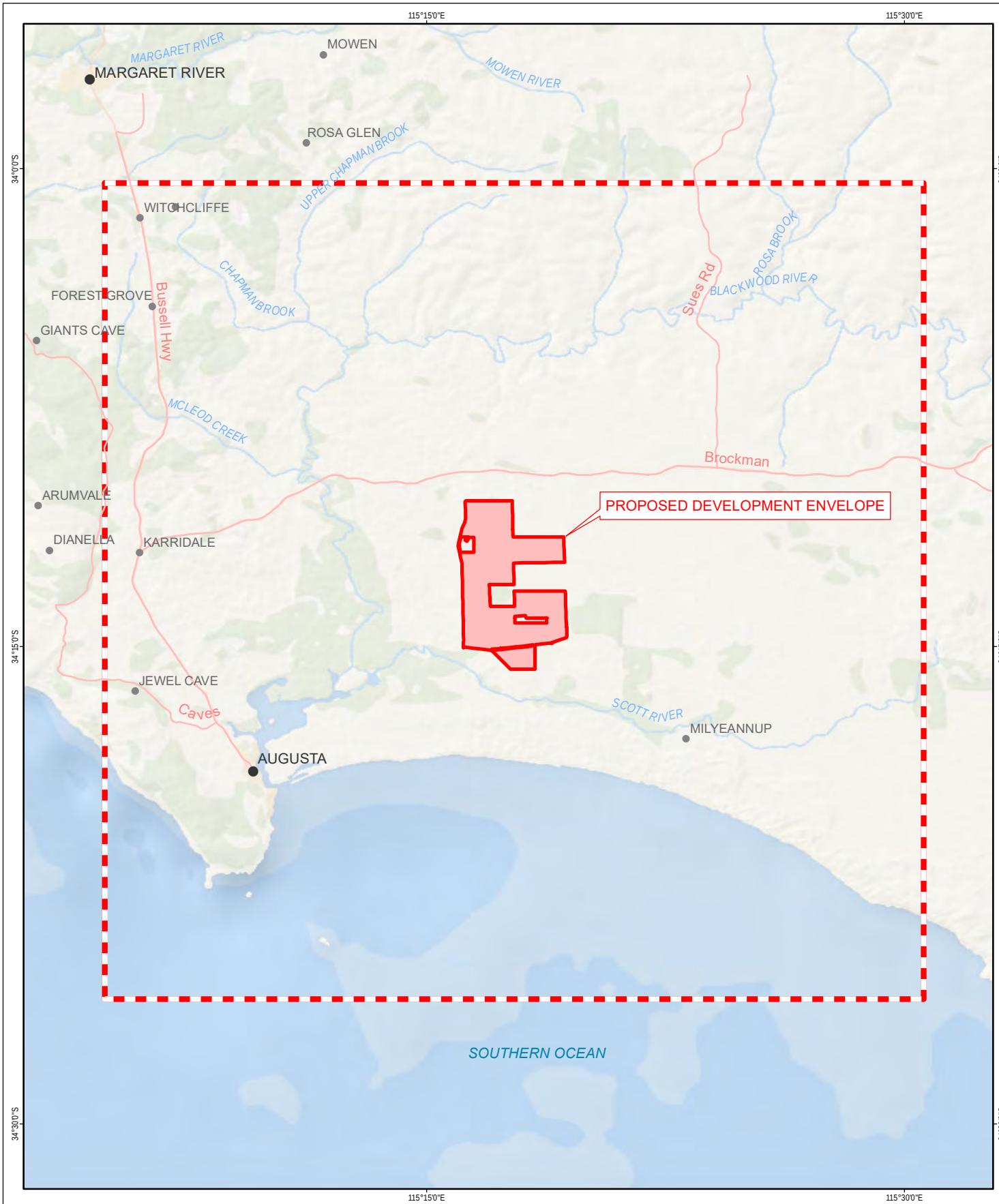


Plate 1 Cape Leeuwin long term climate data (After BOM.gov.au).



Legend

- Dekstop Study Area
- Proposed Development Envelope

0 2.5 5 10 km

Scale: 1:300,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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HORIZONTAL DATUM & PROJECTION	DATE
GDA2020	5/08/2024

PROJECT
Scott River Wind Farm

CREATED	CHECKED	APPROVED	REVISION
ENVIRONMAPS	TM	TM	0

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Figure 1

Proposed Scott River Windfarm Location and Desktop Study Area

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C:\GIS\Jobs\Invertebrate Solutions\Scott River Wind Farm\Figures\SRWF_F01 Proposed Scott River Windfarm Location and Desktop Study Area_240805.mxd

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1.3 Introduction to SRE fauna

SRE invertebrates are species with restricted distributions. The isolation of invertebrates in specific habitats or bioregions leads to endemism at various spatial scales. The vast majority of invertebrates are capable of dispersing substantial distances at some phase of their life cycle. Some groups, however, are susceptible to short-range endemism which describes endemic species with restricted ranges, arbitrarily defined in Western Australia as less than 10,000 km^2 (100 km x 100 km) (Harvey 2002). Taxa that have been more commonly found to contain SRE representatives include:

- Onychophorans (velvet worms);
- Crustaceans (Isopoda);
- Arachnids (mygalomorph spiders, pseudoscorpions, opiliones, scorpions, schizomids);
- Myriapods (millipedes and centipedes);
- Molluscs (land snails); and
- Insects (hemipterans, grasshoppers, butterflies).

SRE invertebrate fauna taxa are generally found in sheltered, relatively mesic environments such as isolated habitats (e.g., boulder piles, isolated hills, dense patches of vegetation, gullies) and can include microhabitats within these environments such as deep leaf litter accumulation, large logs, under bark, cave areas, and springs and permanent water bodies.

Many processes contribute to taxa being susceptible to short range endemism. Generally, these factors are related to the isolation of a species which can include the ability and opportunity to disperse, life history, physiology, habitat requirements, and habitat availability. Taxa that exhibit short range endemism generally exhibit poor dispersal, low growth rates, low fecundity, and reliance on habitat types that are discontinuous (Harvey 2002). Taxa that reside within easily isolated habitats surrounded by physical barriers such as islands, mountains, aquifers, lakes and caves are also more susceptible to becoming SRE species, often including additional taxa not otherwise generally forming SREs.

Taxa that exhibit short range endemism are particularly vulnerable to disturbance, either natural or anthropogenic, as they are reliant upon specialised, often restricted and often moist habitats (Framenau *et al*. 2008). SRE taxa are unable to disperse to *refugia* when their habitats are threatened or destroyed, thus making them a priority for conservation efforts.

The allocation of SRE status can be difficult due to the often incomplete taxonomic framework of many invertebrate groups and the often frequent need for substantial revision to enable accurate identification. SRE status is assigned using the categories described in Table 1, based upon the available information from the Western Australian Museum (WAM) database and discussion with appropriate taxonomic authorities for various invertebrate groups. Insufficient information exists for many invertebrate species due to specimens being juvenile, the wrong sex to allow identification, or damaged, as well as inadequate taxonomic frameworks, precluding the assignment of SRE status.

Table 1 Short Range Endemic Status of Species

SRE Status	Definition
Confirmed	A confirmed SRE species. A known distribution of < 10,000 km^2 (after Harvey 2002). Taxonomy of the group is well known. The group is well represented in collections, or via comprehensive sampling.
Likely	Likely to be an SRE species based upon knowledge of the family/genus, where other closely related species show evidence of short range endemism. Where habitats containing the specimens show discontinuity within the landscape.
Possible	Based upon existing knowledge of the genus / family there is a possibility that the species may have a restricted range. Where habitats containing the specimens may show discontinuity within the landscape. Possible SRE species may be assigned one of the subcategories below: A. Data deficient, i.e., new species; lack of distribution, taxonomic or collecting knowledge; juvenile specimens; wrong sex for identification B. Habitat indicators C. Morphology indicators D. Molecular evidence E. Research and expertise of WAM staff/taxonomic specialists
Widespread	Not an SRE, a wide ranging distribution of > 10,000 km^2

1.4 Conservation Legislation and Guidance Statements

Terrestrial SRE species are protected under state legislation via the *Biodiversity Conservation Act 2016* (BC Act) which came into effect on 1st January 2019, replacing the *Wildlife Conservation Act 1950* (WC Act). The BC Act is aligned with the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The assessment of SRE fauna for environmental impact assessment (EIA) is undertaken in Western Australia with regard to Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

At the State level, the BC Act provides a list of threatened species that have special protection as species listed under Part 2 of BC Act. This notice is updated periodically by the Department of Biodiversity, Conservation and Attractions (DBCA) (formerly the Department of Parks and Wildlife (DPaW) and the current list (October 2022) includes numerous threatened SRE species from the Wheatbelt, South Coast, Murchison and Pilbara regions. Included in the list are crustaceans, arachnids and myriapods that are considered to be "rare or likely to become extinct, as critically endangered fauna, or are declared to be fauna that is in need of special protection" (DBCA 2022).

In addition to the specially protected fauna, DBCA also maintains a list of Priority fauna that are considered to be of conservation significance but do not meet the criteria for formal listing under the BC Act. Priority is not a listing category under the BC Act, however, all fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (DBCA 2022). Species that may possibly be threatened but do not meet the criteria for formal listing under the BC Act because of data deficiencies, are added to the Priority Fauna List under Priorities 1, 2 or 3, in order of prioritisation for evaluation of conservation status so that consideration can be given to

potential listing as threatened DBCA (2022). Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. The Priority fauna list is irregularly updated by DBCA. The South West region contains thirteen conservation significant spiders, burrowing crayfish, and crickets, along with various aquatic snails.

The BC Act provides the ability for the state government of WA to formally list Threatened Ecological Communities (TECs), and Priority Ecological Communities (PECs) along with threatening processes.

The federal EPBC Act also protects both species and ecological communities. Sixteen invertebrates are listed in Western Australia under the EPBC Act with five of these species being from the Southwest region of Western Australia.

1.5 Report Limitations and Exclusions

This study was limited to the written scope provided to Eco Logical Australia Pty Ltd by Invertebrate Solutions (1st March 2024) and in Section 1.1. This study was limited to the extent of information made available to Invertebrate Solutions at the time of undertaking the work. Information not made available to this study, or which subsequently becomes available, may alter the conclusions made herein.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Invertebrate Solutions has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Invertebrate Solutions described in this report (this section and throughout this report). Invertebrate Solutions disclaims liability arising from any of the assumptions being incorrect.

Invertebrate Solutions has prepared this report on the basis of information provided by Eco Logical Australia Pty Ltd and others (including Government authorities), which Invertebrate Solutions has not independently verified or checked beyond the agreed scope of work. Invertebrate Solutions does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Site conditions may change after the date of this report. Invertebrate Solutions does not accept responsibility arising from, or in connection with, any change to the site conditions. Invertebrate Solutions is also not responsible for updating this report if the site conditions change.

2. Methods

Invertebrate Solutions undertook the following tasks for the desktop SRE assessment of the Desktop Study area, that contains the Development Envelope:

- SRE desktop assessment based upon WAM Records, database searches, and literature review.

The desktop assessment was undertaken with regard to the Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

2.1 SRE Desktop Methodology

The Desktop Study area comprises approximately 100,000 ha rectangle bounded by the northwest corner (34.007°S, 115.08°E) and the southeast corner (34.435°S, 115.51°E), centred on the Project.

A search of the WAM databases for Arachnids, Crustacea and Molluscs was undertaken for potential SRE taxa occurring in the Scott River region. The desktop assessment was used to identify any potential SRE species that may occur in the region within the Development Envelope.

The search of the WAM databases for potential SRE taxa occurring in the broader Desktop Study area was centred on the Project. The records held by the WAM are not exhaustive and represent only specimens within the WAM collections that have been registered in the database. The Entomology, Mollusc and Crustacean collections remain largely un-registered. Specimens identified to genus level only have been excluded from the analysis as it is impossible to determine if they represent a SRE taxa.

2.1.1 Likelihood of SRE invertebrate occurrence

The likelihood of SRE invertebrate species occurring in the Development Envelope was assessed using a combination of regional and local botanical and landform information and database searches including:

- Analysis of published and unpublished reports concerning SRE invertebrate from the region.
- Results from the Protected Matters Search Tool (PMST) (from the Federal Government's Department of Climate Change, Energy, and the Environment (DCCEEW) website.
- Records of fauna held by the WAM.
- Vegetation descriptions and mapping within the Biological Surveys and Wetland Mapping for the Beenup Wind Farm Project (Phoenix 2024).

The likelihood that a particular vegetation unit potentially contains or supports SRE species is defined in Table 2.

A list of conservation significant fauna for the Desktop Study Area was compiled from the DBCA Specially Protected Fauna Notice 2024 (DBCA 2024) and DCCEEW's PMST. Based on the analysis of all available information, potential SRE invertebrate species were assigned a level of likelihood to be present within habitats contained in the Study area of either 'Very Low', 'Low', 'Moderate', 'High', or 'Definite' (Table 3).

A full description of the BC Act and DBCA conservation codes are shown in Appendix 1.

Table 2 SRE habitat suitability definitions

SRE habitat Likelihood of occurrence	Definition
High	The habitat has a High likelihood of containing SRE species as it has at least three microhabitat factors that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation, or habitats known to contain SRE species.
Moderate	The habitat has a Moderate likelihood of containing SRE species as it has at least two microhabitat factors that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation or habitats known to contain SRE species.
Low	The habitat has a Low likelihood of containing SRE species as it has only a single microhabitat factor that support the presence of SRE species such as: SE facing slopes, moisture, rocky areas, habitat isolates, deep leaf litter, mountainous areas, deep gullies or gorges, riparian vegetation or habitats known to contain SRE species.
Nil	No potential habitat exists for SRE species within the vegetation type / condition area. This includes areas that are totally cleared, completely degraded or urbanised. This also includes areas that are dominated by weeds or exotic vegetation species.

Table 3 SRE and Conservation significant species likelihood of occurrence definitions

Short Range Endemic and Conservation significant invertebrate Likelihood of occurrence	Definition
Definite	The species is confirmed to occur within the Project Area.
High	Habitat for the species is known to occur within the Project Area and known records of the species are within 20 km.
Moderate	Habitat for the species is known to occur within the Project Area and known records of the species are within 50 km.
Low	The species has been recorded from within 50 km, however, no habitat is present for the species within the Project Area.
Very low	No habitat exists for the species within the Project Area and no records of the species are within 50 km or the distribution of the species is known well enough to exclude its presence within the Project Area.

2.2 Short Range Endemic Status

Taxonomic groups known to contain SRE representatives were examined in more detail to determine if SRE status is to be assigned. SRE status will be assigned after comparison with the morphology of other close relatives in the group and current knowledge on their distribution and ecology, where known.

3. Results

3.1 Terrestrial Invertebrates of South West Western Australia

Terrestrial invertebrate species in the south west region of WA that are of conservation interest to government and researchers are predominately arachnids and crustaceans that have been assigned a conservation significance by DBCA. Some conservation significant invertebrates are also considered to be SRE species and some invertebrates are SRE species but have no formal conservation significance. SRE species more commonly encountered in the south west region include mygalomorph spiders, slaters, and millipedes (Bamford 2008, Bennelongia 2013).

The Margaret River region is known to contain several conservation significant and SRE mygalomorph spiders, both from the bassian genus *Bertmaini*. *Bertmaini opimus* occurs throughout the south west corner of WA, whilst *B*. *tingle* occurs in a more restricted distribution near Walpole (Rix et al. 2015).

Several conservation significant Katydids, commonly known as tree crickets occur in the south west region including *Kawaniphila pachomai* (Priority 1), known from the Perth hills south to near Busselton, and *Pachysaga strobila*, known from remnant bushland near Vasse.

Three crayfish with both Federal and state conservation listings are known from the south west region, including two species of the burrowing crayfish *Engaewa (E. reducta and E. pseudoreducta)*, and the Margaret River Hairy Crayfish (*Cherax tenuimanus*).

3.2 SRE Habitat in Development Envelope

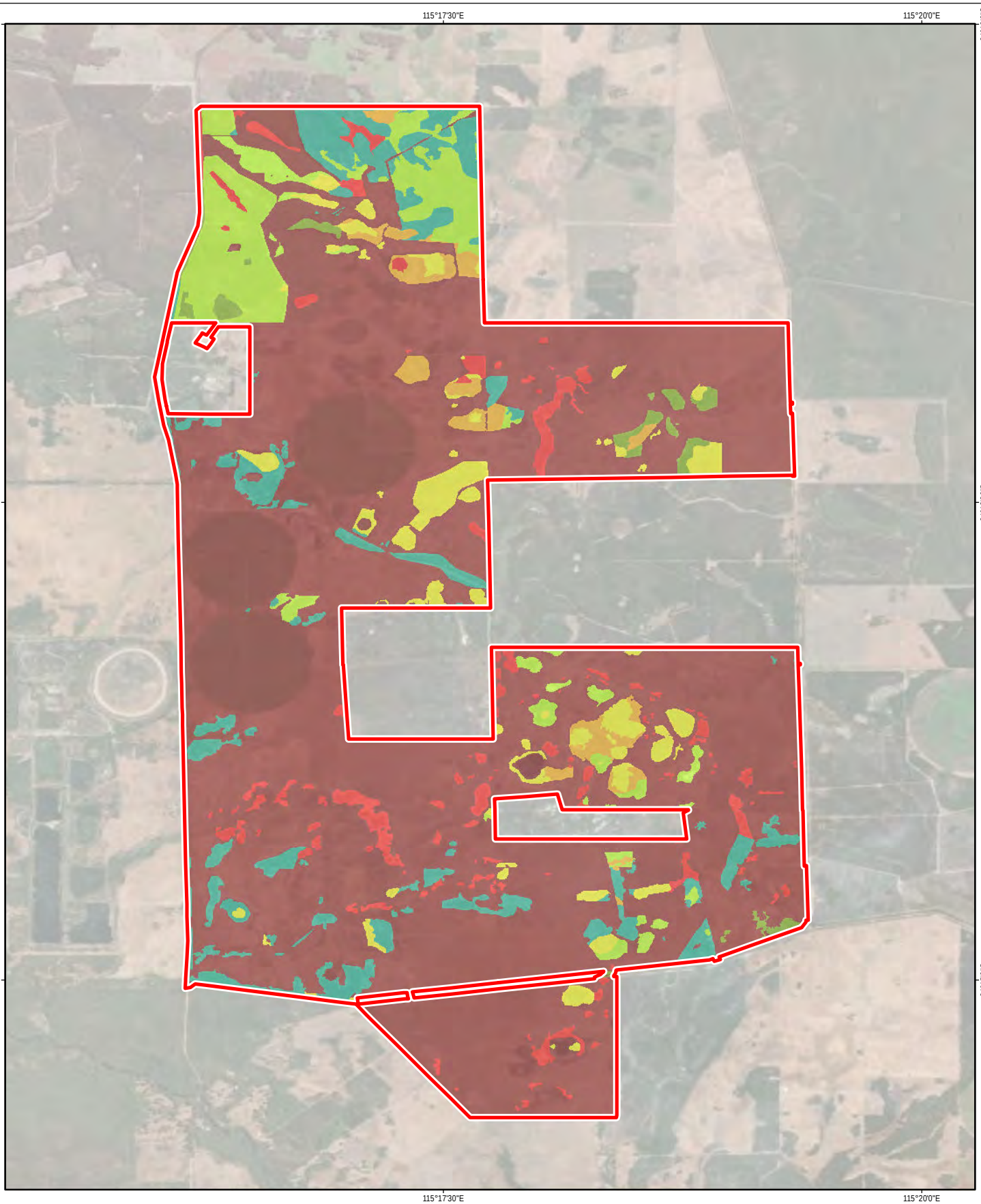
Habitat for SRE invertebrates was assessed using broad groupings associated with the vegetation types and descriptions contained in Phoenix Environmental (2024) to provide a likelihood of each habitat potentially containing SRE taxa (Table 2). Individual vegetation types from Phoenix Environmental (2024) were grouped according to SRE functional habitats, and to increase clarity for SRE habitat mapping where vegetation units are functionally the same for invertebrate usage with only minor differences in plant assemblages (Table 2, Table 3).

The Development Envelope comprises five potential SRE habitats, cleared land and plantation or modified landscapes (Phoenix Environmental 2024). The cleared and plantation/highly modified landscapes comprise 79.97 % of the total area thus the area of potential SRE invertebrate habitat is minimal within the Development Envelope.

The potential SRE habitats present within the Development Envelope are all continuous in the landscape and do not form habitat isolates present over evolutionary timescales in the regional landscape, and are therefore considered to be Low in their suitability for supporting SRE invertebrates (EPA 2016, Harvey 2002).

Table 4 SRE invertebrates habitat types, suitability, (Vegetation descriptions after Phoenix Environmental 2024).

SRE Habitat	Description	Phoenix Vegetation Codes	SRE habitat suitability
Shrublands over sedgelands	Myrtaceae-dominated shrublands over sedgelands	AsLs, TiLs, PeeLs	Low
Mixed shrublands over tall sedgelands	Mixed (Proteaceae/ Fabaceae/ Myrtaceae-dominated) shrublands over tall sedgelands	XpAs, XpMdLm, ClcVj	Low
Paperbark woodland swamps over sedgelands	*Melaleuca* spp. woodland swamps over rushlands/sedgelands	MrCh, MrTjLs, and XpMdLm	Low
Jarrah woodlands over shrublands	*Eucalyptus marginata* woodlands and forests over mixed shrublands over tall sedgelands	EmmAffMtAsDb, EmmXpMtDb, and EmmTpAs	Low
Jarrah-Marri woodlands over shrublands	*Corymbia calophylla* woodlands and forests over mixed shrublands over tall sedgelands	CcTpCeOh, CcTlXpAp, and EmmTpGoMtPu	Low
Modified landscapes	Plantations and 'Peppermint over pastures'	Egg, Psp and Aff	Nil
Cleared / Degraded	*Cleared or degraded land*		Nil



Legend

- Proposed Development Envelope

SRE Habitat Mapping

- Jarrah woodlands over shrublands: SRE Suitability Low
- Jarrah-Marri woodlands over shrublands: SRE Suitability Low
- Mixed shrublands over tall sedgelands: SRE Suitability Low
- Paperbark woodland swamps over sedgelands: SRE Suitability Low
- Shrublands over sedgelands: SRE Suitability Low
- Modified landscapes: SRE Suitability Nil
- Cleared / Degraded: SRE Suitability Nil

0 0.375 0.75 1.5 km

Scale: 1:50,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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Figure 2

SRE Habitat Mapping Based on Vegetation Mapping by Phoenix Environmental (2024)

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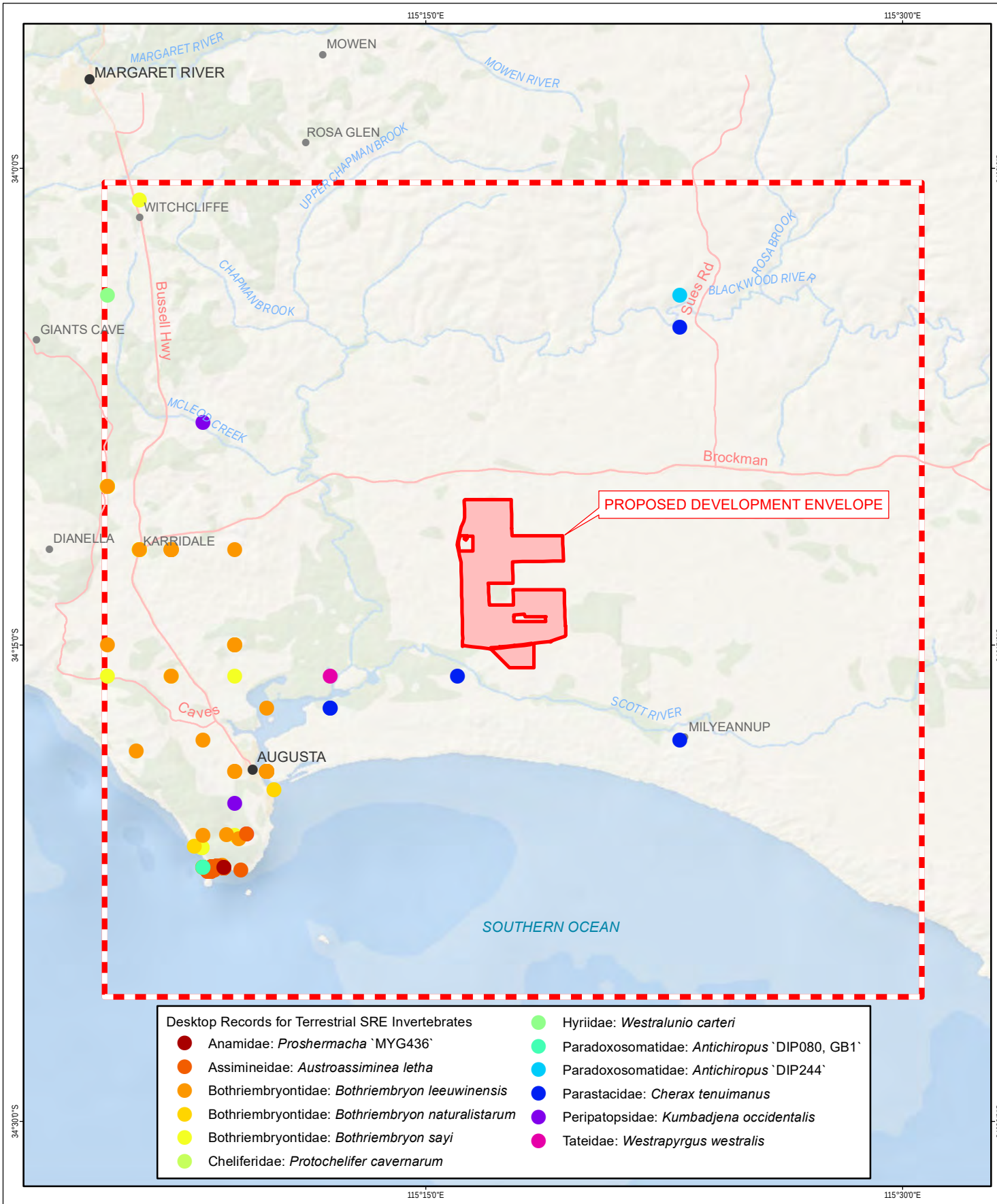

Legend

Dekstop Study Area

Proposed Development Envelope

0 2.5 5 10 km

Scale: 1:300,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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Figure 3

Desktop Records for Terrestrial SRE Invertebrates from WAM

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C:\GIS\Jobs\Invertebrate Solutions\Scott River Wind Farm\Figures\SRWF_F03 Desktop Records for Terrestrial SRE Invertebrates from WAM_240805.mxd

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3.3 Terrestrial Invertebrates within the Desktop Study Area

SRE species that are likely to occur or have known habitat within the Desktop Study Area are shown in Table 5 and Figure 3 along with their conservation code under the BC Act and/or the EPBC Act and their likelihood of occurrence within the Development envelope based on the SRE habitats present.

The PMST results listed no known terrestrial SRE or conservation significant invertebrate fauna within 50 km of the Development Envelope. The full list of species obtained from the PMST search is shown in Appendix 2. The WAM databases searches (WAM 2024a, b, c), filtered for SRE species are shown in Table 5.

Seven Confirmed SRE species, five Likely, and one Possible SRE species are known to occur within the Desktop Study Area (Table 5). The species are summarised below:

- Three land snails from the family Bothriembryontidae (*B. leeuwinensis*, *B. naturalistarum*, and *B. sayi*) – Confirmed SRE species.
- Three crayfish (*Cherax tenuimanus* [DBCA Vulnerable / EPBC Vulnerable], *Engaewa pseudoreducta* [DBCA Vulnerable / EPBC Vulnerable], and *Engaewa reducta* [DBCA Vulnerable / EPBC Vulnerable]) – Confirmed SRE species.
- One velvet worm (*Kumbadjena occidentalis*) – Confirmed SRE species.
- Two aquatic snails (*Austroassiminea letha* [DBCA Vulnerable], and *Westrapyrgus westralis*) – Likely SRE species.
- Two *Antichiropus* millipedes (*Antichiropus 'DIP80/GB1'* and *Antichiropus 'DIP244')* – Likely SRE species
- One pseudoscorpion (*Protochelifer cavernarum*) – Likely SRE species.
- One mygalomorph spider (*Proshermacha* 'MYG434') – Possible SRE species.

The remaining species identified from desktop resources were found to be widespread (non-SRE species).

An additional single conservation significant invertebrate (widespread, non-SRE species) was identified in the desktop assessment:

- One freshwater mussel – *Westralunio carteri* (DBCA Vulnerable / EPBC Vulnerable)

The aquatic conservation significant invertebrates (*Westralunio carteri* along with *Cherax tenuimanus, Engaewa pseudoreducta, Engaewa reducta* and *Austroassiminea letha*), and the Likely aquatic SRE snail *Westrapyrgus westralis* do not have significant suitable habitat within the Development Envelope (Table 5) and are, therefore, considered to have a Very Low Likelihood of occurrence due to their reliance upon substantial permanent freshwater streams or lakes that are not present within the Development Envelope.

The remaining Confirmed, Likely and Possible SRE taxa are considered to have a Low, to Very Low likelihood of occurrence due to an absence of habitat within the Development Envelope and the distances to the nearest known records. Many of the potential SRE taxa that occur in the Desktop Study area are only known from the Cape Leeuwin area, and immediate surrounds and are highly unlikely to occur in the Development Envelope that is predominately cleared or highly modified.

Table 5 Desktop Survey Results of SRE and Conservation Significant invertebrates recorded from or with potential habitat within the Development envelope.

Higher Classification	Genus and Species	SRE status	DBCA / BC Act Conservation Status	EPBC Conservation Status	Likely habitat present in Development envelope	Desktop likelihood of species within the Development envelope
Onychophora						
Euonychophora						
Peripatopsidae	*Kumbadjena occidentalis*	Confirmed	-	-	Not present	Very Low
Gastropoda:						
Assimineidae	*Austroassiminea letha*	Likely	Vu	-	Not present	Very Low
Bothriembryontidae	*Bothriembryon leeuwinensis*	Confirmed	-	-	Not present	Low
	Bothriembryon naturalistarum	Confirmed	-	-	Not present	Low
	Bothriembryon sayi	Confirmed	-	-	Not present	Low
Hyriidae	*Westralunio carteri*	Widespread	Vu	Vu	Not present	Very Low
Tateidae	*Westrapyrgus westralis*	Likely	-	-	Not present	Very Low
Crustacea:						
Parastacidae	*Cherax tenuimanus*	Confirmed	CR	CR	Not present	Very Low
	Engaewa pseudoreducta	Confirmed	CR	CR	Not present	Very Low
	Engaewa reducta	Confirmed	EN	CR	Not present	Very Low
Arachnida:						
Araneae:						
Mygalomorphae						
Anamidae	*Proshermacha 'MYG436'*	Possible	-	-	Not present	Low
Pseudoscorpiones						
Cheliferidae	*Protochelifer cavernarum*	Likely	-	-	Not present	Low
Diplopoda: Polydesmida						
Paradoxosomatidae	*Antichiropus 'DIP80/GB1'*	Likely	-	-	Not present	Low
	Antichiropus 'DIP244'	Likely	-	-	Not present	Low

4. Discussion and Conclusions

The Desktop Study Area contains seven Confirmed SRE species, five Likely, and one Possible SRE species, however the majority of these taxa are known to occur only within the LNR, where moist habitat isolates that foster the presence of SRE taxa are prevalent. The Development Envelope occurs mainly on cleared or highly modified landscapes, does not contain substantial freshwater streams and the native vegetation it does contain is widespread in the landscape and does not form habitat isolates that have been present over evolutionary timescales, thus limiting the likely presence of such taxa. As such all Confirmed or Likely SRE species, or any conservation significant invertebrate are considered to have a Low or Very Low likelihood of occurrence within the Development Envelope.

No further investigation for SRE or conservation significant invertebrates is considered necessary in order to meet 'Technical guidance - Sampling of short range endemic invertebrate fauna' (EPA 2016).

5. References

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Western Australian Museum (WAM). (2024c). Mollusc database search July 2024.

Appendix 1

Conservation Codes from Department of Biodiversity, Conservation and Attractions

CONSERVATION CATEGORY DEFINITIONS

For Western Australian Fauna and Flora

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species.

Threatened flora is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species.

The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 2 that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria[3], and is based on the national distribution of the species.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

Examples of use:

- The western ringtail possum (*Pseudocheirus occidentalis*) is listed as a critically endangered threatened species under the *Biodiversity Conservation Act 2016.*
- Western ringtail possum is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CR.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.

Examples of use:

- *Caladenia hopperiana* is listed as an endangered threatened species under the *Biodiversity Conservation Act 2016.*
- *Caladenia hopperiana* is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EN.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Examples of use:

- The forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) is listed as a vulnerable threatened species under the *Biodiversity Conservation Act 2016.*
- Forest red-tailed black cockatoo is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: VU.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Examples of use:

- *Acacia kingiana* is listed as an extinct species under the *Biodiversity Conservation Act 2016.*
- *Acacia kingiana* is listed as extinct under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EX.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no fauna or flora species listed as extinct in the wild.

SP Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act cannot also be listed as specially protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA)[4], China (CAMBA)[5] or The Republic of Korea (ROKAMBA)[6], and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention)[7], an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Examples of use:

- The wedge-tailed shearwater (*Ardenna pacifica*) is listed as a specially protected migratory species under the *Biodiversity Conservation Act 2016.*
- Wedge-tailed shearwater is listed as migratory under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: MI.

CD **Species of special conservation interest (conservation dependent)**

Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Currently only fauna are listed as species of special conservation interest.

Examples of use:

- The wambenger, south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*) is listed as a specially protected species of special conservation interest under the *Biodiversity Conservation Act 2016.*
- Wambenger, south-western brush-tailed phascogale, is listed as conservation dependent under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CD.

OS **Species otherwise in need of special protection (other specially protected)**

Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Currently only fauna are listed as species otherwise in need of special protection.

Examples of use:

- The dugong (*Dugong dugon*) is listed as a specially protected species otherwise in need of special protection under the *Biodiversity Conservation Act 2016.*
- Dugon is listed as other specially protected fauna under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: OS.

P **Priority species**

Priority is not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of priority status is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 **Priority 1: Poorly-known species - known from few locations, none on conservation lands**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, for example, agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under immediate threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Borya stenophylla* is listed as a Priority 1 species by the Department of Biodiversity, Conservation and Attractions.
- *Borya stenophylla* is listed as Priority 1 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P1.

2 Priority 2: Poorly-known species - known from few locations, some on conservation lands

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, for example, national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Caladenia nivalis* is listed as a Priority 2 species by the Department of Biodiversity, Conservation and Attractions.
- *Caladenia nivalis* is listed as Priority 2 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P2.

3 Priority 3: Poorly-known species - known from several locations

Species that are known from several locations and the species does not appear to be under imminent threat or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.

Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.

Examples of use:

- *Acacia nitidula* is listed as a Priority 3 species by the Department of Biodiversity, Conservation and Attractions.
- *Acacia nitidula* is listed as Priority 3 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P3.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as a conservation dependent specially protected species.

(c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.

(d) Other species in need of monitoring.

Examples of use:

- *Banksia aculeata* is listed as a Priority 4 species by the Department of Biodiversity, Conservation and Attractions.
- *Banksia aculeata* is listed as Priority 4 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P4.

[1] The definition of flora includes algae, fungi, and lichens.

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

[3] Western Australia has assigned species to threat categories using the *IUCN Red List of Threatened Species Categories and Criteria* since 1996 (referencing all criteria).

[4] JAMBA - first included in the WA migratory species list in 1980.

[5] CAMBA - first included in the WA migratory species list in 2010.

[6] ROKAMBA - first included in the WA migratory species list in 2010.

[7] Bonn Convention (Birds) - first included in the WA migratory species list in 2015.

Appendix 2

Protected Matters Search Tool Results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 11-Jun-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	11
Listed Threatened Species:	104
Listed Migratory Species:	56

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	14
Commonwealth Heritage Places:	1
Listed Marine Species:	81
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	4
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	63
Regional Forest Agreements:	1
Nationally Important Wetlands:	3
EPBC Act Referrals:	46
Key Ecological Features (Marine):	3
Biologically Important Areas:	16
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Vasse-wonnerup system	Within 10km of Ramsar site	In buffer area only

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only
Commonwealth Marine Areas (EPBC Act)	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Aquatic Root Mat Community 1 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 2 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Aquatic Root Mat Community 4 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area	In buffer area only
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In buffer area only
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In buffer area only
Empodisma peatlands of southwestern Australia	Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
Scott River Ironstone Association	Endangered	Community likely to occur within area	In feature area
Shrublands on southern Swan Coastal Plain ironstones	Endangered	Community likely to occur within area	In buffer area only
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat may occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area
Zanda baudinii listed as Calyptorhynchus baudinii			
Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris			
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
CRUSTACEAN			
Cherax tenuimanus			
Hairy Marron, Margaret River Hairy Marron, Margaret River Marron [78931]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Engaewa pseudoreducta			
Margaret River Burrowing Crayfish [82674]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Engaewa reducta			
Dunsborough Burrowing Crayfish [82675]	Critically Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Galaxiella nigrostriata			
Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area	In feature area
Nannatherina balstoni			
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat known to occur within area	In feature area
Nannoperca pygmaea			
Little Pygmy Perch [88315]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
FROG			
[Anstisia alba listed as Geocrinia alba](#) White-bellied Frog, Creek Frog [92544]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Anstisia vitellina listed as Geocrinia vitellina](#) Orange-bellied Frog [92547]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Bettongia penicillata ogilbyi](#) Woylie [66844]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
[Myrmecobius fasciatus](#) Numbat [294]	Endangered	Species or species habitat known to occur within area	In feature area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pseudocheirus occidentalis](#) Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Setonix brachyurus](#) Quokka [229]	Vulnerable	Species or species habitat known to occur within area	In feature area
OTHER			
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In feature area
PLANT			
[Banksia mimica](#) Summer Honeypot [82765]	Endangered	Species or species habitat known to occur within area	In feature area
[Banksia nivea subsp. uliginosa](#) Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area	In feature area
[Banksia squarrosa subsp. argillacea](#) Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Boronia exilis](#) Scott River Boronia [64844]	Endangered	Species or species habitat known to occur within area	In feature area
[Brachyscias verecundus](#) Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
[Caladenia busselliana](#) Bussell's Spider-orchid [24369]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Caladenia excelsa](#) Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Caladenia harringtoniae](#) Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area	In feature area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat may occur within area	In buffer area only
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Darwinia ferricola Scott River Darwinia [56706]	Endangered	Species or species habitat known to occur within area	In feature area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area	In buffer area only
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat may occur within area	In buffer area only
Gastrolobium modestum Broad-leaved Gastrolobium [78361]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area	In feature area
Grevillea brachystylis subsp. australis [55525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grevillea brachystylis subsp. grandis Large-flowered Short-styled Grevillea [85001]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grevillea maccutcheonii McCutcheon's Grevillea [64522]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Kennedia lateritia Augusta Kennedia [45985]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat likely to occur within area	In feature area
Lambertia orbifolia Roundleaf Honeysuckle [15725]	Endangered	Species or species habitat known to occur within area	In feature area
Leptomeria dielsiana Diels' Currant Bush [5146]	Vulnerable	Species or species habitat known to occur within area	In feature area
Morelotia australiensis listed as Tetraria australiensis Southern Tetraria [92784]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Reedia spathacea Reedia [2995]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Verticordia densiflora var. pedunculata Long-stalked Featherflower [55689]	Endangered	Species or species habitat known to occur within area	In buffer area only
Verticordia plumosa var. ananeotes Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat known to occur within area	In buffer area only
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
SHARK			
Carcharias taurus (west coast population)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Centrophorus uyato			
Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Megaptera novaeangliae](#) Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area	In buffer area only
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat likely to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area	In buffer area only
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris alba Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area	In buffer area only
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52112]	WA	In buffer area only
Commonwealth Land - [52117]	WA	In buffer area only
Commonwealth Land - [51991]	WA	In buffer area only
Commonwealth Land - [51103]	WA	In buffer area only
Commonwealth Land - [52113]	WA	In buffer area only
Commonwealth Land - [51992]	WA	In buffer area only
Commonwealth Land - [51482]	WA	In buffer area only
Commonwealth Land - [50382]	WA	In buffer area only
Commonwealth Land - [51990]	WA	In buffer area only
Commonwealth Land - [51121]	WA	In buffer area only
Commonwealth Land - [50386]	WA	In buffer area only
Commonwealth Land - [51995]	WA	In buffer area only
Commonwealth Land - [50383]	WA	In buffer area only
Commonwealth Land - [51483]	WA	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Cape Leeuwin Lighthouse	WA	Listed place	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat likely to occur within area	In buffer area only
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Stercorarius antarcticus as Catharacta skua			
Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sternula nereis as Sterna nereis			
Fairy Tern [82949]		Breeding known to occur within area	In buffer area only
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalasseus bergii as Sterna bergii			
Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura australe			
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area	In buffer area only
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Mammal			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area	In buffer area only
Reptile			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
[Balaenoptera acutorostrata](#) Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area	In buffer area only
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In buffer area only
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area	In buffer area only
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area	In buffer area only
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area	In buffer area only
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area	In buffer area only
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area	In buffer area only
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In buffer area only
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area	In buffer area only
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area	In buffer area only

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories	Buffer Status
South-west Corner	National Park Zone (IUCN II)	In buffer area only
South-west Corner	National Park Zone (IUCN II)	In buffer area only
South-west Corner	Special Purpose Zone (Mining Exclusion) (IUCN VI)	In buffer area only
South-west Corner	Special Purpose Zone (Mining Exclusion) (IUCN VI)	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Blackwood River	National Park	WA	In buffer area only
Bramley	National Park	WA	In buffer area only
Chester	Nature Reserve	WA	In buffer area only
D'Entrecasteaux	National Park	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Easter	National Park	WA	In buffer area only
Fish Road	Nature Reserve	WA	In buffer area only
Flinders Bay	Nature Reserve	WA	In buffer area only
Forest Grove	National Park	WA	In buffer area only
Gingilup Swamps	Nature Reserve	WA	In buffer area only
Greater Beedelup	National Park	WA	In buffer area only
Haag	Nature Reserve	WA	In buffer area only
Hamelin Island	Nature Reserve	WA	In buffer area only
Hilliger	National Park	WA	In buffer area only
Leeuwin-Naturaliste	National Park	WA	In buffer area only
Milyeannup	National Park	WA	In buffer area only
Ngari Capes	Marine Park	WA	In buffer area only
NTWA Bushland covenant (0003)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0013)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0036)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0037)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0044C)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0065A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0065B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0069)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0116A)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0116B)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0130)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0144)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0147)	Conservation Covenant	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
NTWA Bushland covenant (0148)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0149)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0152)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0155)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0164)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0168)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0170)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0185)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0186)	Conservation Covenant	WA	In buffer area only
Pagett	Nature Reserve	WA	In feature area
Rapids	Conservation Park	WA	In buffer area only
Scott	National Park	WA	In feature area
Seal Island (WA25645)	Nature Reserve	WA	In buffer area only
St Alouarn Island	Nature Reserve	WA	In buffer area only
Stockdill Road	Nature Reserve	WA	In buffer area only
Sussex Location 2561	NRS Addition - Gazettal in Progress	WA	In buffer area only
Unnamed WA08910	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA12952	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA14567	Nature Reserve	WA	In buffer area only
Unnamed WA15185	Nature Reserve	WA	In buffer area only
Unnamed WA26065	Nature Reserve	WA	In buffer area only
Unnamed WA42377	Nature Reserve	WA	In feature area
Unnamed WA42942	Nature Reserve	WA	In buffer area only
Unnamed WA44676	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA44705	5(1)(g) Reserve	WA	In buffer area only
Unnamed WA45533	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA46400	National Park	WA	In buffer area only
Unnamed WA53843	National Park	WA	In buffer area only
Walburra	Nature Reserve	WA	In buffer area only
Whicher	National Park	WA	In buffer area only
Wiltshire-Butler	National Park	WA	In buffer area only
Yelverton	National Park	WA	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In feature area

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Blackwood River (Lower Reaches) and Tributaries System	WA	In buffer area only
Cape Leeuwin System	WA	In buffer area only
Gingilup-Jasper Wetland System	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Gnarabup Tourism Development: Resort and Beach Village	2022/09224		Assessment	In buffer area only
Gravel Extraction Project	2022/09278		Assessment	In buffer area only
Mara Team Testing Release 37 Dan	2024/09832		Referral Decision	In buffer area only
Mara Team Testing Release 37 Dan 2	2024/09836		Referral Decision	In buffer area only
Mara Team Testing Release 37 Dan 3	2024/09838		Referral Decision	In buffer area only
Controlled action				
Development Guide Plan for 46 ha Residential Subdivision	2008/4102	Controlled Action	Post-Approval	In buffer area only
Flat Rock boating facility	2008/4506	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Lot 32 Tom Cullity Drive, Wilyabrup	2020/8866	Controlled Action	Post-Approval	In buffer area only
Milyeannup Wind Farm	2009/4911	Controlled Action	Post-Approval	In buffer area only
Shark Hazard Mitigation Drum Line Program, WA	2014/7174	Controlled Action	Completed	In buffer area only
Tutunup South Mineral Sands Project	2007/3441	Controlled Action	Post-Approval	In buffer area only
Urban development, multiple lots Northerly Street, Vasse, WA	2019/8494	Controlled Action	Assessment Approach	In buffer area only
Vasse Diversion Drain Upgrade	2017/7932	Controlled Action	Post-Approval	In buffer area only
Vlam Road Gravel Pit, Vlam Road, Karridale, WA	2014/7141	Controlled Action	Post-Approval	In buffer area only
Wonnerup South Mineral Sands Project, Yalyalup, WA	2014/7135	Controlled Action	Post-Approval	In buffer area only
Yalyalup Mineral Sands Project, WA	2017/8094	Controlled Action	Post-Approval	In buffer area only
Yarragadee Water Supply Development	2005/2073	Controlled Action	Completed	In buffer area only
Yoongarillup Mineral Sands Project, WA	2012/6521	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Bussell Highway (Bramley Section) SLK Upgrade	2012/6511	Not Controlled Action	Completed	In buffer area only
Busselton-Margaret River Regional Airport Development Project, WA	2016/7675	Not Controlled Action	Completed	In buffer area only
Busselton to Flinders Bay Rails to Trails Project, WA	2013/6835	Not Controlled Action	Completed	In buffer area only
Busselton to Margaret River Transmission Line	2008/3964	Not Controlled Action	Completed	In buffer area only
Construction of the Margaret River bypass road	2012/6677	Not Controlled Action	Completed	In buffer area only
CTBT - Cape Leeuwin Hydroacoustic Station Proposal	2000/27	Not Controlled Action	Completed	In buffer area only
Geo-science Investigations	2005/2069	Not Controlled Action	Completed	In feature area
Gloucester Park Precinct-expansion of ovals and	2017/7985	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
community facilities, Margaret River, WA				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Installation of stock proof fencing and a stock crossing 8 km from Karridale WA	2012/6427	Not Controlled Action	Completed	In buffer area only
Jalbarragup Telecommunications Tower, WA	2017/8026	Not Controlled Action	Completed	In buffer area only
Nuttman Road, Busselton Gravel Extraction, WA	2017/8086	Not Controlled Action	Completed	In buffer area only
Proposed Expansion of Existing Gracetown Townsite & Upgrade of Existing Associa	2010/5358	Not Controlled Action	Completed	In buffer area only
Reinstating of Firebreaks at McLeod Creek, South West WA	2012/6402	Not Controlled Action	Completed	In buffer area only
Residential & Light Industrial Development, Vasse WA	2013/6932	Not Controlled Action	Completed	In buffer area only
Residential Development Riverslea Estate Stage 8, Margaret River, WA	2014/7227	Not Controlled Action	Completed	In buffer area only
Residential-Rural Subdivision, Lot 1 Kudardup Rd, Kudardup, WA	2012/6471	Not Controlled Action	Completed	In buffer area only
Vegetation clearing for sand extraction, Lot 268 Leeuwin Road, Augusta	2013/6860	Not Controlled Action	Completed	In buffer area only
West's gravel pit development, Cowaramup, WA	2015/7586	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Ambergate North Residential Development	2009/4802	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Clearing of understorey vegetation for fire management purposes	2010/5788	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Locations 2629, 2699 & 2991 - Jamisons Road	2002/771	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Waterloo to Busselton 132kV Transmission Line	2002/816	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Ambergate North Residential Community (4896 lots)	2008/4617	Referral Decision	Completed	In buffer area only
Construction of 14.5km 132kV transmission line	2009/4995	Referral Decision	Completed	In buffer area only
Controlled Burn	2001/440	Referral Decision	Completed	In buffer area only

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Ancient coastline at 90-120m depth	South-west	In buffer area only
Cape Mentelle upwelling	South-west	In buffer area only
Western rock lobster	South-west	In buffer area only

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna carneipes			
Flesh-footed Shearwater [82404]	Foraging (in high numbers)	Known to occur	In buffer area only
Eudyptula minor			
Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In buffer area only
Hydroprogne caspia			
Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In buffer area only
Larus pacificus			
Pacific Gull [811]	Foraging (in high numbers)	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Onychoprion anaethetus			
Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In buffer area only
Onychoprion fuscata			
Sooty Tern [82847]	Foraging	Known to occur	In buffer area only
Pelagodroma marina			
White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur	In buffer area only
Pterodroma macroptera macroptera			
Great-winged Petrel (macroptera race) [1035]	Foraging (provisioning young)	Known to occur	In buffer area only
Pterodroma mollis			
Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur	In buffer area only
Puffinus assimilis tunneyi			
Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In buffer area only
Sternula nereis			
Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In buffer area only
Thalassarche chlororhynchos bassi			
Indian Yellow-nosed Albatross [85249]	Foraging (in high numbers)	Known to occur	In buffer area only
Sharks			
Carcharodon carcharias			
White Shark [64470]	Foraging	Known to occur	In buffer area only
Whales			
Balaenoptera musculus brevicauda			
Pygmy Blue Whale [81317]	Distribution	Known to occur	In buffer area only
Megaptera novaeangliae			
Humpback Whale [38]	Migration (north)	Known to occur	In buffer area only
Megaptera novaeangliae			
Humpback Whale [38]	Migration (north and south)	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Attachment 4 (RSD) - Appendix N

Preliminary Bird and Bat Adaptive Management Plan



Wind Farm in Scott River

Preliminary Bird and Bat Adaptive Management Plan

Synergy Renewable Energy Developments Pty Ltd

ecological AUSTRALIA
A TETRA TECH COMPANY

Document Tracking

Proposal Name: Wind Farm in Scott River

Proposal Number: 24PER7886

Version	Prepared by	Reviewed by	Approved by	Status	Date
VA	L. Sinclair, T. Kelly	A.Bowley, J. Mitchell	SynergyRED	Draft for submission with EPA Referral	24/09/2025

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Abbreviations

Abbreviation	Description
ASS	Acid Sulfate Soil
BACI	Before-After Control-Impact
BBAMP	Bird and Bat Adaptive Management Plan
BBRAS	Bird and Bat Risk Assessment Survey
BC Act	*Biodiversity Conservation Act 2016*
BIA	Bird/Bat Investigation Area
BUS	Bird Utilisation Surveys
CASA	Air Services Australia and Civil Aviation Safety Authority
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EAAF	East Asian-Australasian Flyway
EN	Endangered
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MI	Migratory
NR	Not Recorded
OS	Other Specially Protected
P	Priority
PD Act	*Planning and Development Act 2005*
Phoenix	Phoenix Environmental Sciences
RSA	Rotor Swept Area
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
VU	Vulnerable
WA	Western Australia

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1. Introduction

1.1. Background

The Wind Farm in Scott River (the Proposal) is located approximately 15 km northeast of Augusta, in the South West of Western Australia (WA), approximately 250 km south of Perth. The Proposal, which will include the construction and operation of up to 20 wind turbines, is part of an initiative by Synergy Renewable Energy Developments Pty Ltd (SynergyRED) to explore, scope and develop a range of renewable energy assets across WA, to meet the State Government's 2030 decarbonisation targets. The wind turbines will have a maximum height of 250 m, with an expected rotor swept area (RSA) of a minimum of 40 m above ground level to a maximum of 250 m above ground level.

1.2. Purpose & Objectives

This Preliminary Bird and Bat Adaptive Management Plan (BBAMP) has been prepared in accordance with the draft *Onshore Wind Farm Guidance Best practice approaches when seeking approval under Australia's national environment law* (DCCEEW 2024) to support applications and development under the:

- *Environmental Protection Act 198*6 (EP Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Planning and Development Act 2005* (PD Act).

The overall aim of this BBAMP is to provide a program for monitoring potential impacts of the Proposal on birds and bats and to detail a strategy for managing and mitigating any significant bird and bat impacts arising from the operation of the Proposal. The specific objectives of this BBAMP include:

- To provide baseline data on bird and bat populations that could potentially be affected by the development of the Proposal, particularly Threatened, Migratory and at-risk species
- To implement a monitoring program capable of detecting significant changes to the populations of birds and bats
- To directly record impacts on birds and bats through a robust carcass monitoring program
- To define impact trigger levels and document an agreed investigative process that outlines the specific actions to be taken in order to confirm any identified impacts on birds and bats
- To detail specific mitigation measures and related implementation strategies to mitigate any confirmed significant impacts on birds and bats
- To detail reporting requirements and the provision of data to relevant statutory authorities.

This BBAMP takes an adaptive management approach to allow for flexibility in all components of this plan, in response to monitoring findings and/or as more relevant information becomes available and experience is gained through ongoing research and monitoring of relevant bird and bat species and their populations. This is particularly important for monitoring and managing bird and bat impacts from Australian wind farms, as the majority of published works are from overseas.

1.3. Qualifications and Experience

This BBAMP has been developed with input from a suitably qualified ecologist, Tomas Kelly (CV provided in Appendix A), in accordance with the draft Onshore Wind Farm Guidance Best practice approaches

when seeking approval under Australia's national environment law (DCCEEW 2024). Tomas Kelly (Associate Ecologist) has over seven years' experience undertaking baseline bird and bat survey and assessment for wind energy Proposals and has worked on the development and implementation of BBAMPs for wind farms in WA, New South Wales and Queensland.

In addition, the risk assessment approach and initial risk levels for potential species of concern detailed within this BBAMP were based on the Bird and Bat Risk Assessment Survey (BBRAS) that was prepared by suitably qualified ecologists with relevant qualifications from Phoenix Environmental Sciences (Phoenix 2025a; Appendix B).

1.4. Study Area

The Proponent is proposing to construct and operate the Proposal within a 3,597 ha Development Envelope with an Indicative Disturbance Footprint of 107 ha (Figure 1-1), of which 1 ha of native vegetation is expected to be cleared. The Development Envelope is generally zoned as general agricultural and is situated across number freehold land and crown reserves.

The Development Envelope is primarily cleared for agricultural use (2,476.41 ha; 81%), with interspaced patches of remnant vegetation. Most (80%) remnant vegetation within the Development Envelope is in Completely Degraded to Degraded condition, based on the Keighery (1994) vegetation scale (Phoenix 2025b).

The Proposal occurs in proximity to several Department of Biodiversity, Conservation and Attractions (DBCA) managed lands with the closest being Scott National Park (adjacent to the Development Envelope), South Blackwood State Forest (approximately 300 m to the Development Envelope), Pagett Nature Reserve (approximately 30 m to the Development Envelope), Unnamed Nature Reserve (WA42942, approximately 1 km to the Development Envelope) and an un-named Nature Reserve (WA42377) that has been excised from the Development Envelope (Figure 1-1).

Several minor waterways intersect the Development Envelope. These typically flow towards the Blackwood River which is located approximately 3.8 km west of the Development Envelope, with some flowing south-east towards the Scott River, approximately 1 km to the south. The Scott River acts as a tributary to the Blackwood River and the confluence of the rivers is located approximately 5.4 km south-west of the Development Envelope (Figure 1-1).

Three wetland habitats have been mapped within the Development Envelope and include a mix of seasonally inundated Paperbark woodlands, shrublands and sedgelands, which are patchily distributed and collectively cover 317.55 ha (9.94%) of the Development Envelope (Phoenix 2025c). The wetlands are mostly ephemeral and shallow, with water levels of typically less than 1 m.

1.5. Key Proposal Terminology

The Proposal: Includes the construction and operation of up to 20 wind turbines and associated infrastructure and activities.

Development Envelope: Refers to the area where all Proposal activities will occur. This includes land parcels where consent has been granted for the development of the Proposal and is a total area of 3,597 ha.

Indicative Disturbance Footprint: Refers to the maximum area of land that will be disturbed for the Proposal within the Development Envelope (107 ha). It is based on the largest possible layout and has been used to calculate the maximum area of native vegetation clearing (1 ha of remnant native vegetation). Considering the maximum potential area in the impact assessment process ensures that the impacts to vegetation and habitat have been conservatively assessed.

The final design and placement of turbine infrastructure (including the number and height of turbines) will be dependent on several factors including the results of detailed geotechnical and Acid Sulfate Soil (ASS) investigations, market conditions, cost of construction, infrastructure availability and the capacity of the existing 132 kV transmission line. The BBAMP will be revised following detailed design as detailed in Section 8.

The above areas are illustrated on Figure 1-1.

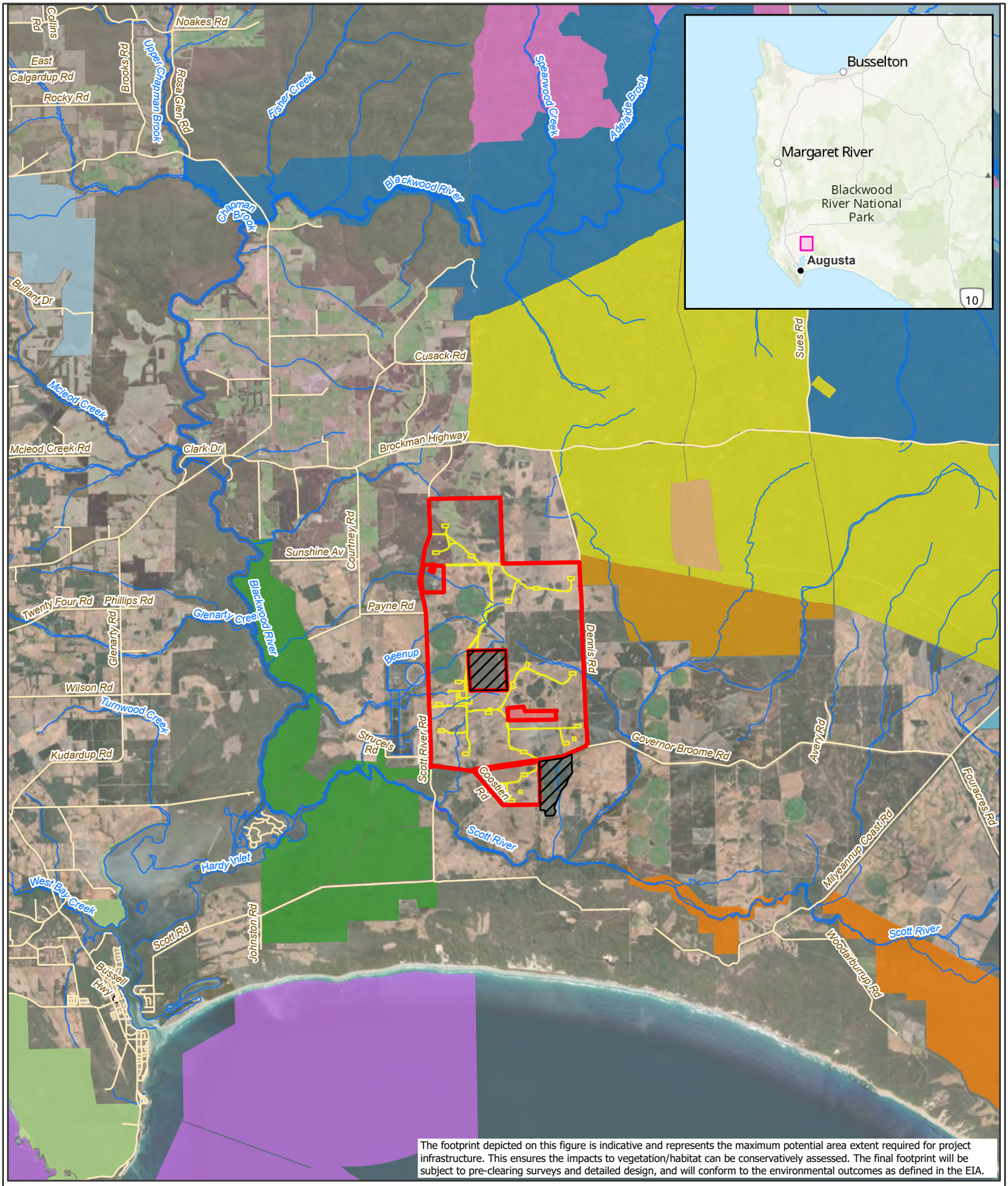

Figure 1-1: The Proposal

- Development Envelope
- Indicative Disturbance Footprint
- DBCA Lands of Interest (Crown Freehold Land)
- Watercourses
- Roads

DBCA managed lands

- Blackwood State Forest
- Milyeannup State Forest
- Ngari Capes Marine Park
- South Blackwood State Forest
- Forest Grove National Park
- Blackwood River National Park
- Leeuwin-Naturaliste National Park
- Scott National Park
- Pagett Nature Reserve
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Wiltshire-Butler National Park
- Unnamed WA42377 Nature Reserve
- Unnamed WA42942 Nature Reserve

0 1.5 3 6
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/24/2025

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2. Baseline Bird and Bat Information

A Bird and Bat Risk Assessment was undertaken by Phoenix Environmental Sciences (Phoenix) to understand the potential risk from the operation of the Proposal to birds and bats (Phoenix 2025a). The objective of the risk assessment was to:

- Collect sufficient information on site and species characteristics to inform a preliminary assessment of risks to birds and bats from the Proposal
- Establish baseline monitoring sites for use in an ongoing monitoring program under a BBAMP
- Provide a preliminary assessment of risk to conservation significant and at-risk birds and bats from the Proposal.

The Bird and Bat Risk Assessment is provided in Appendix B, and a summary of the methodology and results from the assessment is provided below.

2.1. Desktop Assessment and Initial Site Inspection

An initial desktop assessment and site inspection was undertaken to identify potential habitat attributes and develop a comprehensive potential species list of birds and bats, including conservation significant species, that have the potential to occur within the Development Envelope and surrounds. Ten fauna habitat types were identified from the Basic and Targeted fauna survey, including three wetland habitats, two woodlands and five highly modified habitats (Phoenix 2025c). The desktop assessment and initial site inspection identified 198 bird species and seven bat species that have the potential to occur within a 10 km or 40 km radius desktop search extent, including 71 conservation significant species (many of these species have dual listings [i.e. as Threatened and Migratory], hence there appears to be more listings than the number of conservation significant species identified):

- 45 birds listed as Migratory [MI] under the Commonwealth EPBC Act and WA *Biodiversity Conservation Act 2016* (BC Act)
- 41 species listed as Threatened, Conservation Dependent or Specially Protected under the EPBC Act and/or BC Act
- Nine priority species listed by DBCA.

Three conservation significant species had been previously recorded within the Development Envelope, namely:

- Baudin's Cockatoo (*Zanda baudinii;* listed as Endangered [EN] under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris;* listed as EN under the EPBC Act and BC Act)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso;* listed as Vulnerable [VU] under the EPBC Act and BC Act).

2.2. Baseline Survey Methodology

A Bird and Bat Risk Assessment Survey (BBRAS) was undertaken across two years between 2023 and 2025. The main survey area was the Wind Farm Area, which includes the Development Envelope, while site characterisation was also undertaken for the Wind Farm Area with a 10 km buffer, referred to as the Bird/Bat Investigation Area (BIA). Regional Reference sites on the Hardy Inlet were added to the survey effort in Year Two (Table 2-1).

The Year One surveys occurred across four phases between August 2023 and January 2024 and involved a single survey each season to assess seasonal changes (Table 2-1; Phoenix 2025a). The Year Two surveys were conducted from September 2024 to March 2025. The Year Two scope involved monthly surveys over the activity periods for key species of concern identified during Year One (i.e. black cockatoos and migratory birds) as well as two regional migratory shorebird surveys (Table 2-1; Phoenix 2025a).

Table 2-1: Survey dates

Visit	Season	Dates	Area
Year One			
1	Autumn	24–26 May 2023	Development Envelope, BIA
2	Winter	14–16 August 2023	Development Envelope, BIA
3	Spring	17–20 November 2023	Development Envelope, BIA
4	Summer	10–12 January 2024	Development Envelope, BIA
Year Two			
5	Spring	27–30 September 2024	Development Envelope, Regional Reference Sites
6	Spring	17–18 October 2024	Development Envelope
7	Spring	21 October 2024	Development Envelope
8	Spring	13–14 November 2024	Development Envelope
9	Summer	2 December 2024	Regional Reference Sites
10	Summer	11–12 December 2024	Development Envelope
11	Summer	16–17 January 2025	Development Envelope
12	Summer	13–14 February 2025	Development Envelope
13	Autumn	06–07 March 2025	Development Envelope

The BBRAS field survey work included the following methodologies:

- Bird utilisation surveys
- Bat utilisation surveys
- Audio recordings for Masked Owl and black cockatoos.

Systematic Impact and Reference sites were established for the BBRAS to support a future monitoring program for the Proposal based on the Before-After Control-Impact (BACI) framework. At the time of survey commencement, exact turbine locations were not known, therefore systematic BBRAS sites were selected based on ease of access, general distribution relative to key environmental values (e.g. wetlands) and proximity to the most likely turbine locations (i.e. agricultural paddocks). Sites selected inside the Development Envelope were classified as Impact sites and sites outside the Development Envelope were classified as Reference sites in Year One of the survey program.

Following the completion of the Year One sampling period, preliminary turbine locations became available. The data was reviewed, and the sites were adjusted in response to identified data gaps and to reflect the BACI framework, given Impact and Reference Sites could be confidently assigned. Impact sites were classified as any site located <500 m from a proposed turbine, and Reference sites located between 500 m and 1,500 m of turbines. This resulted in ten of the 16 original sites from Year One not

being resampled in Year Two, six sites being sampled in both Year One and Year Two, and 12 new sites sampled in Year Two.

A total of 28 sites were sampled over the survey program (Figure 2-1). Nine sites were classified as Impact sites, 14 were Reference sites and five were additional Regional reference sites located at the Hardy Inlet.

In addition, the BBRAS considered the results from the Basic and Targeted fauna survey (Phoenix 2025c) which included habitat assessments, systematic avifauna censusing, additional microbat echolocation recordings, acoustic surveys for Australasian Bittern (*Botaurus poiciloptilus*) and habitat assessments for black cockatoos. This suite of additional work provided supplementary data for the Proposal, in lieu of, and considered by Phoenix (2025b) as a suitable substitute for, roaming surveys as recommended by Brett Lane and Associates (2005). Opportunistic records of birds were also made during both the BBRAS and Basic and Targeted fauna survey.

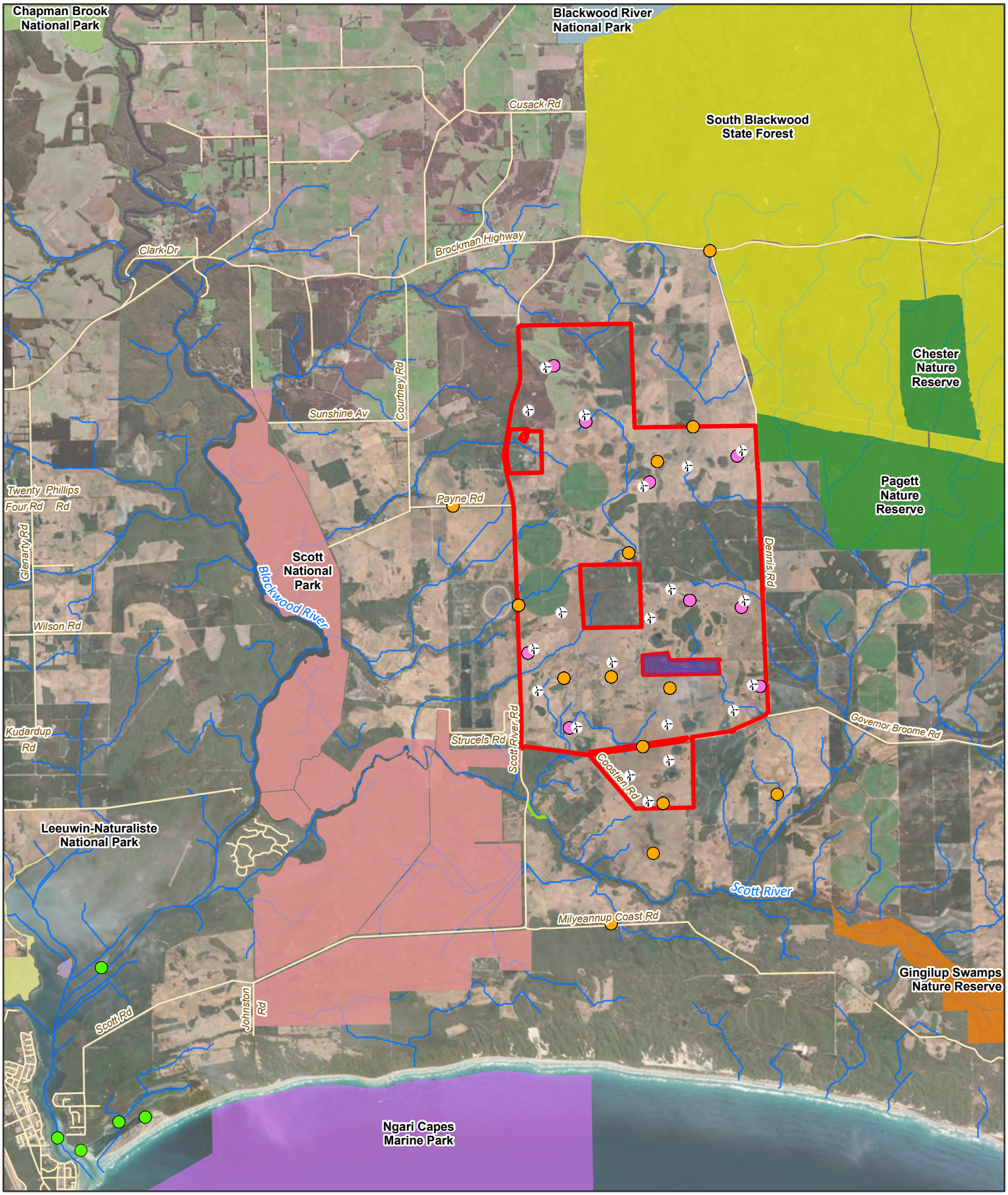

Figure 2-1: Survey Sites

- Development Envelope
- Wind Turbine
- Roads
- Rivers and Tributaries

Survey site

- Impact Sites
- Reference Sites
- Regional Reference Sites

DBCA managed lands

- Blackwood River National Park
- Chapman Brook National Park
- Chester Nature Reserve
- Gingilup Swamps Nature Reserve
- Leeuwin-Naturaliste National Park
- Pagett Nature Reserve
- Scott National Park
- Unnamed WA15185 Nature Reserve
- Unnamed WA42377 Nature Reserve
- Unnamed WA42942 Nature Reserve
- Ngari Capes Marine Park
- South Blackwood State Forest

0 1 2 4
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24PER7886-DH Date: 9/11/2025

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2.2.1. Bird Utilisation Surveys

The Bird Utilisation Surveys (BUS) aimed to generate quantitative data and comprehensively identify the type, frequency, and behaviour of bird species within the Development Envelope and surrounding areas. The data was used to estimate the likelihood of impact and provide a ranked abundance of species use of the site, for birds at varying heights. The BUS comprised:

- Fixed-point counts at 28 locations (nine Impact sites, 14 Reference sites and five Regional reference sites) locations undertaken for 30 minutes each sample event, within a radius of 100 m for small birds and 800 m for larger birds
- Two to six counts (morning and afternoon) conducted in each survey phase at most Impact and Reference sites, including morning and afternoon counts
- Regional reference sites were sampled once each in spring and autumn, and as they were accessed by boat, they were sampled at variable times during the day dependent on tidal and weather conditions.

The following parameters were recorded at each site:

- The bird's distance from the fixed survey location, where a range finder was used to measure the distance to various 'reference points' from which distance could be estimated
- The estimated height so that presence and abundance can be related back to the potential RSA height. In Year One, height was recorded within one of five height categories as detailed below. This was changed to actual height estimates in Year Two to inform collision risk modelling.
    - The flight height categories applied in Year One were:

    Below the RSA

    - 0-25 m

    Within the RSA

    - 26-50 m
    - 51-75 m
    - 76-150 m
    - >150 m
- The direction of each bird/flock sighted to the nearest 45 degrees of the compass (i.e. cardinal and ordinal/inter-cardinal points)
- If flying across the landscape, the direction to and from, also to the nearest 45 degrees of the compass.

Habitat descriptions were recorded at all sites.

2.2.2. Bat Utilisation Surveys

The bat utilisation surveys were undertaken during Year One and aimed to generate quantitative data on bats within the study area and surrounds. The data was used to estimate likelihood of impact and provide a ranked abundance of species use of the site.

Echolocation recorders were placed at all 16 fixed-point count locations as the Year One BUS, at approximately 1 m height above the ground. Ultrasonic recordings were repeated for each season over a 12-month period. In each sample period, the recorders were operated for one night, unless conditions

were windy (approximately >20 knots), in which case additional nights were completed. The echolocation recorders were operated from 30 minutes before sunset to 30 minutes after sunrise; therefore, the total recording hours changed each season; however, were approximately 10-12 hours per night.

The echolocation data was analysed, with the species list and number of detections, treated as a surrogate for abundance, being provided per half hour, so that temporal differences in activity could be analysed, where required. Level of activity for each bat species was reported as the mean number of calls, being the sum of calls divided by the number of detections. Activity level for each species was assigned to one of three categories, based on all sites and samples, as follows:

- Low: 0-4.0
- Moderate: 4.1-11
- High: >11.

As bat presence was only assessed using ultrasonic recorders, data on flight height, direction and true abundance was not able to be determined.

2.2.3. Audio Recordings for Significant Bird Species

During the first seasonal survey phase in Year One BUS, an audio recorder positioned on the Scott River detected calls of the Masked Owl (*Tyto novaehollandiae novaehollandiae*; Priority 3 [P3]). Consequently, audio recorders were placed at each of the 16 sample sites for the remaining three sample periods in Year One BUS. Consistent with the bat utilisation surveys, the recorders were operated from 30 minutes before sunset to 30 minutes after sunrise.

The audio data analysis focused on Masked Owl and the three conservation significant black cockatoo species (Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo), as these were the most likely and easily detectable conservation significant species considered to occur. Any recorded black cockatoo calls were identified to a species level, where possible.

2.3. Baseline Results

A total of 96 bird species (including 14 conservation significant species) and eight bat species (including one conservation significant species) were recorded during the surveys. Eight of the conservation significant species were recorded within the Development Envelope and/or nearby Reference Sites, including:

- Baudin's Cockatoo (*Zanda baudinii*; listed as Endangered [EN] under the EPBC Act and BC Act)
- Carnaby's Cockatoo (*Zanda latirostris*; listed as EN under the EPBC Act and BC Act)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; listed as Vulnerable [VU] under the EPBC Act and BC Act)
- Wood Sandpiper (*Tringa glareola*; listed as Migratory [MI] under the EPBC Act and BC Act)
- Osprey (*Pandion haliaetus*; listed as MI under the EPBC Act and BC Act)
- Western False Pipistrelle (*Falsistrellus mackenziei*; listed as P4 by DBCA)
- Peregrine Falcon (*Falco peregrinus*; listed as Other specially protected (OS) under the BC Act)
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; listed as P3 by DBCA).

The remaining seven conservation significant species, were only recorded at Regional Reference sites within the Hardy Inlet (9 km south-west of the Development Envelope), during Year Two of the surveys including:

- Caspian Tern (*Hydroprogne caspia*; listed as MI under the EPBC Act and BC Act) – unlikely to occur in Development Envelope
- Fairy Tern (*Sternula nereis nereis*; listed as MI under the EPBC Act and BC Act) – unlikely to occur in Development Envelope
- Greater Crested Tern (*Thalasseus bergii*; listed as MI under the EPBC Act and BC Act) – unlikely to occur in Development Envelope
- Sharp-tailed Sandpiper (*Calidris acuminata*; listed as VU/MI under the EPBC Act) – may possibly occur in Development Envelope
- Sanderling (*Calidris alba*; listed as MI under the EPBC Act and BC Act) – unlikely to occur in Development Envelope
- Red-necked Stint (*Calidris ruficollis*; listed as MI under the EPBC Act and BC Act) – may possibly occur in Development Envelope
- Bar-tailed Godwit (*Limosa lapponica*; listed as MI under the EPBC Act and BC Act) – unlikely to occur in Development Envelope.

Full species assemblages for bird and bats recorded during the surveys is provided in Appendix B.

3. Bird and Bat Risk Assessment

3.1. Purpose

Incorporating the data from the BBUS, a risk assessment framework was developed to evaluate the potential risk of impact to bird and bat species of concern from the Proposal. This approach assesses risk using a combination of likelihood and consequence of impact, in accordance with relevant Australian standards for risk management (Phoenix 2025a; Standards Australia 2018). While the framework is primarily based on collision risk, the risk assessment also considered other impacts including displacement, avoidance behaviours, and habitat loss.

Through identifying species at a heightened risk and considering relevant factors such as their status, ecology and the nature of known and potential impacts, targeted monitoring and management measures can be developed. The preliminary risk assessment is provided in the Bird and Bat Risk Assessment provided in Appendix B (Phoenix 2025a) and is summarised below.

3.2. Risk Assessment Process

Based on the findings of the site and species characterisation and data collected during field surveys, 47 bird and bat species were considered 'potential species of concern' by Phoenix (2025a), including:

- 29 conservation significant species, including 28 bird species and one bat species (six recorded species and 22 species considered likely, or to possibly occur in the Development Envelope)
- 11 non-conservation significant raptors species (recorded within the Development Envelope)
- Seven non-conservation significant bats species (recorded within the Development Envelope).

A risk assessment was then undertaken for these species to determine the likely risk of impact from the Proposal to each (Phoenix 2025a; Appendix B). The risk assessment utilises a risk matrix (Table 3-3) that was developed in accordance with relevant Australian standards for risk management (Standards Australia 2018), which considers the likelihood of a potential impact occurring, as well as the consequence should the impact occur. The likelihood of direct impact from collision with turbines was classified into five categories (Almost certain, Likely, Potential, Unlikely, Rare), which considered species utilisation of the Development Envelope, including frequency and flight height and any previously recorded wind farm mortality for the species (Table 3-1). The consequence of impact was classified into five categories, from insignificant to severe, based on estimated loss of individuals relative to Australian population estimates or East Asian-Australasian Flyway (EAAF) populations for Migratory species (Table 3-2). The consequence categories for Migratory shorebirds were established in consideration of the industry guidelines for assessment of impacts to EPBC Act listed Migratory shorebirds (DoEE 2017).

The overall level of risk is determined by the combined likelihood and consequence of an impact occurring on a given bird or bat species as shown in the risk matrix (Table 3-3). The risk matrix should be considered a guide rather than a predictive tool, recognising that bird and bat behaviours are varied and complex, as can be their response to both natural and human-induced impacts.

Table 3-1: Likelihood definitions

Likelihood	Birds	Bats
Almost certain	It is very probable that the risk event could happen in any year. • species recorded frequently (>five times) and/or in large numbers (>30 individuals) within the RSA of the Development Envelope; **AND** • has observed windfarm mortality.	It is very probable that the risk event could happen in any year. • species displays **high** activity levels (see Section 2.2.2) within the Development Envelope; **AND** • suspected to fly at heights within the RSA of the Development Envelope; **AND** • has observed windfarm mortality.
Likely	It is more probable that the risk event could happen in any year. • species recorded frequently (>five times) and/or in large numbers (>30 individuals) within the RSA of the Development Envelope; **AND** • has no observed windfarm mortality.	It is more probable that the risk event could happen in any year. • species displays **moderate** activity levels (see Section 2.2.2) within the Development Envelope; **AND** • suspected to fly at heights within the RSA of the Development Envelope; **AND** • has no observed windfarm mortality.
Potential	It is equally probable that the risk event could happen in any year. • species recorded infrequently within the Development Envelope, or considered likely or possibly to occur; **AND** • is known or suspected to fly within the RSA of the Development Envelope and/or has observed windfarm mortality.	It is equally probable that the risk event could happen in any year. • species displays **low** activity levels (see Section 2.2.2) within the Development Envelope, OR considered likely or to possibly occur; **AND** • suspected to fly at heights within the RSA of the Development Envelope or in open/uncluttered air spaces and/or has observed windfarm mortality.
Unlikely	It is less probable that the risk event could happen in any year. • species recorded within the Development Envelope or considered likely or to possibly occur; **AND** • is not known or suspected to fly within the RSA of the Development Envelope and has no observed windfarm mortality **OR** • species is considered to possibly occur within the Development Envelope but only on rare occasions; **AND** • is suspected to fly within the RSA of the Development Envelope and/or has observed windfarm mortality.	It is less probable that the risk event could happen in any year. • species has not been recorded but is considered likely or to possibly occur within the Development Envelope; **AND** • is not suspected to fly at heights within the RSA of the Development Envelope or in open/uncluttered air spaces and has no observed windfarm mortality.
Rare	It is improbable that the risk event could happen in any year. • species has not been recorded but is considered to possibly occur within the Development Envelope but only on rare occasions; **AND** • species is unlikely to fly within the RSA and has no observed windfarm mortality.	It is improbable that the risk event could happen in any year. • species has been recorded, or considered likely or to possibly occur within the Development Envelope; **AND** • is unlikely to fly within the RSA of the Development Envelope given foraging and movement behaviour is restricted to cluttered air space and has no observed windfarm mortality.

Table 3-2: Consequence definitions

Consequence	Description	Group
Severe	Loss of greater than 1% of EAAF population over ten years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction in population viability for a period of at least ten years.	All other birds and bats
Significant	Loss of at least 0.1% of EAAF population over ten years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction population viability for between five and ten years.	All other birds and bats
Medium	Loss of at least 0.05% of EAAF population over ten years.	Migratory shorebirds
	Loss in numbers of individuals, leading to minor reduction in population viability for between one and five years.	All other birds and bats
Minor	Undetectable (<0.05%) loss of EAAF population over ten years.	Migratory shorebirds
	Occasional loss of small numbers of individuals but no reduction in population viability.	All other birds and bats
Insignificant	Undetectable loss (<0.005%) of EAAF population over ten years.	Migratory shorebirds
	Rare loss of individuals but no reduction in population viability.	All other birds and bats

Table 3-3: Risk matrix based on likelihood and consequence

Likelihood	Consequence				
	Insignificant	**Minor**	**Medium**	**Significant**	**Severe**
Almost certain	Negligible	Low	High	Extreme	Extreme
Likely	Negligible	Low	Moderate	High	Extreme
Potential	Negligible	Low	Moderate	High	High
Unlikely	Negligible	Negligible	Low	Moderate	Moderate
Rare	Negligible	Negligible	Negligible	Low	Moderate

3.3. Risk Assessment Results

The preliminary BBRAS (Phoenix 2025a), which was based on a minimum RSA height of 25 m, determined that of the 47 species considered 'potential species of concern' assessed:

- 34 species recorded a *Negligible* risk level
- Ten species recorded a *Low* risk level
- Three species, Baudin's Cockatoo (*Zanda baudinii),* Carnaby's Cockatoo (*Zanda latirostris)* and *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo), recorded a *Moderate* risk level.

Following finalisation of the preliminary BBRAS, the minimum blade height was modified from 25 m to 40 m to minimise impacts to low flying at-risk bird and bat species, such as black cockatoos. The Proponent subsequently engaged Ron Johnstone (Johnstone 2025) to provide technical advice on the potential impacts to black cockatoos from the Proposal taking into consideration the revised minimum blade height.

Based on this advice (Johnstone 2025) and the changes to the revised minimum blade height, the preliminary BBRAS has been revised. Of the 47 species considered 'potential species of concern' assessed (Table 3-4):

- 35 species recorded a Negligible risk level
- 11 species recorded a Low risk level
- One species recorded a Moderate risk level, *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo).

Given the above, mitigation and monitoring measures are proposed within this BBAMP to manage the risk of turbine collision and barotrauma from the operation of the Proposal, these measures also have a particular emphasis on monitoring potential impacts to black cockatoos.

Consistent with the adaptive management approach of this BBAMP, the risk level for each bird and bat species assessed in Table 3-4 will be revised in response to any impact trigger (Section 6) and updated as necessary during annual reporting (Section 7).

Table 3-4: Risk assessment for potential species of concern

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Calyptorhynchus banksii naso **(Forest Red-tailed Black Cockatoo)**	VU (EPBC & BC Acts)	Roosting Foraging Breeding	48 (206)	0-24 (3) [54] 25-50 (2) [11]	Direct collision/ barotrauma Displacement Habitat loss	Potential	Medium	Moderate	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles). A large flock (>30 individuals) was recorded south of the Development Envelope. Heights were not recorded for many observations (e.g. audio recordings), and it was mostly observed at or below tree height. There were five flight height records for this species; three were below 24 m and two were within 25-50 m and therefore potentially within the RSA. In addition, flight height data was collected for black cockatoos which could not be identified to a species level, comprising 15 records of *Calyptorhynchus/Zanda* sp. Of these records, one was recorded within the adjusted RSA at 40 m. There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025a; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025a). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes only minor loss of native foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025c). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Forest Red-tailed Black Cockatoo (Phoenix 2025c). No known breeding or roost sites within the Development Envelope. This species is known to mainly forage in the canopy and lower levels of Jarrah-Marri forests, and when moving from site-to-site generally flies just above the canopy (Johnstone 2025), as was supported by most of the flight observations within the BBUS, which were below 25 m. The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. However, this species is generally a poorer flier and less agile than Carnaby's and Baudin's cockatoos and therefore potentially more susceptible to turbine collision (Johnstone 2025). Therefore, a likelihood of impact rating of Potential was considered appropriate. Forest Red-tailed Black Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025a). Loss in numbers of individuals may lead to minor reduction in population viability for between one and five years. Based on the above the risk to this species from the operation of the Proposal is considered Moderate. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Roosting Foraging Breeding	7 (57)	0-24 (3) [11]	Direct collision/ barotrauma Displacement Habitat loss	Unlikely	Medium	Low	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles, small flocks). All recorded flight heights were below RSA (0-24 m). In addition, flight height data was collected for black cockatoos which could not be identified to a species level, including 15 records of *Calyptorhynchus/Zanda* sp. and two records of white-tailed black cockatoos (*Zanda* sp.). Of these records, all but one (*Calyptorhynchus/Zanda* sp.) were below the adjusted RSA, with the single record at 40 m. There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025a; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025a). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes only minor loss of foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025c). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Baudin's Cockatoo (Phoenix 2025c). No known breeding sites within the Development Envelope, but two known *Zanda* spp. roosts are located within 12 km of the Development Envelope. Black cockatoos are known to forage in areas up to 20 km from night roosting habitat during the non-breeding season (Phoenix 2025a). The species generally flies at about 5 to 15 m above the ground (Johnstone 2025), which was confirmed by the results of the BBUS. Therefore, this species is most likely to fly below the RSA. It may occasionally fly above canopy height and therefore potentially within the RSA; however, it is considered a very competent flyer with excellent vision at night and in poor light and is therefore capable of avoiding wind turbines on the rare occasions that it flies within the RSA (Johnstone 2025). The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. Therefore, the likelihood of impact is considered unlikely. Baudin's Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025a). Loss in numbers of individuals may lead to minor reduction in population viability for between one and five years. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Zanda latirostris **(Carnaby's Cockatoo)**	EN (EPBC & BC Acts)	Roosting Foraging	38 (154)	0-24 (22) [97] 30 (2) [2]	Direct collision/ barotrauma Displacement Habitat loss	Unlikely	Medium	Low	Recorded frequently in the Development Envelope, generally in low numbers (mostly singles, small flocks). All recorded flights were below RSA, with 92% of recorded flights below 25 m, and two records (8% of flights) at flight height of 30 m. In addition, flight height data was collected for black cockatoos which could not be identified to a species level, including 15 records of *Calyptorhynchus/Zanda* sp. and two records of white-tailed black cockatoos (*Zanda* sp.). Of these records, one (*Calyptorhynchus/Zanda* sp.) was recorded within the adjusted RSA at 40 m. Cataby is one of the few areas where there is an operating wind farm (Yandin) close to a small breeding population of Carnaby's Cockatoo which has been monitored for over 20 years (Johnstone 2025). Foraging habitat is present within a few hundred metres of turbines and breeding habitat as close as 3.5-4 km. This small breeding population has remained stable since the wind farm was commissioned in 2021. Further, during the monitoring of this population no Carnaby's Cockatoo were anecdotally observed flying towards the wind turbines (Johnstone 2025). There has been no recorded wind farm mortality of black cockatoos in Australia (Phoenix 2025a; Johnstone 2025). Recognising the paucity of wind farm mortality data in Western Australia, consideration was given to *Zanda funerea* (Yellow-tailed Black Cockatoo), a surrogate species native to the south-east of Australia, with no recorded wind farm mortality (Phoenix 2025a). High and moderate quality foraging habitat is present within the Development Envelope. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the Development Envelope. The Proposal includes minor loss of foraging habitat (1 ha, including no more than 0.5 ha of Moderate – High quality). While suitable habitat is present within the Development Envelope, there is extensive habitat present within adjacent conservation areas such as national parks. The presence of these habitat values in the vicinity likely encourages black cockatoo flights across the Development Envelope, stopping to forage as needed (Phoenix 2025c). As such, it is considered that the Development Envelope contains habitats that are unlikely to be critical but rather provide supplementary foraging habitat for Carnaby's Cockatoo (Phoenix 2025c). No known roosting sites within the Development Envelope but two known *Zanda* sp. roosts located within 12 km of the Development Envelope. Black cockatoos are known to forage in areas up to 20 km from night roosting habitat during the non-breeding season (Phoenix 2025a). The species generally flies at about at about 5 to 15 m above the ground (Johnstone 2025), which was confirmed by the results of the BBUS and therefore is most likely to fly below the RSA. It may occasionally fly above canopy height and therefore potentially within the RSA; however, it is considered a very competent flyer with excellent vision at night and in poor light and is therefore capable of avoiding wind turbines on the rare occasions that it flies within the RSA (Johnstone 2025). The average and maximum recorded canopy height for Marri trees, the tallest species within the Development Envelope, is 17.3 m and 28 m respectively, which is well below the RSA. Therefore, the likelihood of impact is considered unlikely. Carnaby's Cockatoo has a small total population, pair bonding and slow breeding (Phoenix 2025a). Loss in numbers of individuals may lead to minor reduction in population viability for between one and five years. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falsistrellus mackenziei **(Western False Pipistrelle)**	P4 (DBCA list)	Roosting Foraging Breeding	Low	Not Recorded (NR)	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently detected in the Development Envelope but low number of calls (one mean detection per night). Suspected to fly at heights within RSA. No mortality monitoring data available for this species but there are recorded moderate mortalities (10–100) in carcass monitoring for closely related species *Falsistrellus tasmaniensis*. Consistent single detections suggest rare/occasional movement through cleared habitats between remnant patches, and thus foraging typically close to vegetation, rather than open paddocks. Some limited roosting opportunities within the Development Envelope (Phoenix 2025c). May breed in best examples of Marri-Jarrah-Peppermint woodland, where the potential breeding tree assessment (Phoenix 2025c) recorded the most trees with hollows, many of which would be considered suitably sized to support the species. Occasional loss of small numbers of individuals possible but unlikely to lead to reduction in local population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Botaurus poiciloptilus (Australasian Bittern)	EN (EPBC & BC Acts)	Roosting Foraging Breeding	-	-	Direct collision/ barotrauma	Unlikely	Medium	Low	No record from surveys, nor desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Known from Hardy Inlet ~12 km south-west of the Development Envelope and the Gingilup/Quitchup/Jasper wetlands ~30 km south-east (dates of records unknown). The latter is an important wetland suite for the species. Potential for occasional use of the larger wetlands in the Development Envelope but unlikely a regular visitor or regularly transit through the Development Envelope. WA population is very small therefore any loss of individuals may have temporary impact on local population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Pandion haliaetus (Osprey)	MI (EPBC & BC Acts)	Occasional foraging	7 (7)	0-24 (2) [2] 25-50 (3) [6] 51-75 (1) [1]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded only once in the Development Envelope across all surveys. Only recorded flying within RSA heights at regional reference sites. No mortalities recorded in carcass monitoring from reviewed sources at Australian sites, but collision deaths have been reported overseas. Common and widely distributed in coastal regions across most of the country. Many individual Osprey are known in the Busselton to Augusta region (B. Wykes pers. comm. cited in Phoenix 2025a). The population is limited by viable nest sites, not biological factors. Desktop records are nearly all south-west of the Development Envelope associated with Hardy Inlet, Augusta beaches, Scott and Blackwood Rivers. Sampling at the Regional reference sites supports this, with several records made during the Year 2 surveys at the Hardy Inlet coastal sites. Unlikely to utilise habitats in study area regularly because it primarily feeds on fish, though may be an occasional foraging site. Potential for rare loss of individuals but no reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Oxyura australis (Blue-billed Duck)	P4 (DBCA list)	Roosting Foraging Breeding	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Potential for occasional use of the open water present within wetlands in the Development Envelope but unlikely to be a regular visitor. A few records from the artificial wetlands west of the Development Envelope but limited desktop records returned within 10 km, and all from 2010 or older. Potential for rare loss of individuals but no reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Apus pacificus (Fork-tailed Swift)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, nor desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. Only one mortality recorded in carcass monitoring from reviewed sources. Common species, considered to possibly occur on occasion. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	Roosting Foraging Breeding	2 (2)	NR	Direct collision/ barotrauma Displacement	Unlikely	Insignificant	Negligible	Recorded at two locations outside the Development Envelope, as singles. Only likely to fly at RSA heights when displaying courtship over a prospective nest site of which none are present in study area. Unlikely to fly within RSA while hunting. No mortality monitoring data available for this species. No other Masked Owl mortalities from reviewed sources. May hunt in woodland habitats of the Development Envelope and transit through but not likely to utilise extensively. Potential for rare loss of individuals but unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Pluvialis fulva (Pacific Golden Plover)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records <10 km of the Development Envelope. Desktop records all south-west of the Development Envelope associated with the Hardy Inlet and Scott River. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly uses coastal habitats. Potential for occasional use of paddocks and the larger wetlands in the Development Envelope but unlikely a regular visitor to the Development Envelope when present in the region, noting very limited overlap between species arrival in region (December) and persistence of suitable foraging habitat in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Anarhynchus bicinctus (Double-banded Plover)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous desktop records within 10 km of Development Envelope but old (1979-80). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Anarhynchus mongolus (Siberian Sand Plover)	EN/MI (EPBC Act); EN (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous old (1980) desktop record within 10 km of Development Envelope but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Pluvialis squatarola (Grey Plover)	VU/MI (EPBC Act); MI (BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but potential for rare use of wetlands in Development Envelope. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Hydroprogne caspia (Caspian Tern)	MI (EPBC & BC Acts)	None	6 (62)	0-24 (4) [59] 25-50 (2) [3]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded at Hardy Inlet during surveys however no records within the Development Envelope, although may possibly occur within the Development Envelope on rare occasions. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Previous desktop record within 10 km of Development Envelope. Known to utilise near-coastal terrestrial wetlands. May occur as a visitor but the wetlands present in the Development Envelope are too shallow to provide the species' preferred food source (fish). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris tenuirostris (Great Knot)	VU/MI (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from near artificial wetlands. Occurs mostly in coastal intertidal habitats, but rare use of swamps. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Motacilla cinerea (Grey Wagtail)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. No previous desktop records within 10 km of Development Envelope. Occurs in a wide range of habitats. Potential for rare loss of individuals but no reduction in population viability.
Calidris falcinellus (Broad-billed Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but occasional records from swamps and lakes so potential for rare use of wetlands in Development Envelope. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	Foraging	1 (1)	25-50 (1) [1]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in the Development Envelope only once across all surveys. Recorded flying at height between 26-50 m above ground level. Recorded mortalities in carcass monitoring from reviewed sources. The Development Envelope considered foraging habitat within a resident bird's home range. Unlikely to nest in the Development Envelope. Several desktop records, nearly all south-west of the Development Envelope, mainly associated with the Hardy Inlet and Scott River. Individuals/pairs may hunt in the Development Envelope on occasion as part of their large home range, and or transit through. Potential for rare loss of individuals but unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Actitis hypoleucos (Common Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Most desktop records associated with the Hardy Inlet south-west of the study area. Does not form large flocks (mainly occurs singly or in pairs). Potential for occasional use of the larger wetlands in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival (September-October) and when wetlands in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris acuminata (Sharp-tailed Sandpiper)	VU/MI (EPBC Act); MI. (BC Act)	Foraging	1 (40)	0-24 (1) [40]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in survey only from a regional site. Record is from Hardy Inlet in much more suitable and extensive habitat than the Development Envelope. Desktop records all south-west of the Development Envelope associated with Hardy Inlet and Scott River, with one record from artificial wetlands west of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. May arrive in Augusta area from September. Potential for occasional occurrence in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival and when wetlands/dams in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris ferruginea (Curlew Sandpiper)	CR/MI (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records nearly all south-west of the Development Envelope associated with Hardy Inlet, which aligns with its preferred foraging habitats. Desktop records indicate arrival from September. Potential for occasional use of paddocks, wetland habitats and dams in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Limited overlap between species arrival and when wetlands/paddocks in the Development Envelope have suitable foraging habitat. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris melanotos (Pectoral Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys; however, desktop record just outside the Development Envelope, on the Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks and in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	Foraging	1 (1)	0-24 (1) [1]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	One record within the during the surveys at Hardy Inlet, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from near artificial wetlands and at Blackwood River. Occurs mostly in coastal habitats but occasionally observed at inland wetlands and paddocks. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Limosa limosa (Black-tailed Godwit)	EN/MI. (EPBC Act); MI (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the Development Envelope from artificial wetlands. Occurs mostly in coastal habitats but occasionally uses near-coastal wetlands and floodplains. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Tringa brevipes (Grey-tailed Tattler)	MI (EPBC and BC Acts); P4 (DBCA list)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the Development Envelope on very rare occasion. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1981) desktop records within 10 km of the Development Envelope. Occurs mostly in coastal habitats but occasionally observed at near-coastal wetlands. Potential presence in the Development Envelope is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Calidris ruficollis (Red-necked Stint)	MI (EPBC & BC Acts)	Foraging	2 (72)	0-24 (2) [72]	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	Recorded in survey only from regional sites. Records are from Hardy Inlet in much more suitable and extensive habitat than the Development Envelope. Desktop records also mainly south-west of the Development Envelope, associated with Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the South West in spring. Potential for occasional use of paddocks, wetland habitats and dams in the Development Envelope, but unlikely a regular visitor or regular transit through the Development Envelope when present in the region. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa glareola (Wood Sandpiper)	MI (EPBC & BC Acts)	Foraging	1 (3)	0-24 (1) [3]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Three individuals recorded in a single observation within the Development Envelope, across all surveys. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records (only two just west of the Development Envelope). Mainly occurs singly, in pairs or small flocks. Arrives in south-west in spring, though more common from summer to autumn when habitat in the Development Envelope mainly unsuitable (largely dried out). Occasional use of wetlands in the Development Envelope and transit through the Development Envelope by small numbers of birds. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa nebularia (Common Greenshank)	EN/MI (EPBC Act) MI (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys; however, desktop records within 10 km of the Development Envelope. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records all south-west of the Development Envelope, mainly associated with Hardy Inlet, Scott River, but also recorded from artificial wetlands directly west of the Development Envelope. Arrives in the southwest in early spring. Occasional use of the paddocks/ wetland habitats in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tringa stagnatilis (Marsh Sandpiper)	MI (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No records from surveys, nor recorded within 10 km of the Development Envelope but suitable habitat present in the Development Envelope when they arrive in early spring. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records, south-west of the Development Envelope at Augusta. Occasional use of paddocks, wetland habitats in the Development Envelope. Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%). Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Aquila audax (Wedge-tailed Eagle)	-	Foraging Roosting Breeding	37 (50)	0-24 (2) [3] 25-50 (12) [15] 51-75 (3) [3] 76-150 (11) [17] >150 (7) [10]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely uses the Development Envelope regularly for foraging. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Circus approximans (Swamp Harrier)	-	Foraging Roosting Breeding	57 (66)	0-24 (33) [37] 25-50 (12) [12] 51-75 (3) [4] 75-150 (3) [6]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely uses the Development Envelope regularly for foraging. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Elanus axillaris (Black-shouldered Kite)	-	Foraging Roosting Breeding	4 (4)	0-24 (1) [1] 25-50 (1) [1]	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in the Development Envelope, as singles. Recorded flying at RSA height. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Widespread, abundant species. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	-	Foraging	2 (2)	76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Only one record in the Development Envelope of a bird flying over. Recorded flying at RSA height. Only one recorded mortality in carcass monitoring from reviewed sources. Mostly occurs in coastal habitats. May hunt for waterbirds in the Development Envelope on occasion, or transit through but no breeding and unlikely to be a regular visitor. Territorial and occur sparsely across their range. Rare loss of individuals possible but reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Haliastur sphenurus (Whistling Kite)	-	Foraging Roosting Breeding	8 (9)	25-50 (3) [3] 51-75 (1) [1] 76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Hieraaetus morphnoides (Little Eagle)	-	Foraging Roosting Breeding	3 (3)	76-150 (2) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles recorded flying at RSA height. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tachyspiza cirrocephala (Collared Sparrowhawk)	-	Foraging Roosting Breeding	4 (4)	0-24 (2) [2] 25-50 (1) [1] 76-150 (1) [1]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Highly manoeuvrable species. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Tachyspiza fasciata (Brown Goshawk)	-	Foraging Roosting Breeding	6 (7)	0-24 (1) [2] 51-75 (1) [1] 76-150 (2) [2]	Direct collision/ barotrauma	Potential	Minor	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Likely to forage in the Development Envelope. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Falco berigora (Brown Falcon)	-	Foraging Roosting Breeding	17 (21)	0-24 (8) [9] 25-50 (4) [6] 51-75 (1) [1] 76-150 (1) [1]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Relatively heavy slow flight. Likely to forage in the Development Envelope regularly. Potential for breeding but no known nest sites in the Development Envelope. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falco cenchroides (Australian Kestrel)	-	Foraging Roosting Breeding	47 (58)	0-24 (34) [44] 25-50 (8) [9] 76-150 (3) [3]	Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in the Development Envelope, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Observed foraging in the Development Envelope and likely to hunt there regularly. Potential for breeding but no known nest sites in the Development Envelope. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Falco longipennis (Australian Hobby)	-	Foraging Roosting Breeding	3 (4)	0-24 (2) [2] 51-75 (1) [2]	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in the Development Envelope, as singles, one pair. Recorded flying at height within RSA. Only one mortality in carcass monitoring from reviewed sources. Occasional foraging in the Development Envelope likely but not a regular inhabitant. Potential for breeding but no known nest sites in the Development Envelope. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Austronomus australis (White-striped Free-tailed Bat)	-	Foraging Roosting Breeding	High	NR	Direct collision/ barotrauma	Almost certain	Minor	Low	Activity levels highest within the Development Envelope. Second highest total number of calls recorded, overall. Largely absent in winter and autumn. Suspected to fly at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Often represents the species with highest documented mortality. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the Development Envelope and surrounds, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.
Chalinolobus gouldii (Gould's Wattled Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Chalinolobus morio (Chocolate Wattled Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope. Far more active in summer by a factor of 10-20 compared with other seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Nyctophilus geoffroyi (Lesser Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Nyctophilus holtorum (Holt's Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope and present in summer and autumn only. Suspected to fly at heights within RSA. No data found on wind farm mortalities but was previously classified within *C. gouldii* (ref Parnaby), therefore assume similar mortality risk to this species (moderate mortalities). Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.

Species	Cons. Status	Potential use in the Development Envelope	No. Records/ Individuals (birds) Activity level (bats)	Rec. Flight Height Range (m) (No. records)* [No. individuals]*	Potential impact	Likelhd.	Conseq.	Risk Rating	Justification
Nyctophilus major (Greater Long-eared Bat)	-	Foraging Roosting Breeding	Low	NR	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in the Development Envelope, all year, almost absent in winter. Suspected to fly at heights within RSA. No data found on wind farm mortalities. Rare loss of individuals due to low activity in the Development Envelope, reduction in population viability unlikely. Based on the above the risk to this species from the operation of the Proposal is considered Negligible.
Vespadelus regulus (Southern Forest Bat)	-	Foraging Roosting Breeding	Moderate	NR	Direct collision/ barotrauma	Almost certain	Minor	Low	Moderate activity levels in the Development Envelope and high activity levels within the 10 km buffer. Active all seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10–100) in carcass monitoring from reviewed sources. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the Development Envelope and surrounds, therefore unlikely to lead to reduction in population viability. Based on the above the risk to this species from the operation of the Proposal is considered Low. Potential impacts to this species from the operation of the Proposal will be managed through the BBAMP to ensure no significant impacts to this species.

*Not all records included flight details; therefore the no. of flight height records does not necessarily match the number of records/individuals for all bird species.

[3]Not Recorded.

4. Preventative Management and Mitigation Measures

Mitigation measures are required as part of an adaptive management framework to avoid and minimise potential risks to bird and bat species assessed as at moderate and high risk of impact from the operation of the Proposal. Table 4-1 details preventative mitigation measures that will be implemented to prevent and avoid risk. These mitigation measures can also be implemented to reduce risk following the identification of associated impacts.

Table 4-1: Preventative management and mitigation measures

Management measure	Management action	Timing and frequency of monitoring	Reporting
Carrion Removal	The Site Manager will be responsible for ensuring a carrion removal protocol is implemented and includes the following activities: • Educate staff and landowners to immediately report any stock, introduced or native animal carcasses within the Development Envelope and specifically within 120 m of any turbine that may attract raptors • Any carcasses and/or remains found that are within the Development Envelope will be collected and disposed or relocated as soon as practicable, in a manner that will avoid attracting raptors close to turbines in consultation with the landowner • Any bird and bat carcasses within 200 m of a turbine must be collected and disposed of by authorised personnel in accordance with the carcass recording and handling and storage protocols (Section 5.4.6.2).	Commissioning and during operation	Carcasses will be recorded in a dedicated carrion removal register maintained by the Site Manager. This register will inform an annual summary of carcass removal to be provided in the annual reports.
Stock Control	Where possible and agreed to by landholders, grain feeding of stock will be restricted to paddocks more than 200 m from operational turbines to reduce the risk of birds being attracted to the area. The implementation of this mitigation measure will require close coordination with landholders through discussion and notification of feeding areas and annual BBAMP implementation program.	Commissioning and during operation	Stakeholder engagement register.
Feral Animal Reporting	All site personnel will be responsible for the opportunistic recording of feral animals including Red Fox, Feral Cat, Feral Rabbits and Feral Pigs to monitor their occurrence across the Development Envelope. If opportunistic feral fauna sightings show an increase in European Rabbits occurrence over an extended period during construction, investigate the cause and establish further mitigation measures, including: • Targeted control measures in consultation with landholders, DBCA and any regional control programs • Staff training and reinduction if measures are not implemented or incident reporting indicates management processes such as carrion removal protocols and waste management measures are not being followed and contributing to increased feral fauna records.	Commissioning and during operation	Opportunistic feral animal sightings will be recorded and summarised in monthly reports.
Turbine and Met Mast Design	• Turbines will be designed with smooth and rounded surfaces where possible to minimise the availability for raptor perches. • Visual bird diverters will also be installed on guy wires of permanent met masts to minimise the risk of collision. • All site personnel will be responsible for the opportunistic recording of raptors perching on Wind Farm infrastructure.	Design	Opportunistic reporting of raptor perch sightings.
Lighting Design	Lighting on turbines and other Proposal infrastructure will be kept to a minimum to avoid attracting birds, bats, and insects. Specific measures to reduce potential impacts of lighting will include the following: • The use of directional lighting, hoods, sensor lighting and red lights as opposed to white or yellow lights, where practicable • Assessments to date do not indicate that lighting on the wind turbines will be required. Aviation lighting will only be installed on wind turbines where required by Air Services Australia and Civil Aviation Safety Authority	Commissioning and during operation	Opportunistic reporting of lighting malfunctions. Lighting requirements will be detailed within contractual agreements.

Management measure	Management action	Timing and frequency of monitoring	Reporting
	(CASA)/emergency services. In this instance, if lighting is required by the approving authorities, the Proponent will work with aviation and emergency services to assess lighting solutions.		
Transmission line design	• Visual bird diverters will be installed along the Proposal's transmission line to minimise the risk of collision with transmission lines.	Commissioning and during operation	Opportunistic reporting of effectiveness of bird diverters.

5. Operational Bird and Bat Monitoring Program

The Proposal's operational phase monitoring program has been designed for implementation during the initial two-years of full operation. Whilst the methodology and schedule of monitoring is detailed explicitly in the following sections, the monitoring program will be implemented within the broader adaptive management framework of this BBAMP. The main objectives of the monitoring program are to assess both direct and indirect impacts and identify any requirements for adaptive management and/or mitigation. The monitoring program comprises the following components:

- BUS - Monitoring of bird utilisation throughout the initial phase of operations, to be analysed comparatively to pre-operational data (Section 5.1).
- Bat utilisation surveys - Monitoring of bat activity throughout the initial phase of operations, to be analysed comparatively to pre-operational data (Section 5.2).
- Opportunistic flight behaviour and tracking - Recording of Threatened, Migratory and at-risk bird species flight behaviour and activity (Section 5.3).
- Carcass search monitoring program - A robust operational phase carcass search monitoring program to detect birds and bats that collide fatally with turbines, in order to estimate overall bird and bat mortality rates at the Proposal (Section 5.4).

Section 5.1 through to Section 5.4 describes the survey methodologies to be implemented once the Proposal becomes operational.

5.1. Bird Utilisation Surveys

Operational phase BUS will be undertaken utilising a selection of the same sites (excluding the Regional reference sites) and methods used for the pre-construction surveys (see Section 2.2.1). BUS will occur twice annually between September and February over the first two years of operation and will be timed to coincide with the seasonal migration/movement of conservation significant bird species that have been recorded or considered likely to occur in the area, including the three black cockatoo species. Data from operational phase BUS will be compared to pre-construction data to assess the extent and likely causes of any changes in bird species composition or activity recorded during the initial operational phase. The requirement for any additional BUS will be determined following the completion of the Year Two operational BBAMP annual report.

5.2. Bat Utilisation Surveys

Operational phase bat utilisation surveys will be undertaken utilising a selection of the same sites and methods used for the pre-construction surveys (see Section 2.2.2). Bat utilisation surveys will occur twice annually over the first two years of operation and will be timed to coincide with the seasonal BUS. Data from operational phase bat utilisation surveys will be compared to pre-construction data, to assess the extent and likely causes of any changes in bat species composition or activity during the initial operational phase. The requirement for any additional bat utilisation surveys will be determined following the completion of the Year Two operational BBAMP annual report.

5.3. Opportunistic Flight Behaviour and Tracking

The behaviour and flight path of all Threatened, Migratory and at-risk bird species observed opportunistically outside of the BUS will be recorded via spatially enabled digital software such as ESRI Field Maps. The following data will be recorded for each bird:

- GPS location of recorder
- Bird's distance from the recorder
- Direction of each bird sighted
- If flying across the landscape, the direction to and from
- Estimated flight height
- Count of individuals
- Age class of individuals (e.g. juveniles, adults).

5.4. Carcass Monitoring Program

5.4.1. Key Terms

The following key terms are relevant to the carcass monitoring program:

- Mortality: any dead bird or bat or feather clump (a clump of five or more feathers) located within the search zone, unless there are obvious signs of another cause of death.
- Mortality Rate: the estimated annual number of individuals that collide fatally with turbines.

5.4.2. Overview

A carcass monitoring program will be implemented to determine the direct impact of turbine strike on bird and bat species and calculate the mortality rate over an annual period. Collection of carcass monitoring data is important to inform adaptive management that may be implemented to reduce collision risk, monitor impacts to Threatened, Migratory and at-risk species and trigger the requirement for additional monitoring and/or management intervention.

The carcass monitoring program has been designed to generate a robust dataset that can derive estimates of both bird and bat mortality rates, along with monitoring precision. This is achieved by accounting for carcass persistence and searcher efficiency factors which can reduce the quantity of bird and bat carcasses recorded during monitoring. Experimental trials form part of the monitoring program so that 'correction factors' can be applied to the estimated annual mortality rate.

The carcass monitoring program will be implemented in a progressive manner. The three phases will include:

1. Commissioning carcass monitoring program – to be implemented progressively across the Proposal as turbines commence operations (Section 5.4.3).
2. Full carcass monitoring program – to be implemented after all turbines are able to operate and export electricity simultaneously. This program will run for a minimum of two years (Section 5.4.4).
3. Long-term carcass detection/monitoring program – to be implemented following review and consultation of the full carcass monitoring program (Section 5.4.5).

5.4.3. Commissioning Carcass Monitoring Program

Not all turbines will be completely installed and operational simultaneously. However, there remains an elevated risk relative to baseline conditions of bird and bat strikes once a turbine component has been completely installed and commissioning commenced. As such, a commissioning carcass monitoring program is proposed to be implemented, commencing once approximately 50% of the selected turbines (see Section 5.4.6.1) are commissioned and able to be operated simultaneously. Once this has commenced, the program will be progressively expanded to include additional turbines as they are commissioned. This program will continue until all selected turbines have been commissioned, when the full carcass monitoring program phase will commence (Section 5.4.4).

The commissioning carcass monitoring program is proposed to occur monthly.

5.4.4. Full Carcass Monitoring Program

Once all selected turbines have been commissioned and are able to be operated simultaneously, the full carcass monitoring program will commence. The full carcass monitoring program is proposed to be carried out monthly across the first two years (Year One to Year Two) of full operations. Monthly carcass searches will be conducted to capture coverage across the year and will be undertaken in accordance with the Carcass Monitoring Program Methodology (Section 5.4.6) within a 120 m radius of each turbine.

After the completion of the full carcass monitoring program, the Year Two annual report will review the program and assess any requirement for ongoing monitoring (Section 5.4.5).

5.4.5. Long-term Carcass Monitoring Program

Threatened birds and bats can collide at any time during the life of the wind farm operations and; therefore, incidental carcass detection will remain in place for the life of the Proposal operations, along with the management actions in response to impact triggers (Section 6).

After two years of the full carcass monitoring program period, the possibility of changes to the intensity and protocols for further long-term carcass monitoring, if warranted, will be evaluated, as informed by the outcomes of mortality rate estimates. The results of carcass monitoring will be used to objectively determine whether the Proposal imposes a low, moderate, or high impact risk for any Threatened, Migratory or at-risk bird or bat species to provide justification for any proposed changes to the monitoring program. If no triggers are met during full carcass monitoring program, and the risk rating for all species of concern is considered Low or lower, incidental carcass finds will continue to be recorded for the life of the wind farm.

5.4.6. Methodology

5.4.6.1. Search Protocol

Carcass searches aim to quantify the total collision mortality of a species or species group and will be undertaken by qualified ecologists or personnel trained in carcass searches and regularly assessed by the supervising ecologist. Mortality resulting from turbine collision is defined as any dead bird or bat or feather clump (a clump of five or more feathers) located within the search zone, unless there are obvious signs of another cause of death.

Based on the findings of Hull and Muir (2010), inner and outer search zones have been designated for the program. The inner zone targets the detection of the carcasses of bats and small to medium sized birds. Meanwhile, the outer zone will ensure the adequate detection of medium to large sized bird carcasses, such as raptors, which can fall further away from the turbines. The proposed carcass search effort is as follows:

- 10 turbines (50%) searched to a radius of 60 m (inner zone) and 120 m (outer zone).

Turbines will be selected using stratified sampling to ensure representative coverage of different vegetation/habitat types, turbine locations and other factors that may influence bird and bat activity and collision risk. In the inner zone, a circle is formed with a 60 m radius from the turbine base and transects are spaced concentrically within this zone every 6 m (or greater if using a detection dog) (Figure 5-1). The outer zone will comprise the zone between 60 m and 120 m radius. Searched transects in this zone will be spaced concentrically every 12 m (or greater if using a detection dog).

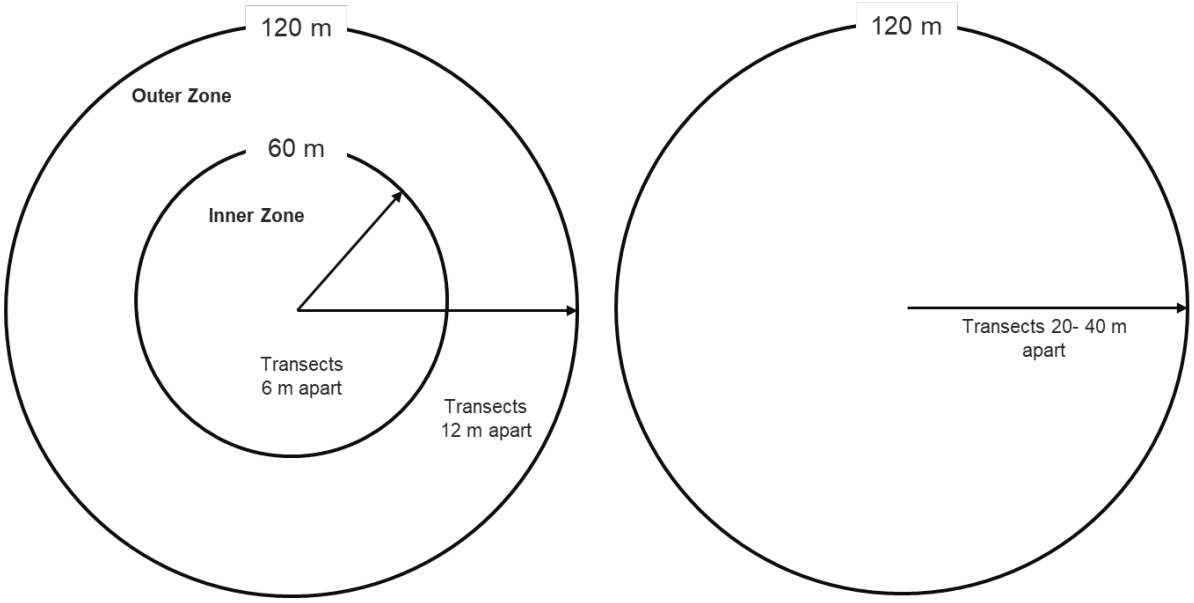

Figure 5-1: Inner and Outer Search Zones for Human and Dog Detection

A second follow-up search, known as a "pulse search", will be undertaken during spring and summer at selected turbines, within several days of the first search, to detect additional mortality of conservation significant species of concern with a Moderate risk rating (Forest Red-tailed Black Cockatoo). Pulse searches will be undertaken within a 120 m radius using 12 m spaced concentric transects, to ensure the adequate detection of conservation significant species of concern (noting Forest Red-tailed Black Cockatoos are considered medium sized, in accordance with the archetypes defined in Hull and Muir (2010). The pulse search allows for the rate of carcass strikes to be more accurately determined, by lessening the potential for carcasses to be lost to scavenging between monthly carcass monitoring events. Pulse searches will be undertaken at select turbines located in proximity habitat values of

conservation significant species of concern that have a Moderate risk rating (i.e. Forest Red-Tailed Black Cockatoo). The selected turbines for the pulse searches will take into consideration High quality foraging habitat, potential nesting trees and areas of higher activity based on baseline survey results. In addition, if a monthly carcass monitoring event identifies mortality of conservation significant bird species at a particular turbine not surveyed as part current pulse search, this turbine will be included in future pulse searches.

Trained detection dogs, if available, may be used for carcass searches and where weather conditions and the terrain of the search areas are suitable for a safe and effective search. The use of detection dogs will be subject to landholder agreement and the availability of suitably trained and experienced detection dog operators. Detection dogs have been successfully used for carcass monitoring across existing Australian wind farms and have advantages with regard to detection efficiency and accuracy (Stark and Muir 2020). However, there are limited detection dog teams available in WA trained for detections, at the time of preparation of this plan.

If detection dogs are to be used, this will generally involve a dog and handler traversing the 120 m search with wider transect spacing, approximately 20–40 m from one another, depending on wind speed (high winds potentially impacting scent detection). The spacing of the paths within this range would be determined by the handler. The dog would be fitted with a GPS unit to provide a measure of coverage completed during each survey. Dog handlers will be trained and experienced in identification of all bird and bat species that may occur within the Development Envelope or otherwise supported by an ecologist.

The results from searches undertaken by detection dogs will be compared with the results of subsequent human searches, and a correction factor applied to human results where differences occur, to ensure an accurate estimate of strike rates per turbine.

5.4.6.2. Carcass Recording and Handling

Bird and bat carcasses located during monitoring and opportunistically will be recorded digitally using geo-referenced data collection software (such as ESRI ArcCollector) with the following data to be recorded:

- GPS location along with distance (m) and compass bearing from the turbine (excludes incidental carcass finds)
- Time and date
- Nearest turbine ID number
- Species, age, and sex (where identifiable)
- Signs of injury and/or predation
- Estimated carcass age
- Groundcover type and height
- Immediately surrounding broad vegetation type (250 m radius)
- Presence and distance to key habitat features such as wetlands or other surface water, and Potential breeding trees
- Current weather conditions and any extreme or unusual weather events since the time of estimated death

- Photographs (to be provided to qualified ecologist for identification, if required, within two business days).

All recorded carcasses will be:

- Removed from search zone to prevent re-counting and scavenging
- Handled by authorised personnel using hand protection (e.g. rubber gloves)
- Packed into a plastic bag
- The bag will be clearly labelled with the time, date, the turbine it was collected from and the species name (if identifiable) and placed in the onsite storage freezer.

A carcass register will be maintained to document all bird and bat carcasses (including feather clumps) recorded both during monitoring and opportunistically across the Development Envelope. This will include recording those carcasses stored in the onsite storage freezer in accordance with Section 5.4.6.2. The registers will be held on a secure online platform (such as Microsoft Excel Online) so that both operational personnel and Proposal ecologists can access and update the register as required. Carcasses would then be utilised for positive species identification, use in scavenger and detectability trials, detection dog training, and for donation to museum collections.

5.4.6.3. Scavenger Rates and Trials

Scavenger Trials will involve the placement of bird and bat carcasses within the search zone of turbines to quantify the rate of carcass removal. The metric calculated is referred to as the survival function, which determines the probability that a carcass will 'survive' in the field past a given time then provides a mean and confidence interval on the time to scavenge of a given carcass.

Placed carcasses will be paired with a motion-sensing and colour/infra-red compatible remote camera positioned directly on the carcass. The utilisation of remote cameras allows for an accurate recording of the time and species responsible for scavenging of each placed carcass. The trial period will take place across 30 days, after which the cameras will be retrieved for analysis and any remaining carcasses (or part thereof) removed. Carcasses and cameras will be checked throughout the duration of the trial. Scavenger Trials may be undertaken concurrently with Detectability Trials (see Section 5.4.6.4) and monthly monitoring to re-position carcasses if necessary, and also to maximise efficiency and resources.

The turbines used for the Scavenger Trial will be a subset of the turbines monitored each month and will represent the range of surrounding broad vegetation types and adequate spatial distribution across the site. Scavenger Trials will be undertaken on two occasions over the first and second year of the full carcass monitoring program, with one trial to be undertaken in winter/early-spring and the other trial to be undertaken in summer/early-autumn, to account for seasonal variation.

To account for potential variation in scavenger rates based on carcass size, three different carcass sizes will be used for each trial, microbat, small/medium bird, and large bird. The carcass quantities per size class required to obtain a reasonable measure of average scavenging rates are detailed in Table 5-1.

Should insufficient quantities of carcasses be available for the trial, substitute carcasses for these trials will be of similar size, colour and general appearance of the target species group (e.g. mice as substitute for microbats).

Table 5-1: Carcass classes and quantities required for Scavenger Trials

Trial	Microbat	Small/medium bird	Large bird
Winter/ early-spring	10	10	10
Summer/ early-autumn	10	10	10

5.4.6.4. Detectability (Observer) Trials

Observer detectability is another factor which needs to be accounted for in calculating annual mortality rates, as the detectability of carcasses under turbines varies depending on a range of factors such as efficacy of the observer, size of carcass and type of groundcover (particularly given the presence of cropping). Detectability trials aim to quantify the probability that a searcher will detect a carcass in their search zone, whilst undertaking the prescribed carcass search protocol.

Two detectability trials will be undertaken over the first and second year of the full carcass monitoring program, one during winter and one during summer. The carcass classes and quantities used will also be consistent with those used for the Scavenger Trials (Table 5-1). Given this, and to maximise efficiencies in timing and resources, detectability trials may be undertaken concurrently with the Scavenger Trials and/or monthly carcass searches. However, where completed concurrently, it is important that the detectability trials are completed in one day, being the first day of the Scavenger Trial and prior to the setup of remote cameras to monitor the carcasses. This will minimise the opportunity for the carcasses to be scavenged and ensure the validity of the trial. To achieve the most applicable result, only personnel who have carried out monthly searches within the Development Envelope will be involved in the Detectability Trials.

Carcasses will be placed within the search zone of a given turbine. A carcass controller (a third party, independent from the monthly carcass searches) will throw each carcass into the air, allowing it to land in a manner somewhat consistent with a bird/bat which has collided with a turbine. The carcass controller will collect details on the coordinates, species, timing and groundcover of each placed carcass. The results of these trials will be used to calibrate the findings of the monthly carcass search program.

Should insufficient quantities of carcasses be available for the trial, substitute carcasses for these trials will be of similar size, colour and general appearance of the target species group (i.e. mice as substitute for microbats) and may include stuffed replica, or visually and similar sized proxies.

5.5. Key Personnel

Suitably qualified and trained people will be engaged to implement this BBAMP. BUS and bat utilisation surveys are to be undertaken by qualified and trained ecologists. Carcass searches will also be undertaken by qualified and trained ecologists or by dog handlers trained and experienced in identification of all bird and bat species that may occur or otherwise supported by an ecologist.

Select number of site personnel will be trained in key components of the implementation of this BBAMP. Such components include the Carcass Recording and Handling (Section 5.4.6.2), Storage Register (Section 5.4.6.2) and Injured Bird and Bat (Section 5.6) protocols, impact triggers (Section 6), and notification and reporting requirements (Section 7). The protocols will be relayed to all Proposal staff as part of the site induction.

5.6. Injured Bird and Bat Protocol

All Proposal staff who locate injured birds and bats are to report the find to the Proposal site manager immediately. Only trained and authorised staff are to handle wildlife. The coordinates and/or specific

location of the injured animal is to be recorded (along with photos where safe and able) and risks to the animal and staff assessed. If it is deemed safe to proceed then the animal should be collected in a towel or cloth bag, then placed immediately into a dark place (e.g. ventilated cardboard box or wildlife carrier) for transfer to a wildlife carer or veterinarian.

5.7. Monitoring summary for Threatened, Migratory and at-risk bird and bat species

A summary of the monitoring requirements for Threatened, Migratory and at-risk bird and bat species is detailed in Table 5-2.

Table 5-2: Operational monitoring of Threatened, Migratory and at-risk species / species groups

Survey	Species group	Methodology	Timing	Period
BUS	Conservation significant birds Other at-risk bird species	Section 2.2.1	Twice annually, in Spring and Summer following commencement of full operation.	2 years
Bat utilisation surveys	Conservation significant bat Other at-risk bat species	Section 2.2.2	Twice annually, in Spring and Summer following commencement of full operation.	2 years
Opportunistic Flight Behaviour and Tracking	Conservation significant birds Other at-risk bird species	Section 5.3	Opportunistically during BUS, bat utilisation surveys, carcass search protocols and trials.	2 years
Carcass Search Protocol	Conservation significant bats and birds Other at-risk bird and bat species	Commissioning Carcass Monitoring Program (Section 5.4.3)	Monthly during commissioning, once 10 turbines have been commissioned.	Until commencement of full operations.
		Full Carcass Monitoring Program (Section 5.4.4)	Monthly following commencement of full operations. Pulse searches to be undertaken monthly during spring and summer.	2 years
		Long-term Carcass Monitoring Program (Section 5.4.5)	To be confirmed following the evaluation of mortality rate estimates informed by the full carcass monitoring program.	
Scavenger Rates and Trials	Conservation significant bats and birds Other at-risk bird and bat species	Section 5.4.6.3	Biennially, once in winter / early-spring and once in summer / early-autumn.	2 years
Detectability (Observer) Trials	Conservation significant bats and birds Other at-risk bird and bat species	Section 5.4.6.4	Biennially. May be undertaken concurrently with the scavenger trials.	2 years

6. Impact Triggers

This section of the BBAMP defines impact triggers for both listed Threatened, Migratory or Priority species and non-listed species, as well as detailing the notification requirements, process for investigation and the implementation of mitigation strategies following an impact trigger.

6.1. Non-listed Species Impact Trigger

An impact trigger has been defined for bird and bat species which are not conservation listed but are considered to have a higher potential for collision with turbines (e.g. raptors and microbats).

The impact trigger for non-listed species is the confirmation of a carcass or injured individuals as recorded during the carcass detection program or detected within 120 m of turbines incidentally during other activities a total of four or more times at the same or adjacent turbine within two successive searches.

6.2. Conservation Significant Species Impact trigger

Impact triggers have been defined for bird and bat species listed as Threatened and/or Migratory under the EPBC Act or BC Act or Priority by DBCA.

The impact trigger for Threatened and Priority species is the confirmation of one dead or injured individual during the carcass detection program or detected within 120 m of turbines incidentally during other activities. The impact trigger for species listed as Migratory under the EPBC Act or BC Act is the confirmation of four dead or injured individuals detected within 120 m of any turbine during the species migratory season.

Table 6-1 outlines the rationale for the proposed outcome-based management trigger criteria, response actions, management measures and monitoring requirements.

Table 6-1: Outcome-based management for bird and bat species of concern

Key impact/risk	Trigger criteria	Trigger level actions
Direct injury or mortality of a species listed as Threatened under the BC Act or EPBC Act or as Priority by DBCA	Any Threatened species listed under the BC Act or EPBC Act or Priority by DBCA is found dead or injured beneath or adjacent (120 m radius) to a turbine.	• Immediately notify site manager who will notify the Proposal ecologist and State and Commonwealth agencies within five working days. • Increase carcass monitoring to fortnightly for an initial period of six weeks, subject to the availability of qualified ecologists and in consultation with the relevant regulator. If additional carcasses are recorded, monitoring is to continue fortnightly for another six weeks, subject to the availability of qualified ecologists and in consultation with the relevant regulator, or if no carcasses are recorded, return to monthly monitoring.
Direct injury or mortality of a species listed as Migratory under the BC Act or EPBC Act	Four or more carcasses from the same migratory species are recorded beneath or adjacent (120 m radius) to any turbine during the species migratory season.	• Subject to the results of the carcass monitoring and consultation with the relevant regulators, implement targeted monitoring at the impact turbine/s and any subsequent turbines where impacts are recorded, along with locations the target species has been previously sighted to better understand the reason for the injury or mortality to inform any updates to the risk assessment. For example, whether the impact is likely to be an isolated event or the result of regular seasonal movement. Targeted monitoring methodology and timing should be specific to the impacted species and should be developed in consultation with the relevant regulator. • Based on the results of the carcass and targeted monitoring update the risk assessment for the species by re-assessing the species risk level and determining whether the impact trigger has resulted in a significant impact to the species or is likely to result in a significant impact if repeated. • Within a timeframe agreed to by the relevant regulator, a report will be prepared confirming the likely cause of death, contributing factors and the results of additional carcass and targeted monitoring undertaken to determine whether the impact has resulted in a significant impact. • Where the impact has resulted, or is likely to result, in a significant impact, implement appropriate adaptive mitigation strategies, including use of deterrents (e.g. noise, visual) or turbine curtailment in response to high-risk environmental factors (e.g. low wind speed, periods of high species activity). • Where the impact has resulted, or is likely to result, in a significant impact, additional targeted monitoring will be implemented to assess the efficacy of any adaptive mitigation strategies implemented. • A summary will be included within the annual report confirming the likely cause of death, contributing factors, results of any additional monitoring undertaken and the efficacy of any adaptive mitigation strategies implemented.

Key impact/risk	Trigger criteria	Trigger level actions
Direct injury or mortality of a species not listed as Threatened or Migratory under the BC Act or EPBC Act or as Priority by DBCA	Four or more carcasses from the same species are recorded beneath or adjacent (120 m radius) to the same turbine in two successive searches. This impact trigger does not apply to introduced species or those listed as declared pests.	• Immediately notify site manager. • Instigate a desktop investigation within five working days to confirm the cause of death and any likely contributing factors or circumstances. Review site conditions, existing monitoring data for the species, and document consultation with State agencies and other relevant parties to determine whether any additional monitoring is warranted. • If required by State agencies, as subject to the above consultation, within a timeframe agreed to by the relevant regulator, a report will be prepared confirming the likely cause of death, contributing factors, the results of additional monitoring undertaken, re-assessment of the risk level for the species and determining whether the impact trigger has resulted in a significant impact to the species or is likely to result in a significant impact if repeated. • Where the impact has resulted, or is likely to result, in a significant impact, implement appropriate adaptive mitigation strategies, including use of deterrents (e.g. noise, visual) or turbine curtailment in response to high-risk environmental factors (e.g. low wind speed, periods of high species activity). • Where the impact has resulted, or is likely to result, in a significant impact, additional targeted monitoring will be implemented to assess the efficacy of any adaptive mitigation strategies implemented. • A summary will be included within the annual report confirming the likely cause of death, contributing factors, results of any additional monitoring undertaken and the efficacy of any adaptive mitigation strategies implemented.
Presence of a threatened or at-risk bird nest close to a wind turbine	Confirmed active nest (excluding hollows) of Threatened or at-risk bird species within 200 m of operational turbine.	• Consider relocating the nest and/or tree once the breeding event has concluded. • Conduct monthly checks of the nest and/or tree after the likely fledging period for the species, to confirm whether the breeding event has concluded and whether the nest is suitable for relocation. • Summary will be included in the annual report detailing any relocation that has occurred and the results of the monthly checks.

7. Reporting

Monthly carcass monitoring reporting

At the conclusion of each monthly carcass monitoring event, a brief report will be prepared and sent from the Proposal ecologist to relevant Proposal personnel, outlining the survey results. The report will include the species, quantity and location of recorded carcasses, a review against impact triggers (Section 6), and any other ecologically significant matter (e.g. presence of feral fauna from opportunistic sightings). The report will also include the results of the scavenger and detectability trials, when relevant. In preparing the monthly report, the Proposal ecologist will also review and consider any incidental finds recorded within the carcass and storage register, as well as ensure the register is updated with monthly carcass monitoring finds. The report (as described in Table 6-1) will be prepared within 20 days of the completion of the monitoring event.

Annual reporting

The results of the Operational Bird and Bat Monitoring Program will be detailed in an annual report, to be prepared within three months of the completion of both Year One and Year Two operations. The annual report will present the results of the operational BUS and bat utilisation surveys, the Carcass Monitoring Program and include details of any trigger response or adaptive management measures implemented in the previous 12-month reporting period.

The Year Two annual report will present a detailed analysis of the initial two-year full carcass monitoring program and discuss the requirement for any further monitoring, adaptive management and/or mitigation.

Statistical analysis of carcass monitoring results will provide an estimate of bird and bat mortality resulting from turbine collision. Overall mortality estimates will be provided for birds, bats, and where necessary, individual species. Statistical estimates of total mortality will be undertaken via the combined use of carcass monitoring data and scavenger and detectability trial data. Estimates will also take into account the limitations of the data inputs, with regard to the select area and number of turbines searched as part of the monitoring program.

Statistical analysis will also be undertaken to determine if there has been any significant decline ($p = <0.05$) in species richness of bird and/or bat utilisation and/or Significant decline or increase in abundance of Moderate or High risk level Threatened, Migratory or at risk bird and bat species of concern post construction.

Results will be presented alongside their relevant confidence intervals and any applicable standard error. Analyses will also aim to identify any spatial, temporal, morphological or other species-specific trends evident within the data. This will ensure that any high-risk species and/or turbines are identified so that adaptive management and mitigation measures can be implemented.

Consistent with the adaptive management approach of this BBAMP, the risk level for each bird and bat species assessed in Table 3-4 will be revised in response to any impact trigger (Section 6) and updated as necessary during annual reporting.

Threatened and Priority species mortality notification

Any dead or injured Threatened or Priority species will require notification of Department of Climate Change, Energy, the Environment and Water (DCCEEW) and/or DBCA as soon as practicable (generally within five working days of the impact being known). The Proponent will liaise with these regulatory authorities to ascertain the significance of impact to these species and where required develop suitable adaptive management and mitigation measures to be incorporated into this Plan.

Incident/Impact Trigger reporting

As detailed in Table 6-1, if direct injury or mortality of a species listed as Threatened under the BC Act or as Priority by DBCA a report will be prepared in a timeframe agreed by the relevant regulator. This report will detail the likely cause of death, contributing factors and the results of any additional carcass and targeted monitoring undertaken.

If any of the other impact criteria are triggered a summary of the incident will be included within the annual report.

8. Adaptive Management and Review

This BBAMP will be revised prior to construction commencing and following detailed design to account for the final turbine layout and model, and to align with any future approval conditions under the EPBC Act, EP Act or the PD Act, as required.

This BBAMP will then be reviewed at least annually following the completion of each year's operational bird and bat monitoring program, and following any incident (i.e. exceedance of trigger) that results in:

- Changes to the risk assessment
- Change in monitoring or management requirements.

Any recommended changes to the BBAMP will be detailed within the annual reports described in Section 7.

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Phoenix Environmental Sciences (Phoenix) 2025b. *Detailed Flora and Vegetation Survey for a Proposed Wind Farm in Scott River*. Report prepared for Synergy Renewable Energy Development.

Phoenix Environmental Sciences (Phoenix) 2025c. *Basic and Targeted vertebrate fauna survey for a Proposed Wind Farm in Scott River*. Report prepared for SynergyRED.

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Appendix A Suitably Qualified Ecologists CV



Tom Kelly

Associate Ecologist

Tom commenced work for Eco Logical Australia (ELA) in May 2015 out at our Greater Western Sydney office before relocating to ELA's Mudgee office in November 2015 to take up a Graduate Ecologist position. Since this time, Tom has developed into an experienced Associate Ecologist, performing a wide range of tasks including ecological monitoring and surveys, environmental impact assessments, targeted threatened species surveys, management plan preparation and associated reporting. In performing these tasks, Tom has developed specialised knowledge and skills relevant to the environment and biodiversity, particularly with regards to the bird and bat species of south-eastern Australia. After over six years living and working in Mudgee, Tom relocated to ELA's Sydney office in February 2022.

Tom is an experienced project manager delivering a diverse range of projects, from small scale assessments and expert advice to long-term biodiversity monitoring programs for industry, government and community clients.

Upon graduating from the University of Wollongong with a Bachelor of Science degree, Tom continued his studies at the National Environment Centre, gaining an Advanced Diploma of Applied Environmental Management, which he completed in 2014.

QUALIFICATIONS

- Bachelor of Science – Physical Geography/Environmental Science Major, University of Wollongong
- Advanced Diploma of Applied Environmental Management, Riverina Institute – National Environment Centre
- Respond to Wildlife Emergencies (AHCFAU301)
- Conduct Local Risk Control (RIIRIS201D)
- Comply with Operation Work Processes / Procedures (RIIGOV201D)
- Apply Risk Management Processes (RIIRIS301D)
- Drive and Recover a 4WD Vehicle (SISODRV302A)
- Provide cardiopulmonary resuscitation (HLTAID001)
- Provide basic emergency life support (HLTAID002)
- Provide first aid (HLTAID003)

PROFESSIONAL MEMBERSHIPS

- Australian Bird Study Association
- Australasian Bat Society
- Birdlife Australia and Australian Raptor Group

KEY PROJECT EXPERIENCE RELATING TO RENEWABLES

BIODIVERSITY MONITORING

- Proposed Wind Farm Site near Darkan, WA . Bird and Bat Utilisation survey. Synergy Renewable Energy Developments (2025)
- Proposed Wind Farm Site near Burekup, WA . Bird and Bat Utilisation survey. Synergy Renewable Energy Developments (2025)
- Beryl Rd Solar Farm flora and fauna impact assessment. Mid Western Regional Council (2018)
- Bookham Wind Farm Biodiversity Development Assessment Report and Bird and Bat Adaptive Management Plan. Squadron Energy. Squadron Energy (2024)
- Euroley Wind Farm ecological constraints assessment. apa (2024)
- Jeremiah Wind Farm Bird and Bat Adaptive Management Plan. CWP Renewables (2020-24)
- Crudine Ridge Wind Farm Bird and Bat Adaptive Management Plan. CWP Renewables (2020-24)
- Coopers Gap Wind Farm Bird and Bat Adaptive Management Plan implementation. GE Renewables (2021-23)
- Ruby Hills Wind Farm Biodiversity Development Assessment Report and Bird and Bat Utilisation Surveys. Origin Energy (2023-24)
- Uungula Wind Farm Bird and Bat Adaptive Management Plan. CWP Renewables (2021-23)
- Kareela Grey-headed Flying-fox camp monitoring. Sutherland Shire Council (2015)
- Parkes to Manildra transmission line nest box monitoring. TransGrid (2015-16)
- Murrumbidgee to Googong Biodiversity Offset Area ecological monitoring. Icon Water (2016)
- Hunter North Coast Littoral Rainforest baseline monitoring. Office of Environment and Heritage NSW – National Parks & Wildlife Service (2018)
- Northwest Forests diurnal bird surveys and fauna habitat assessment. Forico (2022)
- Great Northern Forests diurnal bird monitoring. National Parks and Wildlife Service NSW (2024)

IMPACT ASSESSMENTS

- Wind Farm in Scott River Part IV Environmental Review Document. Synergy Renewable Energy Developments (2024-2025)
- Bookham Wind Farm Biodiversity Development Assessment Report. Squadron Energy (2024)
- Ruby Hills Wind Farm Biodiversity Development Assessment Report. Origin Energy (2023-25)
- Valley of the Winds Wind Farm Biodiversity Development Assessment Report. UPC\AC Renewables Australia (2020-21)
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- Uungula Wind Farm Biodiversity Assessment Report. CWP Renewables (2018-20)
- Spring Gully EPBC Act targeted threatened flora and fauna impact assessment. Origin Energy (2018)
- Narrabri and Boggabri bridge replacement and road re-alignment flora and fauna impact assessment. Narrabri Shire Council (2018)
- Ulan Rd upgrade flora and fauna impact assessment. Mid Western Regional Council (2016)
- Ulan-Wollar Rd intersection flora and fauna impact assessment. Wilpinjong Coal Pty Ltd (2016)
- Avisford 4WD Park flora and fauna impact assessment. Central West 4WD Park (2016)
- EL6288 flora and fauna impact assessment. Moolarben Coal Operations (2016)

- Open Cut 3 Modification biodiversity impact assessment. Moolarben Coal Operations (2017)
- ML1715 flora and fauna impact assessment. Moolarben Coal Operations (2017)
- UG4 Modification Biodiversity Assessment. Moolarben Coal Operations (2018)
- Slate Gully microbat assessment. Wilpinjong Coal Mine Pty Ltd (2016)
- Migratory shorebird targeted surveys and assessment. Water Corporation WA (2023)

BIODIVERSITY MANAGEMENT PLANS AND PROCEDURES

- Uungula Wind Farm Bird and Bat Adaptive Management Plan. Squadron Energy (2021-23)
- Jeremiah Wind Farm Bird and Bat Adaptive Management Plan. Squadron Energy (2023-24)
- Crudine Ridge Wind Farm Bird and Bat Adaptive Management Plan. Squadron Energy (2020-24)
- Cudgegong River Flying-fox Camp Management Plan. Mid-Western Regional Council (2017)
- Lamberts North Biodiversity Offset Management Plan. Energy Australia NSW (2019)

Appendix B Bird and Bat Risk Assessment

PHOENIX
ENVIRONMENTAL SCIENCES

Bird and bat risk assessment for a proposed wind farm in Scott River – Level Two investigation

Prepared for Synergy Renewable Energy Developments Pty Ltd

August 2025

Final v1.0



Bird and bat risk assessment for a proposed wind farm in Scott River–Level Two investigation

Prepared for Synergy Renewable Energy Developments Pty Ltd

Version history

Author/s	Reviewer/s	Version	Version number	Date submitted	Submitted to
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K. Crews, J. Clark	K. Crews, E. Broom	Draft for client comments	0.2	04-Mar-25	N. Bell
J. Clark, K. Crews	P. Strickland	Update with Year 2 results	0.3	18-Jun-25	N. Bell
J. Clark	K. Crews	Addressed client comments	1.0	20-Aug-25	N. Bell

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ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
AGL	Above ground-level
BACI	Before, After, Control, Impact
BC Act	*Biodiversity Conservation Act 2016*
BIA	Bird/Bat Investigation Area
BBRAS	Bird and bat risk assessment survey
CAMBA	China-Australia Migratory Bird Agreement
CR	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EAAF	East Asian-Australasian Flyway
EIA	Environmental impact assessment
EN	Endangered
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Areas
IBRA	Interim Biogeographic Regionalisation of Australia
JAMBA	Japan-Australia Migratory Bird Agreement
Mig.	Migratory
NES	National Environmental Significance
OS	Species otherwise in need of special protection
RAMSAR	A RAMSAR site is a wetland site designated to be of international importance under the Ramsar Convention
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RSA	Rotor swept area
SP	Specially protected
TEC	Threatened Ecological Community
VU	Vulnerable
WA	Western Australia
WAPC	Western Australian Planning Commission
WFA	Wind Farm Area

EXECUTIVE SUMMARY

Synergy Renewable Energy Developments Pty Ltd is investigating the feasibility of a Proposed Wind Farm in Scott River (the Project), located approximately 15 km north-east of Augusta, Western Australia. Phoenix Environmental Sciences Pty Ltd (Phoenix) has undertaken a bird and bat risk assessment survey (BBRAS) to identify potential risks to bird and bat species from the Project.

The BBRAS comprised:

- a desktop assessment (regional overview) to define the site and species characteristics
- bird and bat utilisation surveys undertaken over 2 years between May 2023 to March 2025
- risk assessment for species identified as potentially of concern for the Project based on the regional overview and field surveys.

An adaptive approach was taken for this survey program, with adjustments made to site locations after the completion of Year 1, following review of the first year of sampling results, and the provision of proposed turbine locations. The main 'study area' for this survey was the wind farm area (WFA), within which 20 turbines are proposed to be located. Site characterisation was conducted for the study area plus a 10 km buffer, referred to as the Bird/Bat Investigation Area (BIA). Regional reference sites on the Hardy Inlet (outside the BIA, except for one site) were added to the survey program in Year 2 to collect contextual regional data for Migratory shorebirds, in response to the Year 1 survey results. The study area is 3,882.2 ha and the BIA is 86,347.9 ha.

Fixed-point counts for birds were undertaken at a total of 28 sites, comprising 9 Impact sites, 14 Reference sites and 5 Regional reference sites. Echolocation recordings for bats were undertaken at all 16 Year 1 fixed-point count sites. Audio recordings for birds were also undertaken at the 16 Year 1 sites targeting 4 conservation significant species: Masked Owl (*Tyto novaehollandiae novaehollandiae*), Baudin's Cockatoo (*Zanda baudinii*), Carnaby's Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

In addition to the BBRAS, a Basic and Targeted fauna survey was conducted for the Project that is reported separately. Bird and bat species records from that survey, however, have only been included in this report where necessary, such as for the risk assessment conducted for potential species of concern. Fauna habitat mapping undertaken for the WFA in the Basic and Targeted survey was also utilised to in this report.

The Project site is located predominantly within the Warren Interim Biogeographic Regionalisation of Australia bioregion (Warren subregion). Large areas of intact forest occur north and east of the study area, with several conservation reserves present in the BIA. One nature reserve occurs within, but is excised from, the WFA boundary. Notable surface water features include the Scott River, located directly south of the WFA and the Blackwood River, which runs through the western and northern parts of the BIA outside the WFA and flows into the Hardy Inlet. The Beenup artificial wetlands created at the old Beenup mine are located ~1 km west of the WFA.

Topography of the WFA is generally flat/undulating. Three native wetland habitats are present, a mix of seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 9.7% of its extent. Two woodland habitats, Marri-Jarrah-Peppermint woodland and degraded Open woodland of Peppermint trees, are present and cover 10.7% of the study area. The remainder of the WFA (79.6%) is highly modified and mostly cleared paddock, much of which is inundated during winter.

The species characterisation identified 41 conservation significant species that may occur in the study area. This includes species listed as Threatened and/or Migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); species listed as Threatened, Conservation

Dependent, Otherwise in need of special protection and/or Migratory under the *Biodiversity Conservation Act 1999* (BC Act); and Priority species listed by the Department of Biodiversity, Conservation and Attractions. Records of 199 bird species and 7 bat species were identified within the area of the desktop searches.

A total of 313 fixed-point count samples taken from the 28 BBRAS sites resulted in a total bird species richness of 96 and total abundance of 13,471 birds. Bird species richness was lower at Impact sites (n=60), than at Reference sites (n=74). Species richness at Regional reference sites was 31; however, sampling at those sites represented just 2.5% of total sampling effort, therefore relative to survey effort, the Regional reference sites at Hardy Inlet are more species rich than the Impact and Reference sites. Abundance was also higher at the Regional reference sites when adjusted for survey effort.

Number of bird records and abundance counts were higher in Year 2 (1,599 records, 8,315 total abundance) compared with Year 1 (1,075 records, 5,156 total abundance), but this reflects a higher sampling effort conducted in Year 2.

Seasonally, autumn in Year 1 had the highest mean bird abundance followed by summer in Year 2 and winter in Year 1. Species richness was highest in summer of Year 2, spring of Year 2 and spring of Year 1. Other than total abundance in summer Year 2, the summary parameters did not vary substantially between seasons.

Eight bat species were recorded in the BBRAS, all of which were recorded at Impact sites, and 7 of which were recorded at Reference sites. Bats were detected in most (43 of 55) recording nights but at generally low activity levels in the WFA. Recorded bat activity was considerably higher in summer than in the other 3 seasons.

Fourteen bird species of conservation significance were recorded across the BBRAS survey and/or the Basic and Targeted fauna survey, including 7 that were recorded in the WFA and/or wider BIA (and likely to occur in the WFA), and 7 that were only recorded at Regional reference sites (variable likelihood of occurrence in the WFA). One conservation significant bat species was also recorded.

Based on the findings of the site and species characterisation, and the field surveys, 29 conservation significant species were considered potential species of concern to the Project, including 8 species that were recorded in the WFA or wider BIA (7 birds, one bat) and 21 additional significant species considered likely, or to possibly occur in the WFA, or possibly occur on rare occasion only. Based on the risk assessment conducted for these species, 3 were considered at moderate risk of impact from the Project, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. Two other conservation significant species were considered at low risk, Australasian Bittern and Western False Pipistrelle. Risk was assessed as negligible for the remaining 24 conservation significant species.

In addition to the conservation significant species, 11 non-significant raptors were identified as potential species of concern, as were the 7 other (non-significant) bat species recorded. Eight of these species (6 birds and 2 bats) were assessed as at low risk from the Project, Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, Brown Goshawk, Brown Falcon, Australian Kestrel, White-striped Free-tailed Bat and Southern Forest Bat. Risk rating was assessed as negligible for the remaining 10 species.

In conclusion, while the risk to most species is considered low to negligible, the data suggests that raising the minimum blade height to 50 m above ground-level would substantially reduce the risk to most species, including black cockatoos, leading to a 54% reduction in species flying within the RSA and just 3.8% of flights occurring within the RSA. As well as raising the minimum blade height, collision risk could be further reduced by limiting the concentration of turbines and maintaining a sufficient separation distance, approximately 100 m, between turbines and important habitat, to maintain adequate open areas for bird and bat movement.

1 INTRODUCTION

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is a wholly owned subsidiary of Synergy Pty Ltd located in Perth, Western Australia (WA). SynergyRED is investigating the feasibility of a proposed wind farm in Scott River (the Project), located approximately 15 km north-east of Augusta, WAFigure 1-1. In April 2023, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by SynergyRED to undertake a bird and bat risk assessment survey (BBRAS) for the Project in accordance with the approach outlined in Brett Lane and Associates (2005).

The renewable energy sector has grown rapidly in recent years, including wind farms, with guidance on bird and bat impact studies for proposed wind farms evolving in response to emerging knowledge. At the time of engagement, no detailed government authored methodology existed for conducting bird and bat risk assessments (and the supporting studies that inform these) for proposed wind farms. Interim guidance on bird and bat management by the Australian Government (DAWE 2021) provides a broad outline of key requirements of desktop studies, field surveys and impact risk assessments for onshore wind farms, and has been considered here. For detailed methods for conducting risk assessments for birds however, including the supporting desktop and field studies, Brett Lane and Associates (2005) is a current accepted approach.

In May 2024, after completion of field surveys, the Australian Government released new draft guidance for onshore windfarms (DCCEEW 2024) that provides an overarching framework for the referral, assessment and approval process for proposed onshore wind farm projects, with a focus on bird and bat management. DAWE (2021) and DCCEEW (2024) consider it best practice to conduct at least 24 months of site utilisation surveys to provide sufficient baseline data about bird and bat usage of the site and surrounds, with surveys conducted in each relevant season over this period.

This report presents the results of a two-year survey program for the Project. The work completed represents a Level Two investigation in line with Brett Lane and Associates (2005). At the commencement of the program no turbine layout was available and as such Impact and Reference sites could not be confidently placed. Sites were therefore located in areas considered most likely to support turbines at that time. In May 2024 a proposed turbine layout was provided. In response several sites were dropped and new sites established so that a balanced mix of Impact and Reference sites were achieved. Due to a lack of Migratory species being detected in Year 1, the decision was made to survey the Hardy Inlet as it is a known local hotspot for Migratory species, to compare the assemblage there with that of the WFA. These Regional reference sites were only sampled during the migratory season.

1.1 OBJECTIVES AND SCOPE OF WORK

The scope of work for the bird and bat risk assessment survey was as follows:

- undertake a Level Two investigation, comprising
    - regional overview
    - bird and bat utilisation surveys
    - risk assessment
- ensure the works completed satisfy the following guidelines, by employing adequate survey methodology and effort by suitably qualified and experienced practitioners
    - *Wind Farms and Birds: Interim Standards for Risk Assessment, Australian Wind Energy Association Report* (Brett Lane and Associates 2005)

- *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020)
- *EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed Migratory shorebird species* (DoEE 2017)
- *Survey guidelines for Australia's Threatened birds. Guidelines for detecting birds listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999* (DEHWA 2010)
- *Survey guidelines for Australia's Threatened bats. Guidelines for detecting bats listed as Threatened under the Environmental Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

Where possible, this assessment has considered the new draft guidance: *Onshore Wind Farm Guidance: Best practice approaches when seeking approval under Australia's national environment law* (DCCEEW 2024).

The objectives of this study were to:

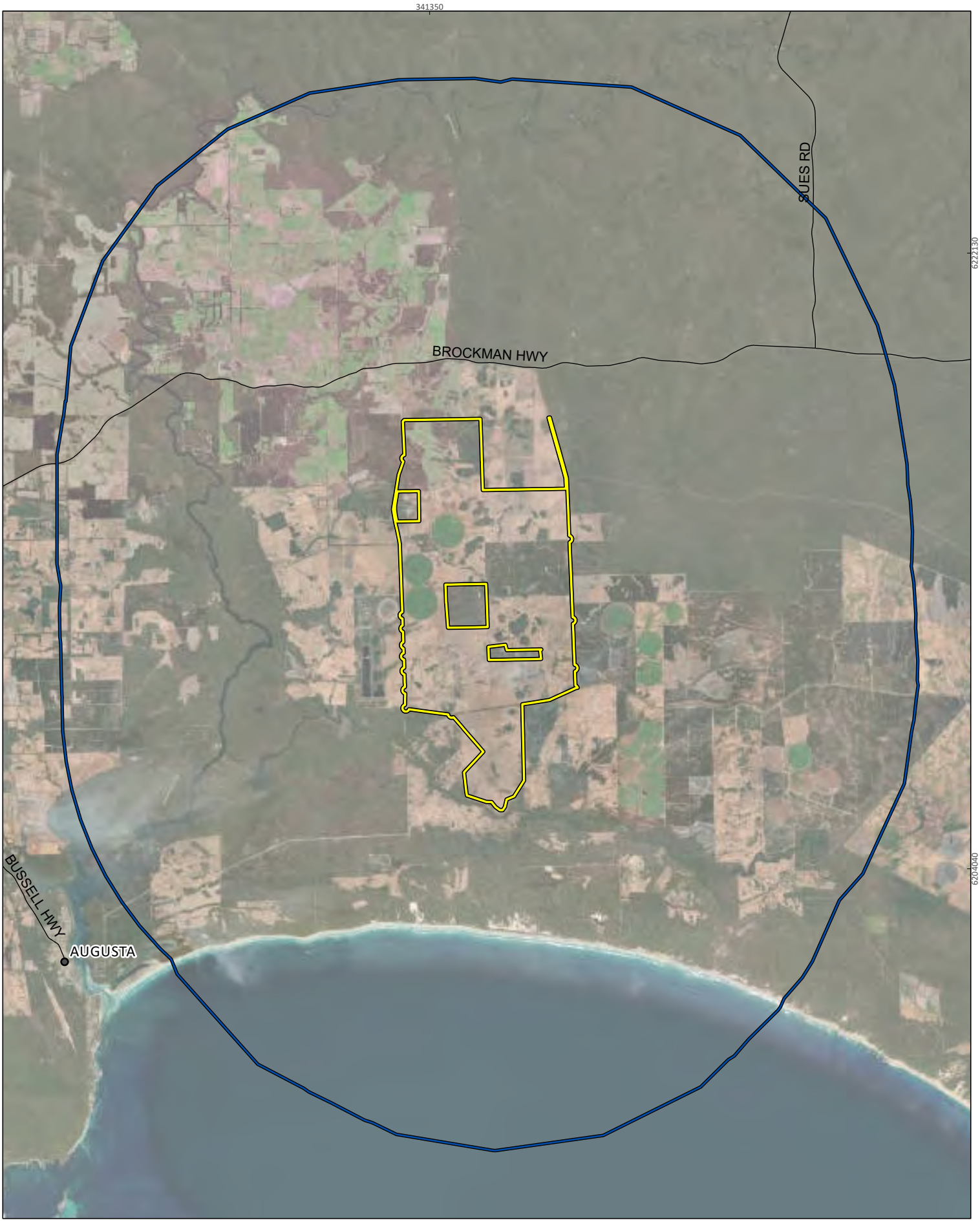
- collect sufficient information on site and species characteristics to inform a preliminary assessment of risks to birds and bats from the Project
- establish baseline monitoring sites for use in an ongoing monitoring program under a bird and bat management plan
- provide an assessment of risk to conservation significant and 'at-risk' birds and bats from the Project.

Phoenix also conducted a Basic and Targeted fauna survey for the Project in 2023/2024 (Phoenix 2025a). Species records from that survey have only been included in this report where necessary, such as for the risk assessment of conservation significant and other potential species of concern.

1.2 STUDY AREA

The main focus 'study area' for this survey was the wind farm area (WFA), within which turbines are proposed to be located (Figure 1-1). Site characterisation was conducted for the study area plus a 10 km buffer, referred to as the Bird/Bat Investigation Area (BIA; Figure 1-1). Regional reference sites on the Hardy Inlet included in Year 2 but are outside the BIA, except for 1 site further upstream, which is within the BIA but has been treated as a Regional reference site (see Section 3.2 for details).

The study area is 3,882.2 ha and the BIA is 86,347.9 ha.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	12/06/2025
Drawn by	BK
Map author	BA

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Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 12/06/2025. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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Study area
Bird/Bat Investigation Area
Roads

Figure 1-1

Project location and study area

PHOENIX ENVIRONMENTAL SCIENCES

2 LEGISLATIVE AND POLICY CONTEXT

Impacts to birds and bats from proposed wind farms need to be considered under both Federal and State environmental approval frameworks, i.e.:

- assessments of proposals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- assessments of proposals under Part IV of the State *Environmental Protection Act 1986* (EP Act).

2.1 COMMONWEALTH

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of National Environmental Significance (NES), require approval from the Australian Government Minister for the Environment (the Minister) through a formal referral process. The EPBC Act provides for the listing of both Threatened fauna, and Migratory bird species protected under international agreements, as matters of NES. When considering whether a proposed wind farm requires approval under the EPBC Act, the Minister must consider all adverse impacts to matters of NES resulting, either directly or indirectly, from the action (DCCEEW 2024).

Threatened fauna listed as matters of NES under the EPBC Act are assigned to one of 4 categories:

- Extinct in the Wild (EW)
- Critically Endangered (CR)
- Endangered (EN)
- Vulnerable (VU).

International agreements applicable to listed Migratory species are the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Convention on the Conservation of Migratory Species of Wild Animals (Bonn) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

2.2 STATE

In WA, proposals which, if implemented, are likely to have a significant impact on specified environmental factors, are assessed by the Environmental Protection Authority (EPA) and approved by the State Government Minister for the Environment under Part IV of the *Environmental Protection Act 1986* (EP Act). Assessment of potential impacts to birds and bats from proposed wind farms falls under the EPA's environmental factor 'terrestrial fauna'.

The EPA's objective for terrestrial fauna (EPA 2016) is "to protect terrestrial fauna so that biological diversity and ecological integrity are maintained". It recognises significant fauna species, habitats and assemblages as requiring consideration in environmental impact assessment (EIA). Significant fauna includes Threatened and Priority species, species with restricted distributions, species subject to historical impact from threatening processes and those providing important ecological functions. Fauna habitats may be significant if they provide habitat important to the life history of a significant species, i.e. breeding, feeding and roosting or aggregation areas, or where they are unique or isolated habitats in the landscape or region (EPA 2016).

The *Biodiversity Conservation Act 2016* (BC Act) provides for the listing of Threatened fauna species in WA under 3 categories (Government of Western Australia 2022): Critically Endangered (CR),

Endangered (EN) and Vulnerable (VU). The BC Act also provides for the listing of specially protected (SP) species under 3 categories: species of special conservation interest (conservation dependent fauna, CD), Migratory species (Mig.) including birds subject to international agreement and species otherwise in need of special protection (OS).

Priority fauna as identified by the Department of Biodiversity, Conservation and Attractions (DBCA) are not protected under the BC Act but are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna list are assigned to one of 4 Priority (P) categories, P1 (highest)–P4 (lowest), based on level of knowledge/concern.

2.3 POTENTIAL IMPACTS TO BIRDS AND BATS FROM PROPOSED WIND FARMS

Federal guidelines for wind farms (DAWE 2021; DCCEEW 2024; DEWHA 2009) identify the following as the main risks to birds and bats:

- direct impacts
    - habitat loss through clearing for turbines and other infrastructure
    - mortality or injury from collisions by birds or bats with operating wind turbines
    - mortality or injury from barotrauma (damage to body tissues from a drop in air pressure when animals fly too close to turbines)
- indirect impacts
    - displacement, when birds or bats avoid the area due to wind farm construction and operation (e.g. due to rotor movement, artificial noise or light sources), which can result in breeding disturbances or force longer flights to access feeding areas
    - alienation of important sites, such as those where Threatened species concentrate when roosting, feeding, breeding or on migration.

The potential for collision with turbines is often the most significant risk to birds and bats at wind farms. Risk to individual species is influenced by many factors including utilisation of the WFA, flight behaviour, flight heights, flight speeds, manoeuvrability, bird size and/or turbine parameters (such as turbine height, blade size-, rotor swept area) (Brett Lane and Associates 2005; Smales *et al.* 2013).

There is currently insufficient data to demonstrate barotrauma as a common cause of bird/bat mortality/injury from wind turbines. Different studies for bats have provided conflicting evidence (e.g. Baerwald *et al.* 2008; Lawson *et al.* 2020); limited research has been conducted for birds. The pressure variation necessary to cause barotrauma is so close to the blade surface that there is a higher probability of direct contact with blades (Guest & Hein 2023). Risk of barotrauma is therefore treated together here with collision risk.

Many studies have been conducted globally on the displacement effects of wind farms on birds and bats. A systematic review of 84 peer-reviewed studies (Tolvanen *et al.* 2023a) found that 63% of cases reported displacement for birds and 72% displacement for bats. Displacement effects on birds were variable across studies, groups and species, but included reduced bird density, reduced number of breeding birds, changes in flight behaviour and changes in selection of roosting and feeding areas (Tolvanen *et al.* 2023a). Waterfowl, raptors, passerines and waders were displaced on average up to 500 m in cases where displacement was observed. Bats were displaced on average up to 1 km, with responses influenced by the foraging environment and the echolocation range of particular species (Tolvanen *et al.* 2023a), for example species with short-range echolocation showed reduced abundance and activity around turbines.

Some studies have observed localised impacts (close to turbines) from turbine noise on birds or bats. For example, decline in abundance (Lehnardt *et al.* 2024) and masking of territorial defence behaviour (Zwart *et al.* 2016) has been observed in songbird species. Displacement of narrow-space foraging forest bats has also been potentially attributed to turbine noise (Ellerbrok *et al.* 2024). Lighting has been suggested to disturb birds and have adverse effects on communication (Gomez-Catasus et al 2018, 2022, Leddy et al 1999, in Tolvanen *et al.* 2023b). Red aviation lights have been also suggested as a reason for bat displacement (Barre *et al.* 2018).

EPBC Act Policy Statement 2.3 (DEWHA 2009), which provides guidance to proponents on whether referral of a wind farm proposal is required under the EPBC Act, identifies the following groups most at-risk and situations where they are most affected:

- waterbirds that are listed Threatened species, listed Migratory species, and/or part of the ecological character of a RAMSAR wetland
- seabirds that are listed Threatened species, listed Migratory species and/or part of the ecological character of a RAMSAR wetland–in the case of coastal and offshore wind farms
- listed Migratory species and listed Threatened species that migrate within Australia–where wind farms are situated on migration routes
- species that are at-risk of extinction (Endangered or Critically Endangered), particularly certain species of bats and birds where wind farms are situated on a site they frequent.

The matters of NES significant impact guidelines 1.1 (DoE 2013) and EPBC Act Policy Statement 3.21 (DoEE 2017), for Migratory shorebirds, provide guidance for assessing impacts to EPBC Act listed birds and bats.

In addition to listed Threatened or Migratory species, some non-conservation significant bird and bat species have been identified as being at-risk of impact from wind farms. Some raptor species, such as *Aquila audax* (Wedge-tailed Eagle) and *Falco cenchroides* (Australian Kestrel), are particularly vulnerable to collision risk due to their morphology, behaviour, flight type and habitat use (Dohm *et al.* 2019; Moloney *et al.* 2019a; Stark & Muir 2020b). Similarly, some bat species, such as *Austronomus australis* (White-striped Free-tailed Bat) and *Chalinolobus gouldii* (Gould's Wattled Bat), are frequently recorded in mortality monitoring at wind farms (Moloney *et al.* 2019a; Stark & Muir 2020b).

3 METHODS

The Level Two investigation was largely conducted in accordance with the methods described in Brett Lane and Associates (2005) and comprised the following:

- regional overview, entailing desktop assessment and site inspection to–
    - provide a qualitative overview of bird usage of the study area and the surrounding region
    - characterise the bird and bat species potentially occurring in or near the study area, including conservation significant species, i.e. those listed under the EPBC Act, BC Act and/or Priority species
    - define the study area characteristics and habitats in or near the study area
    - identify species or groups that are at-risk of potential impact and conduct a preliminary risk assessment
- on-ground surveys to ground-truth the results of the regional overview, including –
    - bird utilisation surveys
    - bat utilisation surveys
    - targeted species surveys.

Additional sampling was conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a) data from which was used in the risk assessment for conservation significant species and other species of potential concern.

The methods also largely comply, where applicable, with the other guidelines mentioned in the scope of work (Section 1.1) with respect to survey timing, replication, experience of practitioners and reporting standards. While Brett Lane and Associates (2005) specifically applies to birds, the overarching approach to the field surveys and risk assessment was also applied to bats, where possible. A significant departure from the bird observation methods was that bats were detected via echolocation recording rather than direct observation; therefore, it was not possible to determine flight heights, or distance and direction from the recording device. Further, basic biological attributes important to conducting a collision risk assessment for a windfarm, such as mean and maximum flight and foraging heights, are not known for many bat species.

3.1 REGIONAL OVERVIEW

3.1.1 Site characterisation

A preliminary site characterisation was undertaken by interrogating several desktop information sources on the region to identify potential habitat attributes for birds and bats in the BIA, including:

- Interim Biogeographic Regionalisation of Australia (IBRA) bioregions (DoEE 2016) and land systems (Purdie et al. 2004)
- conservation reserves
- Environmentally Sensitive Areas (ESAs) as gazetted under the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 (Government of Western Australia 2005)
- significant wetlands, including RAMSAR wetlands (DCCEEW 2019) and nationally important wetlands (DEWHA 2008)

- the occurrence of other wetlands and coastal habitats that could support listed Migratory species that could fly across the site, including geomorphic wetlands (WRC 2017)
- Threatened and Priority Ecological Communities of relevance to birds/bats
- geographical features evident on aerial photography (Google Earth®) that might concentrate bird or bat movements on or near the BIA, such as promontories, isthmuses, waterways and ridgelines with soaring birds of prey
- known or potential nesting, roosting or foraging areas for conservation significant birds/bats
- potential corridors or zones of bird/bat movement.

3.1.2 Species characterisation

Searches of several biological databases (at 10 km or 40 km buffer of the study area) were undertaken to identify and prepare a list of birds and bats, including conservation significant species, that may occur within the BIA (Table 3-1). A literature search was also conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the list developed from the database searches (Table 3-2).

Atlas of Living Australia data (ALA 2024) on Migratory shorebird records was interrogated for a larger area encompassing roughly the Cape Naturaliste to Cape Leeuwin region to determine when Migratory species arrive in the southwest.

A full potential assemblage list was developed for birds and bats from the regional overview. Desktop characterisation was undertaken for all conservation significant species. The following species characteristics were defined for each species:

- habitat preferences
- behaviour
- flight behaviour
- demographic factors.

Table 3-1 Database searches conducted for the regional overview

Database	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2023)	Approximate centre point of study area (115.300, -34.225) with 10 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2023c)	Study area plus a 10 km buffer
Dandjoo biodiversity data platform (formerly DBCA NatureMap Database) (DBCA 2023a)	Study area plus a 10 km buffer
BirdLife Birdata (Birdlife Australia 2023)	Study area plus a 10 km buffer
Index of Biodiversity Surveys for Assessment (IBSA) database (IBSA 2023) for nearby survey reports and data[1]	Study area plus a 40 km buffer

[1]No data was returned in this search.

Table 3-2 Survey reports included in the regional overview

Report author	Survey description	Project
LEC (1990)	Comprehensive fauna survey	Heavy minerals mine Beenup
Biota (2009)	Windfarm survey	Milyeannup wind farm terrestrial fauna survey

Report author	Survey description	Project
Ninox (2011)	Wetland bird monitoring	Beenup Mineral Sands Mine site 2005–2011
Litoria Ecoservices (2016)	Level 1 fauna assessment, Level 1 terrestrial vertebrate fauna	Expansion of recreational facilities at Gloucester Park, Margaret River
Litoria Ecoservices (2017)	Western Ringtail Possum habitat assessment	Augusta Boat Harbour to Dead Finish Pathway Project
ELM (2017)	Fauna assessment	Lot 2602 McDonald Road, Karridale Flora and Fauna Assessment
Harewood (2018)	Targeted vertebrate fauna survey assessment	Turner Caravan Park, Augusta
Ecosystem Solutions (2020)	Fauna significance assessment	Margaret River Senior High School (well outside BIA and therefore no records entered – reviewed for context only)

3.1.3 Initial site inspection

As it became apparent from the regional overview that potential species of concern were likely to utilise the study area, the initial site inspection was incorporated into the first bird and bat utilisation survey. The site inspection identified suitable habitat for conservation significant species, such as wetlands and remnant woodlands, and confirmed appropriate selection of survey sites.

3.2 FIELD SURVEYS

Field surveys were undertaken over 13 survey periods between May 2023 and March 2025 (Table 3-3). BBRAS survey effort per site is presented in Table 3-4. The following survey work was undertaken:

- bird utilisation surveys (section 3.2.1)
- bat utilisation surveys (section 3.2.2)
- audio recordings for Masked Owl and black cockatoos (section 3.2.3).

Table 3-3 Survey dates and personnel

Event/Round	Season	Dates	Personnel[1]	Area
1	Autumn	24–26 May 2023	J. Clark, B. Wykes	WFA, BIA
2	Winter	14–16 August 2023	J. Clark, B. Wykes	WFA, BIA
3	Spring	17–20 November 2023	B. Wykes, S. Pynt	WFA, BIA
4	Summer	10–12 January 2024	J. Clark, B. Wykes	WFA, BIA
5	Spring	27–30 September 2024	B. Wykes, A. Green	WFA, Hardy Inlet
6	Spring	17–18, 21 October 2024	B. Wykes, A. Green	WFA
7	Spring	13–14 November 2024	B. Wykes, A. Green	WFA
8	Summer	2 December 2024	B. Wykes, A. Green	Hardy Inlet
9	Summer	11–12 December 2024	B. Wykes, A. Green	WFA
10	Summer	16–17 January 2025	B. Wykes, A. Green	WFA
11	Summer	13–14 February 2025	B. Wykes, A. Green	WFA
12	Autumn	06–07 March 2025	B. Wykes, A. Green	WFA

[1]Jarrad Clark (BSc Env. Mgt), Boyd Wykes (BSc Science (Hons); PhD Zoology), Simon Pynt (BSc Zoology).

Systematic Impact and Reference sites were established for the BBRAS surveys to support a future monitoring program for the Project based on the Before-After Control-Impact (BACI) framework. At

the time of commencement of the Year 1 surveys, proposed turbine locations were not known, therefore systematic BBRAS sites were selected based on general distribution relative to key environmental values (e.g. wetlands) and proximity to the most likely turbine locations. Sites selected inside the study area were classified as Impact sites and sites outside the study area were classified as Reference sites in Year 1 of the survey program.

At the completion of Year 1 sampling, the data was reviewed and soon after that turbine locations became available. An adaptive approach was taken and the decision made to adjust sites in order to respond to identified data gaps and better reflect the BACI framework, given that Impact and Reference sites could now be confidently assigned. Impact sites were classified as any site located <500 m from a proposed turbine, and Reference sites located between 500 m and 1,500 m of turbines. Accordingly, some sites were re-classified.

The identified data gaps following Year 1 surveys were associated with Migratory shorebirds and black cockatoos. The Migratory birds were addressed in this program by sampling intensively through the migratory shorebird season within the WFA, and by expanding the survey to include Regional reference sites at the Hardy Inlet (between 10 and 14 km from the study area) to collect contextual data on Migratory shorebird activity. Further survey effort concerning black cockatoo foraging, breeding and roosting was also undertaken during the breeding season for all 3 species, and is reported in Phoenix (2025a).

A total of 28 sites were sampled over the survey program (Table 3-4; Figure 3-1; Appendix 1). Sixteen sites were sampled in Year 1 between autumn 2023 and summer 2024 (i.e., one sample event per season). Significant revisions were subsequently made to site selection following the completion of the Year 1 surveys, with 12 new sites added. Ten original sites from Year 1 were not resampled in Year 2. Changes were made in response to findings from the Year 1 surveys, and most importantly in relation to the proposed turbine placement. In total, 18 sites were sampled monthly in Year 2 between September 2024 (spring) and March 2025 (autumn; Table 3-4).

Based on the proposed turbine placement, 9 sites are classified as Impact sites (< 500 m from turbines) and 14 are classified as Reference sites (500–1,500 m from turbines), with 5 additional Regional reference sites located at the Hardy Inlet (Table 3-4; Figure 3-1). Two sites (BUS035 and BUS012; Table 3-4) were only sampled in a single season in Year 1 due to land access constraints.

In addition, the Basic and Targeted fauna survey (Phoenix 2025a) included habitat assessments, systematic avifauna censusing, additional bat echolocation recordings, acoustic surveys for Australasian Bittern and habitat assessments for black cockatoos (Table 3-5). This suite of additional work provided supplementary data for the study area in lieu of roaming surveys recommended by Brett Lane and Associates (2005). Opportunistic records of birds were also made whenever observed during both the BBRAS and basic/targeted survey.

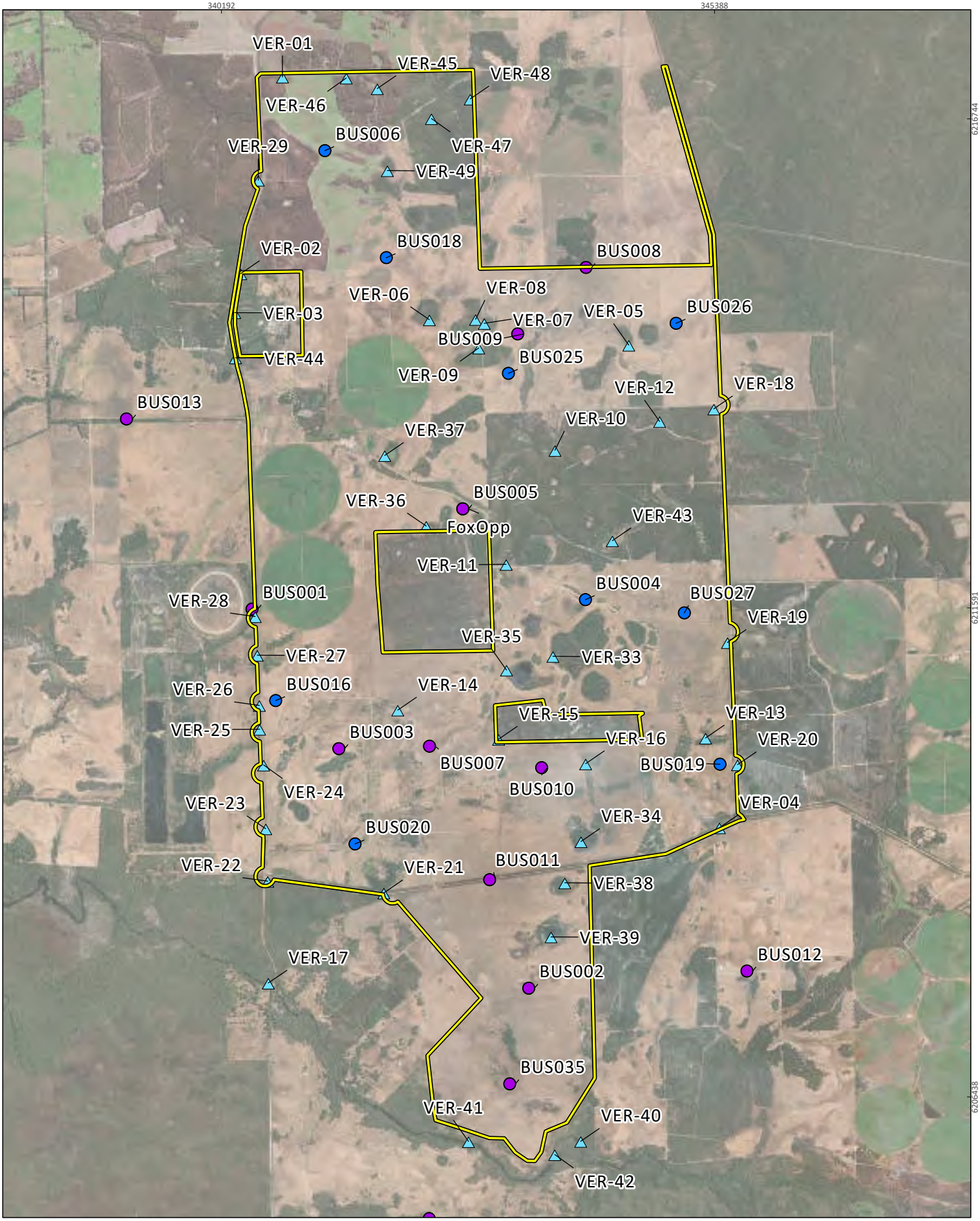
Table 3-4 Sample effort–BBRAS

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
Impact	BUS004	Yr1	Autumn	60		1
		Yr1	Winter	30		
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS006	Yr1	Autumn	60		3

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS016	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS018	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS019	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS020	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS025	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS026	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS027	Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
Reference	BUS001	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS002	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS003	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS005	Yr1	Autumn	60		1
		Yr1	Winter	30		
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS007	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS008	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring		1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS009	Yr1	Autumn	60		1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
	BUS010	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	1	1
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS011	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	30	1	1
		Yr1	Summer	60	3	3
		Yr2	Spring	180		
		Yr2	Summer	180		
		Yr2	Autumn	60		
	BUS012	Yr1	Winter	60	1	1
	BUS013	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS014	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS015	Yr1	Autumn	60		1
		Yr1	Winter	60	1	1
		Yr1	Spring	60	1	1
		Yr1	Summer	60	3	3
	BUS035	Yr1	Spring	60	1	1
Regional ref.	BUS030	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS031	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS032	Yr2	Spring	30		
		Yr2	Summer	30		
	BUS033	Yr2	Spring	30		
	BUS034	Yr2	Spring	30		

Site type	Site name	Monitoring year	Season	Sampling method		
				Fixed-point count (minutes)	Audio recording (nights)	Ultrasonic recording (nights)
		Yr2	Summer	30		
Total effort				**150 hours**	**55 nights**	**71 nights**





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	KC

0 1 2
Kilometers

1:51,526 (at A4) GDA 1994 MGA Zone 50

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Study area
Basic and targeted survey sites (Phoenix 2025)

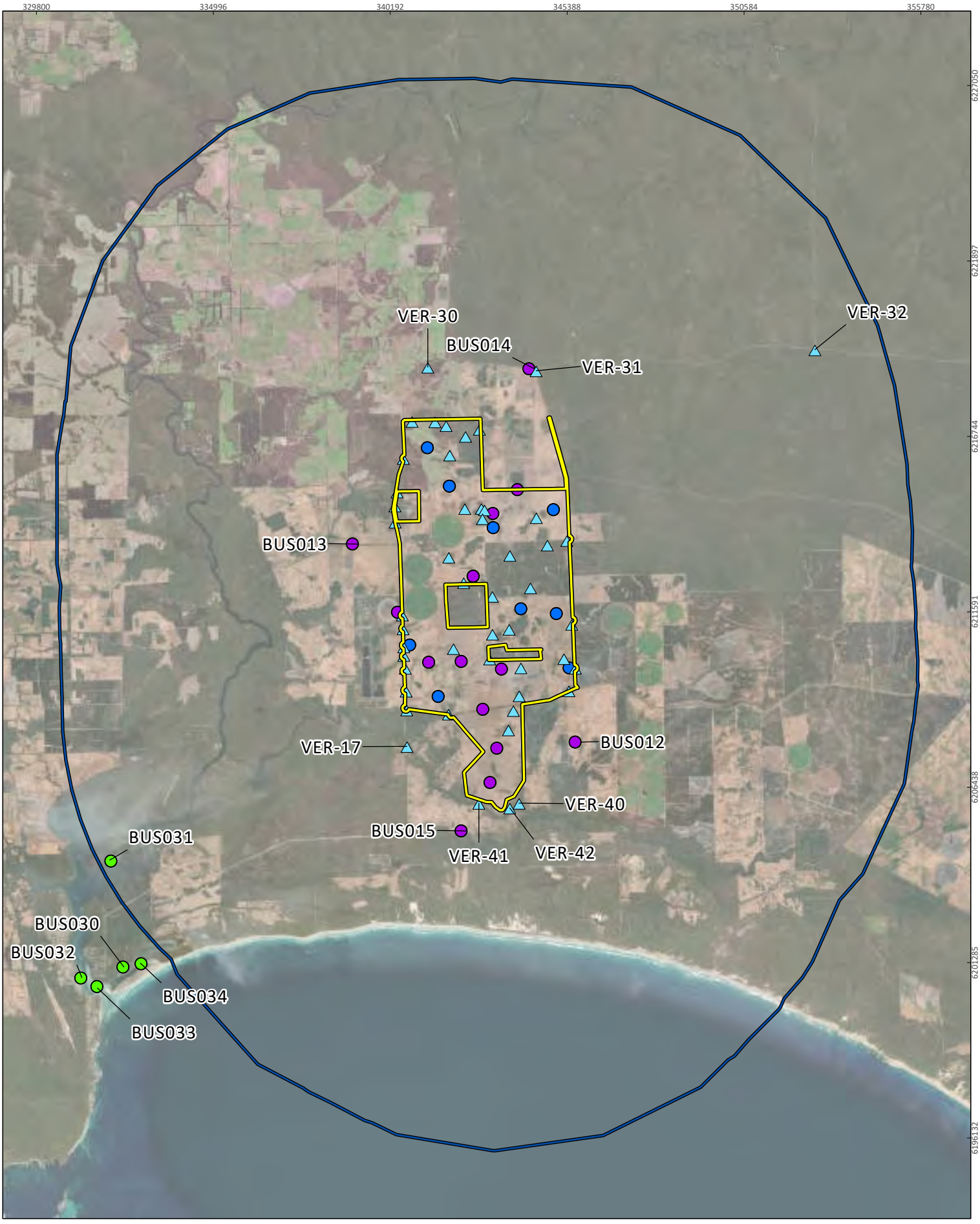
BBRAS sites

Impact
Reference

Figure 3-1a

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES





SynergyRED
Scott River Wind Fam

Project No	1585
Date	12/06/2025
Drawn by	BK
Map author	KC

0 2.5 5
Kilometers

1:143,600(at A4) GDA 1994 MGA Zone 50

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- Study area
- Bird/Bat Investigation Area
- Basic and targeted survey sites (Phoenix 2025)

BBRAS sites

- Impact
- Reference
- Regional reference

Figure 3-1b

Survey sites

PHOENIX ENVIRONMENTAL SCIENCES

3.2.1 Bird utilisation surveys

The utilisation surveys aimed to generate quantitative data on birds within the study area and surrounds. The data was used to estimate likelihood of impact and provide a ranked abundance of species use of the site, for birds at varying heights. The bird utilisation survey comprised:

- fixed-point counts at 28 locations (9 Impact sites, 14 Reference sites and 5 Regional reference sites) undertaken for 30 minutes each sample event, within a radius of 100 m for small birds and 800 m for larger birds (e.g. raptors like Wedge-tailed Eagle)
- between 2 and 6 counts conducted in each survey phase at most Impact and Reference sites, including morning and afternoon counts
- Regional reference sites were sampled once each in spring and autumn, they were accessed by boat sampled at variable times during the day dependent on tide and weather conditions.

Total survey effort of the bird utilisation surveys was 150 hours, comprising 63.5 hours from Impact sites, 82.0 hours from Reference sites and 4.5 hours at Regional reference sites (Table 3-4Table 3-4). The following parameters were recorded:

- the bird's distance from the fixed location, where a range finder was used to measure the distance to various reference points from which distance could be estimated
- estimated height so that presence and abundance can be related back to the potential rotor swept area (RSA) height – in Year 1, height was recorded within one of 5 height categories; this was changed to actual height estimates in Year 2 to inform collision risk modelling but also classified, per year 1, post-field
- the direction of each bird/flock sighted to the nearest 45 degrees of the compass
- and if flying across the landscape, the direction to and from, also to the nearest 45 degrees of the compass.

The flight height categories applied in Year 1 were:

Below the RSA

1) 0-24 m

RSA

2) 25-50 m
3) 51-75 m
4) 76-150 m
5) 151-250 m

Above RSA

6) >250 m.

Habitat descriptions were recorded at all sites (Appendix 2).

Due to the adaptive approach taken in the survey program, sample effort was variable between some sites and was therefore not consistent when analysing the data between years, seasons, and location (i.e. Impact vs Reference). To account for this most analyses and presented data uses summary statistics, such as mean and median counts, per 30-minute sample, or per species. In some cases, however, the data had to be aggregated over an entire sites' dataset.

3.2.2 Bat utilisation surveys

Bat utilisation surveys were undertaken during Year 1 of the survey program. The utilisation surveys aimed to generate quantitative data on bats within the study area and surrounds. The data was used to estimate likelihood of impact and provide a ranked abundance of species use of the site.

Echolocation recorders were placed at all 16 Year 1 sites at ~1 m high (Figure 3-1). In each sample period, the recorders were operated for one night, unless conditions were windy (~>20 knots), in which case additional nights were completed. The echolocation recorders were typically operated from 30 minutes before sunset to 30 minutes after sunrise; therefore, total recording hours changed each season. A total of 71 nights of echolocation recordings were gathered, comprising 60 nights from Reference sites and 11 nights from Impact sites (Table 3-4).

The echolocation data was analysed by Bob Bullen of WA Bat Call, with the species list and number of calls being provided per half hour, so that temporal activity could be analysed if needed, for example, where rotor management might be required to mitigate impacts to an important bat species that frequents an area at particular times. It must be noted however, that the number of bat calls detected is not the equivalent of abundance as recorded for directly observed birds. For example, 100 calls from a bat species in a 30-minute period could be 100 individuals calling once each as they fly past or could be one individual calling 100 times as it actively hunts in close proximity to the recorder. The number of calls is therefore considered a surrogate for abundance.

Level of activity for each bat species was reported as the mean number of calls, being the sum of calls divided by the number of detections. Activity level for each species was assigned to one of 3 categories, based on all sites and samples, as follows:

- Low - 0–4.0
- Moderate- 4.1–11
- High - >11.

As bat presence was only assessed using ultrasonic recorders flight height and direction data were not captured.

3.2.3 Audio recordings for significant bird species

In autumn 2023, during the Basic and Targeted fauna survey, an audio recorder opportunistically positioned on the Scott River (on the Scott River Road crossing; site Mowl01 on Figure 3-1) detected Masked Owl (*Tyto novaehollandiae novaehollandiae*; P3). Consequently, audio recorders were placed at each of the 16 sample sites for subsequent sampling periods in Year 1, with most sites sampled in each of the remaining 3 periods. The recorders were operated from 30 minutes before sunset to 30 minutes after sunriseTable 3-4.

Analysis of the audio data was undertaken by Patrick Williams and Jarrad Clark of Phoenix. The analysis focused on Masked Owl and the 3 black cockatoo species (Baudin's Cockatoo *Zanda baudinii*, EN; Carnaby's Cockatoo *Zanda latirostris*, EN and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*, VU) as the most likely and easily detected species possibly occurring.

In total, 55 nights of bird data was gathered and analysed using Kaleidoscope Pro v5.6.4. Fifty example calls of Masked Owl were utilised to create a simple classifier to identify Masked Owl calls within the raw data. For black cockatoos, the full audio dataset was analysed using cluster analysis and all sounds were grouped into clusters based on their characteristics; this analysis typically assigns one or more species to a cluster. Clusters containing black cockatoo calls were identified and the entire cluster then screened. The black cockatoo calls were identified to species level where possible.

3.2.4 Surveys conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a)

The following additional survey work relevant to birds and bats was undertaken as part of the Basic and Targeted fauna survey (Phoenix 2025a), over 3 survey phases (Figure 3-1):

Phase 1

- Site reconnaissance, wetland boundary mapping review, habitat descriptions and waterbird records at sites across the WFA (Appendix 1)

Phase 2

- systematic avifauna censusing (20-minute censuses) at 17 sites, in all main habitat types (additional 11.8 hours; Table 3-5)
- additional bat echolocation recordings (Song Meter SM2 recordings) at 4 sites, deployed for 4 nights, positioned in areas of habitat likely to have increased bat activity (additional 14 nights; Table 3-5)
- acoustic surveys for Australasian Bittern (*Botaurus poiciloptilus*; EN), with autonomous recording units (ARUs) employed at 5 sites in Phase 1 in suitable habitat for the species (additional 19 nights; Table 3-5)

Phase 3

- acoustic recordings for black cockatoos at 7 sites located in remnants that contained potential breeding trees (PNT) with hollows and/or black cockatoo records (additional 224 nights; Table 3-5)
- night roosting/breeding surveillance for black cockatoos at 19 sites over 11 evenings around the periphery of the study area to detect any movements into the WFA (additional 34.3 hours)
- breeding tree, foraging habitat quality and roosting habitat assessments for black cockatoos.

Table 3-5 Survey effort from Basic and Targeted fauna survey (Phoenix 2025a) relevant to birds and bats

Site name[4]	Phase	Sampling method			
		Avifauna census (min.)	Audio recording (nights)	Ultrasonic recording (nights)	BC roosting/ breeding surveillance (min.)
Mowl01	1		1[1]		
VER-16	2	60			
VER-17	2		3[2]	2	
VER-21	2	40			
VER-22	2	40			
VER-30	2	40			
VER-31	2	40			
VER-33	2		4[2]		
VER-35	2	40			
VER-36	2	40			
VER-37	2	40			
VER-39	2	40			
VER-40	2	50	4[2]		
VER-41	2		4[2]		
VER-42	2	40	4[2]		
VER-43	2			4	
VER-44	2			4	
VER-46	2	40		4	
VER-49	2	40			
BCRoosting01	3				240
BCRoosting02	3				60
BCRoosting03	3				120
BCRoosting04	3				210
BCRoosting05	3				65
BCRoosting06	3				150
BCRoosting07	3				90
BCRoosting09	3				65
BCRoosting10	3				105
BCRoosting11	3				80
BCRoosting12	3				60
BCRoosting13	3				60
BCRoosting14	3				60
BCRoosting15	3				70
BCRoosting16	3				70
BCRoosting17	3				90
Birding01	3				120
Birding02	3				130
Birding03	3				220
Opp20	3	20			
SM4-01	3		39[3]		
SM4-02	3		39[3]		
SM4-03	3		1[3]		
SM4-04	3		40[3]		
SM4-05	3		34[3]		

Site name[4]	Phase	Sampling method			
		Avifauna census (min.)	Audio recording (nights)	Ultrasonic recording (nights)	BC roosting/ breeding surveillance (min.)
SM4-06	3		13[3]		
SM4-07	3		38[3]		
Wetland01	3	20			
Wetland02	3	80			
Wetland03	3	40			
Total effort		**11.8 hrs**	**224 nights**	**14 nights**	**34.4 hrs**

1 - Opportunistic audio recording. 2 - Audio recording targeting Australian Bittern. 3 - Audio recording targeting black cockatoos. 4 - additional sites and species records collected through additional sampling techniques not relevant to this report.

3.3 LIKELIHOOD OF OCCURRENCE ASSESSMENT / POTENTIAL SPECIES OF CONCERN

The likelihood of occurrence for each conservation significant bird/bat species identified in the desktop review, and/or recorded in the field surveys, was assessed and assigned to one of 5 ratings:

- Recorded - species recorded within the study area by previous or current survey.
- Likely - study area within current known range of species, nearby (within 10 km) recent/relatively recent (within the last 10 years) records, suitable habitat within the study area.
- Possible - study area within current known range of species, suitable or potentially suitable habitat within the study area present, no nearby recent/relatively recent (within the last 10 years) desktop records or species has a wide home range and utilises a wide variety of habitats.
- 'Possible (rare)' - for Migratory listed species whose preferred/core foraging habitat is not present, but the study area contains marginal or rarely used habitat; species is rare in the region; occurs in very low numbers.
- Unlikely - study area outside current known range of species, no suitable habitat present in study area, very old desktop records only.

For Migratory shorebirds, the likelihood of occurrence assessment also considered the seasonal availability of suitable habitat as well as the timing of when they are likely to be present in the southwest.

Any conservation significant species that was recorded in the study area, or considered likely, or to possibly occur was classified as a potential species of concern. Species considered unlikely, or unlikely (rare), were not considered at-risk from the Project and therefore not considered further in the risk assessment. All pelagic species were discounted at the desktop review (regional overview) stage as it was determined that the study area is too far inland for any of these to occur. Likelihood of occurrence of all other species was assessed following the field surveys.

Other raptor and bat species recorded in the survey were also included as potential species of concern due to some species from these groups being known to be at-risk from turbine strike (see Section 2.3).

3.4 ANALYSIS OF SURVEY COMPLETENESS

Species accumulation curves were produced on an abundance basis using PRIMER V6 (Clarke & Gorley 2006) to obtain an estimate of survey completeness, i.e., whether the sample effort and methods used produced a dataset that can be considered representative of the bird and bat assemblage present in the study area. Three indices were calculated separately for birds (fixed-point count data) and bats (echolocation data) as the survey methods were different; Chao2, Jacknife2, Bootstrap. All samples per method were included and no data transformation was undertaken. The maximum permutations were set at 999. The resultant data for each indices was then plotted as a line graph within Primer6 and the data analysed with respect to the projected number of species each indices generated.

3.5 RISK ASSESSMENT

A risk assessment framework was developed to evaluate the potential risk of impact on potential species of concern from the Project. The approach assesses risk using a combination of likelihood and consequence of impact, in accordance with relevant Australian standards for risk management (Standards Australia 2018). While the framework is primarily based on collision risk, the risk assessment also considered other impacts of displacement/avoidance, and habitat loss.

Likelihood of direct impact from collision with turbines was classified into 5 categories, which considered desktop and survey records for each species with regard to likelihood of occurrence, utilisation of the study area, frequency of records, flock size, flight heights and available data on observed windfarm mortalities (Table 3-6). Mortality monitoring data for WA windfarms is not readily publicly available. Data on bird and bat windfarm mortalities was therefore obtained from 3 main sources that have collated post-construction mortality monitoring records from multiple windfarm sites in eastern Australia[1]:

- EcoLogical Australia (2025), memo provided for this Project, reviewed species of concern against ELA's database of available monitoring reports from windfarm operations in eastern Australia (includes monitoring reports from 16 windfarms as well as compilated studies)
- Moloney *et al.* (2019b), collated data from mortality surveys at 15 Victorian windfarms
- Stark and Muir (2020a), collated data from mortality surveys 10 windfarms in SE Australia.

For the 3 WA endemic black cockatoo species, *Zanda funerea* (Yellow-tailed Black Cockatoo) has been considered a suitable surrogate due to similarities in morphology, habitat and foraging and flight characteristics (EcoLogical Australia 2025). Consequence of impact was classified into 5 categories, from insignificant to severe based on estimated loss of individuals relative to local, regional, State or East Asian-Australasian Flyway (EAAF) population for Migratory species (Table 3-7). The consequence categories for Migratory shorebirds were established with consideration to the industry guidelines for assessment impacts to EPBC Act listed Migratory shorebirds (DoEE 2017). Collision risk modelling has not yet been completed and therefore is not considered in the risk assessment.

The risk matrix is provided in Table 3-8. Where the risk assessment for a species is determined to be low–negligible, no further action is required. Where the risk is perceived to be moderate–extreme, further studies, or mitigation actions, such as modifications to the wind farm design, should be considered to reduce the residual risk, or risk remaining after mitigation, to acceptable levels.

A risk assessment was conducted for all potential species of concern (see section 3.3) using the framework below and considering the species characterisation profile and field survey results.

[1] Note that there are overlaps between these literature sources.

Table 3-6 Likelihood of direct impact definitions

Likelihood	Birds	Bats
Almost certain	It is very probable that the risk event could happen in any year. • species recorded frequently (>5 times) and/or in large numbers (>30 individuals) within the RSA of the WFA; **AND** • has observed windfarm mortality.	It is very probable that the risk event could happen in any year. • species displays **high** activity levels[1] within the WFA; **AND** • suspected to fly at heights within the RSA of the WFA; **AND** • has observed windfarm mortality.
Likely	It is more probable that the risk event could happen in any year. • species recorded frequently (>5 times) and/or in large numbers (>30 individuals) within the RSA of the WFA; **AND** • has no observed windfarm mortality.	It is more probable that the risk event could happen in any year. • species displays **moderate** activity levels[1] within the WFA; **AND** • suspected to fly at heights within the RSA of the WFA; **AND** • has no observed windfarm mortality.
Potential	It is equally probable that the risk event could happen in any year. • species recorded infrequently within the WFA, or considered likely or to possibly occur (Section 3.3); **AND** • is known or suspected to fly within the RSA of the WFA and/or has observed windfarm mortality.	It is equally probable that the risk event could happen in any year. • species displays **low** activity levels[1] within the WFA, **OR** considered likely or to possibly occur (Section 3.3); **AND** • suspected to fly at heights within the RSA of the WFA or in open/uncluttered air spaces and/or has observed windfarm mortality.
Unlikely	It is less probable that the risk event could happen in any year. • species recorded within the WFA or considered likely or to possibly occur (Section 3.3); **AND** • is not known or suspected to fly within the RSA of the WFA and has no observed windfarm mortality. **OR** • species is considered to possibly occur within the WFA but only on rare occasions; **AND** • is known or suspected to fly within the RSA of the WFA and/or has observed windfarm mortality.	It is less probable that the risk event could happen in any year. • species has not been recorded but is considered likely or to possibly occur within the WFA (Section 3.3); **AND** • is not suspected to fly at heights within the RSA of the WFA or in open/uncluttered air spaces and has no observed windfarm mortality.
Rare	It is improbable that the risk event could happen in any year. • species has not been recorded but is considered to possibly occur within the WFA but only on rare occasions (Section 3.3); **AND**	It is improbable that the risk event could happen in any year. • species has been recorded, or considered likely or to possibly occur within the WFA (Section 3.3); **AND**

Likelihood	Birds	Bats
	• species is unlikely to fly within the RSA of the WFA and has no observed windfarm mortality.	• is unlikely to fly within the RSA of the WFA, given foraging and movement behaviour is restricted to cluttered air space, and has no observed windfarm mortality.

1 – see activity level thresholds in section 3.2.2.

Table 3-7 Consequence definitions

Consequence	Description	Group
Severe	Loss of greater than 1% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction in population viability for a period of at least 10 years.	All other birds + bats
Significant	Loss of at least 0.1% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to reduction population viability for between 5 and 10 years.	All other birds + bats
Medium	Loss of at least 0.05% of EAAF population over 10 years.	Migratory shorebirds
	Loss in numbers of individuals, leading to minor reduction in population viability for between one and 5 years.	All other birds + bats
Minor	Undetectable (<0.05%) loss of EAAF population over 10 years.	Migratory shorebirds
	Occasional loss of small numbers of individuals but no reduction in population viability.	All other birds + bats
Insignificant	Undetectable loss (<0.005%) of EAAF population over 10 years.	Migratory shorebirds
	Rare loss of individuals but no reduction in population viability.	All other birds + bats

Table 3-8 Risk matrix based on likelihood and consequence

Likelihood	Consequence				
	Insignificant	Minor	Medium	Significant	Severe
Almost certain	Negligible	Low	High	Extreme	Extreme
Likely	Negligible	Low	Moderate	High	Extreme
Potential	Negligible	Low	Moderate	High	High
Unlikely	Negligible	Negligible	Low	Moderate	Moderate
Rare	Negligible	Negligible	Negligible	Low	Moderate

4 REGIONAL OVERVIEW

4.1 SITE CHARACTERISATION

4.1.1 Regional environment

The study area is located predominantly within the Warren IBRA bioregion (Warren subregion, WAR01), with a small portion in the Southern Jarrah Forest subregion (JAF02) of the Jarrah Forest bioregion (Figure 4-1). The Warren bioregion contains low Jarrah woodlands and paperbark/sedge swamps on leached sandy soils in depressions and plains, *Agonis flexuosa* and *Banksia* woodlands and heaths, on Holocene marine dunes, Jarrah-Marri forest on laterites and Karri forest on loamy soils (May & McKenzie 2003).

The wider BIA extends more fully into the Southern Jarrah Forest subregion, with large areas of intact forest present to the north and east of the study area (Figure 1-1; Figure 4-1). This subregion contains Jarrah-Marri forest on laterite gravels, Jarrah forest mosaics with a variety of species rich shrublands on Mesozoic sediments and *Agonis* shrublands on eluvial and alluvial deposits (May & McKenzie 2003). Regional vegetation complexes mapped for the southwest forests (DBCA 2018) delineated 12 vegetation complexes within the BIA that broadly include:

- *Eucalyptus marginata* subsp*. marginata-Corymbia calophylla* woodlands and open forests, sometimes with *Banksia grandis*, *Agonis flexuosa*, *Allocasuarina fraseriana*
- tall open *Eucalyptus diversicolor* forest, sometimes with *Corymbia calophylla*
- *Melaleuca rhaphiophylla* woodland
- low open *Banksia attenuata-Nuytsia floribunda* woodland
- open *Corymbia calophylla* woodland with *Eucalyptus patens*, *E. megacarpa*, with tall shrubland of *Agonis* species
- *Eucalyptus rudis-Melaleuca rhaphiophylla* woodland
- woodland of *Eucalyptus patens- Corymbia calophylla*.

Many of these vegetation complexes contain key black cockatoo foraging, nesting and/or roosting plant species, such as *Acacia saligna*, *Agonis flexuosa*, *Banksia attenuata*, *B. grandis*, *B. littoralis*, *C. calophylla*, *Eucalyptus marginata*, *E. patens* and *E. megacarpa*.

Topography of the study area is generally flat/undulating. There are no obvious topographic features that may cause updraft areas for birds or bats.

Numerous conservation reserves, national parks and state forests occur within the BIA (DBCA 2025b) (Figure 4-2). The large area of intact remnant vegetation to the north-east of the study area (Figure 1-1) is gazetted as several contiguous reserves: Blackwood River National Park, Milyeannup National Park, Wiltshire-Butler National Park, Unnamed National Park R46400, Chester Nature Reserve, Pagett Nature Reserve, South Blackwood State Forest, Milyeannup State Forest, Timber Reserve O12925 and Timber Reserve O20125. Scott National Park is located south-west of the study area, within the BIA, and Gingilup Swamps Nature Reserve is located south-east, also within the BIA (Figure 4-2).

Nature Reserve R42377 occurs within the boundaries of the study area but is excluded from the WFA. There is also a large vegetated remnant in the centre of, but excised from, the study area that is of interested to DBCA (DBCA 2025a) (Figure 4-2).

Most of the reserves (i.e. the national parks and nature reserves) are gazetted for the purpose of conservation of flora and fauna. These provide habitat for conservation significant birds and bats.

While state forests are not specifically reserved for the conservation of fauna, they also provide habitat for conservation significant birds and bats.

One Priority Ecological Community (PEC), Subtropical and Temperate Coastal Saltmarsh, located to the south-west of the study area on the Hardy Inlet (Figure 4-2), contains features of habitat value to Migratory shorebirds. The description for the PEC includes "occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic" (DBCA 2023b).

The gazetted ESA dataset (DWER 2023), which lists areas of high conservation value, shows 61 ESAs intersecting the study area, collectively covering most (99%) of the study area (Figure 4-3). These appear to be associated with Threatened flora, TECs and wetlands, the latter being potentially relevant to conservation significant birds. The mapped polygons encompass buffers for these values, typically 50 m for Threatened flora and between 500 m – 2,000 m for TEC, therefore the extent of actual ESAs in the study area is much lower than the mapped ESA polygons.

No RAMSAR sites are located in or near the BIA. The nearest RAMSAR wetland to the BIA is the Vasse-Wonnerup system, located ~48 km to the north. The 'Blackwood River (Lower Reaches) and Tributaries System' is listed as a nationally important wetland located ~4.5 km west of the study area at its closest point, within the BIA (Figure 4-4). This site comprises the lower reaches of the Blackwood River and associated minor tributaries (DCCEEW 2022). It contains riparian vegetation that includes fringing open-forest and open/closed-scrub which supports waterfowl in modest numbers, but the listing is not specifically associated with any conservation significant bird or bat species. The next closest nationally important wetland site is the Gingilup-Jasper Wetland System, located ~14 km ESE of the BIA (Figure 4-4). The Gingilup/ Quitchup/ Jasper wetlands provide habitat for Australasian Bittern (EN) and some habitat for Migratory species, though not in nationally significant numbers.

Australia is part of the EAAF, which is one of several broad global routes that waterbirds undertake annual migrations along. The EAAF extends from the Arctic (eastern Russia and Alaska), southwards through East Asia and South-east Asia, terminating in Australia and New Zealand. Many sites in Australia are internationally important as part of the network of wetlands that support migration along the EAAF. The closest site to the BIA listed in the Directory of Important Habitat for Migratory Shorebirds in Australia (Weller *et al.* 2020) is Gnarabup Beach, roughly 35 km north-west of the BIA, where Sanderling (Mig.) have been recorded in nationally significant numbers.

The Hardy Inlet to the SW of the BIA provides habitat for Migratory shorebirds (Figure 4-4). Several Migratory species have also been recorded from the artificial wetlands created at the old Beenup mine, ~1 km west of the study area within the BIA (Figure 4-4). Approximately 10 km of coastline is also present within the BIA, south of the study area which is also likely to be utilised by Migratory shorebirds.

Many wetlands are present within the BIA according to the Augusta to Walpole Geomorphic Wetlands dataset (DBCA-017) (WRC 2017) including estuary (i.e. Hardy Inlet), floodplains, sumplands and damplands (Figure 4-4). Most of the study area is classified as palusplain (seasonally waterlogged flat), with smaller areas of dampland (seasonally waterlogged basin), floodplain (seasonally inundated flat) and sumpland (seasonally inundated basin). It is evident from aerial imagery however, that the wetland boundaries are not accurate, and that much of the single polygon that identifies palusplain wetland intersects agricultural land.

The Blackwood River, a major watercourse, runs through the western and northern parts of the BIA, and is located ~4.5 km from the study area at its closest point. The Scott River, a minor watercourse, intersects the BIA, and runs directly to the south of the study area (Figure 4-4).

The study area is situated at the junction of 3 South West Regional Ecological Linkages (SWREL; Figure 4-2). The SWREL Project identified a network of regional-scale ecological linkages throughout the southwest of the State (Molloy *et al.* 2009b). Ecological linkages were defined as "a series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape". One east-west linkage intersects the northern end of the study area connecting Pagett Nature Reserve/South Blackwood State Forest with Scott National Park (Figure 4-2). Another east-west linkage is just outside the southern boundary of the study area following the Scott River between Gingilup Swamps Nature Reserve (and surrounding coastal remnant vegetation) and Scott National Park (Figure 4-2). The 3rd linkage runs north-south on the eastern boundary of the study area connecting Pagett Nature Reserve/South Blackwood State Forest to coastal remnants south of the study area (Figure 4-2). Small to moderate sized, mobile bush bird groups are most likely to depend on the linkages for movement, either foraging or dispersal.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	BA

0 2 4
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area

Region, subregion

Jarrah Forest, Southern Jarrah Forest
Warren, Warren

Figure 4-1

Study area in relation to IBRA regions and subregions

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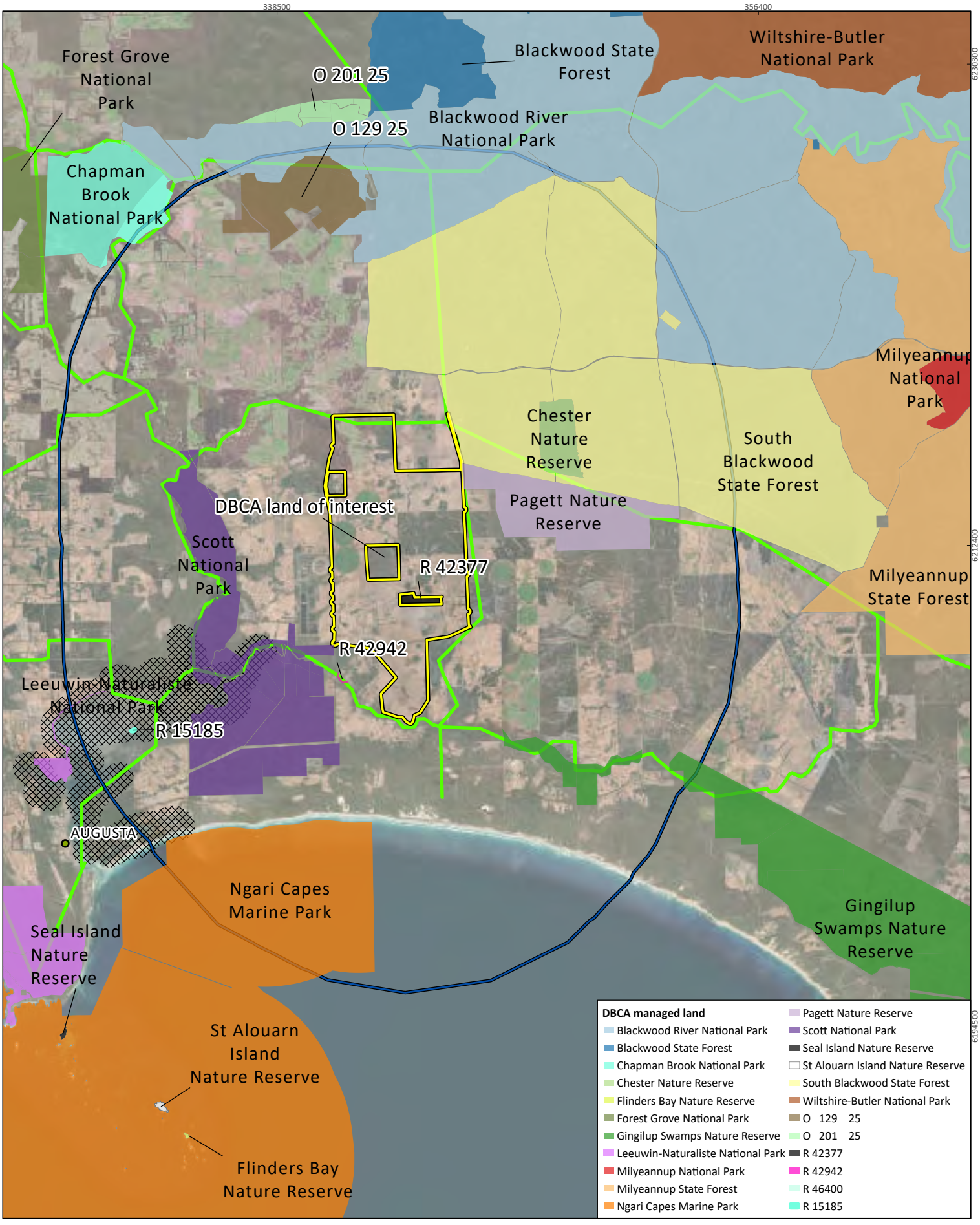



SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
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Map author	KC

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Kilometers

1:181,800 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area
South West Regional Ecological Linkages

Priority ecological community

Subtropical and Temperate Coastal Saltmarsh

Figure 4-2

Conservation reserves, PEC and ecological linkages

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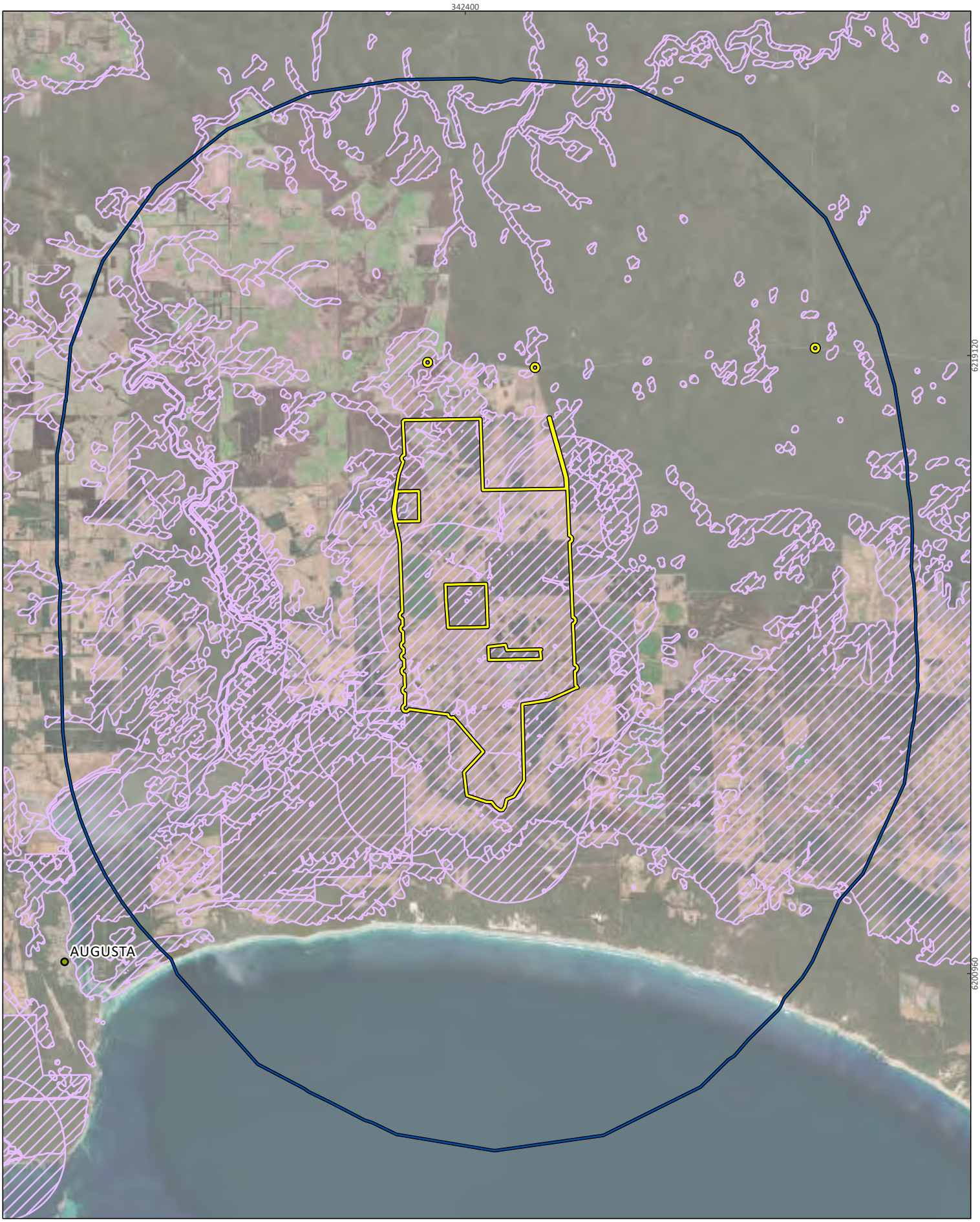



SynergyRED
Proposed wind farm in Scott River

Project No	1583
Date	12/06/2025
Drawn by	BK
Map author	KC

0 2.5 5
Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

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- Study area
- Bird/Bat Investigation Area
- Environmentally Sensitive Areas

Figure 4-3

Environmentally Sensitive Areas

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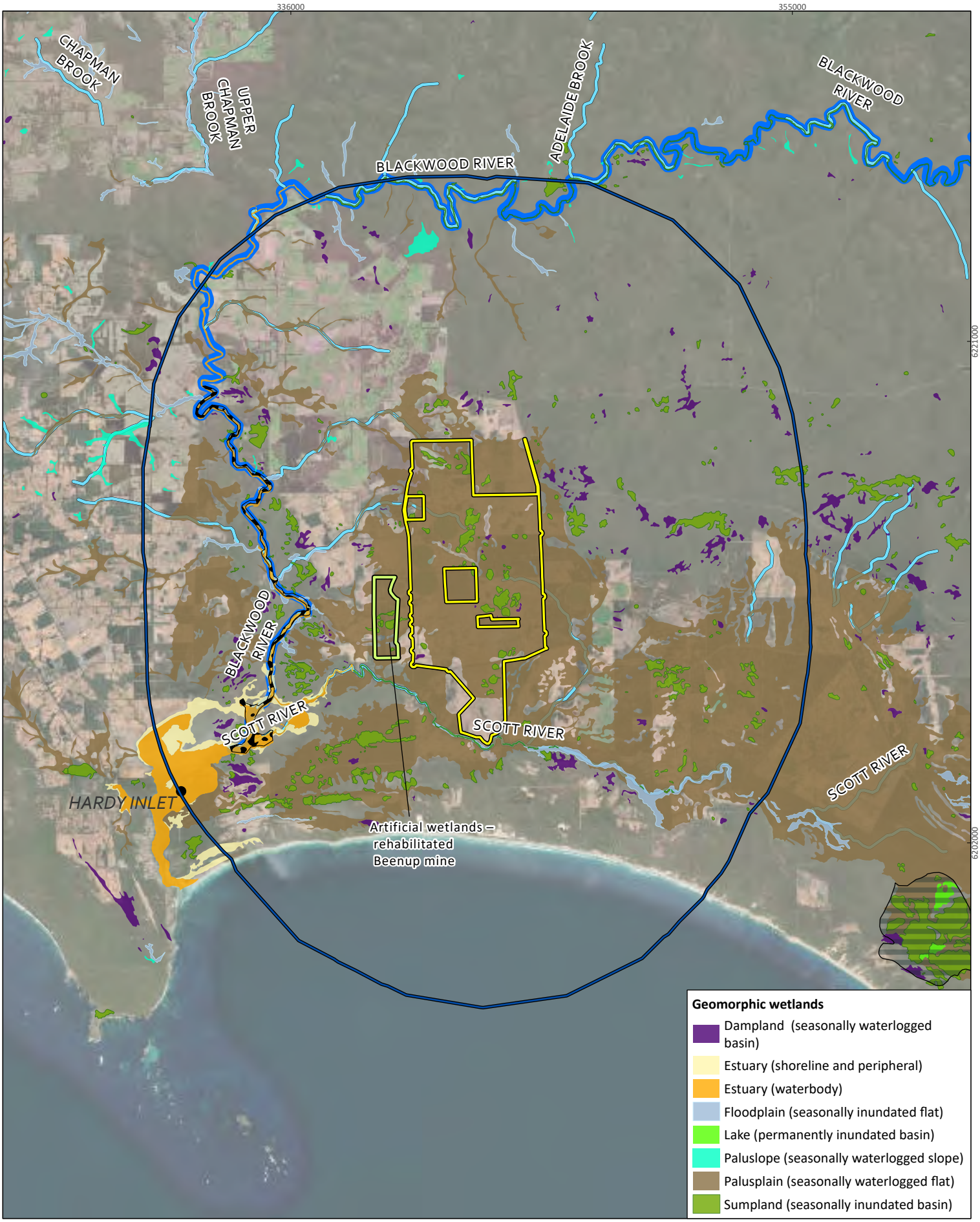



SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	JC

0 3 6
Kilometers

1:185,165 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area
Major watercourses
Minor watercourses

Nationally important wetlands
Blackwood River (Lower Reaches) and Tributaries System
Gingilup-Jasper Wetland System

Artificial wetlands
Rehabilitated Beenup mine

Figure 4-4
Wetlands and waterways

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4.1.2 Climate and weather

The climate of the Warren (WAR01) subregion is described as moderate Mediterranean. The nearest Bureau of Meteorology (BoM) weather station with comprehensive data is Cape Leeuwin (no. 009518, Latitude: 34.37°S Longitude 115.14°E), located 17.8 km south-west of the study area. Cape Leeuwin records the highest mean maximum monthly temperature (23.4°C) in February and the lowest in July and August (16.5°C) (BoM 2025). The lowest mean minimum monthly temperature is in June (11.3°C) and highest in February (17.3°C; Figure 4-5). Mean annual rainfall is 947.5 mm, with July and June recording the highest mean monthly rainfall total (178.2 mm and 173.7 mm, respectively; Figure 4-5).

Daily mean maximum and minimum temperatures at Cape Leeuwin during the survey program (May 2023 to March 2025) were almost all higher than long-term averages, except June 2023 and April 2024 (Figure 4-5), in some cases substantially, e.g. monthly mean maximum temperature for October 2023 and May 2024 were 2°C and 3°C higher than the long-term averages, respectively. Across the complete survey period, monthly mean maximum and minimum temperatures were both on average 1.0°C above the long-term means, which are reflective of the warming trend occurring in south-west WA.

Monthly rainfall during the survey program did not correlate closely with long-term averages and was also variable between Year 1 and Year 2 of the survey program. Most months had below average, or close to average rainfall. Notable exclusions to this were April 2024, with 104.2 mm compared to the long-term average of 59.0 mm, and August 2024, with 228.4 mm compared to the long-term average of 135.1 mm (Figure 4-5). This is reflective of the drying trend occurring within south-west WA.

Based on long-term wind data from Cape Leeuwin weather station, prevailing winds are mainly from the NW–SW during May to September. In October, winds shift to the south, with prevailing winds coming mainly from the SE–SW during November to April. June to September is the windiest period.

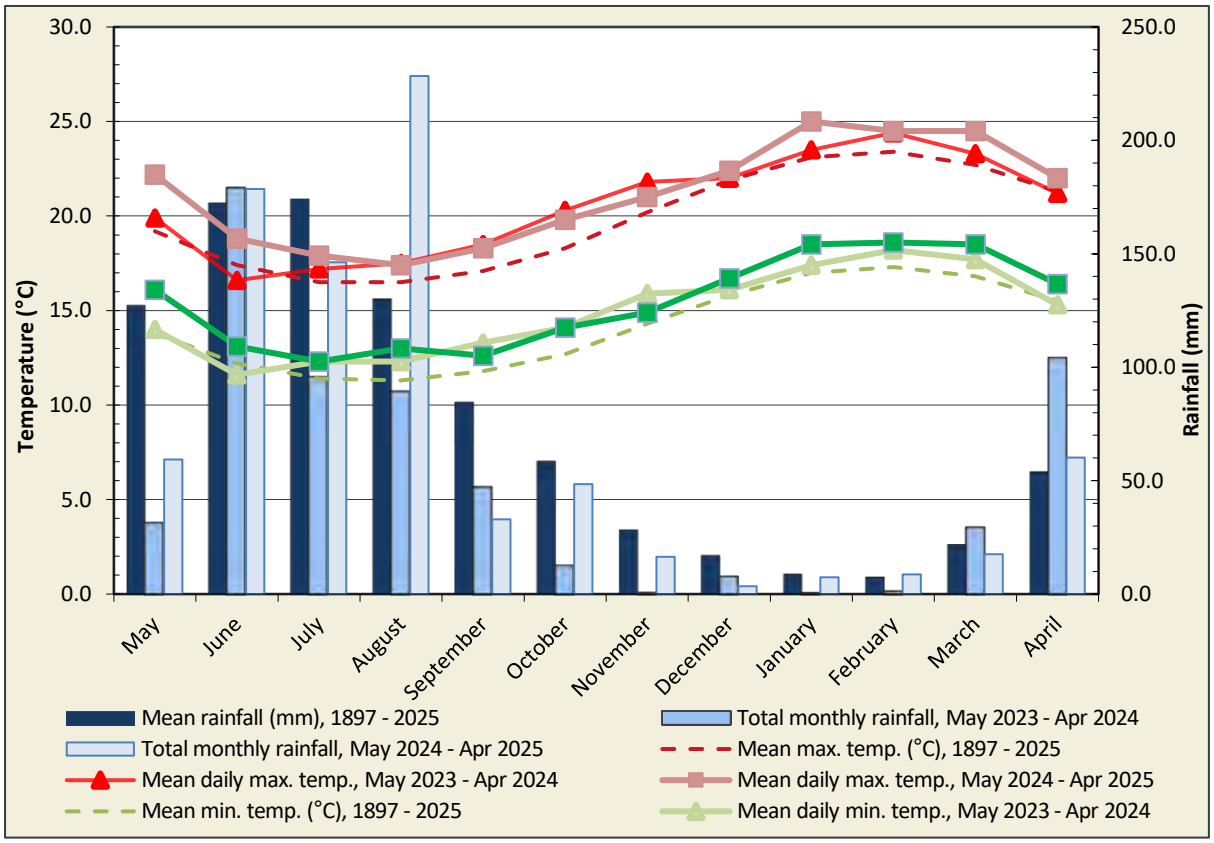


Figure 4-5 Climate data for Cape Leeuwin (no. 009518) – long-term data and for the survey period (BoM 2025)

4.1.3 Habitats in study area

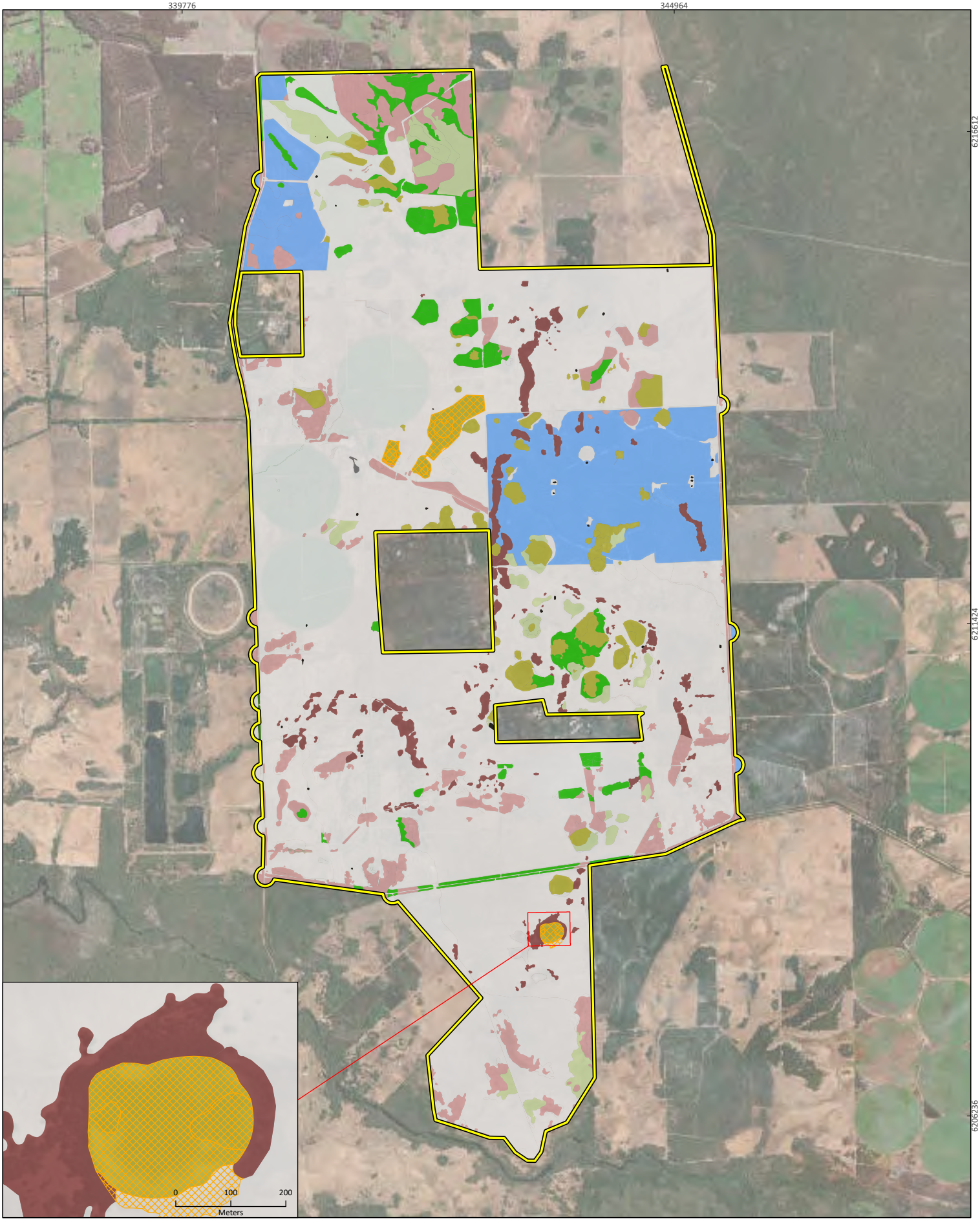
Habitat mapping from the Basic and Targeted fauna survey (Phoenix 2025a) identified 10 fauna habitat types in the study area, including 3 wetland habitats, 2 woodlands and 5 highly modified habitats (Figure 4-6; Table 4-1).

The wetlands are a mix of seasonally inundated paperbark woodlands, shrublands and sedgelands, collectively covering 377.7 ha (9.7%) of the study area, and are patchily distributed throughout (Figure 4-6). The condition of the wetlands was variable, with the paperbark woodlands and shrublands generally in better condition than the sedgelands, which tended to be heavily grazed. The majority of wetlands are seasonally inundated (i.e. ephemeral) and relatively shallow with water level typically less than 1 m, except for a large wetland south of Governor Broome Road and a wetland cluster in the northern part of the WFA that persisted into summer, suggesting that they have the potential to be permanently inundated (i.e. perennial); these are demarcated as 'potentially permanently inundated' in Figure 4-6.

Woodlands were in varying condition throughout the study area. These were categorised into Marri-Jarrah-Peppermint woodland and degraded Open woodland of Peppermint trees, together covering 416.6 ha (10.7%) of the study area. They occur within remnant vegetation patches and as roadside vegetation, sometimes adjacent to wetland habitats (Figure 4-6).

The highly modified habitats comprise cleared areas, dams and plantations. The study area is predominantly (68.7%) cleared areas, mainly comprising paddocks that contain little to no native vegetation but become inundated in winter for around 3 months of the year (June–August), essentially acting as floodplain grasslands. Two large Bluegum plantations are present, and a dense row of old pine trees occurs for 800 m along Scott River Road on the western boundary of the study area (Figure 4-6).

Most habitat in the study area is of low-quality with respect to the general flora assemblage (i.e. cleared areas, plantations, the degraded Open woodland of Peppermint trees, and dams) (Phoenix 2025b). There are however several small–moderate sized remnants of high-quality habitat remaining, some of which have been fenced off to prevent cattle access.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	29/05/2025
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Map author	JC

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Kilometers

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Study area

Habitat

- Bluegum plantation
- Cleared
- Cleared - degraded sumpland
- Dam
- Marri-Jarrah-Peppermint woodland
- Open woodland of Peppermint trees (degraded)
- Pine plantation
- Seasonally inundated paperbark woodland (wetland)
- Seasonally inundated sedgeland (wetland)
- Seasonally inundated shrubland (wetland)
- Seasonally inundated paperbark woodland (wetland) - potentially permanently inundated

Figure 4-6

Fauna habitats in the study area

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Table 4-1 Extent and description of each fauna habitat in the study area

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Wetland habitats			
Seasonally inundated paperbark woodland (wetland)	Seasonally inundated sumplands of paperbark woodlands, flora dominated by *Lemna disperma, Melaleuca rhaphiophylla, Taxandria juniperina, Taxandria inundata, Melaleuca preissiana, Callistachys lanceolata* and *Leptocarpus scariosus*. This wetland habitat is typically less floristically diverse (56 species recorded) than the shrublands, but far more diverse than the sedgelands. The tree canopy ranges from open to closed. Water is typically <50 cm deep and tannin stained, often with Duckweed at the surface and aquatic plants present. Large, old trees often present some with hollows being used by waterbirds. Habitat enhanced for fauna with log debris but can be plentiful or absent. Many examples fenced to prevent stock access. Four examples possibly perennially inundated (Figure 4-6).	144.99 ha (3.7%)	
Seasonally inundated sedgeland (wetland)	Seasonally inundated sumplands of open to dense mixed sedges, dominated by *Leptocarpus roycei*, *Machaerina juncea, Leptocarpus scariosus, Lepidosperma longitudinale* and *Melaleuca incana* subsp. *incana*. With or without occasional stands of paperbark (*Melaleuca rhaphiophylla*) typically at the periphery. Low floristic diversity. Often grazed at margins with associated weed encroachment. Can be relatively closed or with extensive open water areas. Bird presence generally limited to a handful of waterbirds that choose to nest in dense sedge stands that can form large homogenic stands.	106.7 ha (2.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Seasonally inundated shrubland (wetland)	Seasonally inundated sumplands with variable open to sparse shrublands. High floristic diversity (238 species in total). Dominated by *Taxandria inundata, Anarthria scabra, Loxocarya magna, Hypolaena caespitosa, Astartea scoparia, Leptocarpus scariosus*. Often grazed at margins with weed encroachment. Can be relatively closed or with extensive open water areas. Bird diversity generally greater compared with the 2 other wetland types (sedgelands or woodlands) due to higher diversity of flowering shrubs present offering a greater diversity of feeding and nesting opportunities. Waterbirds also present in low numbers.	126.1 ha (3.2%)	
Woodland habitats			
Marri-Jarrah-Peppermint woodland	Low to mid open woodlands dominated by *Corymbia calophylla, Eucalyptus marginata* subsp. *marginata, Allocasuarina fraseriana, Agonis flexuosa* var. *flexuosa*, *Machaerina juncea, Taxandria juniperina, Cyathochaeta equitans, Anarthria scabra, Lepidosperma leptostachyum, Platychorda applanata, Gastrolobium formosum* and *Astartea scoparia*. Habitat condition varies greatly depending on grazing history and can have excellent condition understorey through to completely degraded. Structural complexity also varies substantially with some remnants retaining many logs and debris on the floor and others with very little. The best examples are high quality habitat for the 3 black cockatoo species.	317.7 ha (8.2%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Open woodland of Peppermint trees (degraded)	Highly modified habitat dominated by a single native species, *Agonis flexuosa* var. *flexuosa*, and a variety of introduced weeds, such as **Rumex acetosella, *Hordeum leporinum and *Lolium rigidum, *Ehrharta longiflora* and **Bromus diandrus*. This habitat represents limited value to most native fauna due to the completely degraded nature of the understorey, and the fact *Agonis flexuosa* var. *flexuosa* rarely forms hollows.	98.9 ha (2.5%)	
Highly modified habitats			
Cleared	Cleared areas absent or near absent of native vegetation; agricultural paddocks and roads. May contain isolated paddock trees, generally of Peppermint (*Agonis flexuosa* var. *flexuosa*). Limited value to native fauna. Typically used by birds that tolerate and sometimes thrive in modified environments. Carnaby's Cockatoo observed on 2 occasions feeding on paddock weeds in seed.	2,667.8 (68.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Cleared–degraded sumpland	Seasonally inundated sumpland wetland that has been cleared (i.e., now paddock) and is almost completely devoid of native vegetation, excepting occasional isolated sedge plants. This habitat is essentially a highly degraded form of seasonally inundated sedgeland (wetland) habitat. As such it supports a limited number of native fauna species, including more degradation tolerant bird species. White-faced heron were regularly seen foraging in this habitat while it was inundated.	0.7 ha (<0.1%)	
Dam	Artificial pond or dam with standing water. Typically provides habitat for a handful of waterbirds only, and generally only in the largest examples. One example on Dennis Road was constructed with a sizeable rim and some rocky features affording protection and visibility limited predation and which attracted more birds than elsewhere.	1.7 ha (<0.1%)	
Bluegum plantation	Planted mid woodland of Bluegum (*_Eucalyptus globulus_ subsp. _globulus_). Monoculture which provides limited habitat value for native fauna. Carnaby's Cockatoo are known to use this habitat type on occasion but was not observed in the Bluegum plantation in the study area.	415.4 ha (10.7%)	

Habitat type	Description	Extent in study area ha (%)	Representative photograph
Pine plantation	Planted open woodland of pine (*_Pinus_ sp.) plantation. Monoculture which provides limited habitat value for native fauna. Carnaby's Cockatoo are known to feed on _Pinus_ sp. but were not observed doing so in the study area. Ninox (2012) observed a flock of Baudin's Cockatoo land in the stand of Pines on Scott River Road (in the study area) in 2006.	1.6 ha (<0.1%)	
Total		**3,881.5 ha**	

4.2 SPECIES CHARACTERISATION

The desktop review identified records of 199[2] species of bird and 7 species of bat within the desktop search extent (Appendix 3). This included a total of 58 conservation significant birds and one conservation significant bat, of which 45 are listed as Migratory under the EPBC Act and/or BC Act, 34 are listed as Threatened, Conservation Dependent or OS under the EPBC Act and/or BC Act, and 5 are Priority species listed by DBCA (many species have dual listings, e.g. as Threatened and Migratory).

Eighteen of the conservation significant species are pelagic seabirds, represented by albatrosses, petrels, shearwaters and Pomarine Jaeger (shaded grey in Appendix 3). These were considered unlikely to occur in the study area due to the distance of the study area from the coast and therefore have not been considered further. Species summary profiles for the remaining 41 conservation significant species are provided in Table 4-2.

Of these 41 conservation significant species, 3 have previously been recorded within the study area (Figure 4-7):

- Baudin's Cockatoo (EN) (Birdlife Australia 2023)
- Carnaby's Cockatoo (EN) (Birdlife Australia 2023; DBCA 2023c)
- Forest Red-tailed Black Cockatoo (VU) (DBCA 2023c).

Based on the desktop assessment, no known black cockatoo nesting or roosting sites are present in the study area. No known breeding sites were identified within the wider desktop search area but according to the DBCA Threatened and Priority Fauna database (DBCA 2024) a known roost site (from 2019, count of 19 white-tails) is located roughly 4.5 km north of the WFA. Another is located roughly 11.5 km NW of the WFA but has no bird count data.

[2] Count excludes indet. black cockatoo rows in Appendix 3 (i.e. *Calyptorhynchus* sp., *Calyptorhynchus*/*Zanda* sp. and *Zanda* sp.) as these records will belong to one of the 3 black cockatoo species listed in the appendix. Other indet. taxa detected in the desktop review have been excluded from Appendix 3 as they can be attributed to other species already listed.

Table 4-2 Desktop conservation significant species summary profiles

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Accipitridae	*Pandion haliaetus* (Osprey)	Mig. (EPBC & BC Acts)	1.2 km W	Coastal habitats, saline and freshwater wetlands.	Feeds on fish, other vertebrates, marine invertebrates. Resident or sedentary.	Mostly diurnal, mid-flying, nocturnal hunter on occasion, mostly solitary	Australian pop. size unclear Global pop. ~100,000–1.2 mil.
Anatidae	*Oxyura australis* (Blue-billed Duck)	P4 (DBCA list)	1.0 km W	Shallow freshwater sources with reedbeds and vegetation, rarely saline water.	Feeds on plants, invertebrates. Concentrates in favourable areas.	Mostly diurnal, flocking, dispersive	Australian pop. ~ 11,000–19,000
Apodidae	*Apus pacificus* (Fork-tailed Swift)	Mig. (EPBC & BC Acts)	>20 km	Occurs over a variety of habitats, is almost exclusively aerial.	Overwinters in Australia. Forages for insects in the air. Migratory - present in Australia between September–April.	High flying, diurnal, flocking, transitory	Global pop. unclear, though common in breeding range. Australian pop. Estimated in the 10,000s
Ardeidae	*Botaurus poiciloptilus* (Australasian Bittern)	EN (EPBC & BC Acts)	12 km SW	Freshwater wetlands with dense vegetation.	Forages nocturnally on tadpoles, frogs, fish, dragonfly larvae. Usually occurs singly or in pairs.	Solitary/pairs, nocturnal, dispersive	Global pop. <2,000
Cacatuidae	*Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	Within study area	Jarrah, Karri and Marri forest or woodland with >600 mm average annual rainfall.	Moves between roosts and foraging habitat at dawn and dusk.	Flocking, mid-flying diurnal	Total pop. ~17,000
Cacatuidae	*Zanda baudinii* (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Within study area	High rainfall areas of Jarrah, Marri and Karri forest or woodland.	Moves between roosts and foraging habitat at dawn and dusk. Occurs in different parts of its range according to season.	Mid-flying, flocking, diurnal	Total pop. ~5,000–8,000
Cacatuidae	*Zanda latirostris* (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	Within study area	Jarrah, Marri and Karri forest or woodland.	Moves between roosts and foraging habitat at dawn and dusk. Occurs in different parts of its range according to season.	Mid-flying, flocking, diurnal	Total pop. ~35,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Charadriidae	*Anarhynchus bicinctus* (Double-banded Plover)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal and freshwater wetlands, seldom far inland.	Feeds on invertebrates and plant matter mixing with other small shorebirds. Migratory - present in Australia between October–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~19,000.
Charadriidae	*Anarhynchus leschenaultii* (Greater Sand Plover)	VU/Mig. (EPBC Act); VU (BC Act)	1.9 km W	Coastal habitats, e.g. sheltered beaches, intertidal mudflats, estuaries.	Mixes with other shorebirds in large flocks. Feeds on marine invertebrates. Migratory - present in Australia between late July–April.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~200,000–300,000
Charadriidae	*Anarhynchus mongolus* (Siberian Sand Plover)	EN/Mig. (EPBC Act); EN (BC Act)	1.9 km W	Coastal habitats, e.g. sandflats, mudflats, beaches, brackish swamps.	Mixes with other shorebirds in large flocks. Feeds on marine invertebrates. Migratory - present in Australia between August–April.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~325,000
Charadriidae	*Charadrius cucullatus* (Hooded Plover/Dotterel)	P4 (DBCA list)	3.3 km S	Ocean coastal beaches, saline and freshwater lakes, inland salt lakes.	Feeds on invertebrates, day and night. Some local movements between coast and salt lakes. Locally migratory.	Flocking, diurnal/nocturnal	WA pop. ~2,250.
Charadriidae	*Pluvialis fulva* (Pacific Golden Plover)	Mig. (EPBC & BC Acts)	1.9 km W	Mainly coastal habitats, but also recorded from inland wetlands, paddocks.	Feeds on invertebrates, often occurring in large flocks as well as mixed flocks. Migratory - present in Australia between September–May.	Flocking, high flying, diurnal/nocturnal	EAAF pop. ~ 120,000. Aust. numbers vary greatly annually
Charadriidae	*Pluvialis squatarola* (Grey Plover)	VU/Mig. (EPBC Act); Mig. (BC Acts)	11.0 km WSW	Coastal habitats, e.g. beaches, sandflats, intertidal mudflats, saltmarshes.	Feeds on invertebrates. Often occurs in large flocks, and mixed flocks. Migratory - present in Australia between August–April.	Flocking, high flying, diurnal	EAAF pop. ~80,000 Australian pop. ~11,300
Falconidae	*Falco peregrinus* (Peregrine Falcon)	OS (BC Act)	0.9 km S	Variety of habitats incl. cliff lines, woodland, shrubland, grassland	Undertakes high-speed pursuit of prey, diving from high altitudes. Observed alone or in pairs.	Transitory, soaring, high flying, diurnal	Australian pop. ~ 6,000– 10,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Laridae	*Anous tenuirostris melanops* (Australian Lesser Noddy)	VU (EPBC Act); EN (BC Act)	Proj. dist.	Mangroves, lagoons, beaches on oceanic coral-limestone islands.	Feeds on small surface-dwelling fish, invertebrates and coral fragments.	Sedentary, hovering, most flight over water	Australian pop. ~100,000 breeding birds
Laridae	*Hydroprogne caspia* (Caspian Tern)	Mig. (EPBC & BC Acts)	1.0 km W	Coastal habitat, near-coastal saline and freshwater wetlands.	Forages for fish in open wetland margins and coastal shorelines. Circles slowly and dives for prey. Sedentary or locally migratory in Australia between nesting and non-nesting sites.	Mid-flying, diurnal	Australian pop. unknown, est. many 1000s
Laridae	*Onychoprion anaethetus* (Bridled Tern)	Mig. (EPBC & BC Acts)	11.3 km W	Offshore tropical and subtropical seas and islands.	Occurs almost entirely offshore, nesting on islands. Feeds on aquatic vertebrates and invertebrates. Migratory - present in Australia between September–April.	Flocking, mid-flying, diurnal	Global pop. ~ 610,000–1.5 mil
Laridae	*Sternula nereis nereis* (Fairy Tern)	VU (EPBC & BC Acts)	7.0 km WSW	Offshore, estuarine or lacustrine (lake) islands, wetlands, beaches and spits.	Feeds on aquatic animals and plants. Two subpopulations in WA, one migratory and one sedentary.	Flocking, mid-flying, diurnal	Australian pop. ~7,450
Laridae	*Thalasseus bergii* (Greater Crested Tern)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. estuaries, brackish rivers.	Feeds on aquatic animals, mainly fish, by dive-bombing and fully submerging. Does not migrate in Australia. Breeds between September–April and remains close to breeding sites outside the breeding season.	Flocking, mid-flying, diurnal	Global pop. ~150,000–1.1 mil Australian pop. Unknown
Megapodiidae	*Leipoa ocellata* (Malleefowl)	VU (EPBC & BC Acts)	1.2 km SSW	Semi-arid shrublands and low woodlands.	Feeds on various plant material. Forms large mounds for breeding.	Rarely flies	Total pop. ~20,000–30,000
Motacillidae	*Motacilla cinerea* (Grey Wagtail)	Mig. (EPBC & BC Acts)	Proj. dist.	Riparian woodland, farmland, wetlands.	Vagrant to Australia. Feeds on insects on/low over the ground. Wades in shallow water for	Low flying, diurnal	Global pop. ~7–20 mil.

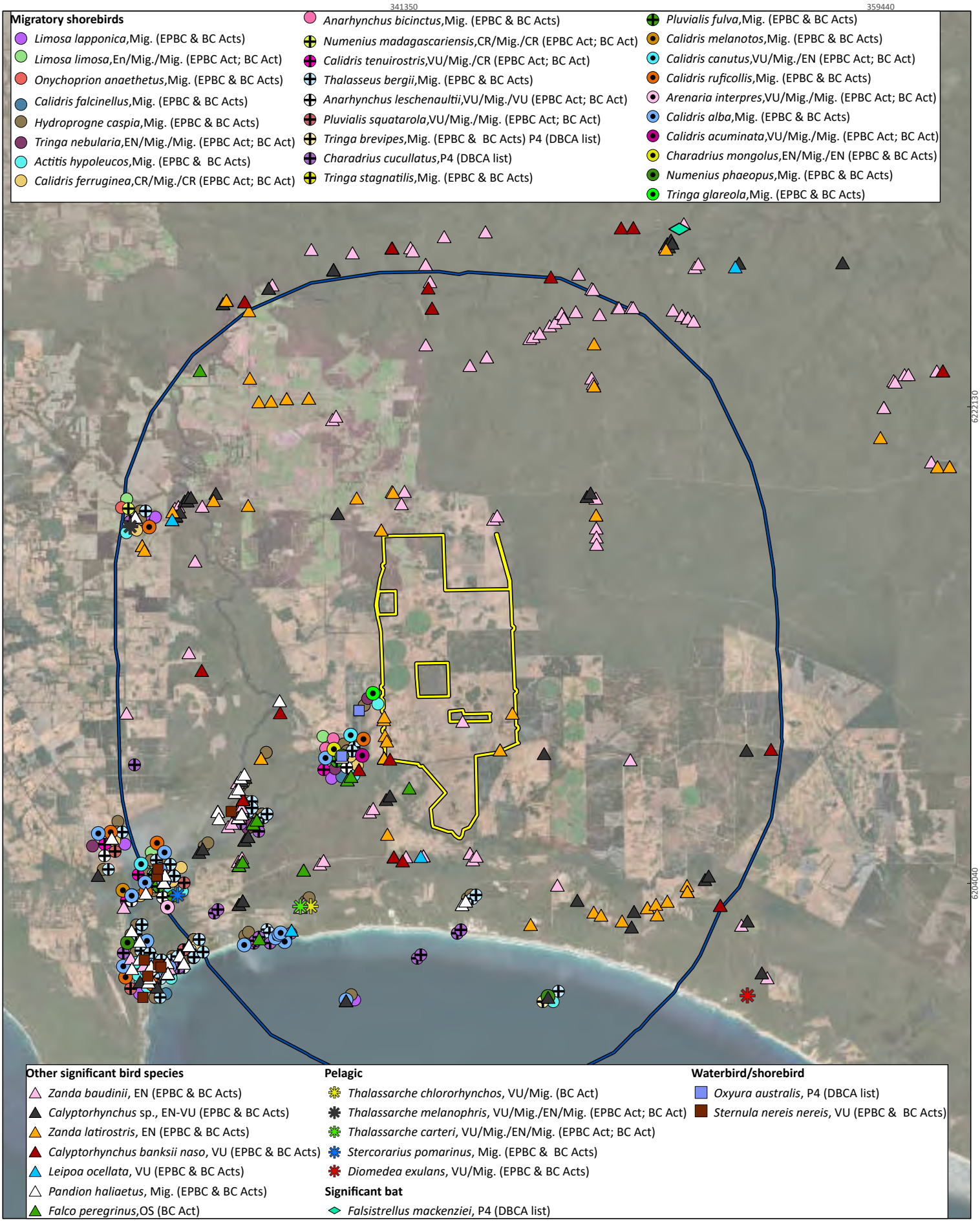
Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
					aquatic invertebrates. Migratory - present in Australia between October–April.		No reliable Australian pop. est.
Scolopacidae	*Actitis hypoleucos* (Common Sandpiper)	Mig. (EPBC & BC Acts)	0.5 km W	Coastal and inland saline and freshwater wetlands.	Forages in shallow water and mud. Often found alone or in pairs. Migratory - present in Australia between July–April.	Mid-flying, diurnal/nocturnal	Global pop. 4.9-7.5 mil. EAAF pop. ~190,000
Scolopacidae	*Arenaria interpres* (Ruddy Turnstone)	VU/Mig. (EPBC Act); Mig. (BC Act)	11.0 km SSE	Variety of coastal habitats, such as mudflats and sewerage ponds	Found singly or in pairs. Feeds nocturnally and diurnally on invertebrates. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000 Australian pop. ~19,000
Scolopacidae	*Calidris acuminata* (Sharp-tailed Sandpiper)	VU/Mig. (EPBC Act); Mig. (BC Act)	1.2 km W	Fresh, brackish and saline wetlands, lagoons, lakes and inundated paddocks.	Preys on invertebrates and plant matter from mud. Forms large mixed flocks. Migratory - present in Australia between August–April.	Mid-flying, diurnal/nocturnal, flocking	EAAF pop. / Australian pop. ~73,000
Scolopacidae	*Calidris alba* (Sanderling)	Mig. (EPBC & BC Acts)	1.9 km W	Open coastal habitats, e.g. exposed beaches.	Active forager in tight flocks, feeding on plants, seeds, and invertebrates. Migratory - present in Australia between September–May.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000
Scolopacidae	*Calidris canutus* (Red Knot)	VU/Mig. (EPBC Act); EN (BC Act)	1.9 km W	Coastal habitats, e.g. estuaries, mudflats.	Feeds on invertebrates in large mixed shorebird flocks. Less common in SW than other coastal areas. Migratory - present in Australia between August–April.	Migratory, high flying, diurnal/nocturnal, flocking	Global pop. ~1.1 mil Australian pop. ~135,000
Scolopacidae	*Calidris falcinellus* (Broad-billed Sandpiper)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. estuarine mudflats, reefs and marshes.	Feeds on invertebrates and plant matter in mud. Rare, with often only one in large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~30,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Scolopacidae	*Calidris ferruginea* (Curlew Sandpiper)	CR/Mig. (EPBC Act); CR (BC Act)	1.9 km W	Mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets	Feeds on invertebrates and plant matter in mud. Forms large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~90,000 Australian pop. ~40,000
Scolopacidae	*Calidris melanotos* (Pectoral Sandpiper)	Mig. (EPBC & BC Acts)	12.7 SWS	Fresh, brackish and saline wetlands, lagoons, lakes and inundated grasslands.	Feeds on invertebrates and plant matter in mud. Rare species, joins large mixed flocks. Migratory present in Australia between September–June.	High flying, diurnal/nocturnal, flocking	Global pop. ~25,000–100,000
Scolopacidae	*Calidris ruficollis* (Red-necked Stint)	Mig. (EPBC & BC Acts)	1.9 km W	Aquatic habitats such as mudflats, beaches and wetlands, and sometimes in inundated paddocks.	Feeds on invertebrates and plant matter in mud and water. Feeds and roosts in large mixed flocks. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~475,000 Australian pop. ~350,000
Scolopacidae	*Calidris tenuirostris* (Great Knot)	VU/Mig. (EPBC Act); CR (BC Act)	1.9 km W	Coastal habitats, e.g. estuaries, mudflats.	Feeds on invertebrates in large mixed shorebird flocks. Mainly found in northern Australia. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~425,000 Australian pop. ~386,900
Scolopacidae	*Limosa lapponica* (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. bays, estuaries, mudflats, sandflats.	Forages for invertebrates on wide intertidal mudflats or sandflats. Observed in large mixed flocks in some locations. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~325,000
Scolopacidae	*Limosa limosa* (Black-tailed Godwit)	EN/Mig. (EPBC Act); Mig. (BC Act)	1.9 km W	Coastal habitats, e.g. bays, estuaries, mudflats, sandflats.	Forages for invertebrates on wide intertidal mudflats or sandflats. Observed in large mixed flocks in some locations. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	AAF pop. ~160,000 Australian pop. ~43,000

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
Scolopacidae	*Numenius madagascariensis* (Eastern Curlew)	CR/Mig. (EPBC Act); CR (BC Act)	11.5 km W	Coastal habitats, e.g. mudflats, sandflats, especially those with seagrass.	Feeds on crustaceans in estuaries, mangroves, saltmarshes and intertidal flats. Migratory - present in Australia between August–April.	Mid-flying, diurnal/nocturnal, flocking	EAAF pop. ~35,000 Australian pop. ~22,500
Scolopacidae	*Numenius phaeopus* (Whimbrel)	Mig. (EPBC & BC Acts)	1.9 km W	Coastal habitats, e.g. mudflats, sandflats, mangroves.	Forages on beaches/rocks, alone or with other shorebirds. Migratory - present in Australia between August–April.	Flocking, high flying	EAAF pop. ~65,000
Scolopacidae	*Tringa brevipes* (Grey-tailed Tattler)	Mig. (EPBC and BC Acts); P4 DBCA list	6.9 km SSE	Coastal habitat, e.g. reefs, rock platforms, mudflats.	Forages for invertebrates in shallow water, usually during the day. Migratory - present in Australia between August–April.	Mid-flying, diurnal, flocking	EAAF pop. ~70,000
Scolopacidae	*Tringa glareola* (Wood Sandpiper)	Mig. (EPBC & BC Acts)	0.5 km W	Well vegetated freshwater wetlands and water sources, as well as inundated grasslands.	Forages for invertebrates in shallow water. Often found alone, in pairs or in small flocks with other shorebirds. Migratory - present in Australia between August–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~130,000
Scolopacidae	*Tringa nebularia* (Common Greenshank)	EN/Mig. (EPBC Act); Mig. (BC Act)	0.5 km W	Saline and freshwater wetlands, mudflats and inundated paddocks.	Forages for invertebrates in shallow water, often along shorelines. Observed in mixed flocks. Migratory - present in Australia between August–May.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~110,000 Australian pop. ~23,700
Scolopacidae	*Tringa stagnatilis* (Marsh Sandpiper)	Mig. (EPBC & BC Acts)	12.5 km SW	Saline and freshwater wetlands, including inundated floodplains.	Forages on invertebrates in shallow water at the edge of wetlands singly or in groups. Migratory - present in Australia between September–April.	High flying, diurnal/nocturnal, flocking	EAAF pop. ~130,000
Tytonidae	*Tyto novaehollandiae novaehollandiae*	P3 (DBCA list)	1.0 km S	Tall open forests with large trees	Territorial, usually seen singly. Roosts in large trees. Feeds on a wide variety of prey. Perch and	Nocturnal, mid-flying	Population size unknown Anecdotally, there is a healthy population

Family	Species	Conservation status	Nearest desktop record	Habitat preferences	Behaviour	Flight behaviour	Population estimates[1]
	(Masked Owl (southwest))				drop predator that hunts on forest edges.		in the Augusta-Margaret River region[2]
Vespertilionidae	*Falsistrellus mackenziei* (Western False Pipistrelle)	P4 (DBCA list)	1.2 km W	Tall woodlands and wet or dry sclerophyll forest	Feeds on insects. Forms colonies up to 30 bats. Roosts in hollows.	High flying, nocturnal	Unknown population size. Estimated in 2014 that remaining habitat sufficient to support >10,000

1 - Refer to Appendix 4 for sources of population estimates. 2 - Pers. comm Dr Boyd Wykes.





SynergyRED
Scott River Wind Fam

Project No	1585
Date	19/06/2025
Drawn by	BK
Map author	BA

0 2.5 5
Kilometers

1:185,500 (at A4) GDA 1994 MGA Zone 50

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Study area
Bird/Bat Investigation Area

Figure 4-7

Desktop records of significant birds and bats

PHOENIX ENVIRONMENTAL SCIENCES

5 FIELD SURVEY RESULTS

5.1 BIRDS

5.1.1 General summary

Results presented in section 5.1.1 are based on the BBRAS survey data from the fixed-point count sites only. Records from the Basic and Targeted fauna survey are omitted, unless otherwise stated.

A total of 310 samples taken from 28 sites resulted in a total bird species richness of 96 and total abundance of 13,471 (Table 5-1). Species richness was 60 at Impact sites, 74 at Reference sites and 31 at the Regional reference sites. Reference sites were therefore the most speciose and abundant overall. Regional reference sites comprised just 2.5% of the samples and 3.9% of species records but contributed 16% of the overall abundance and recorded a species richness that was >50% that of Impact sites, strongly distinguishing the Regional reference sites as species rich and abundant, compared with sites within the WFA and BIA.

Table 5-1 Data summary of records for fixed-point count samples between the 3 site types

Site type	No. sites	No. sample events	Species richness	No. records	Total abundance
Impact	9	125	60	988	4,750
Reference	14	177	74	1,542	6,568
Regional reference	5	8	31	104	2,153
Total	**28**	**310**	**96**	**2,634**	**13,471**

Species richness, abundance and number of records aggregated across sites in the BIA is shown for Year 1 and Year 2 in Figure 5-1, and per season in Figure 5-2. Almost twice as many samples were completed in Year 2 (202) compared with Year 1 (108). Accordingly, the number of records was much higher in Year 2 (1,599 records) compared with Year 1 (1,075 records) as was the total abundance, being 8,315 in Year 2 compared with 5,156 in Year 1. Despite the significant increase in sample effort in Year 2, species richness was only marginally higher (78 species), compared with Year 1 (72 species). The analysis of survey completeness is provided in section 5.4.

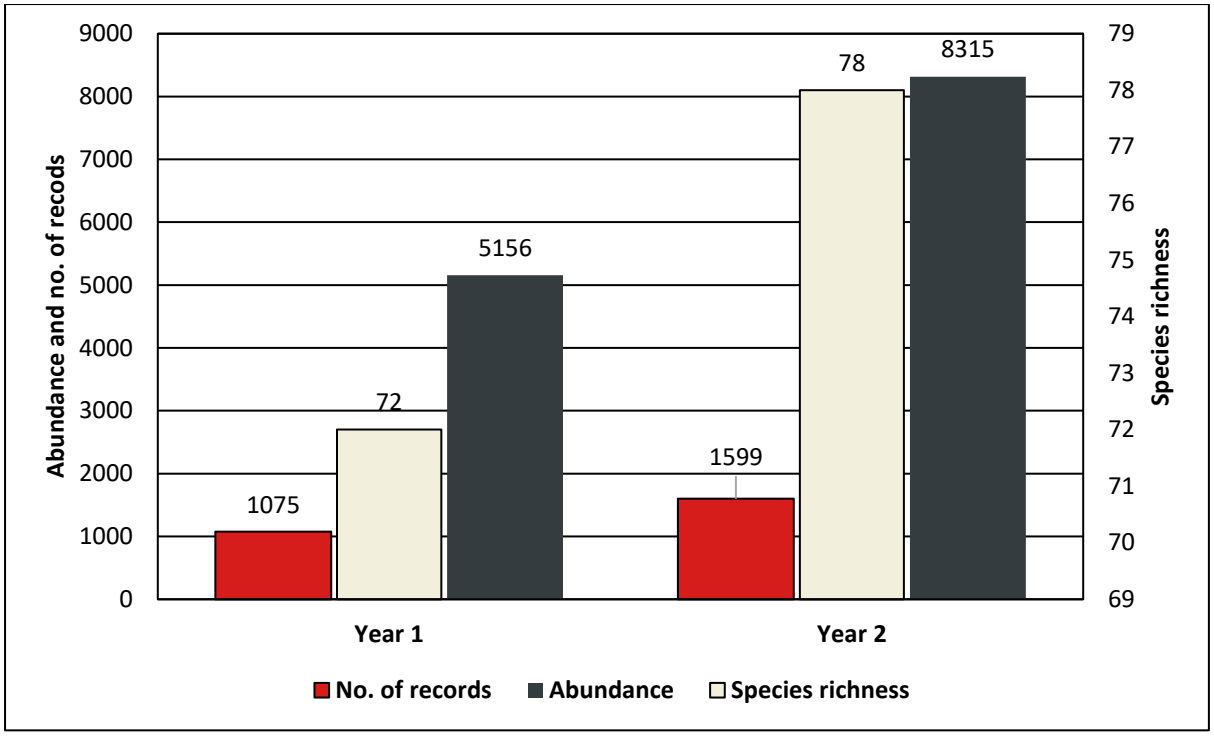


Figure 5-1 **Species richness, number of records and abundance of birds at fixed-point count sites per year**

Figure 5-2 demonstrates the effect on abundance of the additional sample effort in Year 2, which was almost twice that of Year 1 and thus at first appears a much more abundant year, by displaying the mean abundance and mean species richness per sample, per season in each year. With the data summarised per sample and the mean values calculated, the large difference in abundance between years is no longer apparent, i.e. mean abundance for all seasons in Year 2 is far more similar to that of Year 1. Autumn of Year 1 was therefore the period where mean abundance was greatest, followed by summer in Year 2.

Mean species richness per sample was highest in winter and spring of Year 1 (9.2 species). In fact, mean species richness in every season of Year 1 was higher than that of Year 2, conversely however, summer and spring of Year 2 were the most speciose periods over the 2 years, recording 68 and 66 species, respectively; and the autumn of Year 2 was the least speciose period.

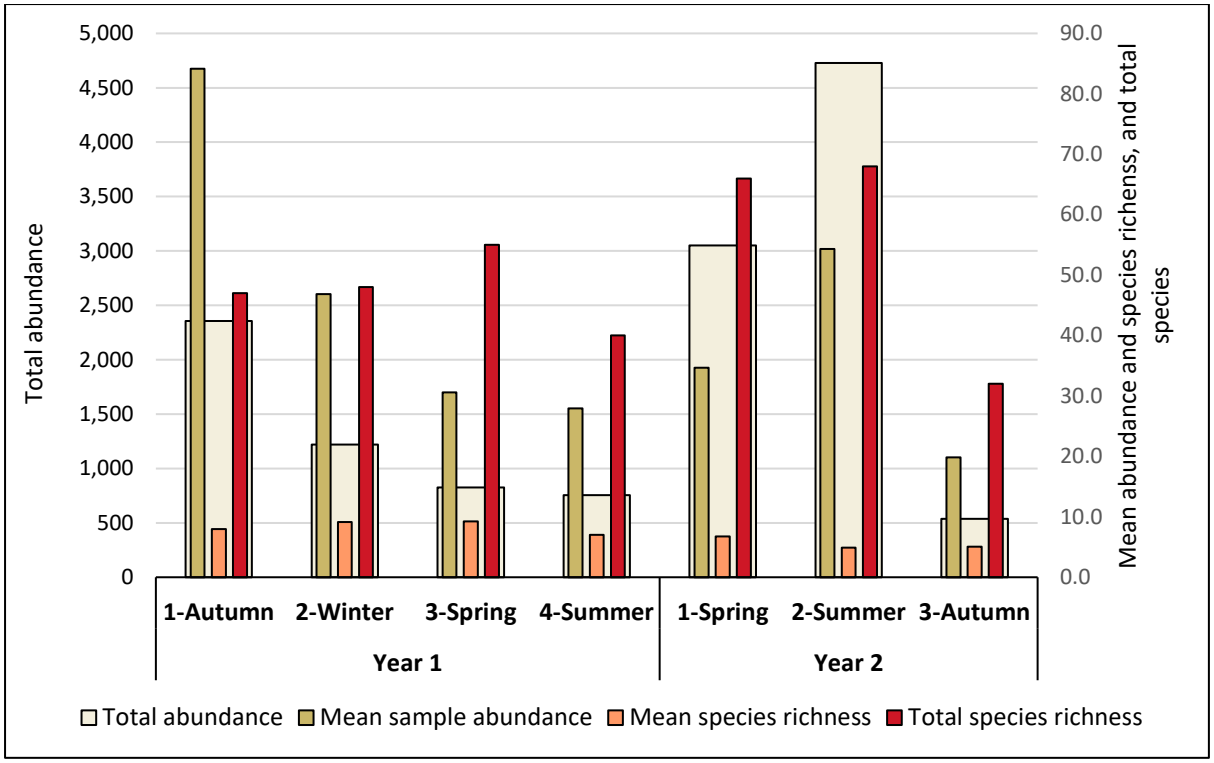


Figure 5-2 Seasonal mean species richness and mean abundance per year, based on samples

At the site level, 9 sites in the 30-minute point counts, including 4 Impact sites, recorded a species richness of just one (Table 5-2). Maximum species richness varied considerably, but sites BUS020 (Impact), BUS015 (Reference) and BUS031 (Regional reference) were the most speciose (15, 19 and 16 species, respectively) in each area. However, sites BUS006 (Impact), BUS009 (Reference) and BUS031 (Regional reference) were consistently the most speciose in each area, recording mean species richness values of 9.0, 12.0 and 14.0, respectively.

When the Impact, Reference and Regional reference sites are compared in aggregate, there is little difference between Impact and Reference sites - numerous metrics for these 2 groups were remarkably similar, for instance mean abundance was 39.2 and 38.6, respectively. The mean median abundance was 25.8 and 23.3, respectively and the standard deviation of the mean abundance was 45.7 and 48.5, respectively. Reference sites were, however, slightly more species rich than Impact sites, recording mean richness values of 8.0 and 5.9 species, respectively.

In contrast, the Regional reference sites were far more abundant (mean = 222.5) and more species rich (10.5) on average compared with Impact and Reference sites in or near the WFA. Further sampling of these sites through other periods of the year, especially when Migratory species are absent, would have undoubtedly lowered both values.

Mean abundance per sample and mean species richness per sample for each site are also displayed graphically in Figure 5-3 and spatially in Figure 5-4[3]. In both figures the much higher mean abundance per sample at Regional reference sites compared with Impact and Reference sites is very clear, particularly for 2 sites, BUS030 and BUS031. It can also be seen in Figure 5-4 that the southwest corner of the WFA supports a more abundant bird population on average. With respect to mean species richness however, both Figure 5-3 and Figure 5-4 indicate that the differences between the 3 groups are far less pronounced.

[3] In order to give visual effect to Figure 5-4, mean abundance was multiplied by 10 and mean species richness was multiplied by 50.

Table 5-2 Site-sample summary for fixed-point count sites

Area	sitename	#samples	Total sp. rich.	Total abundance	Min		Max		Range		Mean		Total		Median		Std.dev.	
					Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.
Impact sites	BUS004	21	33	468	5	4	48	11	43	7	22.3	7.3	468	33	19.0	7.0	12.5	2.1
	BUS006	8	35	383	10	4	149	13	139	9	47.9	9.0	383	35	38.5	9.5	41.9	2.9
	BUS016	14	30	736	6	3	235	13	229	10	52.6	5.6	736	30	21.0	5.0	67.4	2.8
	BUS018	13	22	459	5	3	99	9	94	6	35.3	5.1	459	22	29.0	5.0	25.1	1.7
	BUS019	14	22	253	2	1	35	9	33	8	18.1	4.6	253	22	18.0	4.5	9.6	1.8
	BUS020	14	30	1,557	6	1	792	15	786	14	111.2	7.1	1,557	30	56.5	7.0	191.7	4.2
	BUS025	14	29	334	8	1	51	11	43	10	23.9	6.3	334	29	22.0	6.5	12.6	3.3
	BUS026	13	16	228	1	1	102	6	101	5	17.5	2.6	228	16	11.0	2.0	25.6	1.5
	BUS027	14	21	332	2	2	92	9	90	7	23.7	5.1	332	21	17.0	5.0	24.8	1.9
	Sub-total	**125**	**60**	**4,750**	**1**	**1**	**792**	**15**	**786**	**14**	**39.2**	**5.9**	**4,750**	**60**	**25.8**	**5.7**	**45.7**	**2.5**
Ref. sites	BUS001	22	49	942	16	2	189	17	173	15	42.8	9.2	942	49	34.5	9.0	34.4	3.6
	BUS002	22	31	737	1	1	397	11	396	10	33.5	5.4	737	31	13.5	5.5	80.3	2.9
	BUS003	8	35	1,107	19	8	859	13	840	5	138.4	10.5	1,107	35	36.5	11.0	272.6	1.7
	BUS005	21	37	605	3	3	169	13	166	10	28.8	6.4	605	37	18.0	6.0	33.4	2.8
	BUS007	8	20	349	3	1	123	12	120	11	43.6	6.1	349	20	31.0	6.5	41.0	2.9
	BUS008	19	25	399	1	1	167	7	166	6	21.0	4.0	399	25	11.0	4.0	36.4	1.6
	BUS009	6	30	230	14	7	64	15	50	8	38.3	12.0	230	30	41.5	13.5	18.4	2.9
	BUS010	22	30	632	1	1	82	10	81	9	28.7	5.6	632	30	19.5	5.5	21.5	2.2
	BUS011	21	32	773	1	1	191	12	190	11	36.8	6.8	773	32	20.0	6.0	47.4	2.9
	BUS012	2	14	29	10	6	19	11	9	5	14.5	8.5	29	14	14.5	8.5	4.5	2.5
	BUS013	8	23	242	8	5	125	11	117	6	30.3	7.5	242	23	14.5	7.0	36.6	2.2
	BUS014	8	29	162	6	2	33	11	27	9	20.3	7.6	162	29	20.5	9.5	10.8	3.4
	BUS015	8	28	314	5	3	128	19	123	16	39.3	10.5	314	28	27.0	10.5	36.5	4.2
	BUS035	2	15	47	18	9	29	14	11	5	23.5	11.5	47	**15.0**	23.5	11.5	5.5	2.5

Area	sitename	#samples	Total sp. rich.	Total abundance	Min		Max		Range		Mean		Total		Median		Std.dev.	
					Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.	Abnd.	Sp. rich.
Sub-total		**177**	**74**	**6,568**	1	**1**	**859**	**19**	**840**	**16**	**38.6**	**8.0**	**6,568**	**74**	**23.3**	**8.1**	**48.5**	**2.7**
Reg. ref. sites	BUS030	2	19	769	12	9	757	13	745	4	384.5	11.0	769	19	384.5	11.0	372.5	2.0
	BUS031	2	19	1,112	435	12	677	16	242	4	556.0	14.0	1,112	19	556.0	14.0	121.0	2.0
	BUS032	1	8	45	45	8	45	8	0	0	45.0	8.0	45	8	45.0	8.0	0.0	0.0
	BUS033	1	12	57	57	12	57	12	0	0	57.0	12.0	57	12	57.0	12.0	0.0	0.0
	BUS034	2	13	170	26	6	144	9	118	3	85.0	7.5	170	13	85.0	7.5	59.0	1.5
Sub-total		**8**	**31**	**2,153**	**12**	**6**	**757**	**16**	**745**	**4**	**225.5**	**10.5**	**2,153**	**33**	**225.5**	**10.5**	**110.5**	**1.1**
Total		**310**	**96**	**13,471**	**96**	**1**	**859**	**19**	**840**	**16**	**72.1**	**7.7**	**13,471**	**96**	**60.2**	**7.8**	**58.7**	**2.4**

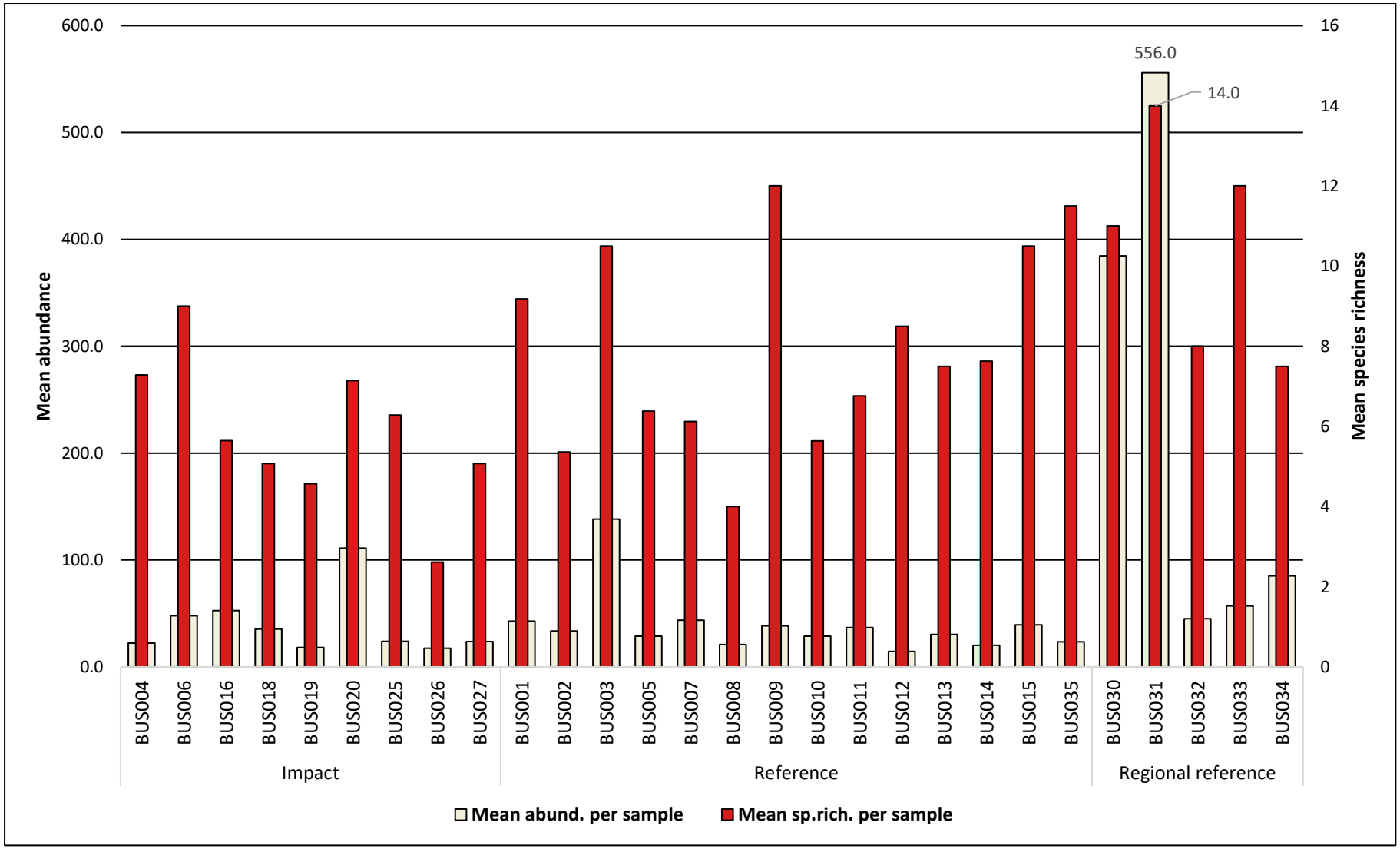
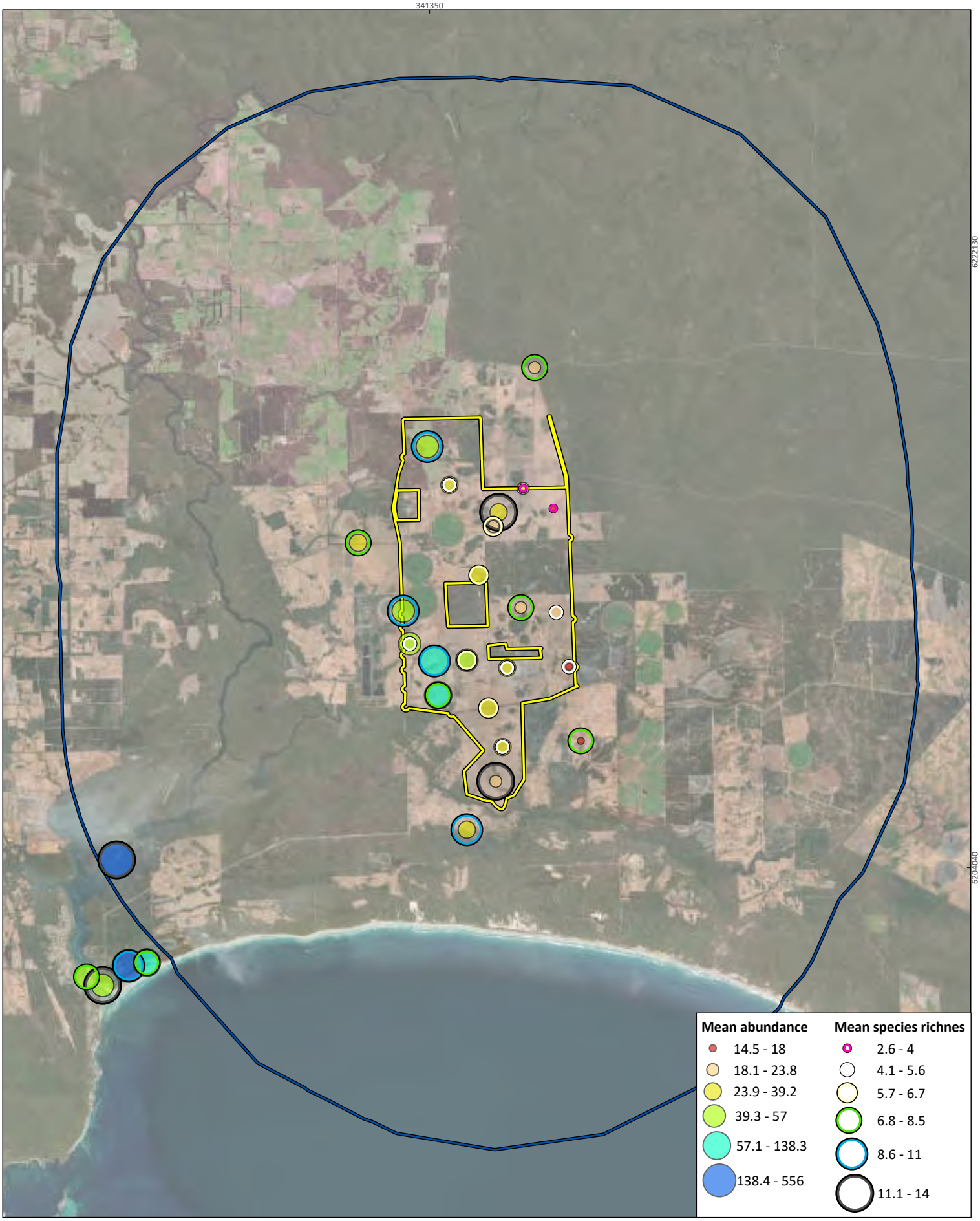


Figure 5-3 **Bar graph displaying mean species richness and abundance per sample, per site**





SynergyRED
Scott River Wind Fam

Project No	1585
Date	18/06/2025
Drawn by	BK
Map author	BA

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Kilometers

1:143,615 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 18/06/2025. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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Study area
Bird/Bat Investigation Area

Figure 5-4

Mean bird abundance and mean richness per sample, per site

PHOENIX ENVIRONMENTAL SCIENCES

5.1.2 Assemblage summary for impact and reference sites

The data presented in Section 5.1.2 relates only to fixed point counts from impact and reference sites (i.e. excludes regional reference sites). A summary of the data relating to the top 10 most abundant and dominant birds is presented in Table 5-3. The top 3, 10 and 20 most abundant species collectively represented just under 50%, 73.6% and 86.2%, respectively of the overall abundance of birds; the individual contribution and cumulative proportion is provided in Table 5-3.

The most abundant bird species recorded was Straw-necked Ibis (n = 3,519) which in relative terms contributed 31.1% of all birds and was recorded in 28.9% of all sample events. It was observed 88 times over the 2-year program, including 11 instances where the flock size was >100 individuals. Typically, it occurred in larger flocks and rarely as individuals or pairs. Abundance was relatively even between years, with Year 2 being 10% lower than Year 1 (Table 5-3).

Australian Raven was the second most abundant species (n = 1,136). It contributed 10.0% of the total abundance and was recorded in 121.6% of samples (i.e. multiple records were made in each sample event). It was far more abundant in Year 2 however, being up by 245.5% compared with Year 1. It was typically recorded in groups of 2 and 3.

Tree Martin was the third most abundant species (n = 912), contributing 8.1% of the overall abundance and being recorded in 42.3% of sample events. This species was usually recorded in small groups of 6–8 individuals and was 230.2% more abundant in Year 2, compared with Year 1.

Australian Shelduck (n = 816) contributed 7.2% of the overall abundance and was detected in 39.7% of sample events. Its abundance was relatively even between years, being just 7.1% higher in Year 2, compared with Year 1.

Australian White Ibis (Table 5-3) was also relatively abundant (n = 619), far more so in Year 2 (+343%). In fact, it was quite rare in Year 1 only being recorded 3 times, whereas in Year 2 it was recorded 50 times at an average of 10.1 individuals, and overall it contributed 5.5% of the total bird abundance for the 2 years of sampling.

Other notable species included While Willie Wagtail, which contributed just 2.2% of the total abundance, but was ubiquitous, being recorded in 56.1% of all sample events. Yellow-rumped Thornbill and White-fronted Chat declined 69.1% and 30.1%, respectively, in Year 2. While not shown in Table 5-3 as it was the 15th most abundant species, it is also noted that Emu abundance was up 235.3% in Year 2.

Three of the top 5 most abundant species were waterbirds, and of the top 20, almost all are considered either cosmopolitan or species that are advantaged by modified landscapes (e.g. Australian Raven, Tree Martin, Australian Ringneck, Yellow-rumped Thornbill, Willie Wagtail, Australian Magpie, White-fronted Chat, Grey Butcherbird, Red Wattlebird, Welcome Swallow, Magpie-lark and Splendid Fairy-wren) or favour grassland and floodplain habitats that dominate the WFA (Straw-necked Ibis, Australian Shelduck, Australian White Ibis, White-faced Heron, Emu and Inland Thornbill).

Table 5-3 Top 10 species by abundance at all fixed-point count sites

Scientific name	Vernacular	Year 1				Year 2				Pct change Year 1-2	Total abund.	Total relat. abund. (%)	Cum. abund. (%)	Total detected (%)
		Abund.	Mean abund.	No. of records	Detected (%)	Abund.	Mean abund.	No. of records	Detected (%)					
Threskiornis spinicollis	Straw-necked Ibis	1,855	74.2	25	8.2	1,664	26.4	63	20.7	-10.3%	3,519	31.1	31.1	28.9
Corvus coronoides	Australian Raven	255	2.7	93	30.5	881	3.2	278	91.1	245.5%	1,136	10.0	41.1	121.6
Petrochelidon nigricans	Tree Martin	212	6.1	35	11.5	700	7.4	94	30.8	230.2%	912	8.1	49.2	42.3
Tadorna tadornoides	Australian Shelduck	394	6.2	64	21	422	7.4	57	18.7	7.1%	816	7.2	56.4	39.7
Threskiornis molucca	Australian White Ibis	114	38	3	1	505	10.1	50	16.4	343.0%	619	5.5	61.9	17.4
Barnardius zonarius	Australian Ringneck	179	3.2	56	18.4	163	2.8	58	19	-8.9%	342	3.0	64.9	37.4
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	236	7.4	32	10.5	73	4.9	15	4.9	-69.1%	309	2.7	67.6	15.4
Rhipidura leucophrys	Willie Wagtail	127	1.6	78	25.6	126	1.4	93	30.5	-0.8%	253	2.2	69.9	56.1
Gymnorhina tibicen	Australian Magpie	126	2.3	54	17.7	110	1.8	61	20	-12.7%	236	2.1	71.9	37.7
Epthianura albifrons	White-fronted Chat	113	6.3	18	5.9	79	4.4	18	5.9	-30.1%	192	1.7	73.6	11.8
Total abundance top 10 species		**3,611**	**14.8**	**NA**	**NA**	**4,723**	**6.7**	**NA**	**NA**	**69.4%**	**8,334**	**73.6%**	**73.6**	**NA**
Total abundance top 11–20 species[1]		**4,377**	**9.3**	**NA**	**NA**	**5,376**	**5.1**	**NA**	**NA**	**35.2%**	**9,753**	**86.2%**		**NA**
Grand total abundance		**5,156**	**4.0**	**NA**	**NA**	**6,162**	**2.3**	**NA**	**NA**	**NA**	**11,318**	**NA**		**NA**

[1]Species not listed in table but summary data shown here for context.

The assemblage has been considered in terms of 'functional groups', which are essentially the Order each species belongs to (Figure 5-5). Eleven functional groups were recorded, with perching and singing birds (passerines) being the most abundant and species rich group overall and including 7 of the top 10 most abundant species (Table 5-4). Parrots and birds of prey were also relatively species rich, but birds of prey were not abundant by comparison, and were generally recorded as singletons or pairs hunting widely across the different habitats of the WFA. Parrots included the 6th most abundant species (Australian Ringneck) as well as Carnaby's Cockatoo (EN), Baudin's Cockatoo (EN) and Forest Red-tailed Black Cockatoo (VU). Most parrot records were of individuals, pairs or small groups moving between bushland remnants rather than actively using the cleared habitats that most sites were located in; although parrots were observed on occasion foraging on the ground when grasses were in seed, including Carnaby's Cockatoo.

The 3 'waterbird' groups collectively represented the 2nd most abundant group, with diversity approaching that of parrots, birds of prey and to a lesser extent perching and singing birds. Except for Banded Lapwing, shorebirds (including 'Migratory' species) were not observed during the fixed-point count sites in the WFA, and were instead restricted to the Regional reference sites. A single record of 3 Wood Sandpiper (Mig.) within the WFA was made during the Basic and Targeted fauna survey (Phoenix 2025a).

Waterbirds include all the ducks and cormorants. The 4 families represented were moderately speciose, and abundant, as would be expected for a study site that includes many ephemeral wetlands as well as large expanses of flooded grassland during the wet portion of the year. Australian Shelduck and Pacific and Black Duck were the 4th and 11th most abundant species overall, respectively (Figure 5-5; Table 5-3). These 2 species were observed foraging and breeding in wetlands and flooded grasslands. Cormorants were often observed loafing on tree branches at the periphery of wetlands.

Wading birds comprise the long-legged wetland birds, such as Straw-necked Ibis (the most abundant species), Australian White Ibis (5th most abundant) and White-faced Heron (14th most abundant) (Figure 5-5; Table 5-3). These species typically forage in flooded grasslands and in and around moderately shallow wetlands. Rarer waders included Little Egret, Royal Spoonbill and Yellow-billed Spoonbill.

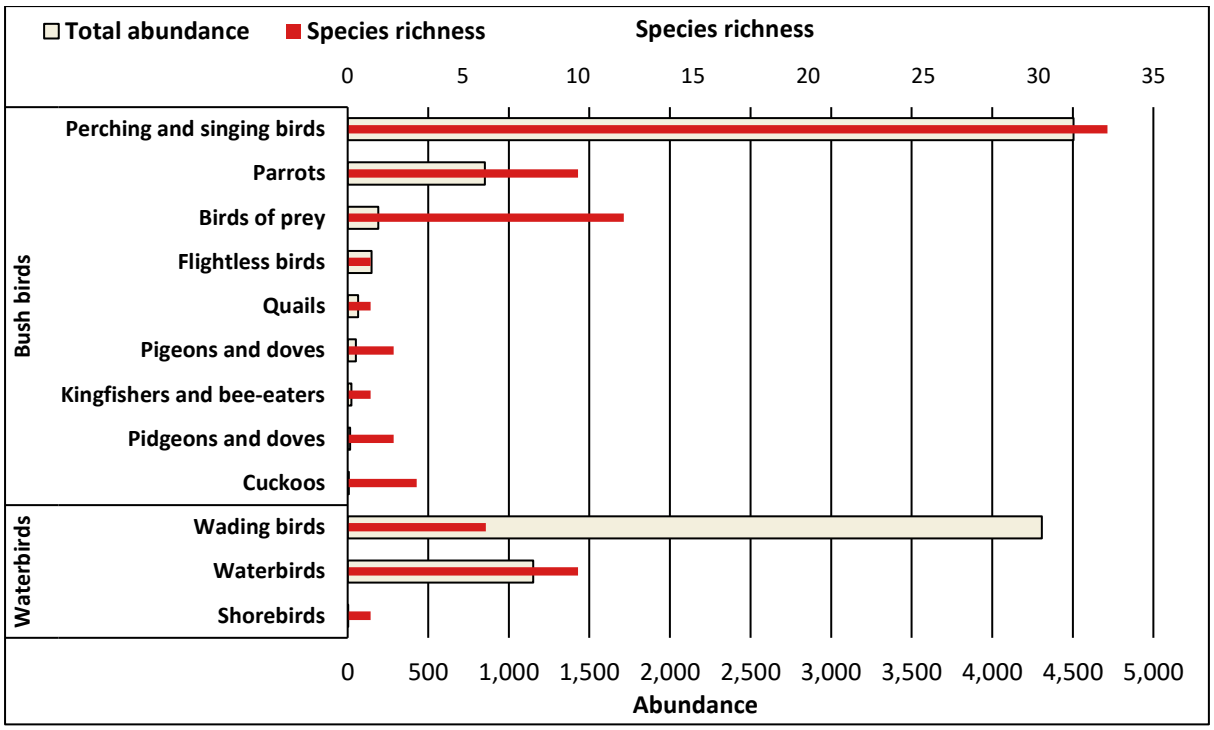


Figure 5-5 Summary by functional/taxonomic group

Table 5-4 further explores each family, providing a brief summary of each. The assemblage derived from the 305 fixed-point count samples from impact and reference sites, included members from 28 families, with some families represented by only a single species, while other families recorded several species (Table 5-4). The most speciose families were Accipitridae and Falconidae (birds of prey; 8 and 4 species each), Anatidae (ducks; 6 species), Psittacidae and Cacatuidae (parrots; 5 species each) and Meliphagidae (honeyeaters and chats; 5 species).

Threskiornithidae was the most abundant family, with records of 4,147 individuals, overwhelmingly of Straw-necked Ibis and to a lesser extent Australian White Ibis. The ducks (Anatidae) were also very abundant (1,133 individuals). Australian Raven, the only Corvidae was the second most recorded species with 1,136 individuals recorded from 371 observations (Table 5-4) and being recorded at least once in in every sample event.

There were few clear trends evident at the family level, except within the 'waterbirds'. Members of the orders Anseriformes (ducks etc) and Ciconiiformes (spoonbills and Ibis), and the family Phalacrocoracidae (cormorants) were largely or entirely restricted to the BBIA, whereas the members of Charadriiformes (families Charadriidae, Haematopodidae, Laridae and Scolopacidae) were restricted to the Regional reference sites and are not included in Table 5-3. This clear split is related to the nature of the available aquatic habitats, e.g. salinity, depth and inundation duration, and the associated food sources within WFA wetlands, compared with the tidal (marine) habitats of the Hardy Inlet.

The Order Passeriformes (perching and singing birds) included 15 families and 33 species in total. This was the most diverse group of birds recorded. However, many common 'bush birds' were not well represented in the fixed-point count data principally because the sites were typically located in open paddocks.

Table 5-4 Bird assemblage by family at fixed-point count impact and reference sites

Family name	Common names	Data summary	Summary of records
Birds of prey (Accipitriformes and Falconiformes) (13 ssp.)			
Accipitridae	Black-shouldered Kite, Brown Goshawk, Collared Sparrowhawk, Little Eagle, Swamp Harrier, Wedge-tailed Eagle, Whistling Kite, White-bellied Sea-eagle	Abundance: 114 No. records: 95 Species richness: 8	Records throughout WFA from cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mostly as singles and pairs. Also represented in Basic and Targeted fauna survey records.
Falconidae	Australian Hobby, Australian Kestrel, Brown Falcon, Peregrine Falcon	Abundance: 76 No. records: 61 Species richness: 4	Records throughout WFA from cleared and Marri-Jarrah-Peppermint woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded exclusively as singles and pairs. Also represented in Basic and Targeted fauna survey records.
Cuckoos (Cuculiformes) (3 ssp.)			
Cuculidae	Fan-tailed Cuckoo, Horsfield's Bronze Cuckoo, Shining Bronze Cuckoo	Abundance: 8 No. records: 8 Species richness: 3	Sparse records throughout WFA within cleared and MJP woodland habitat. Recorded exclusively as singletons, mainly in spring. Also represented in Basic and Targeted fauna survey records.
Flightless birds (Struthioniformes) (1 sp.)			
Dromaiidae	Emu	Abundance: 148 No. records: 26 Species richness: 1	Regular, scattered records in WFA, in cleared and MJP woodland habitats. Mostly recorded as 2 or more individuals and up to 17 recorded. Recorded in summer, autumn and spring. Also represented in Basic and Targeted fauna survey records.
Kingfishers and bee-eaters (Coraciiformes) (1 sp.)			
Halcyonidae	Laughing Kookaburra	Abundance: 23 No. records: 18 Species richness: 1	Naturalised exotic. Regular, scattered records in WFA, in cleared and MJP woodland habitats. Recorded exclusively as singletons and pairs, in all seasons. Also represented in Basic and Targeted fauna survey records, including additional member.

Family name	Common names	Data summary	Summary of records
Parrots (Psittaciformes) (11 ssp.)			
Cacatuidae	Baudin's Cockatoo, Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo,	Abundance: 254 No. records: 36 Species richness: 3	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mostly as singles and pairs, but some larger flocks from 12-53 individuals. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Psittaculidae	Australian Ringneck, Elegant Parrot, Purple-crowned Lorikeet, Red-capped Parrot, Western Rosella	Abundance: 597 No. records: 169 Species richness: 5	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded predominantly as 2 or more individuals. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Perching and singing bids (Passeriformes) (33 ssp.)			
Acanthizidae	Inland Thornbill, Spotted Scrubwren, Western Gerygone, Yellow-rumped Thornbill	Abundance: 450 No. records: 126 Species richness: 4	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded predominantly as 2 or more individuals. Most recorded in summer, spring and autumn. Also represented in Basic and Targeted fauna survey records, including additional member.
Artamidae	Australian Magpie, Black-faced Woodswallow, Dusky Woodswallow, Grey Butcherbird	Abundance: 550 No. records: 285 Species richness: 4	Recorded throughout WFA, in cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Predominantly recorded as singletons and pairs (70%), but a few small flocks of <20 observed. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Campephagidae	Black-faced Cuckoo-shrike, White-winged Triller	Abundance: 94 No. records: 46 Species richness: 2	Regular, scattered records throughout the WFA, in cleared and MJP woodland habitat. Recorded almost exclusively as singletons and pairs, in all seasons. Also represented in Basic and Targeted fauna survey records.
Corvidae	Australian Raven	Abundance: 1,136 No. records: 371 Species richness: 1	The second most abundant species observed. Common throughout WFA, within cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at Regional reference sites. Recorded mainly singletons and pairs (75%), but as many as 100 observed at a time. Present throughout the year. Also represented in Basic and Targeted fauna survey records.

Family name	Common names	Data summary	Summary of records
Dicruridae	Grey Fantail, Magpie-lark, Willie Wagtail	Abundance: 446 No. records: 296 Species richness: 3	Common throughout WFA, recorded from cleared and MJP woodland habitats, present throughout the year. Also recorded outside WFA in wider BIA. More than 2 individuals rarely recorded at any one time. Also represented in Basic and Targeted fauna survey records.
Hirundinidae	Tree Martin, Welcome Swallow	Abundance: 1,047 No. records: 173 Species richness: 2	Recorded throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA and at a Regional reference site. Tree Martin was 3rd most abundant species recorded, often seen in groups of 3 or more and up to 26. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records.
Locustellidae	Brown Songlark, Rufous Songlark	Abundance: 23 No. records: 18 Species richness: 2	Not common, but present throughout WFA, predominantly in the south in cleared habitat. Also represented in Basic and Targeted fauna survey records.
Maluridae	Red-winged Fairy-wren, Southern Emu-wren, Splendid Fairy-wren	Abundance: 139 No. records: 59 Species richness: 3	Commonly recorded, throughout the WFA from cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Likely more prevalent in remnants, particularly with dense shrubs layers. Present in all seasons. Also represented in Basic and Targeted fauna survey records.
Meliphagidae	Brown Honeyeater, New Holland Honeyeater, Red Wattlebird, Western Spinebill, White-fronted Chat	Abundance: 423 No. records: 160 Species richness: 5	Common throughout the WFA in both cleared and MJP woodland habitat. Also recorded outside WFA in wider BIA. Recorded mostly as singletons/pairs, but often in group of 3 or more, and up to 30. Recorded throughout year. Also represented in Basic and Targeted fauna survey records, including additional members.
Motacillidae	Australian Pipit	Abundance: 77 No. records: 54 Species richness: 1	Mon-specific. Recorded throughout the WFA all in cleared areas but primarily in the southern half. Nesting pairs recorded breeding in paddocks and distinctive swooping-diving breeding behaviour observed on several occasions. Recorded mostly as singletons in spring and summer. Also represented in Basic and Targeted fauna survey records.
Pachycephalidae	Grey Shrike-thrush, Western Whistler	Abundance: 16 No. records: 15 Species richness: 2	Rarely recorded in WFA during fixed-point counts, in cleared and MJP habitat. Also recorded outside WFA in wider BIA. Scattered records in throughout the study area. Recorded almost exclusively as singletons. Likely more common in native remnants. Also represented in Basic and Targeted fauna survey records, including additional member.

Family name	Common names	Data summary	Summary of records
Pardalotidae	Striated Pardalote	Abundance: 1 No. records: 1 Species richness: 1	A single record west of the WFA from a roadside remnant, in spring. Also represented in Basic and Targeted fauna survey records in the WFA, including additional member.
Petroicidae	Jacky Winter, Scarlet Robin	Abundance: 3 No. records: 3 Species richness: 2	Single records of each species, in the north and south of the WFA. Recorded from cleared and MJP woodland habitat. One additional member represented in the Basic and Targeted fauna survey.
Zosteropidae	Silvereye	Abundance: 99 No. records: 25 Species richness: 1	Mono-specific. Commonly recorded throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA. Typically recorded as 2 or more individuals. Not recorded in winter. Also represented in Basic and Targeted fauna survey records.
Pigeons and doves (Columbiformes) (3 ssp.)			
Columbidae	Common Bronzewing, Crested Pigeon	Abundance: 66 No. records: 46 Species richness: 2	Commonly recorded throughout WFA but more commonly in the southern half, in cleared habitat. Also recorded outside WFA in wider BIA. Recorded as singletons and pairs almost predominantly. Recorded in all seasons. Also represented in Basic and Targeted fauna survey records in the WFA.
Phasianidae	Stubble Quail	Abundance: 65 No. records: 38 Species richness: 1	Commonly recorded throughout study area, in cleared habitat. Also recorded outside WFA in wider BIA. Recorded almost exclusively as singletons and pairs. Recorded in all seasons, except winter. Also represented in Basic and Targeted fauna survey records.
Waterbirds (Anseriformes, Charadriiformes and Ciconiiformes) (30 ssp.)			
Anatidae	Australian Shelduck, Australian Wood Duck, Black Swan, Grey Teal, Musk Duck, Pacific Black Duck	Abundance: 1,133 No. records: 188 Species richness: 6	Records spread throughout WFA, in cleared and MJP woodland habitats. Also recorded outside WFA in wider BIA. Around 75% of records as singleton and pairs, but also several flocks up to >30 individuals recorded (Australian Shelduck, Black Swan, Pacific Black Duck) and up to 650. The majority of records in winter months, but members of the family present throughout the year. Also represented in Basic and Targeted fauna survey records, notably in wetland habitats.

Family name	Common names	Data summary	Summary of records
Charadriidae	Banded Lapwing	Abundance: 4 No. records: 3 Species richness: 1	Limited records in WFA, only Banded Lapwing, which was restricted to sites in the south of the WFA in Cleared habitat, absent in summer months. Red-capped plover also, but restricted to Regional reference sites. Also represented in Basic and Targeted fauna survey, including additional member and additional Banded Lapwing record, notably in wetland habitats.
Ardeidae	White-faced Heron, White-necked Heron	Abundance: 161 No. records: 50 Species richness: 2	Records throughout the WFA, from cleared areas and MJP woodland habitats. Recorded mostly as singletons and pairs, but with a few flocks also recorded, and up to 55 individuals. Most observations were of White-faced Heron. Also recorded outside WFA in wider BIA and at Regional reference sites (but much rarer). Mainly recorded in summer, some spring records. Also represented in Basic and Targeted fauna survey, including additional member.
Threskiornithidae	Australian White Ibis, Royal Spoonbill, Straw-necked Ibis, Yellow-billed Spoonbill	Abundance: 4,147 No. records: 146 Species richness: 4	Records dominated by Straw-necked Ibis and Australian White Ibis which are both in the top 10 most abundant species for the survey; the other 2 species were rare. The 2 dominant species were recorded throughout WFA, and flocks of Straw-necked Ibis >100 individuals regularly recorded. Recorded from cleared and MJP woodland habitat in the WFA. Also recorded outside WFA in wider BIA and at Regional reference sites (Australian White Ibis only). Rare in winter, mainly recorded in summer. Also represented in Basic and Targeted fauna survey.
Phalacrocoracidae	Great Cormorant, Little Black Cormorant, Little Pied Cormorant, Pied Cormorant	Abundance: 18 No. records: 14 Species richness: 4	Records throughout the WFA, from cleared areas and MJP woodland habitats. Also recorded from Regional reference sites. Little Pied Cormorant and Pied Cormorant commonly recorded. Predominantly recorded as singletons and largely restricted to spring and summer months. Also represented in Basic and Targeted fauna survey.

5.1.3 Flight heights and movements

Table 5-5 summarises flight height and movement recorded in this survey and Phoenix (2025a) for all species where flight data was recorded, including the Regional reference sites (see full dataset in Appendix 6). Figure 5-6 presents the same data with respect to the direction of observed flights. Further information with respect to conservation significant species and other species of potential concern is provided below (section 5.1.4.2).

The data in Table 5-5 shows that far fewer birds were recorded within the RSA range (25.3%) than below (74.7%) or above (0.01%). In total 71.7% of birds were stationary below the minimum RSA height. The number of records (n = 71) and abundance of 'moving' birds (4.3%) in Table 5-5 indicates that relatively few, larger flocks were observed making distinct movements within the RSA.

Table 5-5 Summary of bird height records in relation to RSA height categories for all point-count sites

Bird movement	RSA Location	Height cat.	No. of species	No. consig. species	Abund.	No. of records	Relat. abund.	Pct. rcords
Moving	Below	0-24	35	2	448	136	2.9%	5.0%
	Within	25-50	18	2	365	59	2.4%	2.2%
		51-75	5	0	123	10	0.8%	0.4%
		76-150	1	0	180	2	1.2%	0.1%
		151-250	0	0	0	0	0.0%	0.0%
	RSA	>250	0	0	0	0	0.0%	0.0%
Sub-total			**40**	**3**	**1,116**	**207**	**7.2%**	**7.6%**
Stationary	Below	0-25	91	11	11,706	2,227	75.8%	82.0%
	Within	26-50	43	5	1,757	205	11.4%	7.5%
		51-75	14	1	172	26	1.1%	1.0%
		76-150	13	0	650	41	4.2%	1.5%
		151-250	0	0	0	0	0.0%	0.0%
	RSA	>250	3	0	36	10	0.2%	0.4%
Sub-total			**120**	**5**	**14,321**	**2,509**	**92.8%**	**92.4%**
Grand total – within RSA			**52**	**8**	**3,911**	**414**	**25.3%**	**15.2%**
Grand total – outside RSA			**91**	**11**	**11,526**	**2,302**	**74.7%**	**84.8%**
Grant total			**100**	**12**	**15,437**	**2,716**	**100.0%**	**100.0%**

The following conservation significant species were recorded within the RSA (25–250 m) in the WFA:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (VU)
- Baudin's Cockatoo (*Zanda baudinii*) (EN)
- Carnaby's Cockatoo (*Zanda latirostris*) (EN)
- Peregrine Falcon (*Falco peregrinus*) (OS)
- Osprey (*Pandion haliaetus*) (Mig.).

The following conservation significant species were recorded within the RSA (25–250 m) at the Regional reference sites:

- Sharp-tailed Sandpiper (*Calidris acuminata*) (VU/Mig.)

- Sanderling (*Calidris alba*) (Mig.)
- Red-necked Stint (*Calidris ruficollis*) (Mig.)
- Caspian Tern (*Hydroprogne caspia*) (Mig.)
- Bar-tailed Godwit (*Limosa lapponica*) (Mig.)
- Fairy Tern (*Sternula nereis nereis*) (VU)
- Greater Crested Tern (*Thalasseus bergii*) (Mig.).

Figure 5-6 shows the direction of bird movements across the landscape, using abundance and number of records. The majority of distinct movements were toward the west (38.9%). This was closely followed by birds moving north, from the south (44.4%). However, a fair proportion were also moving in the opposite direction, south to north, and less so west to east. When movements are considered in either direction (east/west or north/south) the data is well balanced (abundance = 434 vs 496, respectively). Overall, the data therefore does not suggest any strong movement direction trends.

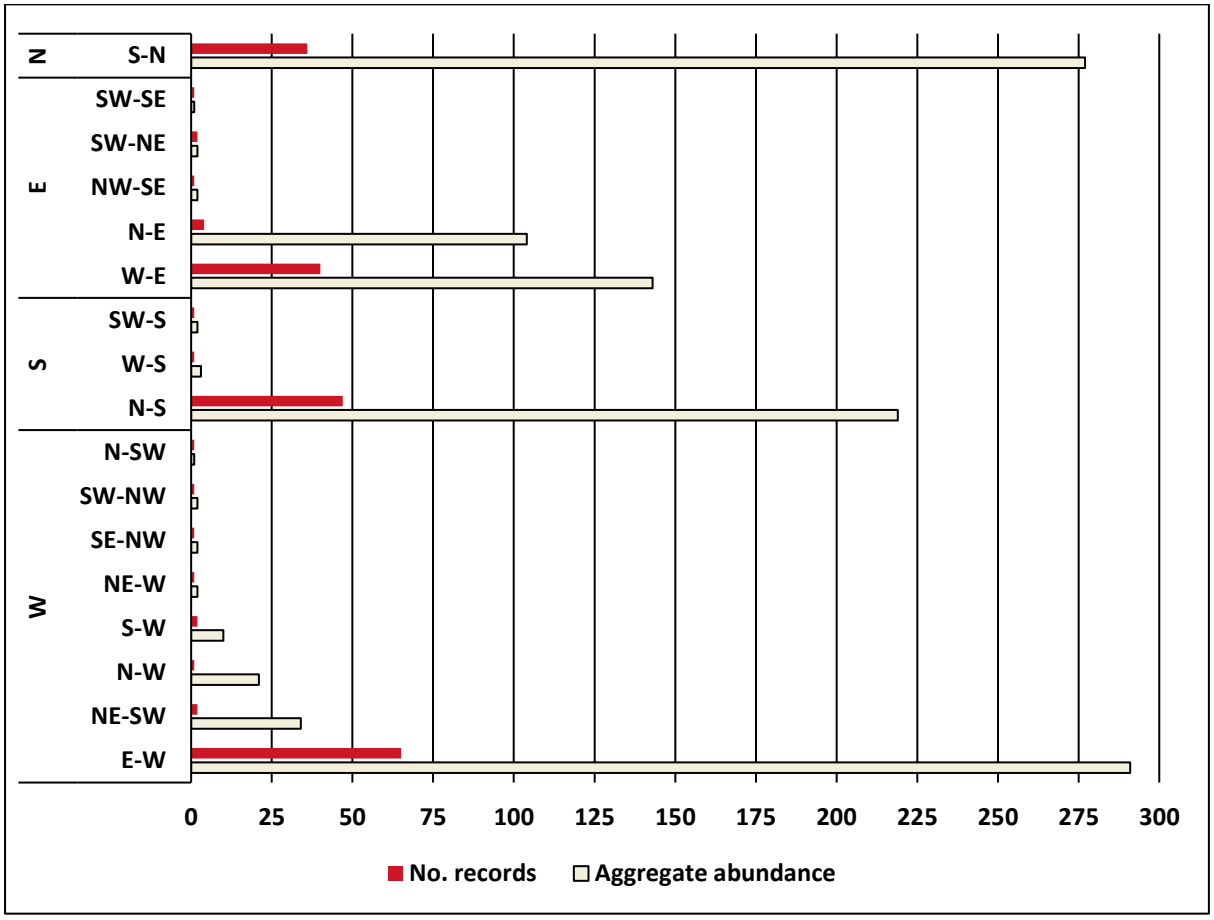


Figure 5-6 **Summary of flight direction: abundance and number of records for all point-count sites**

5.1.4 Conservation significant birds and other birds potentially of concern recorded

5.1.4.1 Species records

Fourteen bird species of conservation significance were recorded across the BBRAS survey and the Basic and Targeted fauna survey, one of which was only recorded from the latter (Wood sandpiper; Table 5-6; Figure 5-7). Seven of these species were recorded in the WFA and/or wider BIA:

- Baudin's Cockatoo (*Zanda baudinii*; EN) – recorded during both surveys, in the WFA and wider BIA
- Carnaby's Cockatoo (*Zanda latirostris*; EN) – recorded during both surveys, in the WFA and wider BIA
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; VU) – recorded during both surveys, in the WFA and wider BIA
- Wood Sandpiper (*Tringa glareola*; Mig.) – recorded during the Basic and Targeted survey, in the WFA only
- Osprey (*Pandion haliaetus*; Mig.) – recorded during both surveys, in the WFA and at Regional reference sites
- Peregrine Falcon (*Falco peregrinus*; OS) – recorded during the BBRAS, in the WFA only
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*; P3) – recorded during the BBRAS, outside the WFA in the wider BIA.

The remaining 7 conservation significant species, all Migratory shorebirds, were recorded only at Regional reference sites, during Year 2 of the BBRAS:

- Caspian Tern (*Hydroprogne caspia*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Fairy Tern (*Sternula nereis nereis*) – recorded at Hardy Inlet, unlikely to occur in WFA
- Greater Crested Tern (*Thalasseus bergii*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Sharp-tailed Sandpiper (*Calidris acuminata*; VU; Mig.) – recorded at Hardy Inlet, may possibly occur in WFA on occasion
- Sanderling (*Calidris alba*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA
- Red-necked Stint (*Calidris ruficollis*; Mig.) – recorded at Hardy Inlet, may possibly occur in WFA on occasion
- Bar-tailed Godwit (*Limosa lapponica*; Mig.) – recorded at Hardy Inlet, unlikely to occur in WFA.

All conservation significant species recorded in the WFA or wider BIA are considered potential species of concern to the Project per Brett Lane and Associates (2005) and DCCEEW (2024). Sharp-tailed Sandpiper and Red-necked Stint are also considered potential species of concern as they may possibly occur in the WFA on occasion. Caspian Tern, Greater Crested Tern, Sanderling and Bar-tailed Godwit are not considered of concern as they are unlikely to occur in the WFA as no suitable habitat is present.

In addition to the recorded conservation significant species, non-conservation significant raptors recorded were also identified as potential species of concern as they are particularly vulnerable to collision risk due to their morphology and/or flight behaviour, though susceptibility varies between species. Eleven non-conservation significant raptors were recorded across the BBRAS survey and the Basic and Targeted fauna survey (Table 5-6; Figure 5-7).

Table 5-6 Summary of conservation significant bird records and other recorded birds potentially of concern

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Conservation significant bird species recorded																			
Pandion haliaetus (Osprey)	Mig. (EPBC & BC Acts)	WFA, Reg.	BBRAS sites – BUS030, BUS032, BUS033, BUS034 B/T sites – Osprey	Direct sighting at 'Osprey' site in WFA; opportunistic record during heritage survey, flying over a paddock. All other records from Regional sites at Hardy Inlet. Known to utilise a variety of near-coastal habitats. Study area considered minor/supplemental foraging habitat within the home range of Hardy Inlet individuals. Suitable foraging habitat is abundant outside the WFA. Unlikely to nest within the study area.	None, transitory only	6 (6)	1 (1)	S	S	S			R					0.05%	0-24 m (2) 25-50 m (3) 51-75 m (1)
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS008, BUS013 B/T sites – AQU-01, AQU-02, AQU-03, AQU-25, AQU-40, AQU-55, BC2024_01, BCForaging, BCRoosting05, BCRoosting09, FRTBC-01, FRTBC-02, FRTBC-03, FRTBC-04, FRTBC-05, FRTBC-06, Opp12, Opp13,	Audio recording, direct sighting and foraging evidence in the WFA. Records from the WFA and wider BIA. Most records of individuals and pairs, with only 9 records of >2 birds. The largest flock (53 individuals) recorded 1.5 km west of study area during the BBRAS (site BUS013). It was directly observed foraging at one site (VER-Opp04) while foraging evidence (chewed Marri nuts predominantly) was obtained from 7 sites. 15 audio detections it total, but only once from the BBRAS recorders (open paddocks). The Phase 3 audio recordings identified 12 detections, of which 6 were flyovers and 6 were foraging detections where the birds spent >1 minute at that site presumably foraging, or prospecting. All other records were of the birds moving	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	3 (55)	45 (104)	R, S	R, S	R, S	R, S	S	R		R			0.83%	0-24 m (3) 25-50 m (2) N-S

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
			Opp15, Opp19, SM4-01, SM4-02, SM4-06, SM4-07, VER-22, VER-32, VER-33, VER-40, VER-45, VER-47, VER-Opp04, VER-Opp07, VER-Opp08	through/over this habitat. No breeding or night roosting behaviour was observed. Suitable habitat within and surrounding the WFA.															
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS014, BUS015, BUS019 B/T sites – Opp11, VER-41, VER-42, VER-Opp01	Calls, direct sightings in the WFA. Records from the WFA and wider BIA. Largest flocks – 26, 10, 9 and 8 individuals. Observed foraging just once in the WFA (site VER-Opp01). All other observations were of birds moving through the landscape. No breeding or night roosting behaviour was observed. In addition to the records of Baudin's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections) for a total occupation time of 9.5 hours over ~2 months of recording, with 37 (45%) of these being birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that most of these records were Carnaby's Cockatoo given the much higher detection rate of this species over Baudin's (~4:1) during the surveys. Suitable habitat within and surrounding the WFA.	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	3 (11)	4 (46)	S	S	S	R, S	S	R	S		S		0.30%	0-24 m (3)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	WFA, BIA	BBRAS sites – BUS001, BUS004, BUS005, BUS010, BUS014, BUS016, BUS019, BUS020, BUS026, BUS027 B/T sites – AQU-28, AQU-39, AQU-51, AQU-53, AQU-55, BCRoosting05, BCRoosting09, CarnabysCockies 02, VER-31, VER-33, VER-39, VER-41, VER-42	Calls, direct sightings in the WFA. Records from the WFA and wider BIA. Evidence of occupation via calls and direct sightings at 23 sites (36 total records), with repeated detections at a number of those sites. Predominantly recorded as singles, with only 9 records of more than one individual and flocks >10 birds observed on 3 occasions. Observed foraging in MJP woodland once outside the WFA. Two observations of foraging on the ground in the WFA eating paddock seeds. All other records were of birds moving through the landscape. In addition to the records of Carnaby's, *Zanda* sp. (either Baudin's or Carnaby's) was detected during Phase 3 audio recordings at all sites (92 individual detections) for a total occupation time of 9.5 hours over ~2 months of recording, with 37 (45%) of these being birds flying over the site. *Zanda* sp. was also recorded directly 5 times, twice foraging and 3 times moving through the landscape. It is likely that most of these records were Carnaby's Cockatoo given the much higher detection rate of this species over Baudin's (~4:1) during the surveys. Suitable habitat within and surrounding the WFA.	Roosting, foraging. Study area contains PNTs but none with hollows currently suitable for breeding	22 (95)	14 (55)	R, S	R, S	R, S	R, S					S	S	0.79%	0-24 m (20) 25-50 m (4)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	WFA	BBRAS sites – BUS011 B/T sites – none	Direct sighting of one individual observed hunting near Governor Broome Rd in the southern part of the WFA. Much of the WFA is suitable hunting habitat. May be a resident close to the WFA, using the available habitats for hunting. Unlikely to nest in WFA.	Foraging	1 (1)	0 (0)	S	S	S	S	S	R, S	S	S	S	S	0.01%	25-50 m (1) N-S
Hydroprogne caspia (Caspian Tern)	Mig. (EPBC & BC Acts)	Reg.	BUS031, BUS032, BUS033, BUS034	Recorded at Hardy Inlet only, in flocks.	None	6 (62)	0 (0)											0.33%	0-24 m (2) 25-50 m (2)
Sternula nereis nereis (Fairy Tern)	VU (EPBC & BC Acts)	Reg.	BUS031, BUS033, BUS034	Recorded at Hardy Inlet only, as singles.	None	1 (3)	0 (0)											0.35%	0-24 m (2) 25-50 m (1)
Thalasseus bergii (Greater Crested Tern)	Mig. (EPBC & BC Acts)	Reg.	BUS030, BUS031, BUS032, BUS033, BUS034	Recorded at Hardy Inlet only, in flocks.	None	10 (46)	0 (0)											0.24%	0-24 m (4) 25-50 m (2)
Calidris acuminata (Sharp-tailed Sandpiper)	VU/ Mig. (EPBC Act); Mig. (BC Act)	Reg.	BUS031	Single record of flock of 40 from Hardy Inlet only.	Foraging	1 (40)	0 (0)	S	S	S			S					0.21%	0-24 m (1)
Calidris alba (Sanderling)	Mig. (EPBC & BC Acts)	Reg.	BUS031	Single record of 4 from Hardy Inlet only.	None	1 (4)	0 (0)											0.02%	0-24 m (1)
Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	Reg.	BUS031, BUS034	Recorded at Hardy Inlet only, in flocks.	Foraging	2 (72)	0 (0)	S	S	S			S					0.38%	0-24 m (1)

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	Reg.	BUS031	Single individual recorded at Hardy Inlet.	None	1 (1)												0.01%	0-24 m (1)
Tringa glareola (Wood Sandpiper)	Mig. (EPBC & BC Acts)	WFA	BBRAS sites – none B/T sites – VER-36	Direct sighting of 3 individuals in a SIPW wetland in the WFA. No records during BBRAS. Likely to utilise wetland habitats in WFA. Suitable habitat within and outside WFA.	Foraging	0 (0)	1 (3)	R, S	S	S								0.02%	0-24 m (1)
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	BIA	BBRAS sites – BUS014 B/T sites – Mowl01	Two audio recordings located ~2.5 km north of the WFA and ~1 km south of the WFA along the Scott River. No records in the WFA. Recorded in May and November 2023 in the BBRAS. May be resident within woodland habitats generally of the WFA, but more likely to roost and nest in such habitat along the Scott River and in nature reserve to the north where habitat is extensive.	Roosting, foraging, breeding	1 (1)	1 (1)				R, S	S	R			S		0.01%	NR, detected via audio recording only
Other potential bird species of concern recorded																			
Aquila audax (Wedge-tailed Eagle)	Not listed	WFA, BIA	BBRAS sites – BUS001, BUS004, BUS005, BUS006, BUS008, BUS009, BUS010, BUS011, BUS015, BUS016, BUS018, BUS019, BUS025 B/T sites – AQU-25, VER-21, WedgeyOpp	Regular direct sightings in WFA. Also recorded in wider BIA. Mostly singles, 3 records of a pair. All records were of birds in flight. Observed soaring and likely foraging in WFA, as well as flying over.	Foraging, roosting, breeding	34 (46)	3 (4)	S	S	R, S	R, S	S	R, S	S				0.26%	0-24 m (2) 25-50 m (12) 51-75 m (3) 76-150 m (11) 151-200 m (5) >200 m(2) E-W

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Circus approximans (Swamp Harrier)	Not listed	WFA, BIA	BBRAS sites – BUS001, BUS002, BUS003, BUS004, BUS006, BUS008, BUS010, BUS011, BUS015, BUS016, BUS018, BUS019, BUS020, BUS025, BUS026, BUS027 B/T sites – AQU-01, AQU-15, AQU-18, AQU-25, AQU-30, AQU-45, AQU-51, AQU-57, Opp07, Opp20, VER-33, VER-38	Regular direct sightings in WFA. Also recorded in wider BIA. Mostly singles, 4 records of a pair. All records were of birds in flight. Observed soaring and likely foraging in WFA, as well as flying over.	Foraging, roosting, breeding	46 (52)	11 (14)	S	S	S			S	S	S			0.35%	0-24 m (33) 25-50 m (12) 51-75 m (3) 76-150 m (3) N-S, S-N, E-W, SW-NE, W-E
Elanus axillaris (Black-shouldered Kite)	Not listed	WFA	BBRAS sites – BUS001, BUS016 B/T sites – AQU-Opp04, Opp17	Direct sightings in the WFA. All singles. All records were of birds in flight. Observed soaring in WFA.	Foraging, roosting, breeding	2 (2)	2 (2)	S	S	S	S	S	S	S	S			0.02%	0-24 m (1) 25-50 m (1)
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Not listed	WFA, Reg.	BBRAS sites – BUS018, BUS032 B/T sites – none	One direct sighting in the WFA and one at a Regional site at the Hardy Inlet. Both singles. WFA record was of the bird flying over the site. Soaring at Regional site.	Foraging	2 (2)	0 (0)	S	S	S								0.01%	76-150 m (2)
Haliastur sphenurus (Whistling Kite)	Not listed	WFA, Reg.	BBRAS sites – BUS001, BUS002, BUS016, BUS020, BUS030 B/T sites – Opp06, Opp07	Direct sightings in the WFA and at a Regional site at the Hardy Inlet. All singles except one pair. All records were of birds in flight.	Foraging, roosting, breeding	6 (6)	2 (3)	S	S	S	S	S	S	S	S			0.05%	25-50 m (3) 51-75 m (1) 76-150 m (2) W-E

Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Hieraaetus morphnoides (Little Eagle)	Not listed	WFA, BIA, Reg.	BBRAS sites – BUS005, BUS030 B/T sites – VER-30	Direct sighting in the WFA, wider BIA and at a Regional site at the Hardy Inlet. All singles. All records were of birds in flight. Observed soaring in WFA.	Foraging, roosting, breeding	2 (2)	1 (1)	S	S	S	S	S	S	S	S			0.02%	76-150 m (2)
Tachyspiza cirrocephala (Collared Sparrowhawk)	Not listed	WFA	BBRAS sites – BUS005, BUS011, BUS020 B/T sites – none	Direct sightings in the WFA. All singles. All records were of birds in flight. Observed soaring in the WFA and flying over.	Foraging, roosting, breeding	4 (4)	0 (0)	S	S	S	S	S	S	S	S			0.03%	0-24 m (2) 25-50 m (1) 76-150 m (1) W-E
Tachyspiza fasciata (Brown Goshawk)	Not listed	WFA	BBRAS sites – BUS001, BUS005 B/T sites – AQU-25, VER-Opp02, VER-Opp03	Direct sightings in the WFA. Singles, one pair. All records were of birds in flight.	Foraging, roosting, breeding	3 (4)	3 (3)	S	S	S	S	S	S	S	S			0.04%	0-24 m (1) 51-75 m (1) 76-150 m (2) E-W
Falco berigora (Brown Falcon)	Not listed	WFA, BIA	BBRAS sites – BUS002, BUS003, BUS008, BUS011, BUS018, BUS025 B/T sites – Bfalcon, VER-09, VER-40	Direct sightings in the WFA and BIA. Mostly singles. All records were of birds in flight. Observed soaring in the WFA and flying over.	Foraging, roosting, breeding	14 (17)	3 (4)	S	S	S	S	S	S	S	S			0.11%	0-24 m (8) 25-50 m (4) 51-75 m (1) 76-150 m (3) W-E, E-W

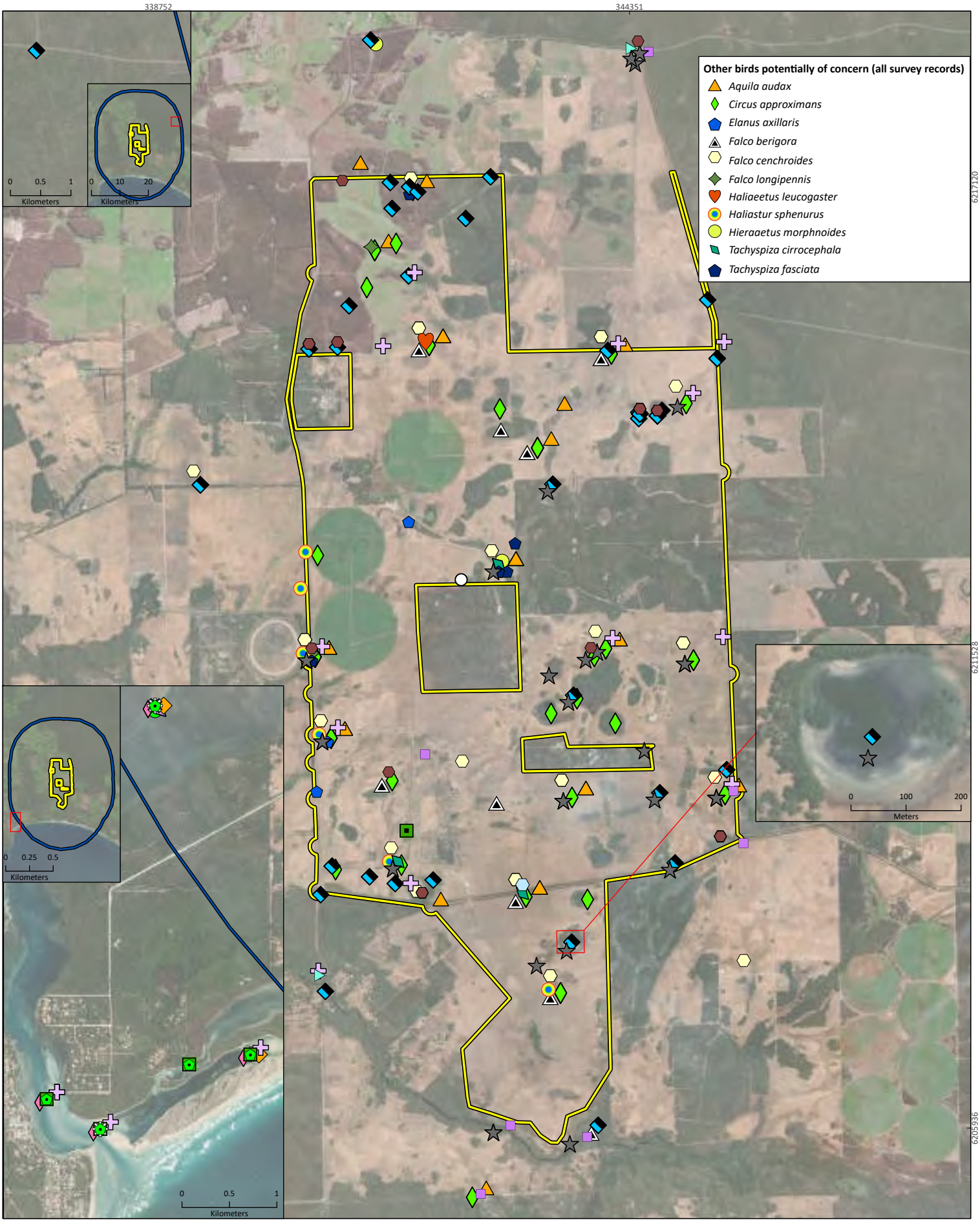
Species	Cons. status	Rec. area[1]	Sites[2]	Evidence	Pot. use WFA	No. rec (ab.)		Habitats[3,4]										Rel. ab.	Rec. flight height cat. (# records), Flight direction/s
						BBRAS sites	B/T sites[2]	SIPW	SISE	SISH	MJP	OWP	Cleared	Clrd – DS	Dam	Bluegum	Pine		
Falco cenchroides (Australian Kestrel)	Not listed	WFA, BIA, Reg.	BBRAS sites – BUS001, BUS002, BUS004, BUS005, BUS007, BUS008, BUS010, BUS011, BUS012, BUS013, BUS016, BUS018, BUS019, BUS020, BUS026, BUS027, BUS030, BUS034 B/T sites – VER-21, VER-45	Direct sightings in the WFA, BIA and Regional reference sites. Singles, pairs. All records were of birds in flight. Observed soaring and foraging in the WFA and flying over.	Foraging, roosting, breeding	45 (56)	2 (2)	S	S	S	S	S	S	S	S			0.30%	0-24 m (34) 25-50 m (8) 76-150 m (3) S-N
Falco longipennis (Australian Hobby)	Not listed	WFA	BBRAS sites – BUS001, BUS006 B/T sites – none	Direct sightings in the WFA. Singles, one pair. All records were of birds in flight.	Foraging, roosting, breeding	3 (4)	0 (0)	S	S	S	S	S	S	S	S			0.02%	0-24 m (2) 51-75 m (1) N-S

1 – BIA in this column refers to the BIA extent that is outside the WFA. Reg. = Regional sites.

2 – B/T sites = Basic and Targeted fauna survey sites.

3 – SIPW – seasonally inundated paperbark woodland (wetland); SISE – seasonally inundated sedgeland (wetland); SISH – seasonally inundated shrubland; MJP – Marri-Jarrah-Peppermint woodland; OWP – Open woodland of Peppermint trees (degraded); Clrd DS – Cleared–degraded sumpland; Bluegum – Bluegum plantation; Pine – Pine plantation.

4 – 'R' = Recorded from habitat. 'S' = Suitable habitat for species.



Western Australia

PERTH

SynergyRED
Scott River Wind Fam

Project No	1585
Date	19/06/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:58,100 (at A4) GDA 1994 MGA Zone 50

Study area
Bird/Bat Investigation Area

Significant birds (all survey records)

- *Calidris acuminata*,VU/ Mig. (EPBC Act); Mig. (BC Act)
- *Calidris alba*,Mig. (EPBC & BC Acts)
- *Calidris ruficollis*,Mig. (EPBC & BC Acts)
- *Calyptorhynchus banksii naso*,VU (EPBC & BC Acts)
- *Calyptorhynchus/Zanda* sp.,EN-VU (EPBC & BC Acts)
- *Falco peregrinus*,OS (BC Act)
- *Hydroprogne caspia*,Mig. (EPBC & BC Acts)
- *Limosa lapponica*,Mig. (EPBC & BC Acts)
- *Pandion haliaetus*,Mig. (EPBC & BC Acts)
- *Sternula nereis nereis*,VU (EPBC & BC Acts)
- *Thalasseus bergii*,Mig. (EPBC & BC Acts)
- *Tringa glareola*,Mig. (EPBC & BC Acts)
- *Tyto novaehollandiae novaehollandiae*,P3 (DBCA list)
- *Zanda baudinii*,EN (EPBC & BC Acts)
- *Zanda latirostris*,EN (EPBC & BC Acts)
- *Zanda* sp.,EN (EPBC & BC Acts)

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Figure 5-7

Recorded conservation significant birds and other birds potentially of concern

PHOENIX ENVIRONMENTAL SCIENCES

5.1.4.2 Flight heights and movements

The flight data presented below (Table 5-7) includes records from the current survey and the Basic and Targeted fauna survey (Phoenix 2025a). Not all records for conservation significant species included flight details due to the sample method (e.g. audio recordings), or other factors, and therefore the numbers below do not necessarily match those presented in Table 5-6 above.

Seven conservation significant species were recorded flying at heights within the RSA (Table 5-7), although most records were of birds flying below the RSA (i.e., 0-24m):

- Caspian Tern (0-50 m) – Regional reference sites only
- Fairy Tern (0-50 m) – Regional reference sites only
- Greater Crested Tern (25-50 m) – Regional reference sites only
- Osprey (0-75 m) – Regional reference sites, plus recorded in the WFA but no height recorded
- Peregrine Falcon (25-50 m) – WFA
- Forest Red-tailed Black Cockatoo (0-50 m) – WFA and BIA
- Carnaby's Cockatoo (0-50 m) – WFA and BIA.

Flight direction for most observations was determined to be 'stationary', as the birds were either hovering or showing no distinct direction of movement. However, where they were recorded as moving in a distinct direction they were typically moving N-S/S-N and there is no difference in movement between conservation significant species and the broader assemblage, as presented in section 5.1.3 (Figure 5-6; Table 5-5).

Wood Sandpiper and Peregrine Falcon were recorded from only a single observation each, therefore no substantive comments can be made concerning observed behaviour, site utilisation etc for these species. Masked Owl was only recorded indirectly via nocturnal audio recording therefore no flight heights were recorded.

Table 5-7 Flight directions per record for conservation significant birds (grey rows denote RSA heights)

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
Charadriiformes						
Laridae	*Hydroprogne caspia* (Caspian Tern)	Mig. (EPBC & BC Acts)	BUS031	27	0-24	Stat.
			BUS031	22	0-24	Stat.
			BUS032	1	25-50	Stat.
			BUS032	2	25-50	Stat.
			BUS033	9	0-24	Stat.
			BUS034	1	0-24	Stat.
	Sternula nereis nereis (Fairy Tern)	VU (EPBC & BC Acts)	BUS031	40	0-24	Stat.
			BUS033	4	0-24	Stat.
			BUS034	4	25-50	Stat.
	Thalasseus bergii (Greater Crested Tern)	Mig. (EPBC & BC Acts)	BUS030	1	0-24	Stat.
			BUS031	9	0-24	Stat.
			BUS032	1	0-24	Stat.
			BUS032	6	25-50	Stat.
			BUS032	6	0-24	Stat.
			BUS032	1	25-50	Stat.

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
			BUS033	20	0-24	Stat.
			BUS034	1	0-24	Stat.
			BUS034	1	0-24	Stat.
Scolopacidae	*Calidris acuminata* (Sharp-tailed Sandpiper)	VU/Mig./Mig. (EPBC Act; BC Act)	BUS031	40	0-24	Stat.
	Calidris alba (Sanderling)	Mig. (EPBC & BC Acts)	BUS031	4	0-24	Stat.
	Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	BUS031	12	0-24	Stat.
			BUS034	60	0-24	Stat.
	Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	BUS031	1	0-24	Stat.
Falconiformes						
Accipitridae	*Pandion haliaetus* (Osprey)	Mig. (EPBC & BC Acts)	BUS030	1	0-24	Stat.
			BUS030	1	25-50	Stat.
			BUS032	4	25-50	Stat.
			BUS033	1	51-75	Stat.
			BUS033	1	25-50	Stat.
			BUS034	1	0-24	Stat.
Falconidae	*Falco peregrinus* (Peregrine Falcon)	OS (BC Act)	BUS011	1	25-50	N-S
Psittaciformes						
Cacatuidae	*Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo/Karrak)	VU (EPBC & BC Acts)	AQU-01	10	25-50	N-S
			BCForaging	1	0-24	Stat.
			BCRoosting09	2	0-24	Stat.
			BUS013	1	25-50	N-S
			BUS013	53	0-24	S-N
	Calyptorhynchus/ Zanda sp. (black cockatoo species)	EN-VU (EPBC & BC Acts)	BCRoosting01	4	0-24	Stat.
			BCRoosting06	2	0-24	Stat.
			BCRoosting16	6	0-24	Stat.
			BUS001	1	25-50	Stat.
			BUS004	38	0-24	Stat.
			BUS008	6	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS019	6	0-24	Stat.
			BUS026	10	0-24	Stat.
			BUS032	4	25-50	Stat.
			BUS032	2	25-50	Stat.
			BUS032	2	0-24	Stat.
			BUS033	7	0-24	Stat.
			BUS034	4	0-24	Stat.
			BUS014	8	0-24	NE-SW

Family (Order)	Species	Conservation status	Site	# indiv.	Height range	Flight direction
	Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	BUS015	1	0-24	N-SW
			BUS019	2	0-24	Stat.
	Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	BCRoosting05	2	25-50	Stat.
			BCRoosting09	2	0-24	Stat.
			BUS001	3	0-24	Stat.
			BUS001	1	25-50	Stat.
			BUS004	2	0-24	Stat.
			BUS005	1	25-50	Stat.
			BUS010	6	0-24	Stat.
			BUS010	4	0-24	Stat.
			BUS014	5	0-24	Stat.
			BUS016	20	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS016	2	0-24	Stat.
			BUS016	4	0-24	Stat.
			BUS019	12	0-24	Stat.
			BUS019	6	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS019	9	0-24	Stat.
			BUS019	2	0-24	Stat.
			BUS020	2	0-24	Stat.
			BUS020	2	25-50	Stat.
			BUS026	2	0-24	Stat.
			BUS027	1	0-24	Stat.
			BUS027	6	0-24	Stat.
			BUS027	1	0-24	Stat.
	Zanda sp. (white-tailed black cockatoo species)	EN (EPBC & BC Acts)	BUS001	3	0-24	E-W
			BUS003	26	0-24	SW-X?

5.2 BATS

5.2.1 General summary

A summary of the data for the 16 sites where ultrasonic recorders were deployed in Year 1 is presented in Table 5-8. The site level data presents a compelling and consistent theme of relatively high bat diversity, but generally low levels of activity, across the WFA. A total of 55 samples were recorded over 71 nights and bats were detected in 43 of those nights, which means over 20% of samples detected no bats at all. Further, 50% of sites (8 of 16) detected no bats at least once. Those samples where no bats were detected occurred in all seasons (seasonal trends are presented in more detail below).

Where bats were detected, all metrics presented in Table 5-8 demonstrate low bat activity, with a few exceptions. For example, a total of 1,233 detections were found from an approximate 852 hours of recording, meaning bats were detected at a rate of 1.5 per hour, or one detection every 40 minutes, on average across the Impact and Reference sites. Similarly for the number of calls, a total of 9,803 were obtained (from 852 hours of recording), resulting in just 11.5 calls per hour on average being recorded. Further, the average number of calls per detection was just 5.5 overall, with 11 sites (69% of sites) recording an average number of calls per detection of <5. These results suggest either very low numbers of individuals typically are being detected when bats are present, and/or bats are not actively hunting in the cleared areas at or near ground-level but are instead passing through on their way to more productive remnant patches; It is considered likely a combination of both scenarios.

The highest activity levels were at sites BUS002 and BUS013 (25.7 and 15.6 average number of calls per detection respectively; Table 5-8). These sites were located on a roadside remnant in the BIA west of the WFA and in a cleared area in the southern half of the WFA, respectively. Sites BUS001, BUS014 and BUS035 also recorded relatively high activity levels, based on average number of calls per detection (6–8). BUS012 was the least active site which although only sampled once before access to this area was removed, recorded a single species, from a single detection and call.

While the number of calls detected vary considerably between sites and species (Table 5-11), a rather homogenous bat assemblage was recorded for the most part across the WFA and immediate surrounds. For example, Impact sites recorded 7 species and Reference sites 8 species; both Impact and Reference sites recorded 2 families. The mean total number of calls per site was 476 at Impact sites and 632.2 at Reference sites, whereas the average number of calls per detection was 4.1 at Impact sites, 8.9 at Reference sites and 8.0 overall, suggesting almost 50% lower activity at Impact sites and low activity generally in both.

Table 5-8 Sites summary for bats

Location	Site	No. samples	No. nights	Approx. hrs recording	No. samples bats detected	Species richness	Families	Total no. of calls	No. of detects	Mean. no. of calls per detect.	No detects / hr	No. calls / hr
Impact	BUS004	3	3	36	2	7	2	111	37	3.0	1.0	3.1
	BUS006	4	8	96	3	6	2	841	197	4.3	2.1	8.8
Sub-total		**7**	**11**	**132**	**5**	**7**	**2**	**952**	**234**	**4.1**	**1.5**	**5.9**
Ref.	BUS001	4	6	72	4	7	2	1,008	131	7.7	1.8	14.0
	BUS002	4	6	72	4	6	2	1,981	77	25.7	1.1	27.5
	BUS003	4	4	48	1	2	1	6	5	1.2	0.1	0.1
	BUS005	3	3	36	3	6	2	100	40	2.5	1.1	2.8
	BUS007	4	4	48	3	3	2	22	13	1.7	0.3	0.5
	BUS008	4	4	48	3	6	2	116	63	1.8	1.3	2.4
	BUS009	3	3	36	3	6	2	48	29	1.7	0.8	1.3
	BUS010	4	4	48	1	4	2	17	13	1.3	0.3	0.4
	BUS011	4	6	72	3	6	2	135	55	2.5	0.8	1.9
	BUS012	1	1	12	1	1	1	1	1	1.0	0.1	0.1
	BUS013	4	6	72	4	7	2	2,952	189	15.6	2.6	41.0
	BUS014	4	6	72	4	8	2	1,887	236	8.0	3.3	26.2
	BUS015	4	6	72	3	8	2	410	119	3.4	1.7	5.7
	BUS035	1	1	12	1	6	2	168	28	6.0	2.3	14.0
Sub-total		**48**	**60**	**720**	**38**	**8**	**2**	**8,851**	**999**	**5.7**	**1.3**	**9.8**
Total abund.		**55**	**71**	**852**	**43**	**8**	**2**	**9,803**	**1,233**	**8.0**	**1.4**	**11.5**

When the bat data is considered spatially, a clear picture emerges, that is that bat activity at sites outside the WFA or at its borders (i.e. in proximity to native vegetation) is much higher than in the central areas (Figure 5-8). The data therefore suggests that while there may be as many species being detected over time inside the WFA, the bat activity at those sites, located in the cleared landscape of the WFA is much lower than at sites outside the WFA. Indeed, the number of calls and detections are so low at many sites (68.75% of them), the data suggests that the individuals detected were moving through the area only, and not actively foraging, which is important when considering risk to bats in general and to individual species.

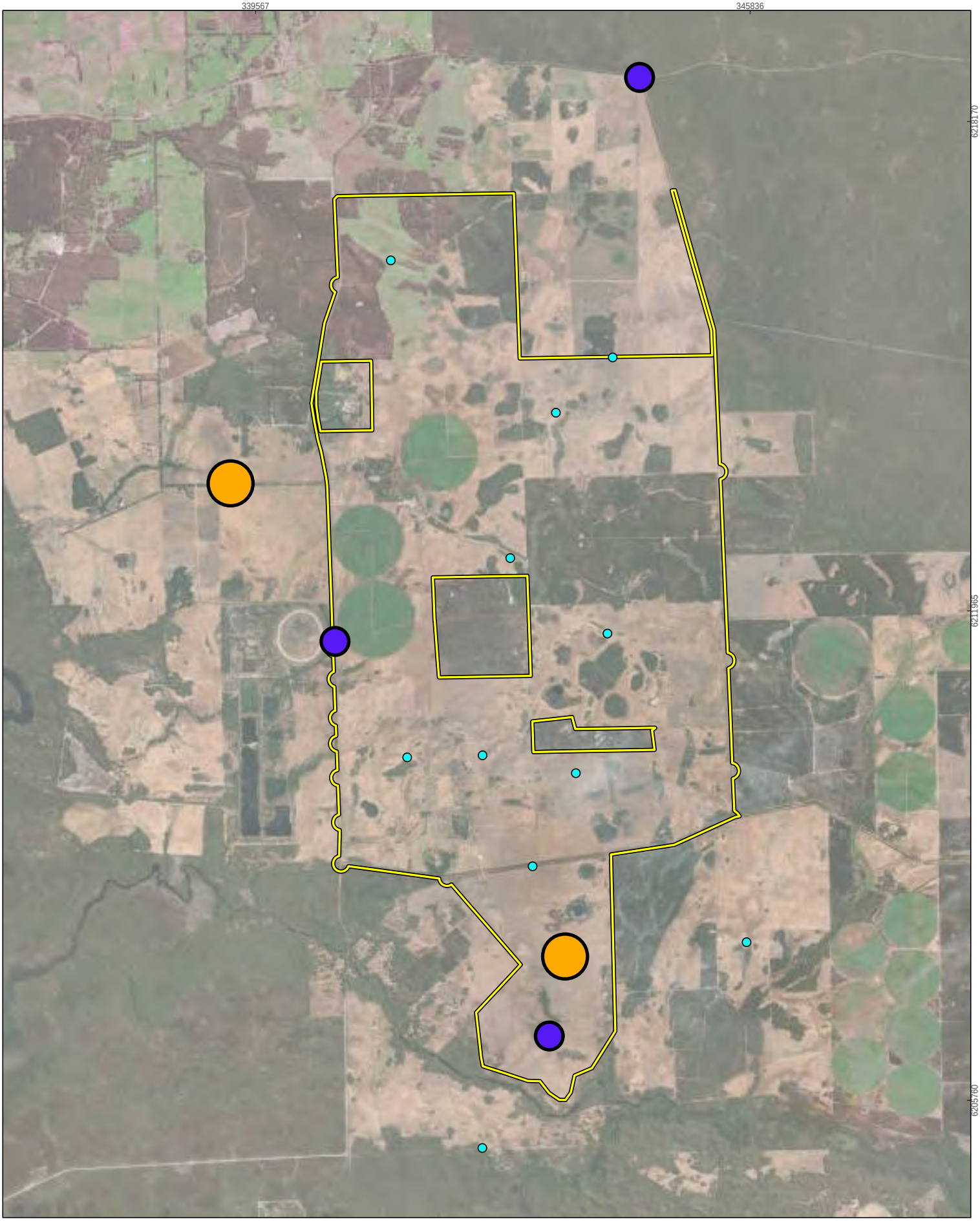
The bat data is summarised with respect to season in Table 5-9 and shown visually in Figure 5-9. While species richness stayed relatively constant over the 4 seasons (6-8 species), bat detection changed markedly, peaking in summer (634), then declining through the rest of the year, so that summer detections were 4 times that of winter (155), 3 times that of autumn (201) and over twice that of spring (283).

The 2 species not detected in winter were *Falsistrellus mackenziei* (Western False Pipistrelle; P4) and *Nyctophilus holtorum* (Holt's Long-eared Bat). While no data is available concerning the hibernation or torpor of *F. mackenziei* and *N. holtorum* specifically, seasonal fluctuation in species diversity and detection is well documented for bats in temperate climates. Bats may be homeothermic like other mammals but their high energy requirements and large surface area to volume ratio mean they expend a lot of energy and get cold easily, hence many undertake a form of hibernation or torpor each winter, and/or will dramatically reduce their activity in response to daily temperature variations. For example, Chocolate Wattled Bat is typically one of the last species to emerge from winter hibernation (Churchill 2008).

Other members of the family Vespertilionidae (such as *F. mackenziei*) as well as *Nyctophilus* species such as, *N. gouldi* and *N. geoffroyi* are also known to go into extended periods of torpor of up to 15 days (Genoud & Christe 2011; Turbill & Geiser 2008). Therefore, the declines in activity per the number detections are a response to seasonal conditions and not due to migration out of the study area to warmer climes.

Table 5-9 Summary of bat data per season

Season	No. of samples	Species richness	Family richness	No. of detections	No. of calls	Mean detections
Autumn	12	8	2	201	2,733	13.6
Winter	8	6	2	115	1,041	9.1
Spring	13	7	2	283	1,181	4.2
Summer	11	8	2	634	4,848	7.6
Total	**44**	**8**	**2**	**1,233**	**9,803**	**8.0**



Western Australia

PERTH

SynergyRED
Scott River Wind Farm

Project No	1585
Date	12/08/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:61,965 (at A4) GDA 1994 MGA Zone 50

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Study area

Mean. no. of calls per detection

- 1 - 4.3
- 4.31 - 8
- 8.01 - 25.7

Figure 5-8

Mean number of calls per detection at each BBRAS site

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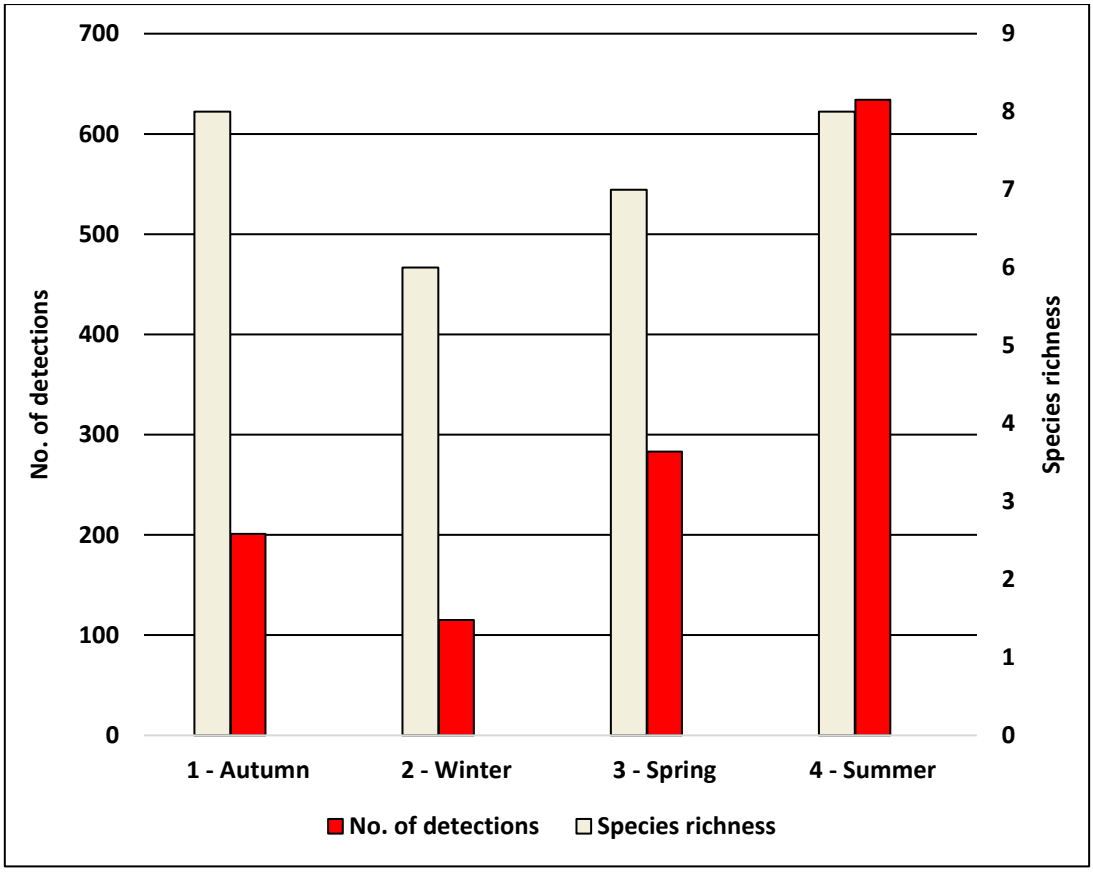


Figure 5-9 Number of bat species and detections per season at BBRAS sites

5.2.2 Assemblage summary

All bats herein are treated as species of concern. A total of 8 bat species were recorded in the current BBRAS survey and 7 in the Basic and Targeted survey (Table 5-10; Appendix 3; Appendix 5). The data presented here relates only to the current survey, unless otherwise stated. *Nyctophilus major* was not recorded by Phoenix (2025a).

Three of the recorded bat species were not identified in the desktop assessment for the species characterisation (Section 4.2), which reflects changes in Chiropteran taxonomy rather than historic or current survey efforts. The assemblage represented 2 families, Vespertilionidae (7 species) and Molossidae (one species; Table 5-10).

Table 5-10 Recorded bat assemblage, by family

Family	Species recorded	Summary of records
Molossidae	White-striped Free-tailed Bat *Austronomus australis*	Recorded at 15 of the 16 sites, mainly in cleared areas between remnants but also 2 Marri Jarrah Peppermint woodland BBRAS sites. However, the species is believed to generally be strongly tied to dense, often old-growth, forest (Churchill 2008). Second most detected species (2,939). Far more active in summer, almost absent in winter.
Vespertilionidae	Gould's Wattled Bat *Chalinolobus gouldii* Chocolate Wattled Bat *Chalinolobus morio* Western False Pipistrelle *Falsistrellus mackenziei* Lesser Long-eared Bat *Nyctophilus geoffroyi* Holt's Long-eared Bat *Nyctophilus holtorum* Greater Long-eared Bat *Nyctophilus major* Southern Forest Bat *Vespadelus regulus*	Activity of the members of this family varied greatly across 15 of the 16 sites (this family was not detected at BUS012). For example, *Falsistrellus mackenziei* (P4) was detected rarely (9 detections from 1 impact site and 5 reference sites), whereas *Vespadelus regulus* was the most detected species (5,478 detections from 14 sites). All species were recorded from both cleared and Marri Jarrah Peppermint woodland[1] BBRAS sites. Representatives were also recorded from Seasonally inundated sedgeland (wetland), Seasonally inundated shrubland (wetland), Open woodland of Peppermint trees (degraded) habitats in the Basic and Targeted fauna survey. As above, members of this family were most active in summer and least active in winter.

The aggregated bat data per species is presented as a species-site matrix in Table 5-11. Bats were recorded at all 16 sites, with just one species detected at site BUS012 (White-striped Free-tailed Bat) and all 8 species detected at sites BUS014 and BUS015, both located outside the study area. The species richness of Impact and Reference sites was similar, with only *Nyctophilus major* being absent from Impact sites.

The activity levels were high for White-striped Free-tailed Bat (overall mean = 12.9) and Southern Forest Bat (overall mean = 11.4) (Table 5-11; Figure 5-10) despite being absent from one and 2 sites, respectively. Activity levels of Southern Forest Bat were however moderate within the WFA but high outside this in the wider BIA.

The activity levels of all other species were low, recording mean call numbers of between 1.0 and 3.5, over all records. Holt's Long-eared Bat and Western False Pipistrelle were the rarest species, being present from 4 and 6 sites and having mean call numbers of 1.1 and 1, respectively. The results suggest that other than for White-striped Free-tailed Bat and Southern Forest Bat, the other 6 species infrequently foraged within the detection circumference of the recorders, and were mostly passing by as either individuals, pairs or small groups.

Table 5-11 Number of bat calls per BBRAS site (C – Calls, D – Detections, M – Mean)

Location	Site	Chocolate Wattled Bat			Gould's Wattled Bat			Greater Long-eared Bat			Holt's Long-eared Bat			Lesser Long-eared Bat			Southern Forest Bat			Western False Pipistrelle			White-striped Free-tailed Bat		
		C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M	C	D	M
Impact	BUS004	3	2	1.5	12	7	1.7	4	3	1.3				2	2	1.0	79	18	4.4	1	1	1.0	10	4	2.5
	BUS006	80	41	2.0	48	30	1.6	15	7	2.1				45	19	2.4	333	75	4.4				320	25	12.8
Sub-total per species		**83**	**43**	**1.9**	**60**	**37**	**1.6**	**19**	**10**	**1.9**	**0**	**0**		**47**	**21**	**2.2**	**412**	**93**	**4.4**	**1**	**1**	**1.0**	**330**	**29**	**11.4**
Impact activity level		**Low**			**Low**			**Low**			**Low**			**Low**			**Moderate**			**Low**			**High**		
Ref.	BUS001	51	26	2.0	5	3	1.7	1	1	1.0				12	9	1.3	828	68	12.2	1	1	1.0	110	23	4.8
	BUS002	1	1	1.0	5	4	1.3	2	2	1.0				9	6	1.5	75	19	3.9				1,889	45	42.0
	BUS003				5	4	1.3										1	1	1.0						
	BUS005	16	10	1.6	2	2	1.0	2	2	1.0				4	3	1.3	67	17	3.9				9	6	1.5
	BUS007	5	4	1.3	9	6	1.5																8	3	2.7
	BUS008	9	8	1.1	24	15	1.6	4	4	1.0				4	4	1.0	44	18	2.4				31	14	2.2
	BUS009	10	7	1.4	16	8	2.0				2	2	1.0	3	1	3.0	9	6	1.5				8	5	1.6
	BUS010	5	3	1.7	8	6	1.3										2	2	1.0				2	2	1.0
	BUS011	2	2	1.0	12	6	2.0							5	3	1.7	81	31	2.6	1	1	1.0	34	12	2.8
	BUS012																						1	1	1.0
	BUS013	283	38	7.4	38	21	1.8				1	1	1.0	186	29	6.4	2,297	72	31.9	1	1	1.0	146	27	5.4
	BUS014	152	29	5.2	134	42	3.2	2	2	1.0	6	5	1.2	44	27	1.6	1,365	97	14.1	3	3	1.0	181	31	5.8
	BUS015	40	18	2.2	12	10	1.2	10	8	1.3	1	1	1.0	14	12	1.2	284	52	5.5	2	2	1.0	47	16	2.9
	BUS035	2	2	1.0	6	4	1.5	2	1	2.0				2	2	1.0	13	6	2.2				143	13	11.0
Sub-total activity		**576**	**148**	**3.9**	**276**	**131**	**2.1**	**23**	**20**	**1.2**	**10**	**9**	**1.1**	**283**	**96**	**2.9**	**5,066**	**389**	**13.0**	**8**	**8**	**1.0**	**2,609**	**198**	**13.2**
Ref. activity level		**Low**			**Low**			**Low**			**`Low**			**Low**			**High**			**Low**			**High**		
Grand total activity		**659**	**191**	**3.5**	**336**	**168**	**2.0**	**42**	**30**	**1.4**	**10**	**9**	**1.1**	**330**	**117**	**2.8**	**5,478**	**482**	**11.4**	**9**	**9**	**1.0**	**2,939**	**227**	**12.9**
No. sites detected		**14**	**14**	**14**	**15**	**15**	**15**	**9**	**9**	**9**	**4**	**4**	**4**	**12**	**12**	**12**	**14**	**14**	**14**	**6**	**6**	**6**	**15**	**15**	**15**
Overall activity level		**Low**			**Low**			**Low**			**Low**			**Low**			**High**			**Low**			**High**		

Bat activity was also analysed by 30-minute intervals to investigate whether there were any periods of particularly high activity as bats typically show strong site fidelity and consistent nightly movement patterns. As can be seen in Figure 5-10 all bats were present throughout the night, although generally less active in the first and last 1–2 hours each night. And, with the exceptions of White-striped Free-tailed Bat and Southern Forest Bat, activity was typically low throughout the night.

Calls of Southern Forest Bat typically peaked between 7–730pm each night, then showed a steady decline throughout the night (Table 5-10; Appendix 7). White striped Free-tailed Bat was generally not active until 8–830pm, after which activity steadily increased until 1130–12pm, then steadily declined toward dawn each night. Chocolate Wattled Bat was the 3rd most active species. It was active from 830pm–4am, being most active at around 2am.

The delayed arrivals and early departures of most species suggest, as would be excepted, that bats are not roosting in the open paddock habitats in which the recorders were located and the proposed impact would take place, but are instead roosting elsewhere in native remnant habitats and moving into the cleared paddocks after foraging near their roost sites. This is certainly the case for the only significant bat recorded, Western False Pipistrelle, which was only detected a handful of times from 1–2 calls per detection (also see section 5.2.3; Table 5-12).

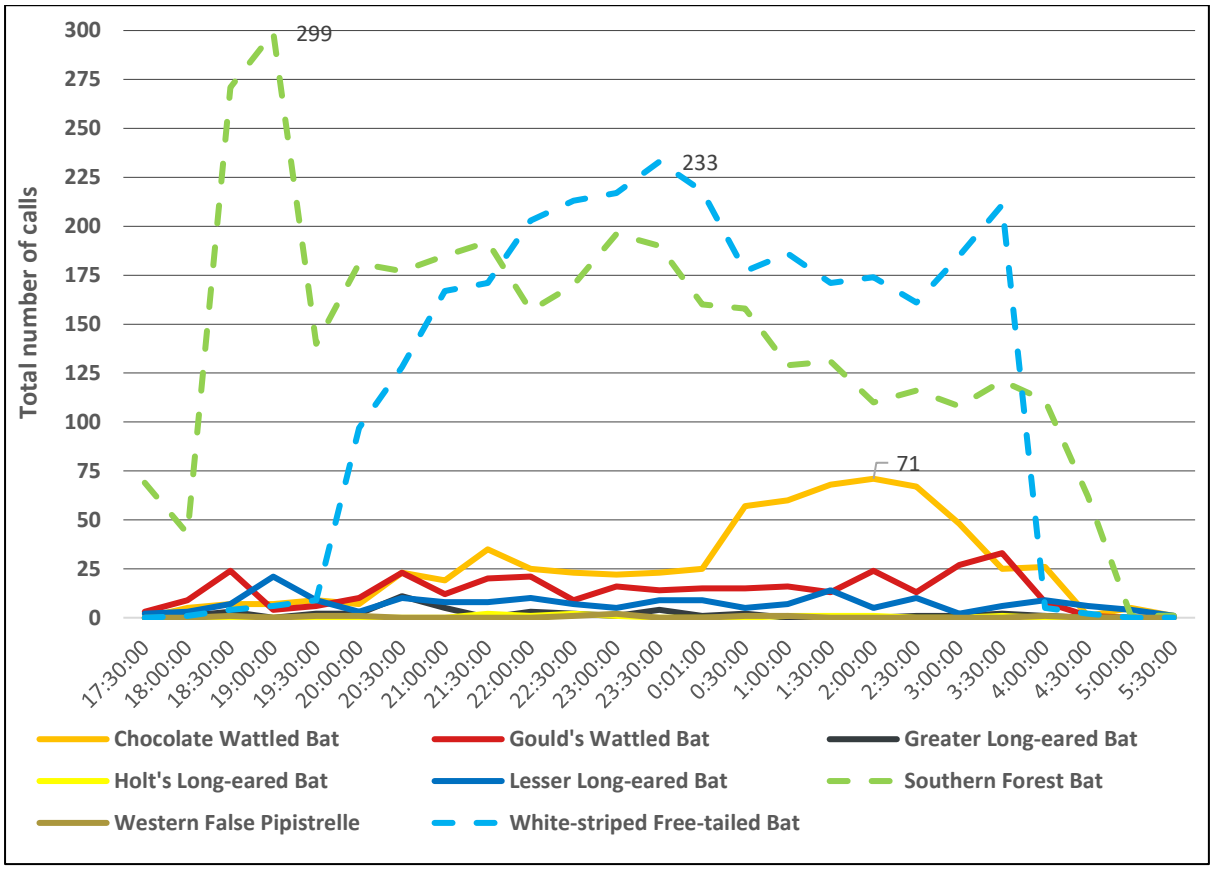


Figure 5-10 Total number of calls per 30-minute time interval

5.2.3 Conservation significant bats

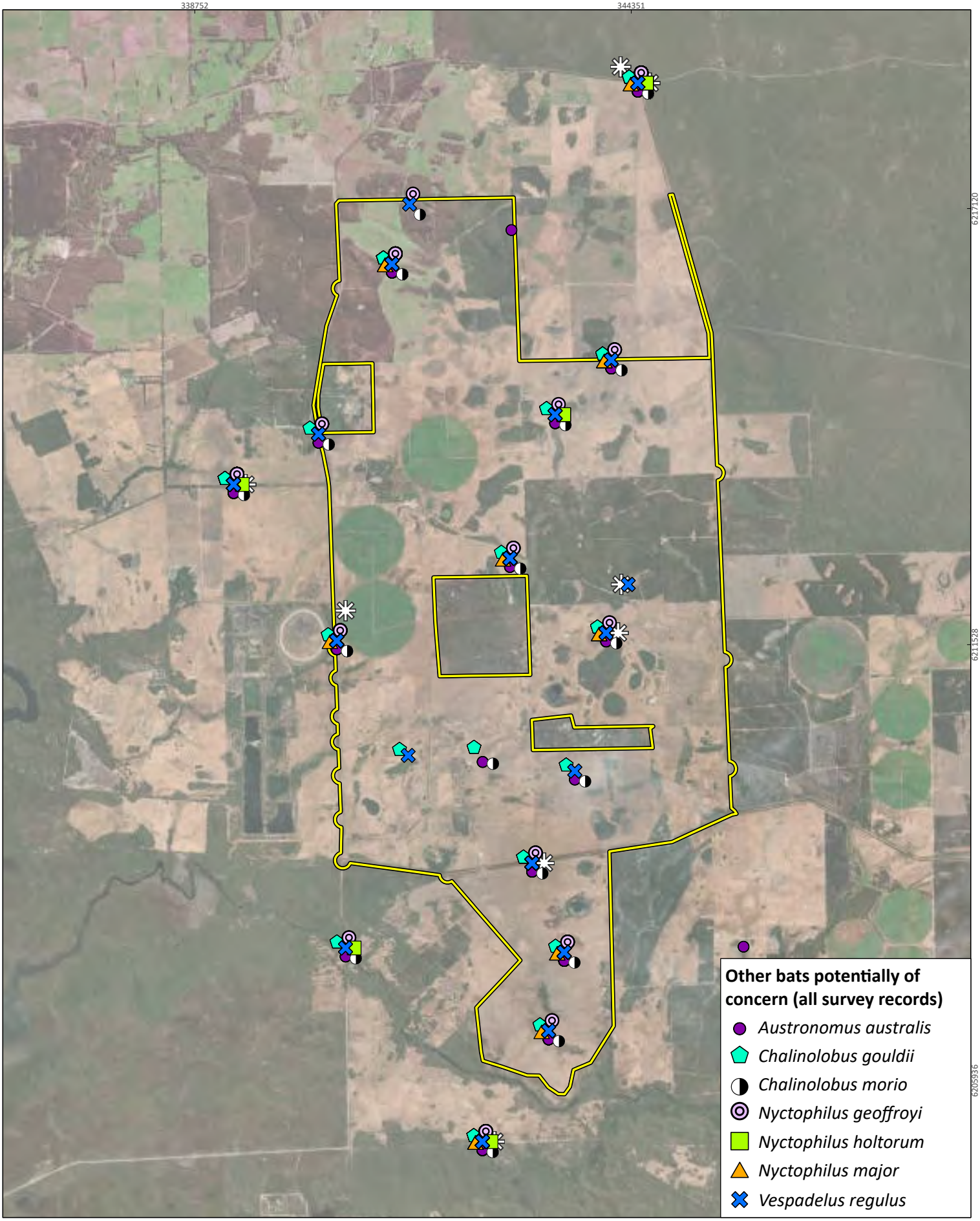
A single conservation significant bat species, Western False Pipistrelle (*Falsistrellus mackenziei*; P4), was recorded across both the BBRAS and the Basic and Targeted fauna survey (Phoenix 2025a). The species was detected once each from 4 BBRAS sites within the WFA and twice at site BUS015 and in 3 consecutive nights at BUS014, both of which are located outside the WFA (within Chester National Park and on the Scott River respectively). It was also detected at site VER-43 on one occasion (Table 5-12). It was recorded from 3 habitat types, Marri-Jarrah-Peppermint woodland, seasonally inundated sedgeland (wetland) and Cleared areas (Figure 5-7).

The timing of the calls for Western False Pipistrelle display no obvious pattern with sparse records throughout the night. Detections were rare, and occurred at sporadic times, over several seasons, primarily in summer (Table 5-12). On this basis it is difficult to say whether or not it is resident in the WFA. The literature suggests it has a strong preference for dense 'old-growth'/mature wet sclerophyll forests of Karri, Jarrah and Tuart (Churchill 2008), from which it rarely ventures far, and this data tends to support that understanding. Within the WFA suitable nesting/roosting habitat occurs in the hollow-supporting MJP woodland, located primarily on the northern boundary, and near Governor Broome Road in the southeast, south and southwest. Abundant, suitable roosting habitat is present in the forested conservation reserves and the Scott River outside the WFA, where this species was most frequently detected.

Table 5-12 Western False Pipistrelle detections

Area	Site	Site description	Season	Date	Time	No. detections
Impact	BUS004	Cleared, open paddock, near several small remnants, in study area.	Spring	18/11/2023	01:00	1
Reference	BUS001	Cleared paddock, directly adjacent narrow roadside Marri-Jarrah-Peppermint woodland, in study area.	Spring	18/11/2023	23:00	1
	BUS011	Cleared roadside, directly adjacent narrow roadside seasonally inundated shrubland, in study area.	Summer	13/01/2024	20:00	1
	BUS013	Narrow roadside remnant vegetation directly adjacent paddock, outside (west of) study area.	Autumn	24/05/2023	19:30	1
	BUS014	Cleared, roadside, directly adjacent large contiguous woodland (conservation reserve), outside (north of) study area.	Summer	12/01/2024	22:30	1
			Summer	13/01/2024	00:30	1
			Summer	14/01/2024	04:00	1
	BUS015	Cleared paddock, directly adjoining vegetation remnant outside (south of) study area.	Autumn	25/05/2023	18:30	1
			Summer	12/01/2024	23:00	1
	VER-43[1]	Seasonally inundated sedgeland (wetland), in study area; within Bluegum plantation stand.	Summer	10/12/2023	00:00	1

[1]Site from the basic/targeted fauna survey (Phoenix 2025a).





SynergyRED
Scott River Wind Fam

Project No	1585
Date	19/06/2025
Drawn by	BK
Map author	JC

0 0.9 1.8
Kilometers

1:62,703 (at A4) GDA 1994 MGA Zone 50

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Study area

Significant bats (all survey records)

Falsistrellus mackenziei, P4 (DBCA list)

Figure 5-11

Recorded conservation significant bats and other bats potentially of concern

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5.3 LIKELIHOOD OF OCCURRENCE ASSESSMENT

Aside from the 7 conservation significant bird and one significant bat species that were recorded in the WFA or wider BIA (sections 5.1.4 and 5.2.3), the likelihood of occurrence assessment for the remaining 33 significant species identified in the regional overview as potentially relevant to the Project (section 4.2) determined 2 were likely to occur in the WFA, 9 may possibly occur and 10 may also possibly occur on rare occasions (Table 5-13). The remaining 12 significant species were considered unlikely to occur in the WFA and therefore are not considered potential species of concern to the Project (Table 5-13).

The 7 conservation significant Migratory shorebirds that were recorded in the survey only at Hardy Inlet Regional sites (section 5.1.4) are included in Table 5-13 so that comment can be made on their likelihood of occurrence in the WFA.

Table 5-13 Likelihood of occurrence assessment for significant species not recorded in the WFA/BIA

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Oxyura australis Blue-billed Duck	P4 (DBCA list)	Likely	Previously recorded near the WFA from multiple sources. Desktop records are greater than 10 years old (some <15 years) but there are close records from several sources, and suitable habitat in the WFA, particularly the larger lakes. Therefore, is it considered likely to occur, at least on occasion.	●									
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Acts)	Possible	WFA within species distribution but no previous records within 10 km. Known to occur in a wide range of habitats. Aerial feeder, may feed over the WFA on occasion.	●	●	●	●	●	●	●	●		
Botaurus poiciloptilus Australasian Bittern	EN (EPBC & BC Acts)	Possible	WFA is within known range and potentially suitable habitat is present. No previous records within 10 km (nearest desktop records from Hardy Inlet ~12 km SW and Gingilup/ wetlands ~30 km SE, dates unknown). While targeted searches and ARUs deployed did not detect the species during the surveys, potential for occasional presence cannot be discounted. Potential for rare use of the larger wetlands in the WFA but unlikely a regular visitor or regularly transit through the WFA.	●	●	●							
Anarhynchus bicinctus Double-banded Plover	Mig. (EPBC & BC Acts)	Possible (rare)	Previous desktop records within 10 km of WFA but old (1979-80) and from a single site near the artificial wetlands. No other desktop records returned. While the species is known to use terrestrial wetlands and pasture near the coast, it occurs rarely in WA. Therefore, considered unlikely to occur except as possibly a very rare visitor.	●	●	●			●	●			
Anarhynchus leschenaultii Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)	Unlikely	Suitable habitat not present in WFA, occurs in littoral and estuarine habitats large intertidal mudflats or sandbanks. There are desktop records from a single site near the artificial wetlands but old (1980).										

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Anarhynchus mongolus Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)	Possible (rare)	Previous old (1980) desktop record within 10 km of WFA but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare use of wetlands in WFA.	●	●	●							
Charadrius cucullatus Hooded Plover/Dotterel	P4 (DBCA list)	Unlikely	Nearby record but is from sandy beach habitat. Suitable habitat not present in WFA, generally a beach and salt lake species.										
Pluvialis fulva Pacific Golden Plover	Mig. (EPBC & BC Acts)	Possible	Previous desktop record within 10 km of WFA, though not recent. Mainly uses coastal habitats but also recorded from wetlands, paddocks. Potential for occasional use of the larger wetlands in the WFA but unlikely a regular visitor to the WFA when present in the southwest. Very limited overlap between species arrival in region (desktop records indicate December) and when most wetlands in WFA have suitable foraging habitat.	●	●	●			●	●			
Pluvialis squatarola Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Acts)	Possible (rare)	No previous record within 10 km of WFA. Suitable main habitat not present, prefers coastal habitats. Potential for rare use of wetlands, paddocks in WFA.	●	●	●			●	●			
Anous tenuirostris melanops Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)	Unlikely	Desktop record is projected distribution only. No nearby records, and no suitable habitat in WFA.										
Hydroprogne caspia Caspian Tern	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible (rare) in WFA	Previous desktop records within 10 km of WFA and was recorded in survey only at Hardy Inlet Regional sites. Mainly found in sheltered coastal embayments. May also occur in near-coastal terrestrial wetlands; however, the wetlands present in the WFA are shallow and unlikely to provide the species' preferred food sources (hunts for fish). Habitat in WFA therefore considered marginal. May occur as rare visitor or transit through but unlikely to utilise the WFA.	●	●	●							

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Onychoprion anaethetus Bridled Tern	Mig. (EPBC & BC Acts)	Unlikely	No previous records within 10 km of WFA. Mainly offshore species. No suitable habitat in WFA.										
Sternula nereis nereis Fairy Tern	VU (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Desktop record was projected distribution only but was recorded in the survey at Hardy Inlet Regional sites only. Occurs in coastal habitats and on offshore islands. Suitable habitat not present in WFA. Species is unlikely to utilise WFA.	●	●	●							
Thalasseus bergii Greater Crested Tern	Mig. (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Desktop records within 10 km but not recent. All recent desktop records associated with the Hardy Inlet and the coast. Survey records only from Hardy Inlet Regional sites. No suitable habitat present in WFA. species is unlikely to utilise the WFA.										
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	Unlikely	Locally extinct.										
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	Possible (rare)	Desktop record is projected distribution only. Suitable habitat is present but occurs in a wide range of habitats. Very few records of this species from the region. May occur in the WFA on rare occasion only.	●	●	●			●	●	●		
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	Possible	Previous recent desktop records within 10 km of WFA. Uses variety of coastal and inland wetlands. Suitable habitat present when species arrives in the region (September-October). Occasional use of the larger wetlands in the WFA possible, but unlikely a regular visitor or regular transit through the WFA.	●	●	●							
Arenaria interpres Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)	Unlikely	Few desktop records none within 10 km (i.e. from Hardy Inlet and over open ocean). Species mainly uses coastal habitats.										

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Calidris acuminata Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)	Recorded Regional sites, Possible in WFA	Previous desktop records within 10 km of WFA, not recent. Uses shallow fresh or brackish wetlands, with inundated or emergent vegetation and inundated paddocks. Suitable habitat present in early spring when it arrives in the southwest (from September). Occasional occurrence in the WFA possible, but unlikely a regular visitor or regular transit through.	●	●	●			●	●	●		
Calidris alba Sanderling	Mig. (EPBC & BC Acts)	Recorded Regional sites, Unlikely in WFA	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All other desktop records are associated with the Hardy Inlet and the coast. Survey records also only from Hardy Inlet Regional sites. Almost always prefers coastal habitats. Suitable habitat not present in WFA.										
Calidris canutus Red Knot	VU/Mig. (EPBC Act); EN (BC Act)	Unlikely	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Mainly uses coastal habitats. Suitable habitat not present.										
Calidris falcinellus Broad-billed Sandpiper	Mig. (EPBC & BC Acts)	Possible (rare)	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Mainly uses sheltered coastal habitats, favouring estuarine mudflats. Only occasional records from swamps and lakes. Arrives in southwest in September, but rare.	●	●	●							
Calidris ferruginea Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)	Possible	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Uses intertidal and wetland habitats, sometimes forages in flooded paddocks. Desktop records indicate arrival in region from September. Suitable habitat present. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●	●		

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	Possible	No previous records within 10 km from WFA; however, desktop record just outside the BIA SW of the WFA on the Hardy Inlet. Uses a variety of wetland habitats and inundated grasslands. Arrives in southwest in spring. Suitable habitat present. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●			
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible in WFA	Old (1980) desktop records within 10 km of WFA from a site near the artificial wetlands, and another near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet. Survey records also only from Hardy Inlet Regional sites. Found across a wide range of open mudflat-like habitats in salt and freshwater systems. Uses coastal and wetland habitats and inundated paddocks. Arrives in the southwest in spring. Occasional use of paddocks, wetland habitats in the WFA possible.	●	●	●			●	●	●		
Calidris tenuirostris Great Knot	VU/Mig. (EPBC Act); CR (BC Act)	Possible (rare)	Old (1979-80) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers sheltered coastal habitats with large intertidal flats. Rarely uses swamps near the coast and saltlakes. Uncommon in the Southwest.	●	●	●							
Limosa lapponica Bar-tailed Godwit	Mig. (EPBC & BC Acts)	Recorded Regional sites, Possible (rare) in WFA	Old (1980) desktop records within 10 km of WFA from a site near the artificial wetlands, and another near the Blackwood River. All other desktop records, including all recent records, are associated with the Hardy Inlet and coast. Survey records also only from Hardy Inlet Regional sites. Occurs almost entirely in coastal habitats such as intertidal sandflats, mudflats and estuaries. It has been observed on occasion on inland wetlands and paddocks but potential presence in the WFA is considered likely very rare.		●	●			●				

Species	Cons. status	LOO	Comment	Suitable habitats in study area									
				SIPW[1]	SISE[1]	SISH[1]	MJP[1]	OWP[1]	Cleared	Clrd–DS[1]	Dam	Bluegum[1]	Pine[1]
Limosa limosa Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)	Possible (rare)	Old (1981) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Prefers coastal habitats but will use shallow and sparsely vegetated, near-coastal wetlands, such as river pools, swamps and floodplains on occasion.	●	●	●			●				
Numenius madagascariensis Eastern Curlew	CR/Mig. (EPBC Act); CR (BC Act)	Unlikely	Old (1981) desktop records within 10 km of WFA from a site near the Blackwood River. No other desktop records. Mainly uses sheltered intertidal sandflats/ mudflats with no vegetation. No suitable habitat present in the WFA.										
Numenius phaeopus Whimbrel	Mig. (EPBC & BC Acts)	Unlikely	Old (1981) desktop records within 10 km of WFA from site near the artificial wetlands. All recent desktop records are from the Hardy Inlet. Inhabits coastal habitats. Suitable habitat not present in the WFA.										
Tringa brevipes Grey-tailed Tattler	Mig. (EPBC and BC Acts); P4 DBCA list	Possible (rare)	Three old (1978) desktop records within 10 km of WFA but offshore. No other desktop records returned. Inhabits coastal habitats, and occasionally found around near-coastal wetlands, such as lakes. Inland records for the species are rare.	●	●	●							
Tringa nebularia Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)	Likely	Several recent records within 10 km of WFA. Uses variety of wetlands and coastal habitats, as well as inundated paddocks. Habitat present in WFA when species arrives in early spring.	●	●	●				●	●		
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	Possible	No previous desktop records within 10 km of study area, last record in December 2000 (BirdLife 2023) at Swan Lake which is part of the Hardy Inlet. Inhabits a range of permanent or ephemeral wetlands and inundated floodplains. Suitable habitat present when species arrives in southwest in early spring.	●	●	●			●	●	●		

[1]SIPW – seasonally inundated paperbark woodland (wetland); SISE – seasonally inundated sedgeland (wetland); SISH – seasonally inundated shrubland; MJP – Marri-Jarrah-Peppermint woodland; OWP – Open woodland of Peppermint trees (degraded); Clrd DS – Cleared–degraded sumpland; Bluegum – Bluegum plantation; Pine – Pine plantation.

5.4 ESTIMATE OF SURVEY COMPLETENESS

In order to gauge whether the survey effort completed can be considered adequate to capture the seasonal diversity of the 2 assemblages present in the study area, 2 sets of species accumulation curves were produced based on the Chao2, Jacknife2, Sobs and Bootstrap indices, one set for birds (Figure 5-12) and one set for bats (Figure 5-13); as each group was systematically surveyed using different methods. For birds, the curves were based on the fixed-point method only. While for bats the curves were derived from echolocation recordings completed at the same BBRAS sites in Year 1.

For birds all 3 curves came close to a horizontal asymptote, indicating that few species remain undetected (Figure 5-12). The Chao2, Jacknife2 and Bootstrap indices calculated an expected species richness of 110, 118 and 106, respectively, compared with a recorded species richness of 97. The results therefore indicate that the effort undertaken is adequate to characterise the avian assemblage.

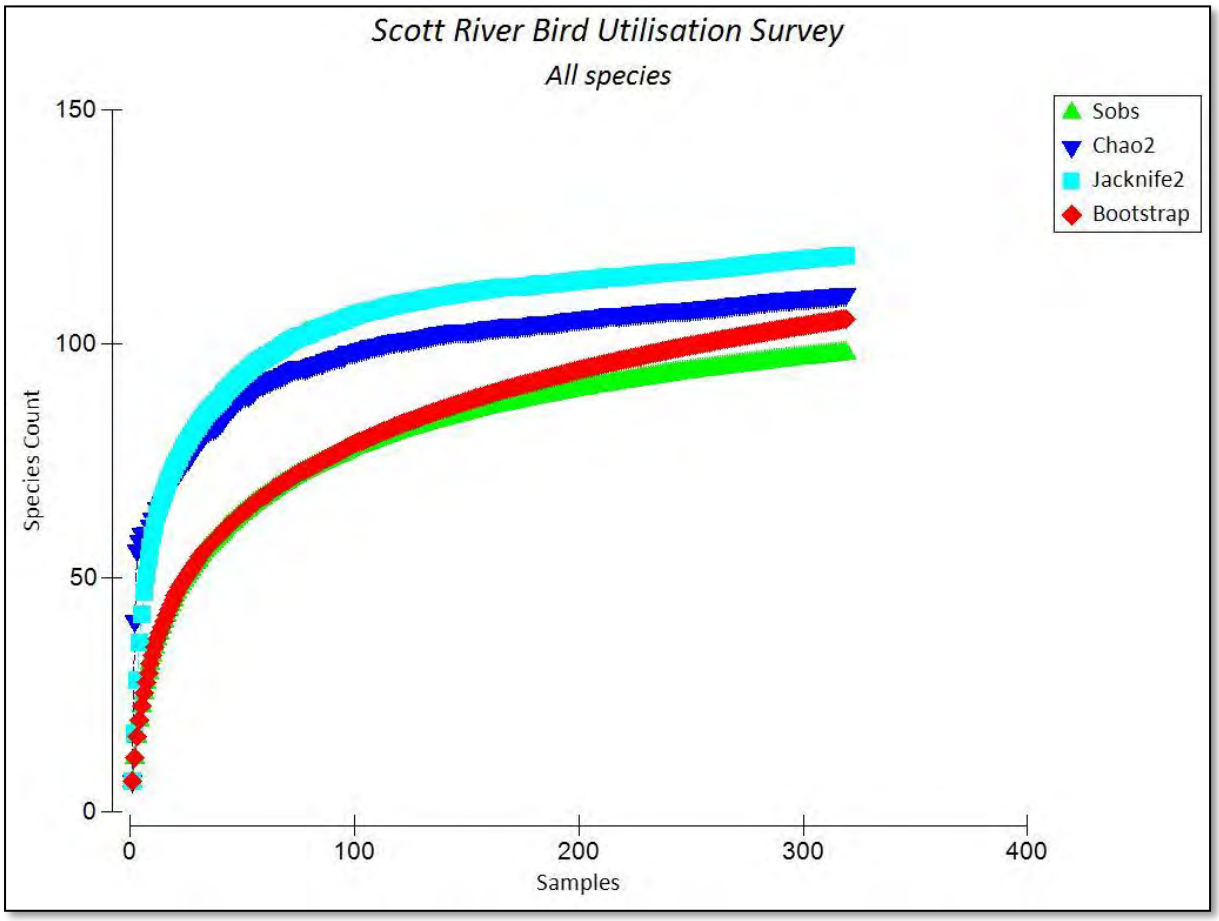


Figure 5-12 Species accumulation curve of bird data for BBRAS survey

The species accumulation curves derived from the Chao1, Jacknife1, Sobs and Bootstrap indices for bats all reached the asymptote at approximately 32 samples (Figure 5-13), with no additional species being detected after that. The curves therefore strongly indicate that is it unlikely any additional bat species would be detected with additional sampling using the echolocation sampling method. This is also evident when the assemblage per site is compared, which showed a largely homogenous assemblage across all sites (Table 5-8).

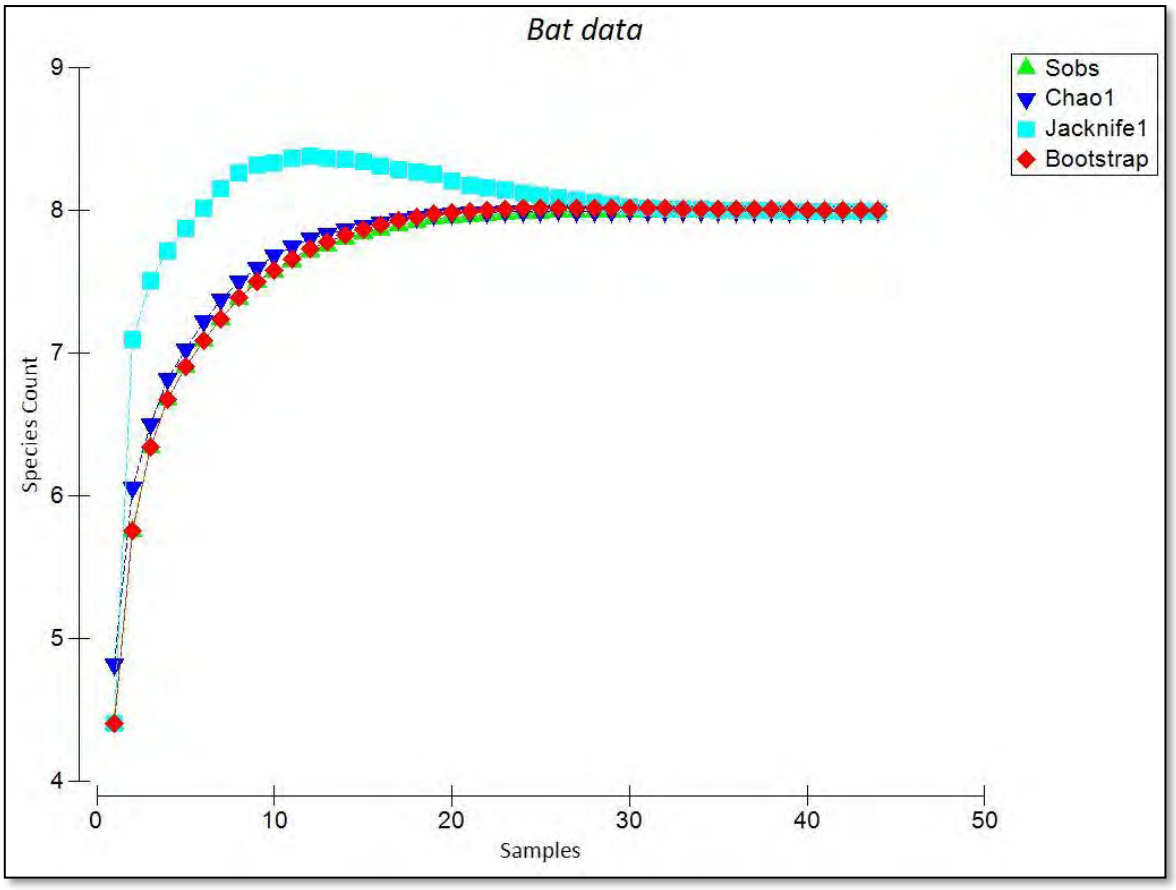


Figure 5-13 Species accumulation curve of bat data for BBRAS survey

5.5 SURVEY LIMITATIONS

The limitations of the survey have been considered in accordance with EPA (2020) and are presented in Table 5-14.

Table 5-14 Consideration of potential survey limitations

Limitations	Comments
Availability of contextual information at a regional and local scale	Database searches and previous surveys within the vicinity of the Project provided a comprehensive species list for birds within the region. There was not a comprehensive species list for bats available, and as such several species were detected during the surveys that were not returned by the database and literature searches.
Competency/experience of the team carrying out the survey	The survey team members all have extensive experience conducting fauna surveys.
Scope and completeness	Sampling effort was adequate for the size of the study area and to meet the objectives of the BBRAS. The basic/targeted fauna survey provided supplemental data to define the bird and bat assemblages of the study area. As bats were detected via echolocation recording rather than direct observation, it was not possible to determine flight heights, or distance and direction from the recording device.
Proportion of fauna recorded and/or collected, any identification issues	Based on species accumulation curves the sample effort was considered adequate to characterise the bird and bat assemblages present in the period the survey was conducted (Section 5.4). Well below average rainfall between July and November may have influenced the number and diversity of Migratory bird records in the spring 2024 sampling event.
Access within the study area	All parts of the study area were accessible for most of the year. Some sites had to be sampled a hundred or so metres from the initial location when the study area was inundated over winter in Year 1. Two sites were on land that was not accessible due to land holder restrictions that took effect in early Year 1 and were not surveyed again (BUS012 and BUS035).
Timing, rainfall, season	Year 1 sampling was completed across all 4 seasons (four sampling events). In Year 2, sampling concentrated on the drier period of the year targeting species of concern identified during Year 1 (i.e., migratory shorebirds and breeding period of the 3 black cockatoo species). Year 2 involved monthly sampling between September 2024 and March 2025. This resulted in a total of 12 sampling events over 2 consecutive years satisfying the relevant guidance (Brett Lane and Associates 2005; DCCEEW 2024). All efforts were made to undertake fixed-point bird sampling during favourable weather conditions.
Disturbance that may have affected the results of the survey	No disturbances affected the results of the survey.

6 RISK ASSESSMENT FOR POTENTIAL SPECIES OF CONCERN

6.1 POTENTIAL IMPACTS

The main risks to birds and bats from wind farms (Section 2.3) have been considered for relevance to the current Project below in Table 6-1.

Table 6-1 Consideration of potential impacts

Potential impact	Comments
Habitat loss through clearing for turbines and other infrastructure	Minimal clearing of native vegetation proposed – no more than 2 ha total (at the time of this assessment), and less than 1 ha of black cockatoo foraging habitat. No removal of PNTs. No clearing of any native vegetation growing in association with wetlands., Proposed maximum number of turbines is 20, all within the WFA. Proposed site placement of turbines is within cleared paddock areas or Bluegum plantation that is scheduled to be harvested prior to construction and will not be replanted (Figure 6-1).
Mortality or injury from collision with turbine blade or as a result of barotrauma[1]	Birds or bats that fly within heights of the RSA at-risk of rotor strike and/or barotrauma. Potential RSA height is within the range of 25–250 m. Encompasses 4 of the flight height categories recorded in the surveys (see section 3.2.1): • 25-50 m • 51-75 m • 76-150 m • 151-250 m.
Alienation of important sites, e.g. key roosting, feeding or breeding areas	No important roosting or breeding sites for birds or bats have been detected within the WFA. Black cockatoos however were observed to forage widely in the WFA principally within MJP woodland, and raptors were observed to forage widely across the entire site. There is therefore potential for the turbines to deter some birds from continuing to forage within the WFA, including the excised areas within the study area of which one is a conservation reserve (Figure 4-2). However, it is not clear how relevant or impactful such a deterrence would be with respect to conservation significant species and other species of potential concern recorded, due to a paucity of such data with respect to WA species.
Displacement leading disruption to feeding or breeding patterns, e.g. from wind turbine noise and/or artificial light sources	May affect birds or bats that would usually use the WFA to move between (for example) roosting sites and foraging habitat. Birds/bats may have to fly longer distances to get to foraging/breeding areas. For example, black cockatoos moving between roost sites in conservation reserves north of the WFA to foraging habitat in Scott National Park/Hardy Inlet, or coastal vegetation south of the WFA. Directional movements of most birds, including black cockatoos, show movements are mainly S-N/N-S and E-W/W-E, though a very limited number of distinct movements were detected and thus no clear trends could be determined. Construction activities are likely to generate the loudest noise (e.g. from vehicle and machinery operation), but will be temporary, the construction period likely to be between 18-24 months. During operations, the wind turbines will be the primary noise source, followed by the substation. The aerodynamic noise generated by a turbine typically increases with rotor speed, which is directly correlated to wind speed. Maximum predicted noise levels at each turbine range from 35-55dB(A), dependent on wind

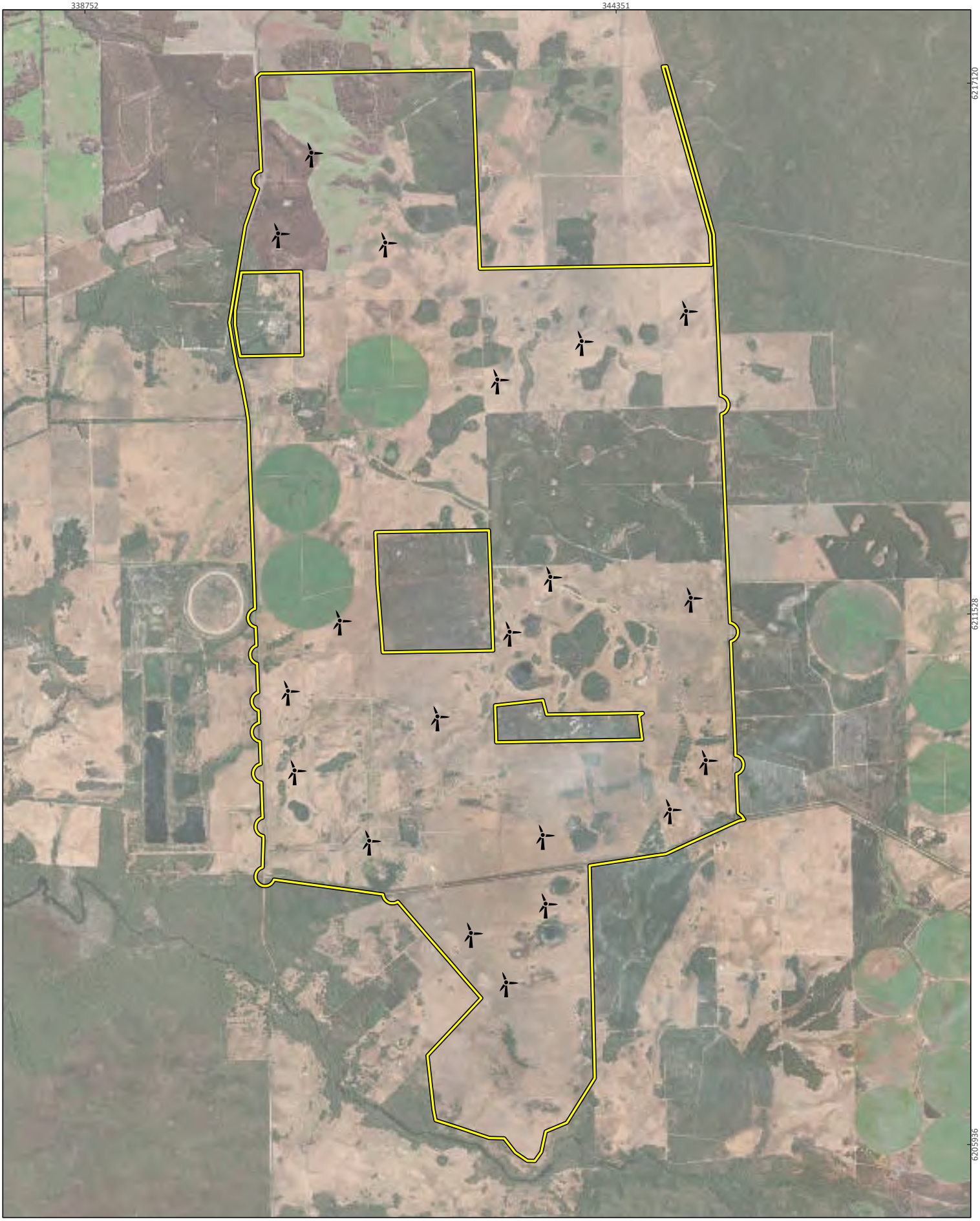
Potential impact	Comments
	speed, and reducing with distance. Existing background noise as measured in the vicinity of the proposed wind farm ranged from 20-50dB(A). Sources of artificial light during construction are expected to be minimal, assuming construction activities will be restricted to daylight hours. Mobile lighting towers may be used to ensure safe work environment in certain situations. Light sources during operations will primarily be associated with night lighting around the perimeter of buildings and substation for security and emergency purposes. SynergyRED advises consultation to date has suggested aviation obstruction lighting will not be required; however, this may change if the Civil Aviation Safety Authority determines there to be suitable risk to aviation safety. Generally, aviation lighting involves the installation of red LED lights on the nacelle of turbines around the perimeter of the Project. Overall, lighting for the Project is unlikely to be of a scale that would cause significant displacement of birds or bats.

[1]Risk of barotrauma treated together here with collision risk, as noted in Section 2.3.

6.2 POTENTIAL SPECIES OF CONCERN

Based on the findings of the site and species characterisation (Section 3.1.1 and Section 3.1.2), and the field surveys (Section 5), 29 conservation significant species are considered potential species of concern, including the 8 species that were recorded in the WFA or wider BIA (7 birds, Section 5.1.4 and one bat, Section 5.2.3) and the 21 additional species considered likely, possibly or possibly (rare) to occur in the WFA (Section 5.3). Detailed profiles for the conservation significant species are provided in Appendix 4.

In addition, the 11 non-significant raptors and 7 non-significant bat species recorded during the survey were also identified as potential species of concern (Section 5.1.4 and Section 5.2.2) and are therefore included in the risk assessment (Section 6.3).





SynergyRED
Scott River Wind Fam

Project No	1585
Date	13/08/2025
Drawn by	BK
Map author	JC

0 1 2
Kilometers

1:51,525 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 13/08/2025. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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Study area

Proposed turbine locations

Figure 6-1

Preliminary turbine locations

PHOENIX ENVIRONMENTAL SCIENCES

6.3 RISK ASSESSMENT OUTCOMES

A risk assessment was conducted for all potential species of concern in accordance with the risk assessment framework defined in Section 3.5. The risk assessment outcomes for conservation significant species are detailed in Table 6-2. From this assessment, 3 conservation significant species were considered at moderate risk of impact from the Project, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. Two species were considered at low risk, Australasian Bittern and Western False Pipistrelle. Risk was assessed as negligible for the remaining 24 conservation significant species (Table 6-2).

The risk assessment for other potential species of concern (i.e. non-conservation significant) is detailed separately in Table 6-3. None of the other potential species of concern assessed received a high or moderate risk rating. Six birds and 2 bats were assessed as at low risk from the Project, Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, Brown Goshawk, Brown Falcon, Australian Kestrel, White-striped Free-tailed Bat and Southern Forest Bat. The risk rating was found to be negligible for the remaining species (Table 6-3).

Table 6-2 Risk assessment for conservation significant potential species of concern

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Pandion haliaetus (Osprey)	Mig. (EPBC & BC Acts)	Occasional foraging	7 (7)	0-75 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded only once in WFA across all surveys. Recorded flying within RSA heights at Regional reference sites. No mortalities recorded in carcass monitoring from reviewed sources at Australian sites, but collision deaths have been reported overseas. Common and widely distributed in coastal regions across most of the country. Many individual Osprey are known in the Busselton to Augusta region (pers. comm. B. Wykes). The population is limited by viable nest sites, not biological factors. Desktop records are nearly all SW of the WFA associated with Hardy Inlet, Augusta beaches, Scott and Blackwood Rivers. Sampling at the Regional reference sites supports this, with several records made during the Year 2 surveys at the Hardy Inlet coastal sites. Unlikely to utilise habitats in study area regularly because it primarily feeds on fish, though may be an occasional foraging site. Potential for rare loss of individuals but no reduction in population viability.
Oxyura australis (Blue-billed Duck)	P4 (DBCA list)	Foraging Roosting Breeding	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys; however, although considered likely to occur within the WFA on occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Potential for occasional use of the larger wetlands in the WFA but unlikely to be a regular visitor. A few records from the artificial wetlands west of the WFA but limited desktop records returned within 10 km, and all from 2010 or older. Potential for rare loss of individuals but no reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Apus pacificus (Fork-tailed Swift)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. Only one mortality recorded in carcass monitoring from reviewed sources. Common species, considered to possibly occur on occasion. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Botaurus poiciloptilus (Australasian Bittern)	EN (EPBC & BC Acts)	Foraging Roosting	-		Direct collision/ barotrauma	Unlikely	Medium	Low	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Known from Hardy Inlet ~12 km SW of the WFA and the Gingilup/Quitchup/Jasper wetlands ~30 km SE (dates of records unknown). Latter is an important wetland suite for the species. Potential for rare use of the larger wetlands in the WFA but unlikely a regular visitor or regularly transit through the WFA. WA population very small therefore any loss of individuals may have temporary impact on local population viability.
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	VU (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	45 (159)	0-50 m	Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA in low numbers (mostly singles). A large flock (53 individuals) recorded west of WFA so may also occur in WFA in large flocks on occasion. Heights not recorded for many observations, mostly observed at or below tree height but 2 of 5 records at RSA height. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the excised

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									areas in the centre of the WFA one of which is a conservation reserve. No known breeding or roost sites within BIA. Minor foraging habitat loss only. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.
Zanda baudinii (Baudin's Cockatoo)	EN (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	7 (57)	0-25 m	Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA in low numbers (singles, small flocks). No records within the RSA of the WFA but suspected to fly at RSA height. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the excised areas in the centre of the WFA one of which is a conservation reserve. Minor foraging habitat loss only. No known breeding sites within BIA but 2 known *Zanda* sp. roosts located within 12 km of the WFA; black cockatoos known to forage in areas up to 20 km from night roosting habitat during the non-breeding season. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Zanda latirostris (Carnaby's Cockatoo)	EN (EPBC & BC Acts)	Foraging Roosting Breeding NCS[2]	36 (150)		Direct collision/ barotrauma, Displacement, Habitat loss	Likely	Medium	Moderate	Recorded frequently in WFA, in low numbers (mostly singles). Recorded within the RSA of the WFA (2 records), though most recorded heights below the RSA. No mortality monitoring data available for this species but there are no reported mortalities in carcass monitoring for surrogate species *Zanda funerea*. High and moderate quality foraging habitat in WFA. Foraging habitat also likely to be present in the (excised) conservation reserve and covenant areas in the centre of the WFA. Minor habitat loss only. No known breeding sites within BIA but 2 known Zanda sp. roosts located within 12 km of the WFA; black cockatoos known to forage in areas up to 20 km from night roosting habitat during the non-breeding season. Small total population, pair bonding and slow breeding. Loss in numbers of individuals may lead to minor reduction in population viability for between one and 5 years.
Anarhynchus bicinctus (Double-banded Plover)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous desktop records within 10 km of WFA but old (1979-80). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Anarhynchus mongolus (Siberian Sand Plover)	EN/Mig. (EPBC Act); EN (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Utilises terrestrial wetlands and pasture near the coast but rarely occurs in WA. Previous old (1980) desktop record within 10 km of WFA but mainly uses coastal habitats such as beaches, mudflats and sandflats. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Pluvialis fulva (Pacific Golden Plover)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Desktop records all SW of the WFA associated with the Hardy Inlet and Scott River. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly uses coastal habitats. Potential for occasional use of the larger wetlands in the WFA but unlikely a regular visitor to the WFA when present in the region, noting very limited overlap between species arrival in region (December) and persistence of suitable foraging habitat in the WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Pluvialis squatarola (Grey Plover)	VU/Mig. (EPBC Act); Mig. (BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but potential for rare use of wetlands/paddocks in WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Falco peregrinus (Peregrine Falcon)	OS (BC Act)	Foraging	1 (1)	26-50 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in WFA only once across all surveys. Recorded flying at height within RSA of the WFA. Recorded mortalities in carcass monitoring from reviewed sources. WFA considered foraging habitat within a resident bird's home range. Unlikely to nest in WFA. Several desktop records, nearly all SW of the WFA, mainly associated with the Hardy Inlet and Scott River. Individuals/pairs may hunt in the WFA on occasion as part of their large home range, and or transit through. Potential for rare loss of individuals but unlikely to lead to reduction in population viability.
Hydroprogne caspia (Caspian Tern)	Mig. (EPBC & BC Acts)	None	6 (62)		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Previous desktop record within 10 km of WFA . Known to utilise near-coastal terrestrial wetlands. May occur as a visitor but the wetlands present in the WFA are too shallow to provide the species' preferred food source (fish). Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Motacilla cinerea (Grey Wagtail)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. No previous desktop records within 10 km of WFA. Occurs in a wide range of habitats. Potential for rare loss of individuals but no reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Actitis hypoleucos (Common Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Most desktop records associated with the Hardy Inlet SW of the study area. Does not form large flocks (mainly occurs singly or in pairs). Potential for occasional use of the larger wetlands in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival (September-October) and when wetlands in WFA have suitable foraging habitat. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Calidris acuminata (Sharp-tailed Sandpiper)	VU/Mig. (EPBC Act); Mig. (BC Act)	Foraging	1 (40)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in survey only from Regional site. Record is from Hardy Inlet in much more suitable and extensive habitat than WFA. Considered to possibly occur within the WFA (Table 5-13). Desktop records all SW of the WFA associated with Hardy Inlet and Scott River, with one record from the artificial wetlands west of the WFA. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. May arrive in Augusta area from September. Potential for occasional occurrence in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival and when wetlands/paddocks in WFA have suitable foraging habitat. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Calidris falcinellus (Broad-billed Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Mainly utilises coastal habitats but occasional records from swamps and lakes so potential for rare use of wetlands in WFA. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris ferruginea (Curlew Sandpiper)	CR/Mig. (EPBC Act); CR (BC Act)	Foraging	-		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records nearly all SW of the WFA associated with Hardy Inlet, which aligns with its preferred foraging habitats. Desktop records indicate arrival from September. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Limited overlap between species arrival and when wetlands/ paddocks in WFA have suitable foraging habitat. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris melanotos (Pectoral Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although considered to possibly occur within the WFA (Table 5-13). Desktop records just outside the BIA SW of the WFA on the Hardy Inlet. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									a regular visitor or regular transit through the WFA when present in the region. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Calidris ruficollis (Red-necked Stint)	Mig. (EPBC & BC Acts)	Foraging	2 (72)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Recorded in survey only from Regional site. Records are from Hardy Inlet in much more suitable and extensive habitat than WFA. Desktop records also mainly SW of the WFA, associated with Hardy Inlet. Considered to possibly occur within the WFA (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Arrives in the southwest in spring. Potential for occasional use of paddocks, wetland habitats in the WFA, but unlikely a regular visitor or regular transit through the WFA when present in the region. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Calidris tenuirostris (Great Knot)	VU/Mig. (EPBC Act); CR (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands. Occurs mostly in coastal intertidal habitats, but rare use of swamps. Potential presence in the WFA is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Limosa lapponica (Bar-tailed Godwit)	Mig. (EPBC & BC Acts)	Foraging	1 (1)		Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands and at Blackwood River. Occurs mostly in coastal habitats but occasionally observed at inland wetlands and paddocks. Potential presence in the WFA is considered likely very rare. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Limosa limosa (Black-tailed Godwit)	EN/Mig. (EPBC Act); Mig. (BC Act)	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1980) desktop records within 10 km of the WFA from near the artificial wetlands. Occurs mostly in coastal habitats but occasionally uses near-coastal wetlands and floodplains. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa brevipes (Grey-tailed Tattler)	Mig. (EPBC and BC Acts); P4 DBCA list	Foraging	-	-	Direct collision/ barotrauma	Unlikely	Insignificant	Negligible	No record from surveys, although may possibly occur within the WFA on very rare occasion (Table 5-13). Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Old (1981) desktop records within 10 km of the WFA. Occurs mostly in coastal habitats but occasionally observed at near-coastal wetlands. Potential presence in the WFA is considered likely very rare.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa glareola (Wood Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	1 (3)	0-25 m	Direct collision/ barotrauma	Potential	Insignificant	Negligible	Three individuals recorded in a single observation within the WFA, across all surveys. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records (only 2 just west of WFA). Mainly occurs singly, in pairs or small flocks. Arrives in southwest in spring, though more common from summer to autumn when habitat in WFA mainly unsuitable (largely dried out). Occasional use of wetlands in WFA and transit through WFA by small numbers of birds. Potential for rare loss of individuals/undetectable loss of EAAF population over 10 years (<0.005%).
Tringa nebularia (Common Greenshank)	EN/Mig. (EPBC Act); Mig. (BC Act)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No record from surveys, however considered likely to occur within the WFA (Table 5-13). Desktop records within 10 km of WFA. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Desktop records all SW of the WFA, mainly associated with Hardy Inlet, Scott River, but also recorded from the artificial wetlands directly west of the WFA. Arrives in the southwest in early spring. Occasional use of the paddocks/wetland habitats in the WFA.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for rare loss of individuals but undetectable loss of EAAF population over 10 years (<0.005%).
Tringa stagnatilis (Marsh Sandpiper)	Mig. (EPBC & BC Acts)	Foraging	-		Direct collision/ barotrauma	Potential	Insignificant	Negligible	No records from surveys, although considered to possibly occur within the WFA (Table 5-13). Suitable habitat present in the WFA when they arrive in early spring. Suspected to fly at heights within RSA. No mortalities recorded in carcass monitoring from reviewed sources. Limited desktop records, SW of WFA at Augusta. Occasional use of paddocks, wetland habitats in the WFA. Potential for rare loss of individuals / undetectable loss of EAAF population over 10 years (<0.005%).
Tyto novaehollandiae novaehollandiae (Masked Owl (southwest))	P3 (DBCA list)	Foraging Roosting Breeding	2 (2)	NR[3]	Direct collision/ barotrauma, Displacement	Unlikely	Insignificant	Negligible	Recorded at 2 locations outside the WFA, as singles. Only likely to fly at RSA heights when displaying courtship over a prospective nest site of which none are present in study area. Unlikely to fly within RSA while hunting. No mortality monitoring data available for this species. No other Masked Owl mortalities from reviewed sources. May hunt in woodland habitats of the study area and transit through but not likely to utilise extensively. Potential for rare loss of individuals but unlikely to lead to reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Falsistrellus mackenziei (Western False Pipistrelle)	P4 (DBCA list)	Foraging Roosting Breeding	Low	NR[3]	Direct collision/ barotrauma	Potential	Minor	Low	Infrequently detected in WFA and low number of calls (1 mean detection per night). Suspected to fly at heights within RSA. No mortality monitoring data available for this species but there are reported mortalities in carcass monitoring for closely related species Falsistrellus tasmaniensis. Consistent single detections suggest rare/occasional movement through cleared habitats between remnant patches, and thus foraging typically close to vegetation, rather than open paddocks. May possibly roost and breed in best examples of MJP woodland, where the PNT assessment (Phoenix 2025a) recorded most trees with hollows, many of which would be considered suitably sized to support the species. Occasional loss of small numbers of individuals possible but unlikely to lead to reduction in local population viability.

[1]No. records (no. individuals) for birds; activity level for bats (see section 3.2.2). [2]Breeding NCS – study area contains PNTs but none with hollows currently suitable for breeding. [3]NR – not recorded; species detected via audio recording only.

Table 6-3 Risk assessment for other potential species of concern

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Aquila audax (Wedge-tailed Eagle)	Not listed	Foraging Roosting Breeding	37 (50)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles/pairs. Frequently recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Lower avoidance rate than other raptors. Likely uses the WFA regularly for foraging. Potential for breeding but no known nest sites in WFA. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Circus approximans (Swamp Harrier)	Not listed	Foraging Roosting Breeding	57 (66)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles/pairs. Frequently recorded flying at RSA heights. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely uses the WFA regularly for foraging. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Elanus axillaris (Black-shouldered Kite)	Not listed	Foraging Roosting Breeding	4 (4)		Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in WFA, as singles. Recorded flying at RSA height. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Widespread, abundant species. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Not listed	Foraging	2 (2)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Only one record in WFA of a bird flying over. Recorded flying at RSA height. Only one recorded mortality in carcass monitoring from reviewed sources. Mostly occurs in coastal habitats. May hunt for waterbirds in the WFA on occasion, or transit through but no breeding and unlikely to be a regular visitor. Territorial and occur sparsely across their range. Rare loss of individuals possible but reduction in population viability unlikely.
Haliastur sphenurus (Whistling Kite)	Not listed	Foraging Roosting Breeding	8 (9)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles, one pair. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Hieraaetus morphnoides (Little Eagle)	Not listed	Foraging Roosting Breeding	3 (3)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles. Recorded flying at RSA height. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Tachyspiza cirrocephala (Collared Sparrowhawk)	Not listed	Foraging Roosting Breeding	4 (4)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles. Recorded flying at heights within RSA. Recorded low mortalities (<10) in carcass monitoring from reviewed sources. Highly manoeuvrable species. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species,

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									therefore unlikely to lead to reduction in population viability.
Tachyspiza fasciata (Brown Goshawk)	Not listed	Foraging Roosting Breeding	6 (7)		Direct collision/ barotrauma	Potential	Minor	Low	Infrequently recorded in WFA, as singles, one pair. Recorded flying at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Likely to forage in WFA. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco berigora (Brown Falcon)	Not listed	Foraging Roosting Breeding	17 (21)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Relatively heavy slow flight. Likely to forage in WFA regularly. Potential for breeding but no known nest sites in WFA. Occasional loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco cenchroides (Australian Kestrel)	Not listed	Foraging Roosting Breeding	47 (58)		Direct collision/ barotrauma	Almost certain	Minor	Low	Frequently recorded in WFA, as singles, pairs. Recorded flying at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Observed foraging in WFA and likely to hunt there regularly. Potential for breeding but no known nest sites in WFA. Loss of individuals likely but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Falco longipennis (Australian Hobby)	Not listed	Foraging Roosting Breeding	3 (4)		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Infrequently recorded in WFA, as singles, one pair. Recorded flying at height within RSA. Only 1 mortality in carcass monitoring from reviewed sources. Occasional foraging in WFA likely but not a regular inhabitant.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
									Potential for breeding but no known nest sites in WFA. Rare loss of individuals possible but is a widespread, abundant species, therefore unlikely to lead to reduction in population viability.
Austronomus australis (White-striped Free-tailed Bat)	Not listed	Foraging Roosting Breeding	High		Direct collision/ barotrauma	Almost certain	Minor	Low	Activity levels highest within the WFA. Second highest total number of calls recorded, overall. Largely absent in winter and autumn. Suspected to fly at heights within RSA. Recorded high mortalities (>100) in carcass monitoring from reviewed sources. Often represents the species with highest documented mortality. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the WFA and surrounds, therefore unlikely to lead to reduction in population viability.
Chalinolobus gouldii (Gould's Wattled Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Chalinolobus morio (Chocolate Wattled Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA overall. Far more active in summer by a factor of 10-20 compared with other seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10-100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Nyctophilus geoffroyi (Lesser Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year. Suspected to fly at heights within RSA. Recorded moderate mortalities (10 - 100) in carcass monitoring from reviewed sources. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.

Species	Cons. status	Potential use in WFA	No records/ detects (birds) Activity level (bats)[1]	Rec. flight height range	Potential impact	Likelhd.	Conseq.	Risk rating	Justification
Nyctophilus holtorum (Holt's Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, present in summer and autumn only. Suspected to fly at heights within RSA. No data found on wind farm mortalities but was previously classified within C. gouldii (Parnaby *et al.* 2021) therefore assume similar mortality risk to this species (moderate mortalities). Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Nyctophilus major (Greater Long-eared Bat)	Not listed	Foraging Roosting Breeding	Low		Direct collision/ barotrauma	Potential	Insignificant	Negligible	Low activity levels in WFA and BIA, all year, almost absent in winter. Suspected to fly at heights within RSA. No data found on wind farm mortalities. Rare loss of individuals due to low activity in WFA, reduction in population viability unlikely.
Vespadelus regulus (Southern Forest Bat)	Not listed	Foraging Roosting Breeding	Mod. (WFA) High (BIA)		Direct collision/ barotrauma	Almost certain	Minor	Low	Moderate activity levels in the WFA and high activity levels in the BIA. Highest total number of calls recorded, but also highest number of detections, so activity lower than for A. australis. Active all seasons. Suspected to fly at heights within RSA. Recorded moderate mortalities (10-100) in carcass monitoring from reviewed sources. Loss in numbers of individuals likely but is a widespread and relatively abundant species in the WFA and surrounds, therefore unlikely to lead to reduction in population viability.

[1]No. records (no. individuals) for birds; activity level for bats (see section 3.2.2).

7 DISCUSSION

This report documents the results of the two-year BBRAS, commencing in autumn 2023 and finishing in autumn 2025. Most analyses presented in this report (Section 5) have focused on the data collected in the fixed-point counts (birds) and 'ultrasonic recordings' (bats) from the BBRAS survey sites. The risk assessment (Section 6) also incorporates results from the Basic and Targeted fauna survey undertaken for the Project, with respect to birds and bats, as this provided additional data for potential species of concern (Phoenix 2025a).

The survey work completed to date represents a bird and bat utilisation survey program equivalent to a Level Two investigation in accordance with Brett Lane and Associates (2005). The risk assessment completed serves to evaluate the potential environmental impacts to birds and bats associated with the Project.

7.1 REGIONAL OVERVIEW

The climate of the WFA is moderate Mediterranean, with a strong seasonal rainfall gradient where over 65% of annual rainfall occurs between May and August each year. As such, the WFA has a distinct wet-dry regime over the course of a year. For around 3–4 months of the year (May–August), surface water is present across much of the Cleared areas, which essentially act as flooded grassland habitat, but which dissipates rapidly thereafter. Many of the wetlands retain surface water into spring, with at least one wetland, located south of Governor Broome Road, retaining water into summer and possibly permanently. This hydrologic regime is not as evident in the assemblage data as would be expected.

The study area is situated in a region of high floristic diversity (Phoenix 2025b) and is surrounded by a variety of bird and bat attracting landscape features/habitats, some occurring within the BIA outside the WFA boundary, such as dense forests (some of which are preserved in State Forest and National Park) and regionally important rivers (such as the Blackwood River and associated Hardy Inlet, and Scott River). Forest and woodland vegetation complexes mapped in the BIA (DBCA 2018) contain black cockatoo foraging, nesting and roosting plant species (e.g. *Acacia saligna*, *Agonis flexuosa*, *Banksia attenuata*, *B. grandis*, *B. littoralis*, *C. calophylla*, *E. marginata*, *E. patens* and *E. megacarpa*).

There are a number of ESAs associated with Threatened flora, TECs and wetlands, and a PEC present either in the WFA or the wider BIA. Artificial wetlands are present immediately west of the WFA which contain desktop records for a diversity of birds, including several conservation significant species in low numbers that were not recorded in this survey (Ninox 2011). There are no RAMSAR sites or internationally important wetlands located within the BIA; however, the 'Blackwood River (Lower Reaches) and Tributaries System' located ~4.5 km west of the WFA at its closest point (within the BIA) is listed as a nationally important wetland. The WFA is situated at the junction of 3 regional ecological linkages (Molloy *et al.* 2009a).

The topography of the WFA is generally flat to undulating. There are no outstanding topographic features that may cause updraft areas for soaring birds for example (though many soaring bird observations were made), or unique nesting opportunities, such as on cliffs tops or faces. This is important as the availability of nesting resources is often the limiting factor for raptor breeding, such as for Wedge-tailed Eagle, Peregrine Falcon and Osprey.

The regional overview found a diverse bird and bat assemblage as potentially occurring (199 and 7 species, respectively), that included 58 conservation significant birds and one conservation significant bat. Most of the conservation significant birds were listed as Migratory under the EPBC Act and/or BC Act. Three conservation significant species, the 3 Threatened black cockatoo species, had previously been recorded within the WFA (Figure 4-7), although the nature of how the cockatoos were using the site was not noted in the desktop records.

Fauna habitat mapping generated from the Detailed flora and vegetation survey (Phoenix 2025b) and the Basic and Targeted fauna survey (Phoenix 2025a) found 10 fauna habitat types in the WFA, including 3 wetland habitats, 2 woodlands and 5 highly modified habitats (comprising cleared areas, plantations and dams), with 68.7% of the WFA mapped as Cleared areas. The native habitats largely align with the habitats described for the Warren bioregion in which the majority of the WFA is located (May & McKenzie 2003).

7.2 FIELD SURVEY RESULTS

The fixed-point counts from the BBRAS field surveys recorded 96 bird species, which represents 49% of those identified in the desktop review. Eight bat species were recorded, which is one more than identified in the desktop review.

Despite the variety of habitats present in the WFA, and the BIA more broadly, just 6 of the 58 conservation significant birds from the regional overview were detected in the WFA during the surveys, including 5 in this BBRAS survey and Wood Sandpiper (Mig.) only during the Basic and Targeted fauna surveys Phoenix (2025a). The 3 Threatened black cockatoo species, Forest Red-tailed Black Cockatoo (VU), Baudin's Cockatoo (EN) and Carnaby's Cockatoo (EN), including those where the species could not be determined) were overwhelmingly the dominant conservation significant species recorded, collectively contributing 98% of such records in the WFA. All 3 black cockatoo species were directly observed feeding and were recorded from old feeding debris. However, while the PNT assessment conducted as part of the Basic and Targeted fauna survey (Phoenix 2025a) identified PNTs with hollows suitable for breeding in the WFA, no evidence of roosting or breeding was recorded.

The remaining 3 significant birds recorded in the WFA, Wood Sandpiper (Mig.), Osprey (Mig.) and Peregrine Falcon (OS), were all recorded from single observations, suggesting they are uncommon in the WFA. For Osprey and Peregrine Falcon, the data suggests the WFA forms a portion of a much larger home range and that breeding is taking place outside the WFA. This is supported by multiple records of Osprey that were obtained from the Regional reference sites at the Hardy Inlet. Another conservation significant bird, Masked Owl (southwest; P3), was recorded outside but near to the WFA, again only in low numbers (twice). One conservation significant bat species, Western False Pipistrelle, was recorded in the WFA, in this survey and Basic and Targeted fauna surveys Phoenix (2025a), from only 4 ultrasonic call detections.

Additional sites included in Year 2 of the BBRAS at the Hardy Inlet (Regional reference sites) recorded a further 7 conservation significant species (only at those sites), all Migratory. Five of these species were considered unlikely to occur within the WFA due to absence of suitable habitats and dietary preferences. The remaining 2 species, Sharp-tailed Sandpiper and Red-necked Stint may possibly occur in the WFA on occasion.

The likelihood of occurrence assessment for conservation significant species identified during the regional overview that were not detected during the surveys (see Section 5.3) determined an additional 2 conservation significant species to be likely to occur (1 Migratory species and one Priority species) on the basis of the proximity and recency of desktop records and presence of suitable habitat. Nine species were determined to possibly occur (all Migratory species, except for Australasian Bittern which is Endangered) and a further 10 were considered to possibly occur on rare occasion only.

In consideration of the survey records from 2 years of systematic bird surveys, the WFA supports few conservation significant bird species. Those that were recorded represent only a small portion of both the recorded bird assemblage and overall bird abundance. The various wetlands present, many of which retain water into the start of the migratory bird season were essentially absent Migratory species, with just the Wood Sandpiper being recorded, and only once. Banded Lapwing was the only 'shorebird' recorded (on 3 occasions) from wetland habitat; this species is not Migratory or otherwise conservation significant. Wetland habitats were instead found to support an array of ducks and

cormorants, and wading birds, such as Australian White Ibis, Straw-necked Ibis, and rarely Royal Spoonbill and Yellow-billed Spoonbill. The various remnant woodlands in the WFA, with their larger array of flowering plants were the habitats of primary value, as they support feeding for the 3 black cockatoo species.

As shown in section 5.1.2 the 10 most abundant species collectively represented 73.6% of the overall abundance of birds and the top 20 species represented 86.2%. Throughout the year Straw-necked Ibis and Australian White Ibis were pervasive, with small and large flocks regularly seen foraging in paddocks, or moving within, and in and out of, the WFA. Australian Raven was seen moving between sites and many nests were seen in degraded Peppermint woodlands and MJP woodland. Tree Martins, Australian Ringneck, Yellow-rumped Thornbill and Willie Wagtail dominated the records in open paddocks at or near ground-level often coming in close to observers. Pacific Black Duck and Australian Shelduck were commonly observed foraging in flooded paddocks over winter–spring months and in the wetlands for the remainder of the year. All 10 are species that are advantaged by modified habitats. Bird diversity and abundance did not correlate with seasons or the amount of standing water in the WFA (Figure 5-2).

Importantly, the wet period only partially overlaps the arrival of EAAF Migratory species, which start arriving in southwest WA in late spring, at which point the modified floodplain has dried (or is close to dry), but which would likely attract several Migratory species if it remained inundated. Further, despite the pronounced wet period where large areas of flooded grasslands are present, no overwintering Migratory bird species have been observed to date. Some of the basin wetlands (particularly those with a canopy of *Melaleuca* species) remain inundated through to early summer when Migratory species have arrived; however, they do not appear to be utilised by these species, with only a single species (Wood Sandpiper) being observed (3 individuals from single observation) during the Basic and Targeted fauna survey (Phoenix 2025a). It is considered most likely that the wetlands simply are not productive enough, or do not support the preferred food sources of many of the Migratory shorebirds.

Notwithstanding the above, minor incursions of Migratory species to the basin wetlands are likely to occur from time to time. The data therefore suggests that despite the abundance of 'wetland' habitats that could be expected to support a range of Migratory species, the inundation cycle, low productivity and available food sources precludes their presence, and instead the largely highly-modified environment favours species that respond positively to such environments, such as Pacific Black Duck, Australian Shelduck, Black Swan, and to a lesser extent species of cormorant and heron.

Bird flight height and direction of travel data was captured so that movements could be analysed within the context of the proposed turbine locations and modelled against the RSA airframe in support of any future collision risk modelling. The flight height and direction data however showed no clear trends, with movement N–S and E–W being fairly well balanced (Table 5-5). Further, movements, such as between habitat patches or into and out of the WFA were limited, being just 7.7% of all 2,634 observations. Therefore, the utility and importance of the WFA as a linkage between the large tracts of forest to the north and east, the Hardy Inlet at Augusta and the Proteaceous woodlands and shrublands to the south is not strongly supported. The data and general observations do however more strongly support the assumption that the habitats within the WFA, particularly the north-south chain of remnant bushland and wetlands (largely in the central area) act as internal stepping stones for small-moderate bush birds, such as Australian Raven, Australian Ringneck, Willie Wagtail, Australian Magpie, White-fronted Chat and Grey Butcherbird, which were regularly seen crossing paddocks from one remnant to the next. Raptors were observed hunting from <10 m to 800 m above ground-level, moving over open paddocks and remnants. Raptors comprised the two Orders most recorded within the RSA height range and had the highest mean flight height (Appendix 6). The importance of remnants in the maintenance of biodiversity and as stepping stones in agricultural landscapes for birds (and bats) is well documented (Arnold *et al.* 1987; Bentley & Catterall 1997;

Collard *et al.* 2009; Donald & Evans 2006; Fischer & Lindenmayer 2002a, b; Johnson *et al.* 2007; Major *et al.* 2001).

7.3 RISK ASSESSMENT

Four potential impacts to birds and bats arise from wind farms, including habitat loss, mortality or injury from collision with wind turbine blades, and alienation or displacement leading to disruption to feeding or breeding behaviour (Table 6-1). In consideration of these potential impacts a risk assessment was undertaken for all conservation significant species recorded or considered likely or potentially occurring (Table 6-2), as well as for all other potential species of concern, that is, non-conservation significant species that are particularly vulnerable to collision risk due to their morphology, behaviour, flight type and/or habitat use (i.e. birds of prey and bats; Table 6-3).

The assessment found no species to be at high risk from the Project, but 3 species to be at moderate risk, Forest Red-tailed Black Cockatoo, Baudin's Cockatoo and Carnaby's Cockatoo. The risk profile and reasoning was similar for all 3 black cockatoo species: all were recorded on multiple occasions in the WFA and within the RSA (except Baudin's Cockatoo), they all have small total population estimates, are slow breeding and display strong pair bonding. No mortality monitoring data was available for these species; however, the related *Zanda funerea* from south-eastern Australia, which may be considered a suitable surrogate due morphological, habitat and movement characteristics, had no reported mortalities from the reviewed literature sources. However, both Forest Red-tailed Black Cockatoo and Carnaby's Cockatoo were recorded flying at heights within the RSA of the WFA, but only twice each. This is similar to the results of (BCE 2025) which found just 1.9% of Carnaby's Cockatoo flights were above 18 m (within the original RSA) and that increasing the minimum rotor height to 50 m would reduce the number of flight within the RSA to 0.13%. (BCE 2025) also notes personal observations of Carnaby's Cockatoo adjusting flight heights as they approach turbines, perhaps suggested a learnt behaviour response.

While Baudin's Cockatoo was not recorded at RSA heights, it is suspected to reach RSA heights on occasion. Given that, and the lack of species-specific data on turbine strike risk for the 3 WA species, a precautionary assessment is warranted. It is noted that the RSA flight heights for Forest Red-tailed Black Cockatoo and Carnaby's Cockatoo were limited to the lowest RSA category of 26-50 m.

The mortality risk for the 3 black cockatoo species is reduced by the relatively low numbers recorded in the WFA, considering the number of sampling phases, survey effort and duration of the survey program. The abundance data indicates that their local populations are small and any mortality experienced is unlikely to have a significant impact on the total population, with the risk assessment finding potential for minor reduction in population viability for between one and 5 years from loss of individuals from turbine strike. The risk is also reduced by the lack of breeding or roosting sites within the WFA or wider BIA. While there is high and moderate quality foraging habitat in WFA, the proposed cleared of the small amount (<1 ha) of this habitat is unlikely to affect the local populations when extensive suitable foraging habitat is present outside the WFA.

Risk was assessed as negligible for the remaining 4 conservation significant bird species recorded in the WFA (Wood Sandpiper, Osprey, Peregrine Falcon) or wider BIA (Masked Owl (southwest)). Direct collision with turbine blades is considered the primary potential impact to these species but they are considered at negligible risk principally because they were recorded so rarely (once or twice each) and as single birds (Osprey, Peregrine Falcon, Masked Owl) or small groups (Wood Sandpiper, flock of 3), indicating likely only occasional occurrence in the WFA. Even for the 2 species recorded at RSA heights (Osprey and Peregrine Falcon), their limited presence and lack of breeding on site means the associated risk from the proposed wind farm is negligible.

The risk assessment for Western False Pipistrelle (P4), the only conservation significant bat species detected, determined that the proposed wind farm represents a low risk to this species. This species

was the least recorded bat species. Direct turbine blade strike is again considered the most likely impact from the Project; however, it is noted that the literature suggests it typically stays close to remnant vegetation, rarely venturing out into open paddocks. This is supported by the survey data, of the 6 recorded sites, only one is in open paddock, and was located between a cluster of remnants. The other 5 sites were in or at the edge of larger native remnants or roadside remnants. A precautionary approach has been taken as so little is known of this species, therefore, it has been assumed the species will fly at RSA heights and so has the potential to be at strike-risk, but due primarily to the lack of knowledge was determined to be at low risk, rather than negligible risk.

The Australasian Bittern (EN), which was also rated low risk. It was not recorded within the WFA or wider BIA, despite audio recordings taken at suitable habitat through the breeding season (Phoenix 2025a). However, it has been reported from Hardy Inlet (12 km west) and Gingilup/Quitchup/Jasper wetlands (~30 km SE) and limited information was available on the local population distribution. As the WA population of Australasian Bittern is very small, any loss of individuals may have a temporary impact on local population viability. Given this, and because of its potential to occasionally use the larger wetlands in the WFA and potentially fly within the height of the RSA, it was assigned a risk rating of low.

For the 2 undetected conservation significant species considered likely to occur (Blue-billed Duck, P4 and Common Greenshank, Mig.) the risk was determined to be negligible. For Blue-billed Duck there are no records from the WFA and no mortalities have been reported from carcass monitoring. Similarly, Common Greenshank has no records in the WFA, however suitable habitat is present in the form of flooded paddocks and wetlands. No mortalities have been reported in carcass monitoring and its population size means losses would be expected to be undetectable.

The risk to the 18 additional undetected conservation significant species considered to possibly occur, or possibly occur on rare occasion, was also found to be negligible. Most of these are Migratory shorebirds, many of which largely favour marine/intertidal habitats but cannot be discounted from occurring on occasion, with none considered likely to utilise the WFA on a regular basis during the Migratory shorebird season. The 2 non-shorebird species, Fork-tailed Swift and Grey Wagtail, are typically more northern species and their presence in the desktop is a function of 'modelled distribution' rather than actual records.

Curlew Sandpiper (CR, Mig.) Sharp-tailed Sandpiper (VU, Mig.) have not been recorded close to the WFA in a long time (1979/1980) from the adjacent artificial wetlands. All other records are from to the Hardy Inlet. Inland freshwater wetlands are not their preferred habitats, but they will use them on occasion in southwest WA. As such the risk to these two species is negligible.

For the non-significant bird species of concern (11 raptor species; Wedge-tailed Eagle, Swamp Harrier, Black-shouldered Kite, White-bellied Sea-Eagle, Whistling Kite, Little Eagle, Collared Sparrowhawk, Brown Goshawk, Brown Falcon, Australian Kestrel and Australian Hobby) the risk assessment found the risk to be low to negligible. While the likelihood of a collision for the majority of those 11 species ranged from potential to almost certain, the consequence of strike was considered insignificant to minor as the loss of small numbers of individuals is unlikely to impact local and regional populations. Those individuals would be readily replaced by individuals already occupying the abundant habitat available outside the WFA.

The preliminary risk assessment for non-significant bats found the risk to be negligible for 5 of the 7 species present (Gould's Wattled Bat, Chocolate Wattled Bat, Lesser Long-eared Bat, Holt's Long-eared Bat and Greater Long-eared Bat). Southern Forest Bat and White-striped Free-tailed bat were found to be at low risk. Similarly to the non-significant bird species of concern, the likelihood of collision for these species ranged from potential to almost certain; and the consequence of collisions was considered insignificant to minor. For the Southern Forest Bat and White-striped Free-tailed bat the

consequence was assessed as minor due to the combination of their higher activity level in the WFA and their high recorded mortality from reviewed sources.

Based on the flight heights recorded, the data suggests that increasing the minimum blade height to 50 m would reduce the total number of birds species recorded flying within the RSA from 52 to 24 species, a 54% reduction. This includes the 3 black cockatoos and Western False Pipistrelle but excludes raptors, which were often recorded flying above 50 m. Further, with the RSA minimum raised to 50 m, only 3.8% of all flight where height observations were recorded would be from within the RSA. As well as increasing the minimum RSA height, collision risk could be further reduced by limiting the concentration of turbines and increasing the separation distance of turbines from important habitat to maintain adequate open areas for bird and bat movement.

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Appendix 1 Survey site locations

BBRAS sites (current survey)

Site	Latitude	Longitude
BUS001	-34.22466	115.26917
BUS002	-34.26111	115.30009
BUS003	-34.23805	115.27883
BUS004	-34.22428	115.30666
BUS005	-34.21547	115.29346
BUS006	-34.18121	115.27773
BUS007	-34.23796	115.2892
BUS008	-34.19273	115.30802
BUS009	-34.19894	115.30008
BUS010	-34.24018	115.30199
BUS011	-34.25074	115.29583
BUS012	-34.25982	115.3251
BUS013	-34.20639	115.25518
BUS014	-34.16078	115.31235

Site	Latitude	Longitude
BUS015	-34.28284	115.28826
BUS016	-34.23337	115.27104
BUS018	-34.19148	115.28455
BUS019	-34.24013	115.32174
BUS020	-34.24712	115.27984
BUS025	-34.20266	115.29829
BUS026	-34.19817	115.31756
BUS027	-34.22569	115.31795
BUS030	-34.31733	115.17962
BUS031	-34.28922	115.17638
BUS032	-34.32004	115.16611
BUS033	-34.32238	115.17119
BUS034	-34.31655	115.18542
BUS035	-34.27017	115.29774

Basic and Targeted fauna survey sites (Phoenix 2025a) with bird/bat survey effort and/or bird/bat records

Site	Latitude	Longitude
AQU-01	-34.2475	115.2713
AQU-02	-34.2487	115.2761
AQU-03	-34.2495	115.2794
AQU-15	-34.1805	115.2805
AQU-18	-34.1852	115.2766
AQU-25	-34.1748	115.2828
AQU-28	-34.2349	115.3125
AQU-30	-34.2323	115.3077
AQU-39	-34.2578	115.2982
AQU-40	-34.2561	115.3021
AQU-45	-34.2311	115.2995
AQU-51	-34.2251	115.3052
AQU-53	-34.2267	115.3004
AQU-55	-34.207	115.3006
AQU-57	-34.1984	115.2935
AQU-Opp04	-34.2387	115.2695
BC2024_01	-34.1993	115.3148
BCForaging	-34.1994	115.3119
BCRoosting01	-34.1926	115.2777
BCRoosting03	-34.1985	115.3015
BCRoosting04	-34.2242	115.3068
BCRoosting05	-34.2402	115.3138
BCRoosting06	-34.2502	115.2801
BCRoosting07	-34.1982	115.3156
BCRoosting09	-34.2478	115.3156
BCRoosting10	-34.1738	115.291
BCRoosting11	-34.1766	115.2949
BCRoosting12	-34.2379	115.3231
BCRoosting13	-34.2443	115.3233

Site	Latitude	Longitude
BCRoosting14	-34.2619	115.2944
BCRoosting15	-34.1746	115.2741
BCRoosting16	-34.1927	115.3217
BCRoosting17	-34.2565	115.3011
BCRoosting18	-34.2243	115.3209
Bfalcon	-34.2402	115.2936
Birding01	-34.1971	115.3075
Birding02	-34.2285	115.3093
Birding03	-34.2426	115.3207
Black Cockatoos	-34.2593	115.2679
CarnabysCockies02	-34.1601	115.3133
FRTBC-01	-34.2379	115.3224
FRTBC-02	-34.2492	115.2843
FRTBC-03	-34.1994	115.3119
FRTBC-04	-34.2609	115.2702
FRTBC-05	-34.1875	115.2747
FRTBC-06	-34.1844	115.2825
Mowl01	-34.2597	115.2701
Opp06	-34.2166	115.2693
Opp07	-34.2138	115.2696
Opp11	-34.2343	115.2812
Opp12	-34.2001	115.3119
Opp13	-34.1875	115.321
Opp15	-34.1938	115.3221
Opp17	-34.21	115.282
Opp19	-34.1772	115.2804
Opp20	-34.2568	115.3016
Osprey	-34.2438	115.281
Raven01	-34.2377	115.3226

Site	Latitude	Longitude
SM4-01	-34.1998	115.3143
SM4-02	-34.1996	115.312
SM4-03 (failed)	-34.2375	115.3203
SM4-04	-34.2455	115.3215
SM4-05	-34.251	115.2829
SM4-06	-34.1919	115.2732
SM4-07	-34.192	115.2695
Tawny01	-34.2377	115.3223
VER-09	-34.2002	115.2949
VER-16	-34.2399	115.3064
VER-17	-34.2602	115.2697
VER-21	-34.2518	115.283
VER-22	-34.2505	115.2698
VER-30	-34.1598	115.2783
VER-31	-34.1613	115.3128
VER-32	-34.1569	115.4017
VER-33	-34.2296	115.3028
VER-35	-34.2308	115.2975
VER-36	-34.217	115.2886
VER-37	-34.2103	115.284

Site	Latitude	Longitude
VER-38	-34.2511	115.3038
VER-39	-34.2563	115.3021
VER-40	-34.2757	115.3051
VER-41	-34.2756	115.2922
VER-42	-34.2769	115.3021
VER-43	-34.2187	115.3099
VER-44	-34.2007	115.2671
VER-45	-34.1754	115.2838
VER-46	-34.1743	115.2803
VER-47	-34.1783	115.29
VER-49	-34.1832	115.2848
VER-Opp01	-34.2457	115.3229
VER-Opp04	-34.159	115.2781
VER-Opp07	-34.1743	115.2803
VER-Opp08	-34.1739	115.2933
WedgeyOpp	-34.1728	115.2743
Wetland01	-34.2513	115.3033
Wetland02	-34.2568	115.3023
Wetland03	-34.1803	115.2816
White-tail_Foraging	-34.1848	115.2819

Appendix 2 Survey site descriptions

Site details			
Site	**BUS001**	**Position (WGS84)**	115.2692, -34.2247
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
2	Opportunistic sighting	25 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	21 Oct 2024	21 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	14 Nov 2024	14 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	17 Jan 2025	17 Jan 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	14 Feb 2025	14 Feb 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
22	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (24 May 2023)			
Paddock with autumn-early spring pools and small stream; completely degraded. Beenup constructed wetlands across the road to the West. Roadside vegetation condition weed infested and in completely degraded condition.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS002**	**Position (WGS84)**	115.3001, -34.2611
Slope	negligible	**Topography**	floodplain
Soil colour	black	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	18 Oct 2024	18 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	14 Nov 2024	14 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	17 Jan 2025	17 Jan 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	14 Feb 2025	14 Feb 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
22	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (25 May 2023)			
Paddock, with small water body containing no fringing native vegetation. Dead Melaleuca sp. trees pushed over and into piles. Some water birds using waterbody, including nesting black swans.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS003**	**Position (WGS84)**	115.2788, -34.2381
Slope	negligible	**Topography**	floodplain
Soil colour	black, grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
1	Opportunistic sighting	19 Nov 2023	19 Nov 2023
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock, with a few stands of Agonis sp. (peppermint) trees present, and no understorey. Completely degraded.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS004**	**Position (WGS84)**	115.3067, -34.2243
Slope	negligible	**Topography**	floodplain
Soil colour	grey, brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Fixed-point count	26 May 2023	26 May 2023
1	Site description	26 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	16 Aug 2023	16 Aug 2023
4	Fixed-point count	17 Nov 2023	17 Nov 2023
1	Audio recording	18 Nov 2023	19 Nov 2023
2	Ultrasonic recording	18 Nov 2023	19 Nov 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
8	Fixed-point count	27 Sep 2024	27 Sep 2024
9	Fixed-point count	30 Sep 2024	30 Sep 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	17 Oct 2024	17 Oct 2024
12	Fixed-point count	13 Nov 2024	13 Nov 2024
13	Fixed-point count	14 Nov 2024	14 Nov 2024
14	Fixed-point count	11 Dec 2024	11 Dec 2024
15	Fixed-point count	11 Dec 2024	11 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	16 Jan 2025	16 Jan 2025
18	Fixed-point count	13 Feb 2025	13 Feb 2025
19	Fixed-point count	13 Feb 2025	13 Feb 2025
20	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
21	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (26 May 2023)			
Open paddock, with blue gum plantation to the north, wetlands to the south, Peppermint parkland to the north-east.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS005**	**Position (WGS84)**	115.2935, -34.2155
Slope	negligible	**Topography**	floodplain
Soil colour	black, grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Fixed-point count	26 May 2023	26 May 2023
1	Site description	26 May 2023	26 May 2023
1	Opportunistic sighting	26 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	16 Aug 2023	16 Aug 2023
4	Fixed-point count	17 Nov 2023	17 Nov 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
1	Audio recording	18 Nov 2023	19 Nov 2023
2	Ultrasonic recording	18 Nov 2023	19 Nov 2023
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	16 Jan 2025	16 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (26 May 2023)			
Paddock site surrounded by excellent condition remnant vegetation, including narrow a strip of quality Banksia/Peppermint woodland immediately to the north; and a large, connected remnant of Eucalypt-wetland and Peppermint/Melaleuca bushland to the west, east and south.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS006**	**Position (WGS84)**	115.2777, -34.1812
Slope	gentle	**Topography**	floodplain
Soil colour	black	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Site description	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	28 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	12 Jan 2024	12 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Paddock, with Blue gum plantation 120m to the west. High quality remnant woodland to the NW and various sumplands in vicinity.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS007**	**Position (WGS84)**	115.2892, -34.2380
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock with isolated peppermint trees. Gently undulating.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS008**	**Position (WGS84)**	115.3080, -34.1927
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	24 May 2023	24 May 2023
1	Site description	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
5	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	11 Jan 2024	11 Jan 2024
7	Fixed-point count	27 Sep 2024	27 Sep 2024
8	Fixed-point count	30 Sep 2024	30 Sep 2024
9	Fixed-point count	17 Oct 2024	17 Oct 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	13 Nov 2024	13 Nov 2024
12	Fixed-point count	14 Nov 2024	14 Nov 2024
13	Fixed-point count	11 Dec 2024	11 Dec 2024
14	Fixed-point count	11 Dec 2024	11 Dec 2024
15	Fixed-point count	17 Jan 2025	17 Jan 2025
16	Fixed-point count	17 Jan 2025	17 Jan 2025
17	Fixed-point count	13 Feb 2025	13 Feb 2025
18	Fixed-point count	13 Feb 2025	13 Feb 2025
19	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
20	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (24 May 2023)			
Open paddock, near flat, under powerlines, adjacent small degraded seasonally inundated shrubland.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS009**	**Position (WGS84)**	115.3001, -34.1989
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	25 May 2023	25 May 2023
3	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Ultrasonic recording	17 Nov 2023	18 Nov 2023
1	Audio recording	17 Nov 2023	18 Nov 2023
4	Fixed-point count	18 Nov 2023	18 Nov 2023
5	Fixed-point count	10 Jan 2024	10 Jan 2024
2	Audio recording	10 Jan 2024	11 Jan 2024
3	Ultrasonic recording	10 Jan 2024	11 Jan 2024
6	Fixed-point count	11 Jan 2024	11 Jan 2024

Site description - Sample no. 1 (24 May 2023)			
Paddock alongside small, fenced wetland with windmill feeding small dam - attracting birds. Small degraded remnants of Peppermint woodland to the east and northeast, and excellent condition wetlands to the southwest.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS010**	**Position (WGS84)**	115.3020, -34.2402
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
1	Site description	25 May 2023	25 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
2	Ultrasonic recording	15 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
3	Audio recording	10 Jan 2024	11 Jan 2024
4	Ultrasonic recording	10 Jan 2024	11 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
9	Fixed-point count	27 Sep 2024	27 Sep 2024
10	Fixed-point count	30 Sep 2024	30 Sep 2024
11	Fixed-point count	17 Oct 2024	17 Oct 2024
12	Fixed-point count	18 Oct 2024	18 Oct 2024
13	Fixed-point count	13 Nov 2024	13 Nov 2024
14	Fixed-point count	13 Nov 2024	13 Nov 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	17 Jan 2025	17 Jan 2025
18	Fixed-point count	14 Feb 2025	14 Feb 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (25 May 2023)			
Open, flat paddock, with isolated peppermint low trees and tall shrubs. Completely degraded.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS011**	**Position (WGS84)**	115.2958, -34.2507
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam, sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Site description	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	10 Jan 2024	10 Jan 2024
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	27 Sep 2024	27 Sep 2024
9	Fixed-point count	30 Sep 2024	30 Sep 2024
10	Fixed-point count	17 Oct 2024	17 Oct 2024
11	Fixed-point count	18 Oct 2024	18 Oct 2024
12	Fixed-point count	13 Nov 2024	13 Nov 2024
13	Fixed-point count	14 Nov 2024	14 Nov 2024
14	Fixed-point count	12 Dec 2024	12 Dec 2024
15	Fixed-point count	12 Dec 2024	12 Dec 2024
16	Fixed-point count	16 Jan 2025	16 Jan 2025
17	Fixed-point count	17 Jan 2025	17 Jan 2025
18	Fixed-point count	14 Feb 2025	14 Feb 2025
19	Fixed-point count	14 Feb 2025	14 Feb 2025
20	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
21	Fixed-point count	07 Mar 2025	07 Mar 2025

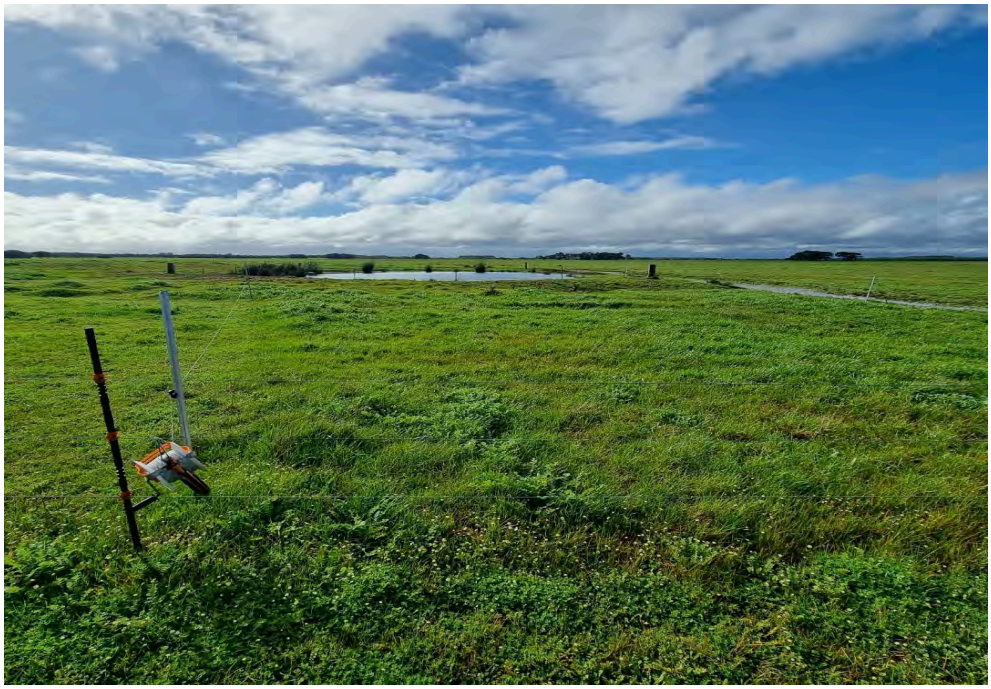
Site description - Sample no. 1 (24 May 2023)			
Open, flat paddock adjacent excellent condition roadside shrubland. Paddock gently slopes south toward the coast and Scott River.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS012**	**Position (WGS84)**	115.3251, -34.2598
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	14 Aug 2023	14 Aug 2023
1	Site description	14 Aug 2023	14 Aug 2023
2	Fixed-point count	15 Aug 2023	15 Aug 2023
1	Audio recording	15 Aug 2023	16 Aug 2023
1	Ultrasonic recording	15 Aug 2023	16 Aug 2023

Site description - Sample no. 1 (14 Aug 2023)			
Open paddock, adjacent small dam to the north and degraded peppermint woodland remnants to the south.			
Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS013**	**Position (WGS84)**	115.2552, -34.2064
Slope	negligible	**Topography**	floodplain
Soil colour	brown	**Soil texture**	clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Fixed-point count	24 May 2023	24 May 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	18 Nov 2023	19 Nov 2023
3	Ultrasonic recording	18 Nov 2023	19 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024

Site description - Sample no. 1 (24 May 2023)			
Flat, open paddock, with few trees present. Adjacent roadside Jarrah-Marri forest remnant in excellent good condition for the most part.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS014**	**Position (WGS84)**	115.3123, -34.1608
Slope	negligible	**Topography**	floodplain
Soil colour	black, brown	**Soil texture**	sand, clay loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	24 May 2023	24 May 2023
1	Ultrasonic recording	24 May 2023	25 May 2023
1	Site description	24 May 2023	24 May 2023
2	Fixed-point count	25 May 2023	25 May 2023
1	Opportunistic sighting	24 May 2023	24 May 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	15 Aug 2023	15 Aug 2023
5	Fixed-point count	18 Nov 2023	18 Nov 2023
2	Audio recording	19 Nov 2023	20 Nov 2023
3	Ultrasonic recording	19 Nov 2023	20 Nov 2023
6	Fixed-point count	19 Nov 2023	19 Nov 2023
7	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024
8	Fixed-point count	12 Jan 2024	12 Jan 2024

Site description - Sample no. 1 (24 May 2023)

Open paddock with no trees remaining. Adjacent high-quality roadside remnant of Jarrah-Marri woodland, so the east and north. And with large expanse of National Park and Reserves also to the east and north.

Habitat	grassland		
Disturbance	large-scale clearing, grazing-high		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS015**	**Position (WGS84)**	115.2883, -34.2828
Slope	gentle	**Topography**	floodplain
Soil colour	grey	**Soil texture**	sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Site description	25 May 2023	25 May 2023
1	Fixed-point count	25 May 2023	25 May 2023
1	Ultrasonic recording	25 May 2023	26 May 2023
2	Fixed-point count	26 May 2023	26 May 2023
2	Ultrasonic recording	14 Aug 2023	15 Aug 2023
1	Audio recording	14 Aug 2023	15 Aug 2023
3	Fixed-point count	14 Aug 2023	14 Aug 2023
4	Fixed-point count	16 Aug 2023	16 Aug 2023
5	Fixed-point count	17 Nov 2023	17 Nov 2023
2	Audio recording	17 Nov 2023	18 Nov 2023
3	Ultrasonic recording	17 Nov 2023	18 Nov 2023
6	Fixed-point count	18 Nov 2023	18 Nov 2023
7	Fixed-point count	10 Jan 2024	10 Jan 2024
8	Fixed-point count	11 Jan 2024	11 Jan 2024
3	Audio recording	11 Jan 2024	14 Jan 2024
4	Ultrasonic recording	11 Jan 2024	14 Jan 2024

Site description - Sample no. 1 (25 May 2023)			
Open paddock gently sloping down toward a Scott River to the north. Stands of degraded Peppermint woodland present, devoid of vegetated understorey, but with excellent condition native vegetation immediately to the south.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	101	**Litter distribution**	none
Tree cover (%)	1	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS016**	**Position (WGS84)**	115.2710, -34.2334
Slope	negligible	**Topography**	floodplain
Soil colour	red-brown	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	21 Oct 2024	21 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	12 Dec 2024	12 Dec 2024
8	Fixed-point count	12 Dec 2024	12 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)			
Open, flat paddock. Nearest trees are a strip of mature Pine, 200m to the west.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS018**	**Position (WGS84)**	115.2845, -34.1915
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	21 Oct 2024	21 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Open, gently undulating paddock. Nearest native vegetation is approximately 450m to the northeast and is a degraded Jarrah-Marri woodland. A Bluegum plantation occurs 650m to the west.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS019**	**Position (WGS84)**	115.3217, -34.2401
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	18 Oct 2024	18 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	13 Nov 2024	13 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)

Open, gently undulating paddock, dissected by track. Excellent condition Jarrah-Marri-Peppermint woodland 240m to the north. Eucalypt plantation 160m to the east. A few old Peppermint shade trees in southern paddock, but no trees in the northern paddock.

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	2	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	98	**Herb cover (%)**	0



Site details			
Site	**BUS020**	**Position (WGS84)**	115.2798, -34.2471
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	loamy sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	18 Oct 2024	18 Oct 2024
4	Fixed-point count	18 Oct 2024	18 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	12 Dec 2024	12 Dec 2024
8	Fixed-point count	12 Dec 2024	12 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	14 Feb 2025	14 Feb 2025
12	Fixed-point count	14 Feb 2025	14 Feb 2025
13	Fixed-point count	07 Mar 2025	07 Mar 2025
14	Fixed-point count	07 Mar 2025	07 Mar 2025
1	Site description	07 Mar 2025	07 Mar 2025

Site description - Sample no. 1 (07 Mar 2025)

Open, flat paddock intersected by track and drain. The area is generally highly degraded. The nearest trees occur as a windbreak line of introduced Eucalypts to the NW

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS025**	**Position (WGS84)**	115.2983, -34.2027
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	17 Jan 2025	17 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Paddock with seasonally wet depression containing small Melaleuca-grove, mostly dead 100m to the north. An excellent condition seasonally inundated shrubland occurs 100m to the north, and excellent condition Jarrah-Marri woodland 200m to the east.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS026**	**Position (WGS84)**	115.3176, -34.1982
Slope	negligible	**Topography**	floodplain
Soil colour	grey	**Soil texture**	sand
Rock cover (%)	0	**Rock type**	none

Sample and effort summary

Sample no.	Sample method	Date start	Date stop
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	17 Jan 2025	17 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)

Open, flat paddock, with only a few remaining small trees present. The nearest native remnant is excellent condition bushland 230m to the west.

Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS027**	**Position (WGS84)**	115.3180, -34.2257
Slope	negligible	**Topography**	floodplain
Soil colour	brown-grey	**Soil texture**	sandy loam
Rock cover (%)	5	**Rock type**	laterite

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	27 Sep 2024	27 Sep 2024
2	Fixed-point count	30 Sep 2024	30 Sep 2024
3	Fixed-point count	17 Oct 2024	17 Oct 2024
4	Fixed-point count	17 Oct 2024	17 Oct 2024
5	Fixed-point count	13 Nov 2024	13 Nov 2024
6	Fixed-point count	14 Nov 2024	14 Nov 2024
7	Fixed-point count	11 Dec 2024	11 Dec 2024
8	Fixed-point count	11 Dec 2024	11 Dec 2024
9	Fixed-point count	16 Jan 2025	16 Jan 2025
10	Fixed-point count	16 Jan 2025	16 Jan 2025
11	Fixed-point count	13 Feb 2025	13 Feb 2025
12	Fixed-point count	13 Feb 2025	13 Feb 2025
13	Fixed-point count	06 Mar 2025	06 Mar 2025
1	Site description	06 Mar 2025	06 Mar 2025
14	Fixed-point count	06 Mar 2025	06 Mar 2025

Site description - Sample no. 1 (06 Mar 2025)			
Open, gently undulating paddock with scattered Peppermint Trees. The closest remnant vegetation is a Peppermint-Melaleuca woodland with a wetland, 350m to the southwest.			
Habitat	grassland		
Disturbance	grazing-high, large-scale clearing		
Vegetation condition	Completely Degraded	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100	**Herb cover (%)**	0



Site details			
Site	**BUS030**	**Position (WGS84)**	115.1796, -34.3173
Slope	negligible	**Topography**	tidal wetland
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Relatively deep section of Swan Lake, margins vegetated for the most part. With areas of varying water column depth present due to sandbars, offering a variety of feeding opportunities for waterbirds.			
Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS031**	**Position (WGS84)**	115.1764, -34.2892
Slope	negligible	**Topography**	river - sand bar
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)

Sandbar in Blackwood River channel, approximately 5km north of the river mouth. This bar holds abundant small to large waterbirds over the summer months, but overwintering birds are also common. It is often completely inundated on higher tides at which time only larger birds remain. Feeding and roosting/loading take place on mid-low tides.

Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS032**	**Position (WGS84)**	115.1661, -34.3200
Slope	negligible	**Topography**	inlet
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Sandbar 800 north of the Blackwood River mouth. As with others, this bar also holds abundant small to large waterbirds over the summer months, but overwintering birds are also common. It is often completely inundated on higher tides at which time only larger birds remain. Feeding and roosting/loading take place on mid-low tides.			
Habitat	beach		
Disturbance			
Vegetation condition		**Fire age**	
Total veg. cover (%)	0	**Litter distribution**	
Tree cover (%)		**Litter depth (cm)**	0.0
Shrub cover (%)		**Litter cover (%)**	0
Grass cover (%)		**Herb cover (%)**	



Site details			
Site	**BUS033**	**Position (WGS84)**	115.1712, -34.3224
Slope	negligible	**Topography**	inlet
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Sandbar at the confluence of Blackwood River and 'dead water' entrances. The bar is usually flooded at high tide and offers feeding and roosting opportunities at lower tides for a variety of waterbirds.			
Habitat	beach		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Site details			
Site	**BUS034**	**Position (WGS84)**	115.1854, -34.3166
Slope	negligible	**Topography**	embayment
Soil colour	not applicable	**Soil texture**	not applicable
Rock cover (%)	0	**Rock type**	not applicable

Sample and effort summary			
Sample no.	**Sample method**	**Date start**	**Date stop**
1	Fixed-point count	29 Sep 2024	29 Sep 2024
2	Fixed-point count	02 Dec 2024	02 Dec 2024
1	Site description	29 Sep 2024	29 Sep 2024

Site description - Sample no. 1 (29 Sep 2024)			
Shallow embayment at the eastern end of 'dead water'. Algal mat covering surface. Lots of birds feeding. Open water to the west, opens into Hardy Inlet and the Blackwood River mouth.			
Habitat	beach		
Disturbance			
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	0	**Litter distribution**	none
Tree cover (%)	0	**Litter depth (cm)**	0.0
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	0	**Herb cover (%)**	0



Appendix 3 Desktop and field survey bird and bat species records

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Birds (207)															
Anatidae	*Anas castanea*	Chestnut Teal										•		•	
Anatidae	*Anas gracilis*	Grey Teal			•	•						•		•	•
Anatidae	*Anas superciliosa*	Pacific Black Duck			•	•				•		•		•	•
Anatidae	*Aythya australis*	Hardhead			•	•						•			
Anatidae	*Biziura lobata*	Musk Duck			•	•						•		•	•
Anatidae	*Chenonetta jubata*	Australian Wood Duck			•	•				•		•		•	•
Anatidae	*Cygnus atratus*	Black Swan		•	•	•						•		•	•
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck										•		•	
Anatidae	*Oxyura australis*	Blue-billed Duck	P4 (DBCA list)		•	•						•	•		
Anatidae	*Spatula rhynchotis*	Australasian Shoveler			•	•						•		•	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		•	•	•				•		•		•	•
Apodidae	*Apus pacificus*	Fork-tailed Swift	Mig. (EPBC & BC Acts)					•							
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			•	•				•					
Podargidae	*Podargus strigoides*	Tawny Frogmouth			•	•				•				•	
Charadriidae	*Anarhynchus bicinctus*	Double-banded Plover	Mig. (EPBC & BC Acts)										•		
Charadriidae	*Anarhynchus leschenaultii*	Greater Sand Plover	VU/Mig. (EPBC Act); VU (BC Act)		•			•					•		
Charadriidae	*Anarhynchus mongolus*	Siberian Sand Plover	EN/Mig. (EPBC Act); EN (BC Act)										•		
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		•	•	•		•				•			•[4]
Charadriidae	*Charadrius cucullatus*	Hooded Plover/Dotterel	P4 (DBCA list)		•	•		•					•		
Charadriidae	*Charadrius melanops*	Black-fronted Dotterel			•							•		•	
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	Mig. (EPBC & BC Acts)		•			•					•		
Charadriidae	*Pluvialis squatarola*	Grey Plover	VU/Mig. (EPBC Act); Mig. (BC Act)		•										
Charadriidae	*Vanellus tricolor*	Banded Lapwing			•	•						•		•	•
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher			•										
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		•	•	•									•[4]
Laridae	*Anous tenuirostris melanops*	Australian Lesser Noddy	VU (EPBC Act); EN (BC Act)					•							
Laridae	*Chlidonias hybrida*	Whiskered Tern			•										
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		•	•	•						•			•[4]
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)		•	•		•				•	•		•[4]
Laridae	*Larus dominicanus*	Kelp Gull			•										
Laridae	*Larus pacificus*	Pacific Gull		•	•	•		•							•[4]
Laridae	*Onychoprion anaethetus*	Bridled Tern	Mig. (EPBC & BC Acts)		•			•					•		
Laridae	*Stercorarius pomarinus*	Pomarine Skua (Pomarine Jaeger)	Mig. (EPBC & BC Acts)		•										
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)		•	•		•							•[4]
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)		•	•							•		•[4]
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt			•										
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt			•							•			
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet			•	•									
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Mig. (EPBC & BC Acts)		•			•				•	•		
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	VU/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)					•				•	•		•[4]
Scolopacidae	*Calidris alba*	Sanderling	Mig. (EPBC & BC Acts)		•	•		•					•		•[4]

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Scolopacidae	*Calidris canutus*	Red Knot	VU/Mig. (EPBC Act); EN (BC Act)		•			•					•		
Scolopacidae	*Calidris falcinellus*	Broad-billed Sandpiper	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	Mig. (EPBC & BC Acts)		•			•							
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)		•			•					•		•[4]
Scolopacidae	*Calidris tenuirostris*	Great Knot	VU/Mig. (EPBC Act); CR (BC Act)		•			•					•		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)		•			•					•		•[4]
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	EN/Mig. (EPBC Act); Mig. (BC Act)		•								•		
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR/Mig. (EPBC Act); CR (BC Act)					•					•		
Scolopacidae	*Numenius phaeopus*	Whimbrel	Mig. (EPBC & BC Acts)		•								•		
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	Mig. (EPBC & BC Acts) P4 (DBCA list)										•		
Scolopacidae	*Tringa glareola*	Wood Sandpiper	Mig. (EPBC & BC Acts)		•									•	
Scolopacidae	*Tringa nebularia*	Common Greenshank	EN/Mig. (EPBC Act); Mig. (BC Act)		•	•		•				•	•		
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	Mig. (EPBC & BC Acts)		•										
Ardeidae	*Ardea alba*	Great Egret (Eastern Great Egret)			•	•						•			
Ardeidae	*Ardea pacifica*	White-necked Heron			•	•				•		•		•	•
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN (EPBC & BC Acts)					•							
Ardeidae	*Bubulcus coromandus*	Cattle Egret			•			•						•	
Ardeidae	*Egretta garzetta*	Little Egret			•										•[4]
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			•	•				•		•		•	•
Ardeidae	*Egretta sacra*	Eastern Reef Egret			•										
Ardeidae	*Ixobrychus flavicollis*	Black Bittern			•	•									
Ardeidae	*Nycticorax caledonicus*	Rufous Night Heron			•	•									
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill			•	•						•		•	•
Threskiornithidae	*Platalea regia*	Royal Spoonbill			•	•				•					•
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		•	•	•						•		•	•
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		•	•	•				•		•		•	•
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			•	•						•		•	•
Columbidae	*Phaps chalcoptera*	Common Bronzewing		•	•	•			•	•		•		•	•
Columbidae	*Phaps elegans*	Brush Bronzewing			•	•									
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	Introduced	•	•	•			•	•		•		•	•
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher			•	•				•				•	
Meropidae	*Merops ornatus*	Rainbow Bee-eater		•	•	•		•						•	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			•	•				•		•			•
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		•	•					•		•		•	•
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			•	•				•		•			
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			•	•				•		•		•	•
Accipitridae	*Circus approximans*	Swamp Harrier		•	•					•		•		•	•
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			•	•						•		•	•
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle			•	•		•		•		•			•
Accipitridae	*Haliastur sphenurus*	Whistling Kite			•	•						•		•	•
Accipitridae	*Hamirostra isura*	Square-tailed Kite			•										
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			•	•								•	•
Accipitridae	*Milvus migrans*	Black Kite			•	•									

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)		•	•		•				•	•	•	•
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk			•	•						•			•
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk			•	•						•		•	•
Falconidae	*Falco berigora*	Brown Falcon			•	•				•		•		•	•
Falconidae	*Falco cenchroides*	Australian Kestrel		•	•	•				•		•		•	•
Falconidae	*Falco longipennis*	Australian Hobby		•	•	•				•		•			•
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)		•	•				•		•	•		•
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU (EPBC & BC Acts)			•							•		
Phasianidae	*Coturnix pectoralis*	Stubble Quail			•	•						•		•	•
Phasianidae	*Synoicus ypsilophorus*	Brown Quail			•	•				•					
Rallidae	*Fulica atra*	Eurasian Coot			•	•						•		•	
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen			•	•									
Rallidae	*Porphyrio melanotus*	Australasian Swamphen			•	•						•		•	
Rallidae	*Zapornia pusilla*	Baillon's Crake			•	•									
Rallidae	*Zapornia tabuensis*	Spotless Crake			•	•						•			
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		•	•	•				•		•		•	•
Acanthizidae	*Acanthiza inornata*	Western Thornbill			•	•				•		•			
Acanthizidae	*Gerygone fusca*	Western Gerygone		•	•	•				•				•	•
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		•	•	•			•	•		•		•	•
Acanthizidae	*Smicrornis brevirostris*	Weebill			•	•								•	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			•	•				•		•		•	•
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			•	•				•		•			•
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird												•	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		•	•	•				•		•		•	•
Artamidae	*Gymnorhina tibicen*	Australian Magpie		•	•	•				•		•		•	•
Artamidae	*Strepera versicolor*	Grey Currawong		•	•	•				•					
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		•	•	•				•		•		•	•
Campephagidae	*Lalage tricolor*	White-winged Triller			•					•		•		•	•
Climacteridae	*Climacteris rufus*	Rufous Treecreeper			•	•								•	
Corvidae	*Corvus coronoides*	Australian Raven		•	•	•				•		•		•	•
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird												•	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark			•	•				•		•		•	•
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		•	•	•			•	•		•		•	•
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		•	•	•				•		•		•	•
Estrildidae	*Stagonopleura oculata*	Red-eared Firetail			•	•				•					
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		•	•	•				•		•		•	•
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			•	•									
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		•	•	•				•		•		•	•
Locustellidae	*Cincloramphus cruralis*	Brown Songlark								•				•	•
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark								•					•
Locustellidae	*Poodytes gramineus*	Little Grassbird			•	•				•		•			
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		•	•	•			•	•				•	•
Maluridae	*Malurus splendens*	Splendid Fairy-wren		•	•	•				•		•		•	•
Maluridae	*Stipiturus malachurus*	Southern Emu-wren			•	•				•		•			•

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill			•	•				•		•		•	•
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		•	•	•			•	•		•		•	•
Meliphagidae	*Anthochaera lunulata*	Western Little Wattlebird		•	•	•				•		•			
Meliphagidae	*Epthianura albifrons*	White-fronted Chat			•	•				•		•		•	•
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater		•	•	•								•	
Meliphagidae	*Gliciphila melanops*	Tawny-crowned honeyeater			•	•				•					
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			•	•				•				•	•
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner												•	
Meliphagidae	*Melithreptus chloropsis*	Western White-naped Honeyeater			•	•				•		•			
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			•	•				•					
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		•	•	•				•		•		•	•
Motacillidae	*Anthus australis*	Australian Pipit		•	•					•		•		•	•
Motacillidae	*Motacilla cinerea*	Grey Wagtail	Mig. (EPBC & BC Acts)					•							
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			•	•				•					
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		•	•	•				•				•	•
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		•	•	•				•		•		•	•
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			•	•				•		•		•	
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote		•	•	•				•				•	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		•	•	•				•				•	•
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin		•	•	•									
Petroicidae	*Microeca fascinans*	Jacky Winter													•
Petroicidae	*Petroica boodang*	Scarlet Robin		•	•	•				•		•			•
Petroicidae	*Petroica goodenovii*	Red-capped Robin			•										
Petroicidae	*Quoyornis georgianus*	White-breasted Robin		•	•	•				•		•		•	
Sylviidae	*Acrocephalus australis*	Australian Reed Warbler			•	•						•			
Zosteropidae	*Zosterops lateralis*	Silvereye		•	•	•			•	•		•		•	•
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			•	•						•			•[4]
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			•	•						•			•[4]
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant			•	•				•				•	•
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant			•	•						•			•
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant			•	•						•		•	•
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant			•	•						•			•
Sulidae	*Morus serrator*	Australasian Gannet			•	•									
Podicipedidae	*Podiceps cristatus*	Great Crested Grebe										•			
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			•	•						•			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			•	•						•		•	
Diomedeidae	*Diomedea amsterdamensis*	Amsterdam Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea dabbenena*	Tristan Albatross	EN/Mig. (EPBC Act); CR/Mig. (BC Act)					•							
Diomedeidae	*Diomedea epomophora*	Southern Royal Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU/Mig. (EPBC & BC Acts)					•					•		
Diomedeidae	*Diomedea sanfordi*	Northern Royal Albatross	EN/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Phoebetria fusca*	Sooty Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•							
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)		•			•							
Diomedeidae	*Thalassarche cauta*	Shy Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche chlororhynchos*	Atlantic Yellow-nosed Albatross	VU/Mig. (BC Act)			•							•		

Family	Species[1]	Vernacular	Status	Biota (2009)	Birdata (Birdlife Australia 2023)	NatureMap (DBCA 2023a)	ELM (2017)	PM[2] (DCCEEW 2023)	Harewood (2018)	LEC (1990)	Litoria Ecoservices (2017)	Ninox (2011)	TPFA[3] (DBCA 2023c)	B & T survey (Phoenix 2025a)	This survey
Diomedeidae	*Thalassarche impavida*	Campbell Albatross	VU/Mig. (EPBC & BC Acts)					•							
Diomedeidae	*Thalassarche melanophris*	Black-browed Albatross	VU/Mig. (EPBC Act); EN/Mig. (BC Act)					•					•		
Oceanitidae	*Pelagodroma marina*	White-faced Storm Petrel			•										
Procellariidae	*Ardenna carneipes*	Flesh-footed Shearwater	VU/Mig. (BC Act)					•							
Procellariidae	*Ardenna grisea*	Sooty Shearwater	Mig. (BC Act)					•							
Procellariidae	*Halobaena caerulea*	Blue Petrel	VU (EPBC Act)					•							
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	EN/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Macronectes halli*	Northern Giant Petrel	VU/Mig. (EPBC Act); Mig. (BC Act)					•							
Procellariidae	*Pachyptila turtur*	Fairy Prion						•							
Procellariidae	*Pterodroma mollis*	Soft-plumaged Petrel	VU (EPBC Act)					•							
Procellariidae	*Puffinus assimilis*	Little Shearwater						•							
Cacatuidae	*Cacatua sanguinea*	Little Corella												•	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)		•	•		•		•		•	•	•	•
Cacatuidae	*Calyptorhynchus* sp.	black cockatoo species[5]	EN-VU (EPBC & BC Acts)		•										
Cacatuidae	*Calyptorhynchus/Zanda* sp.	black cockatoo species	EN-VU (EPBC & BC Acts)											•	•
Cacatuidae	*Eolophus roseicapilla*	Galah			•									•	•
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•				•	•	•	•
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	•	•	•		•					•	•	•
Cacatuidae	*Zanda* sp.	white-tailed black cockatoo species	EN (EPBC & BC Acts)	•		•				•			•	•	•
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		•	•	•				•		•		•	•
Psittaculidae	*Neophema elegans*	Elegant Parrot			•	•				•		•		•	•
Psittaculidae	*Neophema petrophila*	Rock Parrot			•	•									
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		•	•	•				•				•	•
Psittaculidae	*Platycercus icterotis*	Western Rosella		•	•	•				•		•			•
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot		•	•	•						•			•
Strigidae	*Ninox boobook*	Boobook Owl			•	•									•
Tytonidae	*Tyto javanica*	Eastern barn owl										•		•	
Tytonidae	*Tyto novaehollandiae novaehollandiae*	Masked Owl (southwest)	P3 (DBCA list)		•									•	•
Dromaiidae	*Dromaius novaehollandiae*	Emu		•	•	•				•		•		•	•
Turnicidae	*Turnix varius*	Painted Button-quail										•			
Bats (10)															
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat										•		•	•
Molossidae	*Mormopterus kitcheneri*	South-western Free-tailed Bat										•			
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat		•								•		•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat		•		•						•		•	•
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	P4 (DBCA list)	•		•						•	•	•	•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat				•									
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat												•	•
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat													•
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat		•		•						•		•	•

[1]Species shaded in grey are pelagic seabirds and unlikely to occur in the study area. [2]PM – Protected Matters Database. [3]TPFA – Threatened and Priority Fauna Database. [4]Species only recorded at regional sites and not in study area in either the BBRAS or Basic and Targeted fauna survey. [5]Could represent red- or white-tailed black cockatoo as some desktop records predate taxonomic revision of Carnaby's and Baudins into *Zanda* genus.

Appendix 4 Profiles for conservation significant species of concern

Osprey (*Pandion cristatus*; Mig. EPBC & BC Acts)

Information gathered from Bierregaard (2020) and DCCEEW (2024f).

Behaviour

Ospreys primarily feed on fish, especially mullet, but may also eat molluscs, crustaceans, insects, reptiles, birds, and mammals. They mostly forage during the day, sometimes hunting at night, by soaring, quartering, or circling above water to locate prey. Once prey is spotted, they hover briefly before diving feet first to capture it. Hunting also occurs from perches when necessary. This behaviour is typical of their hunting style and is largely focused on locating fish near the surface of bodies of water.

Habitat

Ospreys occur in littoral and coastal habitats, as well as terrestrial wetlands across tropical and temperate Australia and offshore islands. They are found in a variety of wetland habitats, including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, exposed reeds, and along major rivers. They show a preference for coastal cliffs and elevated islands in some areas but may also inhabit low sandy, muddy, or rocky shores and coral cays. Additionally, they may travel through heath, woodland, or forest habitats when moving between foraging sites.

Movement

Ospreys are classified as migratory in some parts of the world, where they move north and south depending on weather conditions. However, the species is considered a resident in Australia. They do not typically migrate long distances within the country but may move locally in response to changes in weather or food availability.

Flight behaviour

Most flight occurs during the day during hunting and movement between nesting and foraging habitat. Ospreys generally search for prey by soaring, quartering or circling above a body of water (possibly within RSA height) and scanning below for fish. They occasionally search for prey by scanning from a perch. When a prey item is located while soaring or circling, they hover momentarily and then dive down, sometimes in stages.

Demographic factors

The Australian population size is unclear, but they are common and widely distribution in coastal regions across most of the country. There are estimated to be approximately 100,000–1,200,000 mature individuals globally.

Blue-billed Duck (*Oxyura australis*; P4 DBCA list)

Information gathered from Birdlife International (2024).

Habitat

Blue-billed Ducks occur in shallow freshwater marshes, swamps and lakes with extensive bordering reedbeds and other dense vegetation (e.g. Typha). Outside breeding season, they are also found on larger lakes, sewage ponds, lagoons and wide rivers, including saltwater bodies. They infrequently occur on marine waters.

Movement

Not truly migratory, though relatively dispersive as breeding grounds are generally abandoned after breeding is completed. They concentrate in a few favourable areas where they undergo moult and stay until just before the start of next breeding season. Widespread dispersal follows exceptional flooding events.

Behaviour

Breeding occurs between September – March. They feed on seeds and vegetative parts of aquatic plants and aquatic insects and their larvae, mostly by sieving bottom debris while (usually for <10 seconds). They also dabble on surface and strips seeds from overhanging plants.

Flight behaviour

Flight is mostly diurnal. They form large, loose flocks, especially in non-breeding season, and can travel long distances. This long distance flight is likely higher than normal flight, which is relatively low and direct over water.

Demographic factors

The population size in Australia is estimated to be between 11,000–19,000 with 15,000 mature individuals

Fork-tailed Swift (*Apus pacificus*; Mig. EPBC & BC Acts)

Information gathered from DAWE (2021a).

Habitat

In Australia, Fork-tailed Swifts are found across a variety of habitat. They mostly occur over inland plains but sometimes above foothills or in coastal areas, as well as over cliffs, beaches, islands and sometimes well out to sea. Over land, they mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They also occur over settled areas.

Fork-tailed Swifts probably roost aerially but are occasionally observed to land. They were once recorded roosting in trees, using a bare exposed branch emergent above the foliage. Breeding does not occur in Australia.

Movement

Fork-tailed Swifts are a widespread migratory species that overwinters in Australia. They are transitory across all habitat types. In WA, there are sparsely scattered records of the Fork-tailed Swift along the south coast. They are widespread in coastal and subcoastal areas between on the lower and mid-west coast, including on nearshore and offshore islands.

Fork-tailed Swifts usually arrive in Australia around October; some rarely arriving early in September. Most observations of arrival occur in the south due to a lack of observers in the north of the country. Some birds have been sighted in WA arriving from Indonesia between October–November. In north and north-west WA, most have departed by the end of April.

They are highly mobile within Australia, and large flocks often precede or follow low pressure systems as they cross the country in search of food. In WA, they are common in Broome, with maximum numbers occurring in February.

Behaviour

Fork-tailed Swifts are exclusively aerial (1–300 m above ground). Foraging occurs in the air, often along the edge of low-pressure systems. Often occur in areas of updraughts, especially around cliffs.

Flight behaviour

Feeding flight is characterized by circular flight patterns throughout areas of high prey concentration, whilst dispersal flight is more direct. They feed in flocks ranging from 10–1,000 birds, but the largest recorded flock in Australia was 90,000 birds.

Demographic factors

The global population size has not been quantified, but they are reported to be generally common throughout most of the breeding range. The species is highly transitory, and the Australian population is estimated as at least in the tens of thousands.

Australasian Bittern (*Botaurus poiciloptilus*; EN EPBC & BC Acts)

Information gathered from DCCEEW (2022) and Marchant and Higgins (1990).

Habitat

Australasian Bitterns occur mainly in freshwater wetlands in the temperate southeast and southwest of Australia. They also rarely occur in estuaries or tidal wetlands. Their preferred habitat comprises wetlands with dense vegetation, especially where there is a mosaic of cover, from 0.5–3.5 m in height, where they forage in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. They favour freshwater habitats with permanent or seasonal water, particularly those dominated by sedges, rushes and/or reeds growing over a muddy or peaty substrate. In south-western Australia, they also occur in wetlands where thickets of wetland shrubs (e.g. *Melaleuca*, *Agonis* spp.).

Movement

Australasian Bitterns will move long distances between habitats when according to changes in suitability, but generally do not move seasonally. During wet years, they occur in high densities in temporary or infrequently filled wetlands and utilise ephemeral wetlands when moving from areas that are drying out. During non-breeding season from April to October, there are an influx of birds in regularly monitored wetlands in the Melbourne area.

Behaviour

The Australasian Bittern breeds from October to February in solitary pairs, or polygamously with up to three nesting females per booming male. Usually nocturnal. Feeds on tadpoles, frogs, fish and dragonfly larvae in wetland habitat.

Flight behaviour

The Australasian Bittern occurs solitarily, in pairs or dispersed aggregations of up to 34 birds. Flies with steady, slow wing-beats that are owl-like. Long-distance flight is likely higher than normal flight, though heights are unclear.

Demographic factors

The estimated number of mature individuals is <2,000 globally with approximately 1,300 (range 750–1,800) in Australia. The WA population is considered to comprise fewer than 100 individuals.

Pacific Golden Plover (*Pluvialis fulva*; Mig. EPBC & BC Acts)

Information gathered from DAWE (2021b); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Johnson OWP *et al.* (2024) and Hansen *et al.* (2016).

Habitat

In non-breeding grounds in Australia, Pacific Golden Plovers usually inhabit coastal habitats and occasionally occurs around inland wetlands. They occur on beaches, mudflats, sandflats, mangroves, low saltmarsh, beds of seagrass in sheltered areas, harbours, estuaries, lagoons, and evaporation ponds in saltworks. They are also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less common in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans. Other terrestrial habitats inhabited include short or long grass in paddocks, crops, airstrips, ploughed and recently burnt areas. They are very occasionally recorded well away from water.

Movement

Migratory. Pacific Golden Plovers occur at non-breeding grounds in Australia mostly between September and May, with highest numbers in eastern and south-eastern Australia. They generally arrive in the Kimberley coast in late September and in southern areas such as south-eastern South Australia in October and November. Those arriving in the Kimberley Division of WA occur on passage in October. Birds begin to migrate directly without stopping northwards along the east coast of Australia in late February and March. In northern WA, they occur on passage in February and March and leave the Kimberley Division in late April. Small numbers of birds remain in the non-breeding range throughout the Australian winter, though generally not in the extreme south of the country.

Behaviour

Pacific Golden Plovers are both diurnal and nocturnal. They feed on molluscs, polychaete worms, insects and insect larvae, spiders and crustaceans in non-breeding season, using a combination of picking and run-picking based on visual stimulus. Very occasionally eat seeds, leaves, lizards, birds' eggs and small fish.

Flight behaviour

Pacific Golden Plovers can forage in flocks of 100 or more, and also occur in mixed-species shorebird flocks. Flocks are usually of 20 to 50 birds, though single birds are sometimes seen. The species is capable of swift and extended flight, and are considered the fastest flying shorebirds. Tracking records suggest an average ground speed of around 50 kph during long transoceanic flights.

Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

The EAAF population is estimated at 120,000 and the global population is estimated at about 170,000–220,000. The number of birds recorded in Australia can vary significantly between years.

Peregrine Falcon (*Falco peregrinus*; OS BC Act)

Information gathered from BirdLife Australia (2023); Debus (2012); Department for Environment and Heritage (2024); White (2024).

Habitat

Peregrine Falcons are highly adaptable, breeding across diverse habitats from the tropics to cold deserts and high-altitude areas up to 3300 m. They have been recorded flying up to 4,000 m during long-distance flight and can be found in various habitats. Preferred nesting sites include cliffs, ledges, rocky outcrops, and occasionally tall trees. Cliff edges and wooded watercourses are particularly favoured, with nests often placed on ledges or repurposed from other large bird species.

Movement

Peregrine Falcons display site specific behaviours, mainly appearing in areas during transitory flights or while foraging. They undergo long distance natal dispersal, though once a nest is established site fidelity is high. The Australian subspecies does not migrate.

Behaviour

As diurnal hunters, Peregrine Falcons display varied flight patterns based on feeding needs and conditions. Most prey are birds (around 75–100% of all prey). Hunting behaviours include aggressive pursuits, ambushes from perches, and even occasional ground approaches. They also often feed by ambushing from low perches in the morning and late afternoon. During the breeding season, it perches on cliffs or vantage points near nests, scanning large airspaces where other birds fly. From these perches, it can dive easily onto low-flying prey or climb to intercept high-flying birds. Aerial hunting is less common in poor weather, when perching-based hunts prove more successful.

Flight behaviour

The species typically hunts from high perches or while soaring to spot prey below. Flight altitude varies with seasonal factors and during localized migrations. They are known to soar several hundred metres high, enhancing their vantage over hunting grounds. Flight types used by the species include:

- Flapping Flight - During migration or travel between hunting areas, Peregrine Falcons use a normal cruising wing beat with speeds between 40–55 km/h and can reach altitudes up to 240 m. When pursuing prey, the wing beat becomes faster and more powerful. Pursuit may include low-altitude, contour-following flights or direct tail-chasing.
- Soaring - Static soaring is observed as young individuals begin to fledge, with wings held motionless while moving parallel to a cliff face or similar terrain, often at heights of 3–100 m. As they develop, young individuals soar on thermals within weeks of fledging, occasionally joined by adults.
- Stoop - The stoop is a high-speed dive where the birds fold their wings close to their bodies to reach maximum speeds, braking abruptly by rising or leveling out before striking prey. Their speeds depend on their mass and wing structure. Typical dives are executed from heights of 215–320 m.

Demographic factors

It is estimated that there are 6,000–10,000 individuals within Australia.

Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso*; VU EPBC & BC Acts)

Information gathered from DCCEEW (2024e); DAWE (2022) and Garnett and Baker (2021) .

Habitat

Forest Red-tailed Black Cockatoos inhabit the dense Jarrah, Karri and Marri forests of South-west WA, favouring forests receiving more than 600 mm average rainfall annually in the hilly interior. Although most records are in Jarrah-Marri forests, they have been observed in a range of other forest and woodland types. These include Blackbutt, Wandoo, Tuart, Albany Blackbutt, Yate and Flooded gum. They are also now seen feeding in more open agricultural areas and in the Perth metropolitan area, where they will also breed.

Breeding habitats are generally in woodland or forest but may also breed in partially cleared woodland or forest, including isolated trees. Nest in hollows in live or dead trees (many eucalypt species may provide suitable hollows), particularly Marri, Karri, Wandoo, Bullich, Blackbutt Tuart and Jarrah.

Movement

Forest Red-tailed Black Cockatoos roost in trees at night, leaving trees at sunrise before separating in smaller groups to bask and feed for 10–12 hours. They also travel between feeding habitat and water sources to drink. They return to their roost at dusk.

Forest Red-tailed Black Cockatoos are predicted to have a breeding home range of 116-187 ha. Their movements are generally influenced by available water and foraging resources. Changes in foraging preferences due to habitat alteration have led more regular movement of birds in the northern Darling plateau area onto the Swan Coastal Plain and around the Perth metropolitan area, to feed on cape lilac. Birds on the have also been recorded moving across the wheatbelt since 2010, possibly driven by lack of resources, where previously there had not been records.

Behaviour

Forest Red-tailed Black Cockatoos roost in any tall trees, but especially on tall Jarrah, Marri, Blackbutt Tuart and introduced eucalypt trees or large trees on the edges of forests. Breeding can occur in Autumn and Spring, sometimes twice in one year, with a single chick raised per breeding event. Around 90% of their diet consists of the seeds of Marri and Jarrah, and the species relies heavily on both trees during breeding periods. However, they also consume other native trees and have been increasingly observed feeding on Cape Lilac.

Flight behaviour

They usually occur in family flocks of 10 birds, though groups of 25 or more birds occasionally occur. Flight is mainly crepuscular, with travel between foraging and roosting habitat occurring during the dawn and dusk hours. However, movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats.

Demographic factors

The subspecies' population is estimated to be around 17,000 birds. Population trends are unclear.

Baudin's Cockatoo (*Zanda baudinii*; EN EPBC & BC Acts)

Information gathered from Department of Agriculture (2021a); (Johnstone & Kirkby 2008) and (Garnett & Baker 2021).

Habitat

Baudin's Cockatoos' breeding habitat is generally in Jarrah, Marri and Karri woodland or forest of higher rainfall areas in south-west Western Australia. However, they may also breed in partially cleared woodland or forest, including isolated trees. They nest in hollows in live or dead trees (many eucalypt species may provide suitable hollows), particularly Karri, Marri, Jarrah, Wandoo, Bullich and Tuart. Night roosting habitat includes tall trees such as Jarrah, Flooded Gum, Blackbutt, Tuart and introduced eucalypts. These roosting habitats are ideally around riparian environments, natural water sources or artificial permanent water sources.

Movement

Baudin's Cockatoos breed in spring and into summer (October - January), primarily in the south of the range. Once breeding season ends in January, many birds depart from nesting areas and move northward, forming larger foraging flocks in response to changing food resources. In early February and March, the flocks arrive at non-breeding traditional roosts in the central and northern parts of the Darling plateau (from about Collie north to Mundaring). During non-breeding season, birds in the Perth hills districts move westward onto the southern Swan Coastal Plain in mid-August just before heading south to breed. By mid-October, most birds are either back in their breeding quarters in the south or heading there. Breeding adults that migrate probably return to the same nesting areas each year, though no pairs have been observed returning hollows in successive years.

Behaviour

They mainly feed on the seeds of Marri and rarely Jarrah, as well as seeds of native proteaceous plant species such as *Banksia* spp. and *Hakea* spp.). They also consume insects and insect larvae; pith of Kangaroo Paw ; tips of *Pinus* spp., tips of *Macadamia* spp., and almonds, pecans, seeds of apples, seeds of pears and seeds of persimmons from orchards. Marri is the primary food source with the birds using its seeds, flowers, nectar and buds. A single offspring is raised per breeding event.

Flight behaviour

Although flocks of up to 900 have been recorded, they most commonly move about in small groups of 3, consisting of the adult pair and a dependent juvenile. These flocks base themselves at roost sites and use the roosts to access the local foraging resources. Numbers tend to be largest at the roost site between dusk and dawn. Movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats, though flight over long distances between foraging and breeding parts of the range may be higher.

Demographic factors

The total population of the species is estimated to be 5,000–8,000. It was estimated as 10,000–15,000 from 1995–2004 with a declining trend.

Carnaby's Cockatoo (*Zanda latirostris*; EN EPBC & BC Acts)

Information gathered from Department of Agriculture (2021b) and Garnett and Baker (2021).

Habitat

Breeding habitat of Carnaby Cockatoos is generally in heaths, woodland or forest of south-western Western Australia. They also breed in partially cleared woodland or forest, including isolated trees. Nesting habitat is inland, though increasing numbers are breeding closer to the coast due to habitat loss in the Wheatbelt. Nesting habitat includes in hollows in live or dead Eucalypts. Night roosting habitat includes tall trees such as Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines. Roosting habitats ideally occur around riparian environments, natural permanent water sources and artificial permanent water sources. Birds will forage in woodlands used for breeding. Outside of breeding season, Carnaby's Cockatoos will feed in Banksia woodlands on the Swan Coastal Plain, the Perth area and in Banksia heath on the southern coast.

Movement

Carnaby's Cockatoos are partly resident and partly migratory. In high rainfall areas, with high quantities of native vegetation, they are resident. However, in areas that are drier or have been cleared, they become breeding migrants. Populations that breed in drier areas of the range arrive at breeding localities in late winter and spring. Once their summer breeding is complete, they move into areas of high rainfall. For example, birds breeding in Badgingarra, Dandaragan and Moora regions tend to move west after breeding, into higher rainfall areas especially near coastal banksia scrubs (e.g. at Wanagarren Nature Reserve, Nilgen Nature Reserve and Yanchep area), then south onto the southern Swan Coastal Plan, including the Perth Metropolitan Area, Lake Clifton and Myalup.

Behaviour

Carnaby's Cockatoos feed on seeds, flowers and nectar of native proteaceous plant species as well as *Callistemon* spp. and Marri. They will also feed on seeds of introduced species including Pines, *Erodium* spp., wild radish, canola, almonds, macadamia and pecan nuts; insects and insect larvae; occasionally apples and persimmons; and liquidambar. They have been reported to feed on canola crops. One chick is raised per breeding event, from eggs laid in large eucalypt hollows.

Flight behaviour

When not breeding, Carnaby's Cockatoos tend to aggregate in large flocks and move through the landscape in search of food. These flocks base themselves at roost sites, which are usually the tallest trees in an area and often located in or near riparian environments or permanent water. Different roosts may be used by birds during the non-breeding period and by non-breeding birds during the breeding period. Numbers tend to be largest at the roost site between dusk and dawn and surveys for roosts should occur at these times, as birds are leaving or returning to roost sites, over several days. Movement throughout foraging habitat occurs throughout the day. Flight is often observed above canopy height, with deep flapping wingbeats, though flight over long distances may be higher altitude.

Demographic factors

The population is estimated at around 35,000 birds. It was estimated at 40,000 in 2013, though the species is undergoing ongoing population decline.

Common Sandpiper (*Actitis hypoleucos*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024c); Hansen *et al.* (2016) and Geering *et al.* (2007).

Habitat

Common Sandpipers utilise a wide range of coastal wetlands and some inland wetlands of varying salinity. The species is mostly found around muddy margins or rocky shores and rarely on mudflats. They have been recorded in estuaries, deltas of streams, as well as on banks farther upstream, around lakes, pools, billabongs, reservoirs, dams, claypans, occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep.

Foraging occurs in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. However, they sometimes venture into grassy areas adjoining wetlands. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. They are known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or loaf on rocks.

Behaviour

They are diurnal feeding shorebirds that feed on low-flying insects and terrestrial insects. They are very active and are often observed following prey bobbing their tail. The species is solitary and is most commonly observed alone or in small flocks.

Movement

Migratory. They breed in Eurasia and move south for the boreal winter. Post-breeding, the southward migration usually begins July–November, with individuals arriving from July onwards in South Australia, WA and the Northern Territory. The non-breeding movements of the species within Australia are poorly known.

Flight behaviour

Common Sandpipers do not form large flocks like other shorebirds during migration and are often found alone or in pairs. Flight during the southern migration passage is mostly diurnal, whereas the northern passage mainly occurs by night. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

When flushed, they fly low over water often in direct straight lines.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population is estimated as 190,000. The global population is estimated to number 4,950,000–7,500,000 individuals.

Ruddy Turnstone (*Arenaria interpres*; VU/Mig. EPBC Act; Mig. BC Act)

Information gathered from DCCEEW (2024g); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

Ruddy Turnstones occur in a wide variety of coastal habitats, including exposed rock coastlines, coral reefs, shallow tidal pools, beaches, estuaries, harbours, bays, coastal lagoons, low saltmarsh, exposed beds of seagrass, sewage ponds and mudflats. In northern Australia they may prefer wide mudflats. In southern Australia, they prefer rockier coastlines and are less numerous on large embayments with extensive mudflats.

Movement

Ruddy Turnstones are migratory, with 6 recognised populations. They move south to non-breeding areas with a partial overlap of populations on passage. There may be 2 routes of migration to Australia, with birds occurring in east Australia and New Zealand arriving from a migration south across the Pacific from east Asia and returning north via the east coast of Asia. The birds in the western areas of Australia may come from populations migrating south from east Asia who then return north via east Asia. The species enters Australia from August onwards, and movements into and through Australia continue until at least October. When returning to breeding grounds, Ruddy Turnstones leave sites in the south of Australia from mid-March. Some birds may fly over north Australia and/or touch down in north-west or north Australia though some adults in north-west Australia are thought to be capable of flying non-stop to the south coast of China.

Behaviour

Nocturnally and diurnally feed mainly on insects, worms, crustaceans, molluscs, and spiders. They have also been occasionally recorded feeding on eggs and carrion. During the non-breeding season, their only food source is maggots and larvae obtained from picking decomposing seaweed.

Flight behaviour

They are commonly seen singly or, more usually, in loose groups of 20–100 among mixed shorebird flocks, along coasts and occasionally inland. They tend to fly in tight coordinated flocks when moving locally, but in loose lines when migrating. Migratory shorebirds typically fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Migratory flight heights are also variable based on weather. The mean ground speed of migratory bird flights passing a pacific island was 63 kph.

Demographic factors

The Australasian East Asian Flyway (EAAF) population is estimated at 30,000. The Australian population is estimated at ~19,000 based on extrapolation of the EAAF estimate and other data. The population is undergoing rapid decline.

Sharp-tailed Sandpiper (*Calidris acuminata*; VU/Mig. EPBC Act; Mig. BC Act)

Information sourced from DCCEEW (2024a); Mlodinow *et al.* (2024) Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

Sharp-tailed Sandpipers forage in fresh and hypersaline environments, feeding along water edges on mudflats, coastal and inland wetlands, and sewage ponds. After rainfall, they may also feed on agricultural pastures. During migration, they roost and forage on rocky and sandy beaches, freshwater habitats, and inland saltwater areas.

Movement

Sharp-tailed Sandpipers breed in northern Siberia from June to August and migrate in flocks to their non-breeding areas south of the Equator. Small numbers arrive in Australia by mid-August and the majority by September. Their northward migration for the breeding season begins by April, and they are among the first migratory shorebirds to leave Australia. In wet years in northern Australia, inland birds do not migrate to southern Australian and remain in ephemeral wetlands.

Behaviour

Sharp-tailed Sandpipers are omnivorous, primarily feeding on seeds, worms, molluscs, crustaceans, and insects, which they hunt by pecking and jabbing their beak into the muddy substrate. They often form large mixed flocks with other migratory shorebirds in suitable foraging and roosting habitats.

Flight behaviour

Birds migrating from Siberia travel in flocks of fewer than 1,000 individuals. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

In Australia, they form large mixed flocks with other shorebird species at wetlands and salt lakes which can disperse rapidly when disturbed. When flushed, they exhibit rapid, zigzag flight patterns. During migration or when changing feeding locations, their flight is more leisurely with loose, measured wing beats.

Demographic factors

Their estimated population in the East Asian - Australasian Flyway (EAAF) in 2016 was 85,000 birds, all believed to migrate to Australia. By 2020, the population was estimated to have decreased to ~73,000 mature individuals, based on extrapolation from 2016 data and trends from related studies.

Sanderling (*Calidris alba*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024h); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Hansen *et al.* (2016) and Garnett and Baker (2021).

Habitat

In Australia, Sanderlings are usually found on the coast, mostly on open sandy beaches exposed to open sea-swell and on exposed sandbars and spits and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. They also occur on beaches that may contain rocky outcrops. They more rarely occur on more sheltered sandy shorelines and in near coastal wetlands, such as lagoons, hypersaline lakes, salt ponds and samphire flats. There are also rare inland records from sandy shores of ephemeral brackish lakes and brackish river pools. They will roost on or behind bare sand high on the beach, clumps of washed-up kelp, coastal dunes, and on rocky reefs and ledges.

Movement

Migratory. Sanderlings breed in the holarctic region and move south to broad non-breeding areas. They arrive in Australia during September, mostly occurring in north-western Australia. They move through the northern regions in September–November and cross the continent to the south Australia coast. Small numbers regularly arrive during late August and early September at Rottnest Island, south-west WA. Between March to May, they depart the non-breeding range in south-east Australia. They apparently move west along the south coast of Australia and across the continent before moving north, with at least some birds stopping on the north coast. A few birds, particularly young birds, remain in Australia during winter with other non-breeding areas during the breeding season, though numbers may vary at a site between days indicating birds are nomadic at this time.

Behaviour

Sanderlings are omnivorous, foraging on plants, seeds, worms, crustaceans, spiders, insects, medusae, fish, larger molluscs and crustaceans. They are very active when foraging, often in tightly synchronised flocks, darting onto moist sand between breaking waves picking up food items from the surface of the wet beach. Foraging may also occur at the edges of shallow pools on sandspits and on nearby mudflats. Individuals may also defend a feeding territory during the non-breeding period.

Flight behaviour

Sanderlings tend to migrate in long flights, overflying large areas, typically in small flocks of less than a thousand. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000 – 5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph. Normal, non-migratory flight is rapid and low.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population is estimated to be 30,000. The number during the non-breeding period in Australia is estimated to be 10,000.

Curlew Sandpiper (*Calidris ferruginea*; CR/Mig. EPBC Act; Mig (BC Act)

Information is gathered from DCCEEW (2023); Hansen *et al.* (2016); Geering *et al.* (2007); Newton (2008); Hansen *et al.* (2016); Higgins and Davies (1996) and Garnett and Baker (2021).

Habitat

Curlew Sandpipers are found in brackish lagoons, estuaries, mudflats, sandflats, saltmarshes and to a lesser extent exposed coral, rocky shores and sandy beaches. Foraging occurs in mudflats and nearby shallow water, at the edges of shallow pools, drains and along sandy shores, often following the receding tide to feed near the water's edge. They also forage on mudflats that have been exposed for longer periods, typically in small groups. At high tide, they tend to forage in areas of low, sparse emergent vegetation, such as saltmarsh, and sometimes in flooded paddocks or inundated salt flats. Roosting typically occurs around intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. They also roost in non-tidal swamps, lakes, and lagoons near the coast. Occasionally, they are found near ponds in saltworks or sewage farms, and individuals are occasionally recorded inland around ephemeral and permanent water sources with bare mud or sand edges.

Movement

Curlew Sandpipers migrate from Siberia and occur in Australia from late August – April. Males arriving earlier than females to non-breeding habitat. In Australia, the first adults arrive in the northwest during mid-August and in the southeast during late August, and most adults have arrived by the end of September. The species begins its northward migration during early March, with most birds having departed by early April and nearly all migrants having left by the end of April. Many juveniles do not return to breeding territory in their first year of life, remaining in non-breeding locations. Within Australia in the non-breeding season, birds do not move long distances between habitat.

Behaviour

Curlew Sandpipers are gregarious, often found in large flocks in both fresh and brackish waters. They forage in mixed flocks with other shorebird species, pecking at invertebrates on the surface of mudflats or making shallow probes below the surface.

Flight behaviour

Curlew Sandpipers form large mixed flocks with other shorebird species, sometimes travelling in these large flocks between roosting and foraging habitats. Roosting and foraging flight activities occur during the day and night. Migratory shorebirds typically fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Flight speed during migration has been estimated at 70–75 km per hour. When flushed, Curlew Sandpiper flight has been described as "swift and low".

Demographic factors

The estimated population in the East Asian-Australasian Flyway (EAAF) in 2016 was 90,000 birds, of which 45,500 were thought to come to Australia. The estimated Australian population in 2020 was ~40,000 mature individuals, with a rapidly declining population trajectory.

Pectoral Sandpiper (*Calidris melanotos*; Mig EPBC & BC Acts)

Information gathered from DCCEEW (2024c); Mlodinow *et al.* (2024); Wetlands International (2024); Geering *et al.* (2007); Newton (2008); Kloeckner *et al.* (1982); Higgins and Davies (1996) and Hansen *et al.* (2016).

Habitat

In Australasia, they forage and roosts in shallow wetlands, ranging from fresh to saline. They are typically found in coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands. Breeding does not occur in Australia.

Movement

Migratory, present in Australia from September–June. One of the first species to depart breeding grounds, males leave before females and juveniles. Only a small proportion of the total population visits Australia, with most occurring in South America during the non-breeding season. Nearly all individuals travel north during the breeding season, with very few overwintering records.

Behaviour

Pectoral Sandpipers are omnivorous, consuming algae, seeds, crustaceans, arachnids and insects in shallow fresh to saline wetlands. While feeding, they move slowly, probing with rapid strokes. They form large mixed flocks in suitable foraging and roosting habitat with other migratory shorebirds.

Flight behaviour

Pectoral Sandpipers form large mixed flocks with other shorebird species in suitable habitats. The timing of flight between roosting and foraging areas is dependent on tides, and they roost and forage both during the day and at night. The exact timing of their migratory flight, whether diurnal or nocturnal, is unclear. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

When flushed, Pectoral Sandpiper flight is rapid, characterized by many turns and a zigzag pattern, similar to snipe. However, when migrating or changing feeding locations, flight is more leisurely, with loose, measured wingbeats.

Demographic factors

The global population has been estimated to be around 25,000–100,000 individuals. Accurate population estimates do not exist for the EAAF pop.

Red-necked Stint (*Calidris ruficollis*; Mig. EPBC & BC Acts)

Information sourced from DCCEEW (2024j); (Geering *et al.* 2007); (Newton 2008); (Kloeckner *et al.* 1982); (Hansen *et al.* 2016); (Van Gils *et al.* 2020) and (Garnett & Baker 2021).

Habitat

Red-necked Stints primarily forage on bare wet mud in intertidal mudflats, sandflats, or in very shallow water, typically in areas with a thin film of surface water near the water's edge. During high tides, they may forage in non-tidal wetlands. They are also found foraging in samphire, though they tend to avoid seagrass beds, feeding along their edges instead. They sometimes forage in beach-cast seaweed on sandy ocean beaches and in flooded paddocks or freshly cropped lucerne paddocks near lagoons. For roosting, Red-necked Stints prefer sheltered beaches, spits, banks, or islets of sand, mud, coral, or shingle, and occasionally in saltmarsh or other vegetation. They may also roost on exposed reefs or shoals. Large numbers may roost on ocean beaches, although this is likely not a preferred habitat unless high numbers are present. They have also been recorded roosting up to 1.5 km from an inland lake, in close-cropped grass, and among beach-cast seaweed, clods of mud, or dried cow-pats. During very high tides, they may use sand dunes or claypans, with large groups recorded roosting at an inland claypan near Roebuck Bay in north-west Western Australia.

Movement

Present in Australia from August–April, likely moving in large flocks during migratory flight. AAustralia is reached by late August and arrivals continue until November, with departure mainly March and April. Immature birds usually remain in Australia throughout first year, often moving inland after rains fill wetlands. Adults show high fidelity between years to non-breeding sites.

Behaviour

Red-necked Stints are omnivorous and forage in intertidal and near coastal wetlands in Australia. They use their bill to jab and probe into soft mud to capture small invertebrates and gleans from plants in saltmarshes and water. They are often seen feeding in dense flocks, which spread out as the tide recedes, and frequently forage alongside other shorebird species.

Flight behaviour

Red-necked Stints travel in large flocks and has been observed feeding in dense groups. The timing of flights between roosting and foraging habitats is tide-dependent in marine environments, and the species roosts and forages both during the day and night. The exact diurnal or nocturnal timing of migratory flight is unclear, as is the size of the flocks migrating to and from Australia. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

Their estimated population in the East Asian-Australasian Flyway (EAAF) was 475,000 individuals as of 2016, of which 389,200 were expected to come to Australia. The estimated population as of 2020 was ~350,000 mature individuals in Australia, with a declining population trajectory.

Wood Sandpiper (*Tringa glareola*; Mig. EPBC & BC Acts)

Information gathered from DCCEEW (2024d); Hansen *et al.* (2016) and (Geering *et al.* 2007).

Habitat

Wood Sandpipers inhabit well-vegetated, shallow freshwater wetlands, swamps, billabongs, lakes, pools, and waterholes. These areas are typically associated with emergent aquatic plants or grasses and are often surrounded by tall fringing vegetation. They are also frequently found in inundated grasslands, short herbage, wooded floodplains, and irrigated crops, and are also known to appear in small wetlands as they dry out. They rarely visit brackish wetlands and dry stunted saltmarsh. They occur in artificial wetlands, such as open sewage ponds, reservoirs, large farm dams, and bore drains. In some wetlands in Western Australia, individuals are often observed near each other, concentrating at specific areas within the wetland.

Movement

Wood Sandpipers are a migratory species that breeds across Eurasia. It is likely that the Australian non-breeding population originates from eastern Siberia. Within Australia, they exhibit some dispersive movements between appropriate wetland habitat, though their movements within Australia remain largely unstudied. Although regularly observed at many sites in Australia, they also appear unpredictably in summer at inland storm pools.

Only a small portion of the Asian population reaches Australia, where most sightings occur between August and April. After arrival, some of them move southward across the continent. They are common in southwestern Western Australia, from summer to autumn.

Behaviour

Wood Sandpipers are observed either singly, in pairs, or in small flocks, and very occasionally in groups numbering in the hundreds. They often associate with other wader species and typically feed in loosely scattered groups. They tend to be wary, nervous, and excitable, especially in larger groups, although solitary individuals may sometimes allow a closer approach. They are carnivorous, feeding mainly on insects and molluscs in Australia. The species wades in shallow freshwater, often up to its belly, gleaning prey from the water's surface. They are also known to probe with their bill, sometimes submerging their head and neck, sweeping the bill side to side underwater in search of food.

Flight behaviour

When disturbed, Wood Sandpipers fly quickly in a zigzag pattern, gliding gracefully close to the ground. Their flight involves a swaying motion with rapid wingbeats, often rising high and moving at great speed when startled. Flight ecology during migration is more unclear. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights passing a pacific island was 63 kph.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population was estimated at approximately 130,000 in 2016.

Common Greenshank (*Tringa nebularia*; EN/Mig. EPBC Act; Mig. BC Act)

Information gathered from DCCEEW (2024b); Hansen *et al.* (2016); Geering *et al.* (2007); Newton (2008) and Kloeckner *et al.* (1982) .

Habitat

Common Greenshanks forage at the edges of wetlands, in soft mud on mudflats, in channels, or in shallow waters around the edges of waterbodies. These feeding areas are often located around mangroves or other sparse, emergent vegetation like sedges or saltmarsh. They may also occasionally feed in seagrass beds. They roost in a variety of coastal and inland habitats. These habitats include estuaries, mudflats, mangroves, lagoons, billabongs, swamps, sewage farms, and flooded crops.

Movement

Migratory. Common Greenshanks arrive in Australia from August, primarily passing through Western Australia and the Torres Strait. Numbers slowly increase at both inland and coastal sites between August and September. Common Greenshanks overwinter at a few selected locations, with numbers reaching expected wintering levels in late April and early May. The proportion of the population that overwinters in Australia can vary from year to year. During the non-breeding season, most of them do not appear to move long distances within Australia, although some dispersive movements may occur.

Behaviour

Common Greenshanks are carnivorous, with a diet that primarily consists of insects (such as beetles), along with crustaceans, annelids, molluscs, amphibians, small fish (such as mullet, clinids, and tilapia), and occasionally rodents. They are both diurnal and nocturnal. They feed by picking from the surface, probing, sweeping, and lunging at the edges of mudflats or shallow waters. They may also walk along shorelines and even chase small fish in shallow water. Breeding typically occurs in widely dispersed pairs. Males often build multiple nests, lining them with feathers and vegetation, from which the female will choose one.

Flight behaviour

During non-breeding season, Common Greenshanks do not seem to move long distances within Australia, although dispersive movements may occur. Normal flight when flushed is low, rapid and often zigzagging. Generally, migratory shorebirds fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

Their estimated population in the East Asian-Australasian Flyway (EAAF) in 2016 was 110,000 birds, of which 27,500 were thought to come to Australia. As of 2020, the total number of mature individuals is estimated to be 23,700 (range 16,300–33,400), with a declining trajectory.

Marsh Sandpiper (*Tringa stagnatilis*; Mig. EPBC Act)

Information gathered from (DCCEEW 2024i) and (Hansen *et al.* 2016).

Habitat

Marsh Sandpipers inhabit permanent and ephemeral wetlands of varying salinity. Wetlands include swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats. The species is also commonly found at sewage farms and saltworks, and is less frequently recorded at reservoirs, waterholes, soaks, bore-drain swamps, and flooded inland lakes. In northern Australia, they favour intertidal mudflats. Three of the 5 sites with the highest recorded numbers of Marsh Sandpipers are saltwater habitats, including Port Hedland saltworks in Western Australia, though generally in Western Australia they prefer freshwater environments.

Marsh Sandpipers typically forage in shallow water at the edges of wetlands, probing the wet mud of mudflats or feeding among marshy vegetation. They have also been recorded roosting or loafing on tidal mudflats, near low saltmarshes, and around inland swamps.

Movement

Migratory. Marsh Sandpipers depart from breeding grounds from the first half of July to early September. Birds arrive in Australia from September and apparently move south across the continent from September – December. In the Australian summer, some (possibly dispersive) movements have been observed. The species begins to migrate north in March–April. Within Australia, they may move away from coast after rains and, disperse among temporary inland wetlands.

Behaviour

Marsh Sandpipers are primarily carnivorous, feeding on insects, molluscs, and crustaceans. While plant material has occasionally been found in its stomach, it is likely ingested incidentally. The species typically feeds in shallow water, often wading deeper than the level of its tarsus. It walks briskly and steadily, or may dash about in half-circles, and sometimes swims. Marsh Sandpipers generally forage by picking at the surface of water or mud and may also glean food from vegetation. They feed both singly and in groups, and has been observed following ducks, egrets, and other waders to feed on prey disturbed by these birds.

Flight behaviour

Marsh Sandpipers are known to feed in groups as large as several hundreds and often flocks during migration. Migration typically occurs at high altitude to ensure energy efficiency, as they fly long distances with few stops during migration. Migratory shorebirds usually fly at high altitudes during migration, with flight heights of 1,000–5,000 m reported as typical. Migratory flight heights are also variable based on weather systems and time of day, and the mean ground speed of migratory bird flights in one study from a pacific island was 63 kph.

Demographic factors

The East Asian-Australasian Flyway (EAAF) population was estimated at around 130,000 in 2016.

Masked Owl (Southwest) (*Tyto novaehollandiae novaehollandiae*; P3 DBCA list)

Information gathered from Marks (2020).

Habitat

The Australian Masked Owl (southwest) inhabits tall open forest dominated by large trees suitable for nesting and roosting, favouring sites with access to more open areas. They occur in higher numbers where greatest local forest and woodland diversity occurs, such as forest types with dry, open understorey that provide a variety of ground cover. Smaller numbers are patchily distributed away from coastal regions in wooded farmland, riparian woodland and isolated stands of large trees. They also occur in pine plantations. In South Australia, relic populations of the species have adapted to treeless plains, using caves and rock clefts for nesting and roosting. When foraging, they are often found in and at the edge of small patches (<20 ha) of forest with little or no understorey.

Movement

Australian Masked Owls (southwest) are sedentary, with high site fidelity. Most movements may be post-breeding dispersal of juveniles, and opportunistic exploitation by adults of recently disturbed habitats or changes in prey abundance, including rodent plagues. In Southwest Australia, some records have been attributed to seasonal movements, but this is possibly due to post-breeding dispersal or unrecorded breeding. Their estimated territory size is 1,000–1,200 ha and foraging ranges have been found at 1,800–2,500 ha.

Behaviour

Australian Masked Owls generally are considered territorial and are usually observed as a single individual or occasionally in pairs. Nesting sites are large hollows 40–500 cm deep in living or dead trees, at heights of 12–25 m, usually in trunk but also in vertical branch spouts. They favour isolated trees or trees higher than surrounding ones, with same sites used for many years. They may breed at any time of year with most eggs being laid between March and July. The species is carnivorous, feeding on a wide range of prey such as large possums, mice, small to medium birds, reptiles, beetles and large moths. They prey on arboreal species, but most prey are captured on ground.

Flight behaviour

Flight is typically low and gliding above the ground or through trees. Hunting occurs both on wing and from perches. After dusk, hunting styles change from low hunting flights over open ground to perch-hunting.

Demographic factors

The population size of the subspecies is unclear.

Wedge-tailed Eagle (*Aquila audax*; not listed)

Information gathered from Cherriman (2024); Debus (2020) and (Nature Advisory 2023).

Habitat

Wedge-tailed Eagles occur over most terrestrial habitats, from sea level up to 2000 m, but avoid areas with dense human population, e.g. cities, intensive agriculture. They occupy open forest, woodland, scrub, savanna, plains and deserts, typically in rough or remote country, though avoid dense rainforest. Nesting occurs in all wooded habitats, provided sufficient distance from human activity. Roosts and nests usually are built in live or dead trees with commanding views, 2–73 m (typically 12–30 m) above ground, though often near ground in remote deserts; typically on a rise or hillside. Wedge-tailed Eagles also occasionally on cliff ledges, or among rocks, and even on ground on islands, in areas inaccessible to humans.

Movement

Most Wedge-tailed Eagles are highly faithful to their nesting sites, with high site fidelity. The same nest is often used year after year, potentially for decades. Juvenile Wedge-tailed Eagles, especially in Western Australia, can undertake long-distance dispersal to find territory, with satellite-tagged individuals travelling up to 1,200 km shortly after leaving their natal territories.

Behaviour

Wedge-tailed Eagles forage by low, slow quartering, high soaring or still-hunting from a perch. They seize prey on the ground or sometimes in tree canopies, after a swift, stealthy glide or dive which may become short chase. The species rarely takes prey in flight. Wedge-tailed Eagles occasionally remove mammals such as possums from tree hollows, and pairs or groups attack large prey cooperatively.

Flight behaviour

Wedge-tailed Eagles undertake mostly diurnal flight around peak raptor time (when reptile prey is active), at heights up to 2,000 m. They are known to fly within the Rotor Sweep Area and are hit by turbines regularly at wind farms on the eastern coast of Australia. The species is most exposed to collision risk due to a common habit of soaring and circling at height while foraging. Flight behaviour does not appear to be altered by wind farm development, with records of successful breeding as 200 m from operating wind turbines.

Demographic factors

The estimated population size varies depending on location and subspecies. However, it is one of the most widespread raptors in Australia and the national population is likely stable due to their extensive range across various habitats.

White-bellied Sea-Eagle (*Haliaeetus leucogaster*; not listed)

Information gathered from Birdlife Australia (2017); BirdLife International (2020); DCCEEW (2025); Marchant and Higgins (1993); NSW Office of Environment and Heritage (2019)

Habitat

Habitats of this species are characterised by the presence of large areas of open water, such as the ocean, larger rivers, lakes and swamps. Foraging habitat consists of coastal seas, rivers, fresh and saline lakes, lagoons and reservoirs. May also forage in adjacent terrestrial habitats such as grasslands.

Breeding habitat consists of mature open forest or woodland and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. May also nest in cliffs.

Movement

Resident. High site fidelity to successful nesting trees. Resident pairs are territorial and occupy territories of hundreds of hectares.

Behaviour

Diurnal. Hunts mainly aquatic animals, such as fish, turtles and waterbirds. Also feeds on mammals, reptiles and carrion. Will harass smaller birds to force them to drop their prey.

May be solitary or live in pairs or small family groups consisting of a pair of adults and dependent young. Birds form permanent pairs that inhabit territories throughout the year.

Flight behaviour

Highly maneuverable in flight. Hunts prey from a perch, whilst circling slowly in flight or gliding along 10–20 m above shorelines. Often catches a fish by flying low over the water and grasping it in its talons. May also dive at a 45-degree angle from its perch and briefly submerge to catch fish near the water surface. Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground.

Demographic factors

Occurs throughout coastline regions in most of southeastern and eastern Asia. Distributed around the Australian coastline. Also occurs along some inland rivers in eastern Australia.

Whistling Kite is not globally or nationally threatened, however a 16% decline in reporting rate over the past two decades has been recorded nationally.

Not threatened. Population estimated between 2,600 and 41,000 mature individuals. In Australia, based on a population density of one pair per 40 km, the population is thought to number at least 500 pairs, but this is likely to be a significant underestimate.

Western False Pipistrelle (*Falsistrellus mackenziei*; P4 DBCA list)

Information gathered from Kitchener (1986); IUCN (2024) and (Woinarski *et al.* 2014).

Habitat

The Western False Pipistrelle occurs extensively in tall woodlands and wet or dry sclerophyll forest of south-western Australia. It is associated with Karri, Jarrah and Tuart old-growth forests. The species roosts in tree hollows, branches and stumps.

Movement

Site fidelity and movement patterns are unclear.

Behaviour

It occurs in roosting colonies of up to 30 bats. The species forages between the canopy and understory of tall trees. It is mainly insectivorous.

Flight behaviour

The behaviour of the species in flight is described as quick and straight. Most flight occurs approximately 15 m above ground. Echolocation calls end at low frequencies (30 kHz), with most energy at 32 – 34 kHz, and lasting for 12 ms.

Demographic factors

The population size is unknown. There is likely enough suitable habitat remaining in the area of occupancy to support more than 10,000 individuals.

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Appendix 5 Species by site matrix

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Birds (121)																															
Anatidae	*Anas castanea*	Chestnut Teal																													4
Anatidae	*Anas gracilis*	Grey Teal					4	4									9								50	45					422
Anatidae	*Anas superciliosa*	Pacific Black Duck	55	41	1		1			3		2		3	5	2	14	6	1		34	17			650	2					632
Anatidae	*Biziura lobata*	Musk Duck	1																												5
Anatidae	*Chenonetta jubata*	Australian Wood Duck						6				2					42					2										19
Anatidae	*Cygnus atratus*	Black Swan	56	6																					4	649					310
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck																													1
Anatidae	*Spatula rhynchotis*	Australasian Shoveler																													7
Anatidae	*Tadorna tadornoides*	Australian Shelduck	85	14	14	6	131	5	5	124	22	132	4	2	33	3		1	27		179	18	6	7	12		12				568
Podargidae	*Podargus strigoides*	Tawny Frogmouth																													7
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover																								6		2	83		
Charadriidae	*Charadrius melanops*	Black-fronted Dotterel																													23
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1										1																2	1
Scolopacidae	*Tringa glareola*	Wood Sandpiper																													3
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher																							1	42	1	2	1		
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull																							7	70	22	5	3		
Laridae	*Hydroprogne caspia*	Caspian Tern																								49	3	9	1		
Laridae	*Larus pacificus*	Pacific Gull																							4	3	12		1		
Laridae	*Sternula nereis nereis*	Fairy Tern																								40		4	4		
Laridae	*Thalasseus bergii*	Greater Crested Tern																							1	9	14	20	2		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper																								40					
Scolopacidae	*Calidris alba*	Sanderling																								4					
Scolopacidae	*Calidris ruficollis*	Red-necked Stint																								12			60		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit																								1					
Ardeidae	*Ardea pacifica*	White-necked Heron			1	6		1					1																		15
Ardeidae	*Bubulcus coromandus*	Cattle Egret																													10
Ardeidae	*Egretta garzetta*	Little Egret																							1						
Ardeidae	*Egretta novaehollandiae*	White-faced Heron	4	5	1	3	17	85		4	2						3	2	12	2	3	7	1	1	2						141
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		4																	4										1
Threskiornithidae	*Platalea regia*	Royal Spoonbill	1																												
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis	5	6	3	6	14	110		50		50	9					62	144		119	44			12	4	10				337
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	268	428	1,089			5	94	1	2	73	314		2	3	16	389	53		998	4		140							1,421
Columbidae	*Ocyphaps lophotes*	Crested Pigeon	3	1	1				5		1	1	26		2			2			2	7		3						3	2
Columbidae	*Phaps chalcoptera*	Common Bronzewing	2			1					4						2														2
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	2		2	4	7	1		1		3				1	1	1				1									9
Halcyonidae	Todiramphus sanctus	Sacred Kingfisher																													6
Meropidae	Merops ornatus	Rainbow Bee-eater																													1
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			1																										
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo				1																									5
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo	1			1		1			1					1													1	3

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Accipitridae	*Aquila audax*	Wedge-tailed Eagle	5			3	7	2		3	2	6	5				1	3	5	2		2									4
Accipitridae	*Circus approximans*	Swamp Harrier	11	3	1	3		3		3		1	3				1	6	4	2	1	7	1	2							14
Accipitridae	*Elanus axillaris*	Black-shouldered Kite	1															1													2
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle																	1								1				
Accipitridae	*Haliastur sphenurus*	Whistling Kite	2	1														1			1				1						3
Accipitridae	*Hieraaetus morphnoides*	Little Eagle					1																		1						1
Accipitridae	*Pandion haliaetus*	Osprey																							2		4	2	1		1
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk					2						1								2										
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk	2				2																								3
Falconidae	*Falco berigora*	Brown Falcon		1	3					8			1						1			3									4
Falconidae	*Falco cenchroides*	Australian Kestrel	4	2		1	2		1	3		7	9	1	1			5	9	2	2		1	4	1				1		2
Falconidae	*Falco longipennis*	Australian Hobby	2					2																							
Falconidae	*Falco peregrinus*	Peregrine Falcon											1																		
Phasianidae	*Coturnix pectoralis*	Stubble Quail	6	13	1	1			1	3	6	5	4				1	9	2	1	4	4	1	3							3
Rallidae	*Fulica atra*	Eurasian Coot																													3
Rallidae	*Porphyrio melanotus*	Australasian Swamphen																													3
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill	17		8	19	10	2		3	5		28		7	11	11														9
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	58	25	4		92		29	13	12		4	1	12	2			5			48						2	6
Acanthizidae	*Gerygone fusca*	Western Gerygone									1					1															5
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren	2			3				2	5		8		2		1														6
Acanthizidae	*Smicrornis brevirostris*	Weebill																													2
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		12	3	5				8	4	11	10					2			5	7		2							2
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6	12			2	25		21	2				3														4	
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird																													2
Artamidae	*Cracticus torquatus*	Grey Butcherbird	19	16	4	28	4	4	8	16	6	13	15	5	11	1	9	2	1	3	4	3		2							8
Artamidae	*Gymnorhina tibicen*	Australian Magpie	15	1	13	18	8	4		11	3		36	1	10	9	18	14		42	6	18	3	8							14
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	4	5	4		5	4	39	1	3	2			5		2	3		1		1		3						6	5
Campephagidae	*Lalage tricolor*	White-winged Triller			2				1																					3	1
Climacteridae	*Climacteris rufus*	Rufous Treecreeper																													2
Corvidae	*Corvus coronoides*	Australian Raven	81	66	8	31	182	16	15	48	6	65	95	4	24	32	9	77	58	69	53	30	148	18	13			1	4	5	28
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird																													1
Dicruridae	*Grallina cyanoleuca*	Magpie-lark	5	2	23	10		2	4		15	8	6	1	8	4		6			2	7	4	4						1	6
Dicruridae	*Rhipidura albiscapa*	Grey Fantail	14		7	14	8	3		4	11		3	1		14	8														20
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail	14	25	13	24	3	9	20	6	17	8	22	4	7	6	6	9	6	9	11	4		27						3	16
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	21	11	1	6	14	1			3	5		2	13		9		1	7	27	7	1	7					5		18
Hirundinidae	*Petrochelidon nigricans*	Tree Martin	201	17	4	51	41	9	3	80	19	61	70		13	11	23	86	49	35	35	66	32	6							5
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		3									6	1					3				2								3
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark			2				1			3																		3	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren	2				3						8			8															6
Maluridae	*Malurus splendens*	Splendid Fairy-wren	9			33	16	11		3	14		12			6	5														5
Maluridae	*Stipiturus malachurus*	Southern Emu-wren	9																												
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill					3									1															2
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	7	3	6	37	20	19	1	2	4	9	1	1	14	4	14	2		4	1	12	3	1							10

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Meliphagidae	*Epthianura albifrons*	White-fronted Chat	38	17	1				22			84						9	8		5									8	6
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater																													3
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			1		30						4									1									3
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner																													1
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater	2		1		4	8					3			2						7									4
Motacillidae	*Anthus australis*	Australian Pipit	2	15				1	5			19						1	8	2	1		3	19						1	2
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush						1																							1
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler	5		2		4				2					1	1														8
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler																													1
Pardalotidae	Pardalotus punctatus	Spotted Pardalote																													1
Pardalotidae	*Pardalotus striatus*	Striated Pardalote													1																7
Petroicidae	*Microeca fascinans*	Jacky Winter		1																											
Petroicidae	*Petroica boodang*	Scarlet Robin														2															
Petroicidae	*Quoyornis georgianus*	White-breasted Robin																													1
Zosteropidae	*Zosterops lateralis*	Silvereye	37		2	7	17						16			5	3			2		10									13
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter																							4						
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican																								124	2				
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant	2			2	1												1			2			1	3	1	1			20
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant																			1					8					
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant						1																			26				1
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant					2				1							1				4			2	1	8	2			
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe																													2
Cacatuidae	*Cacatua sanguinea*	Little Corella																													1
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak								1					54																103
Cacatuidae	*Calyptorhynchus/Zanda* sp.	black cockatoo species	1			38				6								2		8			10				8	7	4		15
Cacatuidae	*Eolophus roseicapilla*	Galah																									5	2			1
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo														8	1			2											46
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	4			2	1					10				5		28		31	4		2	8							55
Cacatuidae	*Zanda* sp.	white-tailed black cockatoo species	3		26																										321
Psittaculidae	*Barnardius zonarius*	Australian Ringneck	13		28	65	19	11	2	7	18	15	14	2	19	9	31	3		20	4	38	10	19						2	11
Psittaculidae	*Neophema elegans*	Elegant Parrot	12	8		8	3	11	5		12	17			1			1	18		9	1								3	3
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet	2			6	10	17							8	6	61			3	16										8
Psittaculidae	*Platycercus icterotis*	Western Rosella	2				2	2			2	1			1	4				2											
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot						1																							
Strigidae	*Ninox boobook*	Boobook Owl		1				13			1	2	1		238	1															
Tytonidae	*Tyto javanica*	Eastern barn owl																													2
Tytonidae	*Tyto novaehollandiae novaehollandiae*	Masked Owl (southwest)														1															1

Family	Species	Common name	BUS001	BUS002	BUS003	BUS004	BUS005	BUS006	BUS007	BUS008	BUS009	BUS010	BUS011	BUS012	BUS013	BUS014	BUS015	BUS016	BUS018	BUS019	BUS020	BUS025	BUS026	BUS027	BUS030	BUS031	BUS032	BUS033	BUS034	BUS035	B & T survey sites
Dromaiidae	*Dromaius novaehollandiae*	Emu	20		3		3	19		2		4	27						47	4	19										20
Bats (8)																															
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat	•	•		•	•	•	•	•	•	•	•	•	•	•	•													•	•
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	•	•	•	•	•	•	•	•	•	•	•		•	•	•													•	•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	•	•		•	•	•	•	•	•	•	•		•	•	•													•	•
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	•			•							•		•	•	•														•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat	•	•		•	•	•		•	•		•		•	•	•													•	•
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat									•				•	•	•														•
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat	•	•		•	•	•		•						•	•													•	
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat	•	•	•	•	•	•		•	•	•	•		•	•	•													•	•

Number records for birds represent aggregated data, i.e. all counts across all seasons and sample events. Bats are recorded as positive detection at site.

Appendix 6 Bird flight height data

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	1	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	1	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	2	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	2	0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	3	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3	3	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1	3	0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	5	0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2	6	0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		4		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		12		0-24 m	E	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		5		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m		
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	N	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		1		0-24 m	NE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m	SE	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		3		0-24 m	SW	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza apicalis*	Inland Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	0	0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	0	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	1	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	2	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	2	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	2	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	2	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6	2	0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12	3	0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	3	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3	3	0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	4	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4	4	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5	4	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2	4	0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2	5	0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1	6	0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		14		0-24 m	S	S-N
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	NE-W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		5		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m	N-S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		2		0-24 m	E	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		8		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		21		0-24 m	N-W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		6		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		21		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		30		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		23		0-24 m	W	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	S	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		4		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m	SE	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		3		0-24 m	NW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SW	
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		1		0-24 m		
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		12		0-24 m	SW	
Acanthizidae	*Gerygone fusca*	Western Gerygone		1		0-24 m	N	
Acanthizidae	*Gerygone fusca*	Western Gerygone		1		0-24 m	SE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1	1	0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2	1	0-24 m	E	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2	2	0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		2		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	S	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	W	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NE	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	NW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m		
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	N	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	SW	
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren		1		0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	375	>250 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	800	>250 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	0	0-24 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	0	0-24 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	200	151-250 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		3	200	151-250 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	200	151-250 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	250	151-250 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	200	151-250m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	30	25-50 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	40	25-50 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	50	25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	50	25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	50	25-50 m		
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m	S	E-W
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		25-50 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		25-50 m	E-W	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		25-50 m		
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	60	51-75 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	70	51-75 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1		51-75 m	S	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	80	76-150 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	100	76-150 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	120	76-150 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	120	76-150 m	NE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	N	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	SW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		1	150	76-150 m	SE	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	150	76-150 m	E	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2	150	76-150 m	E	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		3	150	76-150 m	NW	
Accipitridae	*Aquila audax*	Wedge-tailed Eagle		2		76-150 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	2	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	2	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		2	3	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Accipitridae	*Circus approximans*	Swamp Harrier		1	3	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	4	0-24 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		1	5	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	5	0-24 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	6	0-24 m	SE	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	15	0-24 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		2	20	0-24 m	NW	
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	NW	SW-NE
Accipitridae	*Circus approximans*	Swamp Harrier		2		0-24 m	NE	S-N
Accipitridae	*Circus approximans*	Swamp Harrier		2		0-24 m	E	S-N
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	E	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	N	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	NE	E-W
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1		0-24 m	W-E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	25	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	SW	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	30	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	E	
Accipitridae	*Circus approximans*	Swamp Harrier		1	40	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	50	25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1	50	25-50 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	SW	N-S
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		1		25-50 m	W	
Accipitridae	*Circus approximans*	Swamp Harrier		1		51-75 m	ESE	
Accipitridae	*Circus approximans*	Swamp Harrier		1		51-75 m	NE	
Accipitridae	*Circus approximans*	Swamp Harrier		2		51-75 m	S	
Accipitridae	*Circus approximans*	Swamp Harrier		2	100	76-150 m	SE	
Accipitridae	*Circus approximans*	Swamp Harrier		2	150	76-150 m	N	
Accipitridae	*Circus approximans*	Swamp Harrier		2		76-150 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		1	20	0-24 m	NE	
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		1	30	25-50 m	SW	
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		1	80	76-150 m	E	
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		1	150	76-150 m	N	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	35	25-50 m	NE	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	50	25-50 m	N	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1		25-50 m	S	W-E
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	60	51-75 m	W	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	80	76-150 m	NW	
Accipitridae	*Haliastur sphenurus*	Whistling Kite		1	80	76-150 m	S	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle		1	80	76-150 m	N	
Accipitridae	*Hieraaetus morphnoides*	Little Eagle		1		76-150 m	SE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	1	0-24 m	NE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	20	0-24 m	E	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	40	25-50 m	NE	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	40	25-50 m	SW	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	4	50	25-50 m	W	
Accipitridae	*Pandion haliaetus*	Osprey	Mig. (EPBC & BC Acts)	1	60	51-75 m	SE	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		0-24 m	E	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		0-24 m	N	
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		1		25-50 m	S	W-E
Accipitridae	*Tachyspiza cirrocephala*	Collared Sparrowhawk		2	100	76-150 m	SE	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		2		0-24 m	E-W	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1		51-75 m	S	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1	125	76-150 m	S	
Accipitridae	*Tachyspiza fasciata*	Brown Goshawk		1	150	76-150 m	SE	
Anatidae	*Anas gracilis*	Grey Teal		50	0	0-24 m	NE	
Anatidae	*Anas gracilis*	Grey Teal		4		0-24 m	E	
Anatidae	*Anas gracilis*	Grey Teal		2		0-24 m	W	
Anatidae	*Anas gracilis*	Grey Teal		9		0-24 m	N	
Anatidae	*Anas gracilis*	Grey Teal		2		0-24 m	S	
Anatidae	*Anas gracilis*	Grey Teal		5		0-24 m	S	
Anatidae	*Anas gracilis*	Grey Teal		45	30	25-50 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		650	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		4	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		16	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Anas superciliosa*	Pacific Black Duck		30	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		8	0	0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	0	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	0	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		450	0	0-24 m		
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	SW	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	2	0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1	3	0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2	20	0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	E	W-E
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	SW	N-S
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	E	N-S
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	S	E-W
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	NE	
Anatidae	*Anas superciliosa*	Pacific Black Duck		4		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		13		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		3		0-24 m	N	
Anatidae	*Anas superciliosa*	Pacific Black Duck		2		0-24 m	W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		0-24 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		0-24 m	E	
Anatidae	*Anas superciliosa*	Pacific Black Duck		14	25	25-50 m	S	
Anatidae	*Anas superciliosa*	Pacific Black Duck		5		25-50 m	E	S-N
Anatidae	*Anas superciliosa*	Pacific Black Duck		26		25-50 m	E-W	
Anatidae	*Anas superciliosa*	Pacific Black Duck		1		25-50 m	E-W	
Anatidae	*Biziura lobata*	Musk Duck		1		0-24 m	W	
Anatidae	*Biziura lobata*	Musk Duck		1		0-24 m		
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2	15	0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2		0-24 m	N	E-W
Anatidae	*Chenonetta jubata*	Australian Wood Duck		6		0-24 m	S	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		1		0-24 m	E	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		4		0-24 m	NE	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		3		0-24 m	E	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		2		0-24 m	S	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		1		0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		27		0-24 m	N	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		6		0-24 m	W	
Anatidae	*Chenonetta jubata*	Australian Wood Duck		4		0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Cygnus atratus*	Black Swan		60	0	0-24 m		
Anatidae	*Cygnus atratus*	Black Swan		370	0	0-24 m	NW	
Anatidae	*Cygnus atratus*	Black Swan		279	0	0-24 m	W	
Anatidae	*Cygnus atratus*	Black Swan		4	0	0-24 m	NE	
Anatidae	*Cygnus atratus*	Black Swan		1	15	0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		1	20	0-24 m	NE	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	S	W-E
Anatidae	*Cygnus atratus*	Black Swan		6		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		3		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		1		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	N	
Anatidae	*Cygnus atratus*	Black Swan		20		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		4		0-24 m	SE	
Anatidae	*Cygnus atratus*	Black Swan		1		0-24 m	S	
Anatidae	*Cygnus atratus*	Black Swan		6		0-24 m	E	
Anatidae	*Cygnus atratus*	Black Swan		2		0-24 m	S	
Anatidae	*Cygnus atratus*	Black Swan		9	30	25-50 m	S	
Anatidae	*Cygnus atratus*	Black Swan		2		25-50 m	S	W-E
Anatidae	*Cygnus atratus*	Black Swan		1		25-50 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		6	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		8	0	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		150	0	0-24 m		
Anatidae	*Tadorna tadornoides*	Australian Shelduck		30	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20	0	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	0	0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		13	0	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	0	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		18	0	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	1	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		12	2	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	2	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	2	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	3	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	3	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	3	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	5	0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	6	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	8	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	10	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	10	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	12	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	15	0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7	15	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	20	0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	20	0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	20	0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	S	W-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	SW-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	W	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	NW	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	N	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20		0-24 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		9		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		31		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		40		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		0-24 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N-E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		54		0-24 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		0-24 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		29		0-24 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		16	25	25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	25	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	25	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7	25	25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		70	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5	30	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2	30	25-50 m	N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	35	25-50 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1	40	25-50 m	SW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	40	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4	40	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		6	40	25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		100	50	25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3	50	25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	SE	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		5		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	W	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	W-E
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		20		25-50 m	W	S-N
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	SW	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E	N-S
Anatidae	*Tadorna tadornoides*	Australian Shelduck		8		25-50 m	W	N-S

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	E	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		25-50 m	N	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		4		25-50 m	NW	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	NE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	S-N	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		54		25-50 m	NW	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	SE	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		25-50 m	N-S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		18		25-50 m	W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		1		25-50 m	S	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		7		25-50 m	W-E	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		3		51-75 m	NW	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		51-75 m	S	E-W
Anatidae	*Tadorna tadornoides*	Australian Shelduck		2		51-75 m	E-W	
Anatidae	*Tadorna tadornoides*	Australian Shelduck		14		51-75 m	E-W	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		3	0	0-24 m	NE	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		1	20	0-24 m	NE	
Ardeidae	*Ardea pacifica*	White-necked Heron		6		0-24 m	S	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		0-24 m	SE	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		25-50 m	W	
Ardeidae	*Ardea pacifica*	White-necked Heron		1		25-50 m	W	
Ardeidae	*Egretta garzetta*	Little Egret		1	0	0-24 m		
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		4	0	0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		8	0	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	0	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	0	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	2	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	10	0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	N	

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Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	15	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		4	20	0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		3	20	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	20	0-24 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W	N-S
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	S	E-W
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W-E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		8		0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		20		0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	W	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1		0-24 m	SW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	25	25-50 m	NW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	30	25-50 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		6	30	25-50 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	30	25-50 m	S	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	35	25-50 m	NW	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	35	25-50 m	E	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		2	40	25-50 m	NE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	50	25-50 m	N	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		1	50	25-50 m	SE	
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		55		51-75 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	1	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3	1	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	1	0-24 m		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	1	0-24 m	SW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	1	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	2	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	2	0-24 m	N	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	2	0-24 m	N	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	3	0-24 m	NE	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3	3	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	3	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	3	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	4	0-24 m	S	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	4	0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	4	0-24 m	SW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		6	4	0-24 m	SE	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		1	5	0-24 m	NW	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	10	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	15	0-24 m	E	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		3		0-24 m	N	E-W
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		2	25	25-50 m	W	
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		5	30	25-50 m	NE	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		7		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m		
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		4		0-24 m	E	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	SW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		20		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		6		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	W	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		1		0-24 m	NW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		5		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		3		0-24 m	NW	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		5		0-24 m	N	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		2		0-24 m	E	
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow		3		25-50 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	0	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3	1	0-24 m	S	

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Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	1	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	2	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	2	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		4	3	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	3	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	3	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	4	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3	4	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	4	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	4	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	4	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	5	0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	5	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	5	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	6	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	6	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	8	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	8	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	10	0-24 m	W	

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Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	10	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	12	0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2	12	0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	12	0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	15	0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		4		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		3		0-24 m	SE	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m		
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	NW	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	S	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1		0-24 m	E	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		2		0-24 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	25	25-50 m	N	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		1	25	25-50 m	W	
Artamidae	*Cracticus torquatus*	Grey Butcherbird		7		25-50 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	0	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	0	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	0	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	0	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	1	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	1	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	2	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	2	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	2	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	2	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	3	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	3	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	4	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	4	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	4	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	5	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	5	0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	5	0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	5	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	5	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	6	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	8	0-24 m	SW	

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Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	8	0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	8	0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2	15	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	15	0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3	15	0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	15	0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1	20	0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	SE	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	N-S
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	E-W
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		9		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		7		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		6		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		4		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	NW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	W	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	E	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		0-24 m	NE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m		
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	N	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		0-24 m	S	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		1		0-24 m	SW	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		25-50 m	SW	S-N
Artamidae	*Gymnorhina tibicen*	Australian Magpie		3		25-50 m	W	N-S
Artamidae	*Gymnorhina tibicen*	Australian Magpie		10		25-50 m	SE	
Artamidae	*Gymnorhina tibicen*	Australian Magpie		2		51-75 m	NE	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1	0	0-24 m		
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	2	20	0-24 m		
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	53		0-24 m	S-N	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1		25-50 m	N-S	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	10		25-50 m	N-S	
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				

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Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo/Karrak	VU (EPBC & BC Acts)	1				
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	1	0-24 m	NW	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	2	0-24 m	W	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	38	4	0-24 m	N	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	10	5	0-24 m	E	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	7	8	0-24 m	NE	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	8	0-24 m	E	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	6	8	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	10	0-24 m	SE	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	12	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	15	0-24 m		
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	4	30	25-50 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	1	30	25-50 m	S	
Cacatuidae	*Calyptorhynchus/Zanda sp.*	black cockatoo species	EN-VU (EPBC & BC Acts)	2	40	25-50 m	S	
Cacatuidae	*Eolophus roseicapilla*	Galah		2	3	0-24 m	N	
Cacatuidae	*Eolophus roseicapilla*	Galah		5	35	25-50 m	W	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m	N	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	8		0-24 m	NE-SW	
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)	1		0-24 m	N-SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	12		0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2		0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	2	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	3	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	4	0-24 m	E	

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Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	3	4	0-24 m	N	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	5	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	9	5	0-24 m	S	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	6	0-24 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	6	0-24 m	N	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	6	7	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	4	12	0-24 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	15	0-24 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	4	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	18	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	20	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	20	20	0-24 m	W	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	5		0-24 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	25	25-50 m		
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	2	25	25-50 m	E	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	30	25-50 m	SW	
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)	1	30	25-50 m	SE	
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	3		0-24 m	S	E-W
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	26		0-24 m	NE-SW	
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Cacatuidae	*Zanda sp.*	white-tailed black cockatoo species	EN (EPBC & BC Acts)	1				
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	1	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	4	0-24 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	5	0-24 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	6	0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	10	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2	15	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	15	0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	15	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2	20	0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	20	0-24 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	S-N
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		3		0-24 m	W	S-N
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	N-S
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	N	E-W
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	N	E-W
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	W-E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		12		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		4		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	SW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	SW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	NE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		2		0-24 m	E-W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S-N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		22		0-24 m	W	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	NW	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1		0-24 m	E	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		3	25	25-50 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	25	25-50 m	S	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	N	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	SE	
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		1	30	25-50 m	S	
Campephagidae	*Lalage tricolor*	White-winged Triller		2		0-24 m	E	
Campephagidae	*Lalage tricolor*	White-winged Triller		1		0-24 m	SW	
Campephagidae	*Lalage tricolor*	White-winged Triller		2		0-24 m	W	
Campephagidae	*Lalage tricolor*	White-winged Triller		1		0-24 m	S	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		2	0	0-24 m	SW	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		70	0	0-24 m	E	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		13	0	0-24 m	E	
Charadriidae	*Anarhynchus ruficapillus*	Red-capped Plover		6	0	0-24 m	N	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		2		0-24 m	S	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1		25-50 m	NE	
Charadriidae	*Vanellus tricolor*	Banded Lapwing		1		25-50 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	0	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	0	0-24 m	SE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	0	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	2	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	SE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	3	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	4	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	4	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	5	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	5	0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	6	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	8	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	8	0-24 m	N	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	10	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	12	0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	12	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2	15	0-24 m	SW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	15	0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1	15	0-24 m	NW	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	N	W-E
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	W	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	N-E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	E	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		5		0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	S	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		1		0-24 m	NE	
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		2		0-24 m	N	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1	15	0-24 m	W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	E-W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	E-W	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		2		0-24 m	N	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	NE	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	NW	
Columbidae	*Phaps chalcoptera*	Common Bronzewing		1		0-24 m	N-S	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		15	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		4	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		8	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		10	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		20	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		14	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		7	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		9	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		5	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	0	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	0	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		38	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		9	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		10	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	0	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	1	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		9	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	1	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	1	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	1	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		3	2	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	2	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		5	3	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	3	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	3	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		3	3	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		4	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	4	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4	5	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	5	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	5	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	5	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	5	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	5	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	6	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	6	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		100	6	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	6	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	7	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	7	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		4	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	8	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	8	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		30	8	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	9	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	9	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		6	10	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		20	10	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4	10	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	10	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	10	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1	12	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	12	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	12	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	12	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		10	15	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1	15	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	15	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	15	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		5	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	20	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3	20	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		8	20	0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		16	20	0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	20	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		4	20	0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1	24	0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	W-S
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SE	W-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	W-E
Corvidae	*Corvus coronoides*	Australian Raven		4		0-24 m	N	W-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	SW-SE
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	S-N
Corvidae	*Corvus coronoides*	Australian Raven		9		0-24 m	E	S-N
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	S-N
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		5		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	N-S

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	N-S
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	N-E
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		54		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		5		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E-W	
Corvidae	*Corvus coronoides*	Australian Raven		8		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		14		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW-SE	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S-N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	W-E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m		
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1		0-24 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		2		0-24 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3	25	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		16	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		4	25	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		1	25	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	25	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		24	25	25-50 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Corvidae	*Corvus coronoides*	Australian Raven		2	26	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		4	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		1	30	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		3	30	25-50 m	E	
Corvidae	*Corvus coronoides*	Australian Raven		2	30	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		7	30	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		4	40	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3	40	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		2	40	25-50 m	NW	
Corvidae	*Corvus coronoides*	Australian Raven		5	40	25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1	45	25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		12	45	25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		2	50	25-50 m	SW	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	W	S-N
Corvidae	*Corvus coronoides*	Australian Raven		5		25-50 m	W	S-N
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	E	N-S
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	W	N-S
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	S	E-W
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	NW	E-W
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	N	E-W
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	SE	
Corvidae	*Corvus coronoides*	Australian Raven		2		25-50 m	NE	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m		
Corvidae	*Corvus coronoides*	Australian Raven		5		25-50 m	W	
Corvidae	*Corvus coronoides*	Australian Raven		3		25-50 m	S	
Corvidae	*Corvus coronoides*	Australian Raven		1		25-50 m	N	
Corvidae	*Corvus coronoides*	Australian Raven		4		25-50 m	S-N	
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo		1		0-24 m	SE	
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo		1	8	0-24 m	W	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	E	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	W	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	NW	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	S	
Cuculidae	*Chalcites lucidus*	Shining Bronze Cuckoo		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	0	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	0	0-24 m	E	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	0	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		4	0	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	1	0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3	1	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	2	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	3	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	3	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	4	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	4	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	5	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	5	0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	6	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	6	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	10	0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	10	0-24 m	E	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	12	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	15	0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	15	0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1	15	0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	N	E-W
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SE-NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SW-NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		3		0-24 m	NW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SW	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	E-W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	SE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		7		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m	S	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m		
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		10		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		1		0-24 m		
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	N	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	W	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		6		0-24 m	NE	
Dicruridae	*Grallina cyanoleuca*	Magpie-lark		2	25	25-50 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	2	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	3	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	3	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	3	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	4	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	4	0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	5	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2	5	0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	12	0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1	15	0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW-NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m		
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	N	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	E	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	NW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	S	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m		
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	W	

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Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SE	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		1		0-24 m	SW	
Dicruridae	*Rhipidura albiscapa*	Grey Fantail		2		51-75 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		10	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	0	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	1	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	2	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	2	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	3	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	4	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	4	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	4	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	5	0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	5	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	6	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	6	0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	8	0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	8	0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2	15	0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1	15	0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		3		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	SE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	E	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		6		0-24 m	NE	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	N	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m		
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	NW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		4		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	SW	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		1		0-24 m	S	
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail		2		0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		5	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		17	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		12	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		9	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	N	
Dromaiidae	*Dromaius novaehollandiae*	Emu		6	0	0-24 m	NE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		8	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		5	0	0-24 m	SE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		14	0	0-24 m	N	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	W	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		3	0	0-24 m	NE	
Dromaiidae	*Dromaius novaehollandiae*	Emu		6	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		15	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		1	0	0-24 m	S	
Dromaiidae	*Dromaius novaehollandiae*	Emu		4	0	0-24 m	NW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		7	0	0-24 m	SW	
Dromaiidae	*Dromaius novaehollandiae*	Emu		8	0	0-24 m	E	
Dromaiidae	*Dromaius novaehollandiae*	Emu		2		0-24 m	N	
Falconidae	*Falco berigora*	Brown Falcon		2	2	0-24 m	NE	
Falconidae	*Falco berigora*	Brown Falcon		1	4	0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	8	0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	10	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1	10	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1	15	0-24 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1		0-24 m	N	W-E
Falconidae	*Falco berigora*	Brown Falcon		1		0-24 m	NW	
Falconidae	*Falco berigora*	Brown Falcon		1	30	25-50 m	N	
Falconidae	*Falco berigora*	Brown Falcon		1		25-50 m	S	
Falconidae	*Falco berigora*	Brown Falcon		2		25-50 m	EW	
Falconidae	*Falco berigora*	Brown Falcon		2		25-50 m	W	
Falconidae	*Falco berigora*	Brown Falcon		1		51-75 m	N	E-W
Falconidae	*Falco berigora*	Brown Falcon		1	100	76-150 m	NW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	1	0-24 m	E	

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Falconidae	*Falco cenchroides*	Australian Kestrel		3	1	0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	2	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	3	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	3	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	4	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	4	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	5	0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	10	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		3	10	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	10	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	15	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	15	0-24 m	NE	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	15	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	S	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	20	0-24 m		
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	S	W-E
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	NW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	SE	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		0-24 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	NE	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	25	25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	25	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	25	25-50 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		2	30	25-50 m	SW	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	30	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	40	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	40	25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	50	25-50 m	W	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	E	S-N
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1		25-50 m	E	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	80	76-150 m	N	
Falconidae	*Falco cenchroides*	Australian Kestrel		1	80	76-150 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Falconidae	*Falco cenchroides*	Australian Kestrel		1	150	76-150 m	NW	
Falconidae	*Falco longipennis*	Australian Hobby		1	15	0-24 m	SE	
Falconidae	*Falco longipennis*	Australian Hobby		1		0-24 m	E	N-S
Falconidae	*Falco longipennis*	Australian Hobby		2		51-75 m		
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)	1		25-50 m	SW	N-S
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		2	0	0-24 m	SW	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	SE	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	E	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		18	0	0-24 m	N	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		1	0	0-24 m	NE	
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher		24	0	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	0	0-24 m	NW	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	3	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	4	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	5	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	7	0-24 m	NW	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	8	0-24 m	E	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	8	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	10	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1	12	0-24 m	N	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2	15	0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	S	E-W
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	SE	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	SE	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	W	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m		
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		2		0-24 m	S	
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		1		0-24 m	NW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	1	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	1	0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	1	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	2	0-24 m	NE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	2	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	2	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	2	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	2	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	3	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	3	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		10	3	0-24 m	SE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	3	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	4	0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	5	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	6	0-24 m	S	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2	6	0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		4	8	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	12	0-24 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	15	0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1	15	0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		5	15	0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	E	N-S
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	N	E-W
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	E	E-W
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		12		0-24 m	SE	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	E-W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	NW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		21		0-24 m	E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		2		0-24 m	W-E	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		1		0-24 m	N	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	25	25-50 m	SW	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		3	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	1	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	1	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	1	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	2	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	4	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	5	0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	5	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	5	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	5	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		9	5	0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	6	0-24 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	6	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	8	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	8	0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		30	8	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	8	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	8	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		25	10	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		22	10	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	10	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		19	10	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	10	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		32	12	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	12	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	12	0-24 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	12	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	15	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	15	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	15	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	15	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	15	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	15	0-24 m	SE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	15	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		13	15	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	20	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		30	20	0-24 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	20	0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		20	20	0-24 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		22	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8	20	0-24 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	20	0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	N	W-E
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16		0-24 m	N	W-E
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		18		0-24 m	E	N-S
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	N	E-W
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6		0-24 m	N-S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	S-N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		9		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4		0-24 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15		0-24 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		8		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4		0-24 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	E-W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		0-24 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	25	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	25	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	25	25-50 m	E	

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Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	25	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	25	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		33	25	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	30	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		10	30	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		21	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		12	30	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	30	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	30	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		7	30	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	30	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1	35	25-50 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	40	25-50 m	N	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		4	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15	40	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		18	40	25-50 m	S	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	40	25-50 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		6	45	25-50 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2	45	25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		3	50	25-50 m	SW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		16	50	25-50 m	NW	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m	S	N-S
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		2		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		26		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m	W	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		11		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		25-50 m		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		15	70	51-75 m	NE	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		5	70	51-75 m	E	
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		1		51-75 m	N	E-W
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		5	0	0-24 m	SW	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	NE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	0	0-24 m	NE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		2	0	0-24 m		
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	0	0-24 m	SE	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		20	0	0-24 m	W	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		50	0	0-24 m	N	

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Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	5	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		6	5	0-24 m	E	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		1	20	0-24 m	S	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		4	20	0-24 m	SW	
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		3	25	25-50 m	E	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	9	0	0-24 m	SW	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	27	0	0-24 m	N	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	22	0	0-24 m	W	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	1	5	0-24 m	N	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	1	30	25-50 m	E	
Laridae	*Hydroprogne caspia*	Caspian Tern	Mig. (EPBC & BC Acts)	2	40	25-50 m	SW	
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	NE	
Laridae	*Larus pacificus*	Pacific Gull		2	0	0-24 m		
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	E	
Laridae	*Larus pacificus*	Pacific Gull		1	0	0-24 m	NE	
Laridae	*Larus pacificus*	Pacific Gull		7	0	0-24 m	SE	
Laridae	*Larus pacificus*	Pacific Gull		2	15	0-24 m	S	
Laridae	*Larus pacificus*	Pacific Gull		3	20	0-24 m	N	
Laridae	*Larus pacificus*	Pacific Gull		3	40	25-50 m	SE	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	4	0	0-24 m	SW	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	40	0	0-24 m	N	
Laridae	*Sternula nereis nereis*	Fairy Tern	VU (EPBC & BC Acts)	4	30	25-50 m	NW	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	20	0	0-24 m	SW	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	0	0-24 m	SE	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	0	0-24 m	N	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	3	0	0-24 m	N	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	5	0-24 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	10	0-24 m		
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	10	0-24 m	SE	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	25	25-50 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	6	30	25-50 m	E	
Laridae	*Thalasseus bergii*	Greater Crested Tern	Mig. (EPBC & BC Acts)	1	40	25-50 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	0	0-24 m	NW	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		2	1	0-24 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	NE	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1	15	0-24 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		0-24 m		
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		0-24 m	N	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		3		0-24 m	W	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	N	
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Locustellidae	*Cincloramphus cruralis*	Brown Songlark		1		25-50 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		2		0-24 m	N	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	E	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	NE	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		2		0-24 m	S	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	W	
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark		1		0-24 m	W	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		1	1	0-24 m	NE	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		4	1	0-24 m	NE	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		1		0-24 m		
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		3		0-24 m		
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		6		0-24 m	E	
Maluridae	*Malurus elegans*	Red-winged Fairy-wren		2		0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4	0	0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	0	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	0	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2	1	0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4	1	0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3	1	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1	2	0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		5		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		5		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m		
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	W	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		4		0-24 m	SE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		3		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	E	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		1		0-24 m	SW	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	NE	
Maluridae	*Malurus splendens*	Splendid Fairy-wren		2		0-24 m	N	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	SW	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	S	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		3	1	0-24 m	W	
Maluridae	*Stipiturus malachurus*	Southern Emu-wren		2	1	0-24 m	SW	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1	1	0-24 m	S	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1	1	0-24 m	E	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1		0-24 m	N	
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	2	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	3	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	3	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	4	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	4	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	4	0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	5	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	5	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	5	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	6	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	8	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	8	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4	10	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	10	0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	12	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	12	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	12	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3	15	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	15	0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		5	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	15	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1	20	0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	20	0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	S	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S	W-E
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	S-N
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	NW	N-S
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	E-W
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		6		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		8		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W-E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m		
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S-N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E-W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	S	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	SE	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		0-24 m	E	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	25	25-50 m	N	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2	25	25-50 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		4	30	25-50 m	W	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		3		25-50 m	NW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		2		25-50 m	SW	
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird		1		25-50 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	0	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4	0	0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	1	0-24 m	NE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		3	1	0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	2	0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	3	0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		7	3	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	4	0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		6	7	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	8	0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	10	0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		30	10	0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	15	0-24 m	NE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		3	15	0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	15	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		9	15	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2	20	0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	S	E-W
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m		
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		10		0-24 m	NW	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		4		0-24 m	N	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		20		0-24 m	SE	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		5		0-24 m		
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		6		0-24 m	S	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		2		0-24 m	W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1	30	25-50 m	E	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		25-50 m	S	W-E
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		8		25-50 m	E-W	
Meliphagidae	*Epthianura albifrons*	White-fronted Chat		1		25-50 m	S-W	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		3	2	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		3	3	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	4	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	4	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1	4	0-24 m	SE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	E	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		2	5	0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1	5	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		5		0-24 m	NE	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	N	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	SW	
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		1		0-24 m	NW	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2	3	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		3	3	0-24 m	N	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		7	4	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1	10	0-24 m	NE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1		0-24 m	W	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2		0-24 m	N	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		1		0-24 m	SE	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		8		0-24 m	W	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater		2		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		3	0	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		3	0	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	0	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	1	0-24 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	1	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		2	3	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		2	4	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	5	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1	6	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		2	10	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Motacillidae	*Anthus australis*	Australian Pipit		1	10	0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	12	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		1	15	0-24 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	18	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		1	20	0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1	20	0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		3		0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	NE	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m		
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		6		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S-N	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	S	
Motacillidae	*Anthus australis*	Australian Pipit		2		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1		0-24 m	W	
Motacillidae	*Anthus australis*	Australian Pipit		1	25	25-50 m	E	
Motacillidae	*Anthus australis*	Australian Pipit		1	25	25-50 m	SW	
Motacillidae	*Anthus australis*	Australian Pipit		1	30	25-50 m	NW	
Motacillidae	*Anthus australis*	Australian Pipit		1	40	25-50 m	NW	
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush		1		0-24 m	NW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1	3	0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1	15	0-24 m	SE	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	E	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	W	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		2		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	S	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SW	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	NE	
Pachycephalidae	*Pachycephala fuliginosa*	Western Whistler		1		0-24 m	SE	
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		1		0-24 m	E	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		32	0	0-24 m	W	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		50	0	0-24 m	NE	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		42	1	0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		1	3	0-24 m	E	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		1	8	0-24 m	N	
Petroicidae	*Microeca fascinans*	Jacky Winter		1		0-24 m	W	
Petroicidae	*Petroica boodang*	Scarlet Robin		1		0-24 m	N	
Petroicidae	*Petroica boodang*	Scarlet Robin		1		0-24 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		2	0	0-24 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	0	0-24 m		
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	1	0-24 m	SE	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	2	0-24 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	20	0-24 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	30	25-50 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	40	25-50 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	45	25-50 m	S	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	50	25-50 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		2	60	51-75 m	N	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	70	51-75 m	W	
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		1	80	76-150 m	N	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		7	10	0-24 m	N	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		1	30	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		1	80	76-150 m	S	
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		26	10	0-24 m	NW	
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		1		25-50 m	E	N-S
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	1	0-24 m	SE	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	2	0-24 m	SW	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	3	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	4	0-24 m	E	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		5	4	0-24 m	E	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	5	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		2	10	0-24 m		
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	10	0-24 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1		0-24 m	E-W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	25	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1	25	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		4	30	25-50 m	W	
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		1		51-75 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		3	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	NE	

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Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	N	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		4	0	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	NW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	SE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	0	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	1	0-24 m	W	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1	1	0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2	2	0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m		
Phasianidae	*Coturnix pectoralis*	Stubble Quail		3		0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		2		0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		6		0-24 m	NE	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m		
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	S	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	E	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	SW	
Phasianidae	*Coturnix pectoralis*	Stubble Quail		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	0	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	0	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	0	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	0	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	0	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	0.5	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	1	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	1	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	2	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	2	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5	2	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	3	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		25	4	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	4	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	4	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	4	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	4	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	4	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	5	0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	5	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6	5	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	5	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	5	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	6	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	6	0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	7	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1	8	0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4	8	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	8	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2	10	0-24 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3	15	0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	N	W-E
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		9		0-24 m	N	N-S
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	W	N-S
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	N	E-W
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	E-W
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		7		0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	SW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	S-N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	NE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		15		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		10		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m		
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NE	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		5		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	S-N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	NW	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E-W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		1		0-24 m	SE	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		10		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		7		0-24 m	S	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		3		0-24 m	N	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	E-W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		6		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		2		0-24 m	W	
Psittaculidae	*Barnardius zonarius*	Australian Ringneck		4		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		18	0	0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	8	0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	20	0-24 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		9		0-24 m	SW	S-W
Psittaculidae	*Neophema elegans*	Elegant Parrot		2		0-24 m	N	S-N
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		5		0-24 m	W-E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		7		0-24 m	W	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4		0-24 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		0-24 m	S	
Psittaculidae	*Neophema elegans*	Elegant Parrot		12		0-24 m	NW	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	25	25-50 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	30	25-50 m	N	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	30	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	30	25-50 m	NE	
Psittaculidae	*Neophema elegans*	Elegant Parrot		2	40	25-50 m	SE	
Psittaculidae	*Neophema elegans*	Elegant Parrot		4	40	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		3	40	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	50	25-50 m	E	
Psittaculidae	*Neophema elegans*	Elegant Parrot		1	50	25-50 m	E	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Psittaculidae	*Neophema elegans*	Elegant Parrot		2		25-50 m	N	W-E
Psittaculidae	*Neophema elegans*	Elegant Parrot		1		25-50 m	E	S-N
Psittaculidae	*Neophema elegans*	Elegant Parrot		5		25-50 m		
Psittaculidae	*Neophema elegans*	Elegant Parrot		3		25-50 m	E-W	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		6	10	0-24 m	NW	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		3	20	0-24 m	NE	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		10	20	0-24 m	N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		8		0-24 m	S	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		1		0-24 m	E	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		3		0-24 m	N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		0-24 m	S-N	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		10	30	25-50 m	S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		6	30	25-50 m	S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		18		25-50 m	S	W-E
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		25-50 m	W	S-N
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		8		25-50 m	N	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		2		25-50 m	W	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		7		25-50 m	N-S	
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		27		51-75 m	S	E-W
Psittaculidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet		16		51-75 m	EW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2	3	0-24 m	NE	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1	4	0-24 m	SW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2	8	0-24 m	S	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	E	S-N
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	S	S-N
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	E	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	SW	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	NE	
Psittaculidae	*Platycercus icterotis*	Western Rosella		2		0-24 m	W	
Psittaculidae	*Platycercus icterotis*	Western Rosella		1		0-24 m	SW	
Psittaculidae	*Purpureicephalus spurius*	Red-capped Parrot		1		0-24 m	N	E-W
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig. (EPBC Act); Mig. (BC Act)	40	0	0-24 m	N	
Scolopacidae	*Calidris alba*	Sanderling	Mig. (EPBC & BC Acts)	4	0	0-24 m	N	
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)	60	0	0-24 m	E	
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)	12	0	0-24 m	N	
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)	1	20	0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		2	0	0-24 m	NE	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		2	15	0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		1		0-24 m	N	
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill		3		0-24 m	N	
Threskiornithidae	*Platalea regia*	Royal Spoonbill		1	40	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	0	0-24 m	NW	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		10	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	0	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		10	0	0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		24	0	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		12	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		22	0	0-24 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		20	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		7	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		60	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	0	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	0	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	0	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		9	0	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		5	1	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		5	1	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		41	4	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	4	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	5	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		16	5	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		30	6	0-24 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	8	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	10	0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	10	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	10	0-24 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		15	10	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	12	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	15	0-24 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		6	20	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		2	20	0-24 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	20	0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	20	0-24 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	20	0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3		0-24 m		
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		70		0-24 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3		0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1		0-24 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		110		0-24 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		9	170	151-250 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	25	25-50 m	N	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		18	25	25-50 m	E	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	30	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	30	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		6	35	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	35	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	35	25-50 m	SW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		18	40	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	40	25-50 m	S	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		1	40	25-50 m	NE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		14	40	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	N	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	SE	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		4	50	25-50 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		50	50	25-50 m	W	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		3	80	76-150 m	NW	
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		39	120	76-150 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		20	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		5	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		5	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60	0	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	0	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	0	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60	0	0-24 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	0	0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		50	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		25	0	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		400	0	0-24 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		40	0	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		6	4	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		20	6	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	7	0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	10	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	10	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	15	0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	15	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	15	0-24 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	20	0-24 m	S	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	20	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	20	0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		15	20	0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	20	0-24 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		0-24 m	S	W-E
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		16		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		24		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		240		0-24 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		0-24 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		208		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		0-24 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		34		0-24 m	W-E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		125		0-24 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3		0-24 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		0-24 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	200	151-250 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		16	250	151-250 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		200	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		150	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30	25	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	25	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	25	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	30	25-50 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		8	30	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		35	30	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	30	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		18	30	25-50 m	NW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2	30	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		26	30	25-50 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	40	25-50 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		4	40	25-50 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	40	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	40	25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		6	40	25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	50	25-50 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	50	25-50 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		10	50	25-50 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		25-50 m	S	W-E
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60		25-50 m	W	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		100		25-50 m	N	N-E

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3		25-50 m	W-E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		25-50 m	N-S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		700		25-50 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		13	55	51-75 m	SE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		11	60	51-75 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	70	51-75 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	70	51-75 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		51-75 m	NW	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		28		51-75 m	SW	N-S
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		43		51-75 m	E	E-W
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		2		51-75 m		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1		51-75 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		30		51-75 m	SW	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		120		76-150 m	S	S-N
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		60		76-150 m	N	E-W
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		14		76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		18		76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		382		76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		80	80	76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		1	80	76-150 m	N	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		33	80	76-150 m	W	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		3	100	76-150 m	E	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		7	120	76-150 m	S	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		14	120	76-150 m	NE	
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		17	150	76-150 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		8	0	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	1	0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		4	1	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	1	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		6	1	0-24 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	2	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		10	3	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		4	3	0-24 m	W	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	3	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		6	4	0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		5	4	0-24 m	W	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	4	0-24 m	SE	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	5	0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		2	8	0-24 m	NW	
Zosteropidae	*Zosterops lateralis*	Silvereye		4		0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	E	
Zosteropidae	*Zosterops lateralis*	Silvereye		1		0-24 m	NE	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	W	

Family	Species name	Vernacular	Conservation status	Abundance	Height (Yr1)	Height range	Obs. direction	Movement
Zosteropidae	*Zosterops lateralis*	Silvereye		1		0-24 m	SW	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	S	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	N	
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m		
Zosteropidae	*Zosterops lateralis*	Silvereye		2		0-24 m	SW	
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m		
Zosteropidae	*Zosterops lateralis*	Silvereye		3		0-24 m	NW	

Appendix 7 Mean number of calls of each recorded bat species per 30-minute time interval

Start time[1]	Chocolate Wattled Bat	Gould's Wattled Bat	Greater Long-eared Bat	Holt's Long-eared Bat	Lesser Long-eared Bat	Southern Forest Bat	Western False Pipistrelle	White-striped Free-tailed Bat
17:30	1.00	1.50	-	-	1.50	23.33	-	-
18:00	1.25	1.50	1.00	-	38.25	227.00	-	1.00
18:30	1.75	4.00	1.00	-	1.75	22.58	1.00	2.00
19:00	1.75	2.00	-	-	7.00	49.83	-	2.00
19:30	2.25	1.00	1.00	-	1.80	8.24	1.00	2.25
20:00	1.40	1.67	1.00	-	1.00	7.24	1.00	13.86
20:30	1.92	1.92	3.67	-	1.67	5.71	-	12.80
21:00	2.38	1.50	1.25	-	1.60	6.17	-	11.13
21:30	3.18	2.22	-	1.00	1.33	6.40	-	11.40
22:00	2.50	1.75	1.50	1.00	1.25	5.23	-	11.28
22:30	2.09	1.29	1.00	2.00	1.75	8.10	1.00	11.83
23:00	2.44	1.78	1.00	1.00	1.00	7.84	1.00	15.50
23:30	2.56	1.56	2.00	-	1.13	6.55	-	12.94
0:00	4.17	1.88	-	-	1.80	7.62	-	11.47
0:30	5.70	1.67	-	-	1.25	6.58	1.00	11.06
1:00	5.00	1.78	-	-	1.17	5.38	1.00	12.40
1:30	4.86	2.17	1.00	1.00	1.27	5.95	-	14.25
2:00	5.07	2.18	1.00	1.00	1.67	4.78	-	13.38
2:30	6.09	1.30	1.00	-	1.43	4.46	-	17.89
3:00	4.00	2.70	1.00	-	1.00	4.91	-	23.13
3:30	2.08	5.50	-	1.00	1.00	5.04	-	30.14
4:00	4.33	2.00	-	-	2.25	5.84	1.00	5.00
4:30	1.00	1.00	-	-	1.50	7.75	-	1.00
5:00	5.00	-	-	-	2.00	1.00	-	-
Total	**3.45**	**2.00**	**1.40**	**1.11**	**2.82**	**11.37**	**1.00**	**12.95**

[1]Aggregated data across all seasons and sample events.

Appendix 8 Bat species by site per time interval mean and maximum detections

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
BUS035	**1.00**	**1.00**	**1.50**	**3.00**	**2.00**	**2.00**			**1.00**	**1.00**	**2.17**	**6.00**			**11.00**	**25.00**	**6.00**	**25.00**
1:00:00											1.00	1.00			23.00	23.00	12.00	23.00
Wh1:30:00															6.00	6.00	6.00	6.00
2:00:00															1.00	1.00	1.00	1.00
2:30:00											2.00	2.00			2.00	2.00	2.00	2.00
3:00:00			1.00	1.00											1.00	1.00	1.00	1.00
20:30:00			1.00	1.00							1.00	1.00					1.00	1.00
21:00:00															10.00	10.00	10.00	10.00
21:30:00			3.00	3.00							6.00	6.00			18.00	18.00	9.00	18.00
22:00:00	1.00	1.00									2.00	2.00			8.00	8.00	3.67	8.00
22:30:00	1.00	1.00													5.00	5.00	3.00	5.00
23:00:00									1.00	1.00					25.00	25.00	13.00	25.00
23:30:00					2.00	2.00			1.00	1.00	1.00	1.00			21.00	21.00	6.25	21.00
0:00:00			1.00	1.00											11.00	11.00	6.00	11.00
0:30:00															12.00	12.00	12.00	12.00
BUS013	**7.45**	**23.00**	**1.81**	**5.00**			**1.00**	**1.00**	**6.41**	**150.00**	**31.90**	**2000.00**	**1.00**	**1.00**	**5.41**	**30.00**	**15.62**	**2000.00**
1:00:00	6.33	10.00	1.00	1.00			1.00	1.00	1.00	1.00	3.00	9.00			2.00	2.00	3.08	10.00
1:30:00	9.67	20.00							2.50	3.00	3.50	9.00			1.00	1.00	4.90	20.00
2:00:00	15.00	23.00							1.50	2.00	3.25	9.00			1.00	1.00	5.22	23.00
2:30:00	15.00	23.00	2.00	2.00					1.00	1.00	4.00	9.00					5.56	23.00
3:00:00	8.33	16.00	1.00	1.00					1.00	1.00	4.67	9.00					5.13	16.00
3:30:00	7.00	7.00							1.00	1.00	5.67	9.00			1.00	1.00	4.33	9.00
4:00:00	7.00	7.00							1.00	1.00	5.00	9.00					4.50	9.00
4:30:00									1.00	1.00	5.00	9.00					3.67	9.00
5:00:00									1.00	1.00	1.00	1.00					1.00	1.00
17:30:00									1.00	1.00	1.00	1.00					1.00	1.00
18:00:00	1.00	1.00	2.00	2.00					150.00	150.00	1,000.50	2,000.00					430.80	2000.00
18:30:00	2.00	2.00	2.00	3.00							23.00	23.00					7.25	23.00
19:00:00	1.00	1.00							4.00	4.00	33.00	33.00					12.67	33.00
19:30:00			1.00	1.00					1.00	1.00	2.00	4.00	1.00	1.00			1.43	4.00
20:00:00			1.00	1.00							2.00	2.00			1.00	1.00	1.40	2.00
20:30:00	4.50	7.00	2.00	2.00					1.00	1.00	4.00	9.00					3.25	9.00
21:00:00	5.00	7.00	3.00	3.00							4.00	9.00			3.00	3.00	4.00	9.00
21:30:00	11.00	15.00							1.00	1.00	2.80	9.00			3.67	5.00	4.36	15.00
22:00:00	5.67	7.00	2.33	5.00					1.00	1.00	3.67	9.00			7.67	20.00	4.29	20.00
22:30:00	6.00	7.00							1.00	1.00	3.00	9.00			9.33	25.00	5.30	25.00
22:00:00	4.00	7.00	2.33	4.00					1.00	1.00	4.00	9.00			8.25	30.00	4.64	30.00
22:30:00	5.50	7.00	1.00	1.00					1.00	1.00	4.33	9.00			14.00	27.00	5.09	27.00
0:00:00	8.00	9.00	2.00	2.00					1.50	2.00	3.67	9.00			3.33	7.00	3.79	9.00
0:30:00	11.50	16.00	1.00	1.00					1.00	1.00	2.80	9.00			1.50	2.00	3.82	16.00
BUS014	**5.24**	**20.00**	**3.19**	**26.00**	**1.00**	**1.00**	**1.20**	**2.00**	**1.63**	**4.00**	**14.07**	**65.00**	**1.00**	**1.00**	**5.84**	**61.00**	**8.00**	**65.00**

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
1:00:00	7.33	20.00	2.00	3.00					1.00	1.00	16.25	27.00			1.00	1.00	7.31	27.00
1:30:00	7.67	20.00	3.50	5.00			1.00	1.00	1.00	1.00	14.20	31.00			3.00	5.00	7.33	31.00
2:00:00	20.00	20.00	3.75	10.00			1.00	1.00	2.00	2.00	9.75	27.00			14.00	14.00	7.58	27.00
2:30:00	10.50	20.00	1.33	2.00					1.00	1.00	11.75	27.00			3.33	6.00	6.00	27.00
3:00:00	4.00	6.00	4.75	14.00					1.00	1.00	7.80	27.00			17.50	34.00	7.29	34.00
3:30:00	1.00	1.00	9.67	26.00	1.00	1.00			1.00	1.00	9.00	27.00			61.00	61.00	9.40	61.00
4:00:00	6.00	8.00	2.50	4.00					2.67	4.00	10.50	27.00	1.00	1.00	5.00	5.00	5.62	27.00
4:30:00			1.00	1.00					1.00	1.00	12.00	27.00			1.00	1.00	5.71	27.00
17:30:00			1.00	1.00													1.00	1.00
18:00:00	1.00	1.00	2.00	2.00							5.00	8.00					2.80	8.00
18:30:00	2.00	2.00	13.00	13.00	1.00	1.00			2.00	3.00	13.00	22.00					6.57	22.00
19:00:00	2.00	2.00									15.50	19.00			1.00	1.00	8.50	19.00
19:30:00	2.00	2.00	1.00	1.00					1.00	1.00	19.00	53.00			2.00	2.00	9.00	53.00
20:00:00	1.50	2.00	1.00	1.00							15.80	27.00					10.38	27.00
20:30:00	1.00	1.00	1.00	1.00					1.00	1.00	14.50	27.00			2.00	2.00	9.20	27.00
21:00:00	3.00	3.00	2.00	2.00					2.00	2.00	17.83	50.00			7.00	12.00	10.83	50.00
21:30:00	4.00	4.00	4.00	4.00			1.00	1.00	1.50	2.00	18.33	50.00			2.00	2.00	9.62	50.00
22:00:00			1.00	1.00					1.00	1.00	13.20	27.00			1.00	1.00	7.10	27.00
22:30:00			1.00	1.00			2.00	2.00	3.00	3.00	18.75	27.00	1.00	1.00	4.00	7.00	8.27	27.00
23:00:00			1.50	2.00							13.83	30.00					10.75	30.00
23:30:00	1.00	1.00	2.00	3.00					1.50	2.00	19.67	65.00			1.50	2.00	9.36	65.00
0:00:00			3.00	3.00					4.00	4.00	13.60	27.00			2.67	5.00	7.82	27.00
0:30:00	11.50	20.00	3.00	5.00					1.00	1.00	12.80	27.00	1.00	1.00	3.00	3.00	8.17	27.00
BUS015	**2.22**	**6.00**	**1.20**	**2.00**	**1.25**	**2.00**	**1.00**	**1.00**	**1.17**	**2.00**	**5.46**	**14.00**	**1.00**	**1.00**	**2.94**	**10.00**	**3.45**	**14.00**
1:00:00	6.00	6.00	1.00	1.00							6.50	8.00			2.00	2.00	4.40	8.00
1:30:00	5.00	5.00							1.00	1.00	6.50	8.00					4.00	8.00
2:00:00	3.00	3.00	1.00	1.00							6.50	8.00			2.00	3.00	3.14	8.00
2:30:00	2.00	3.00	1.00	1.00							6.50	8.00					3.33	8.00
3:00:00	2.00	2.00			1.00	1.00					6.50	8.00					4.00	8.00
3:30:00							1.00	1.00	1.00	1.00	6.50	8.00					3.75	8.00
4:00:00	1.00	1.00			1.00	1.00					6.50	8.00					3.75	8.00
4:30:00											6.50	8.00					6.50	8.00
17:30:00											14.00	14.00					14.00	14.00
18:00:00									1.00	1.00	3.00	3.00					2.00	3.00
18:30:00	1.00	1.00									4.50	7.00	1.00	1.00			2.75	7.00
19:30:00	2.00	2.00									1.00	1.00					1.50	2.00
20:00	1.00	1.00	1.00	1.00	1.00	1.00					4.25	8.00			1.00	1.00	2.63	8.00
20:30:00			1.50	2.00					2.00	2.00	6.00	8.00			4.00	6.00	3.88	8.00
21:00:00	1.00	1.00							1.00	1.00	3.75	8.00			2.00	2.00	2.71	8.00
21:30:00									1.00	1.00	3.75	8.00			2.00	3.00	2.86	8.00
22:00:00					2.00	2.00			1.00	1.00	5.25	8.00					3.57	8.00
22:30:00	1.00	1.00									6.50	8.00			3.00	3.00	3.60	8.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
23:00:00			2.00	2.00	1.00	1.00			1.00	1.00	4.67	8.00	1.00	1.00	3.00	3.00	2.75	8.00
23:30:00	1.00	1.00	1.00	1.00	2.00	2.00					4.67	8.00			5.50	10.00	3.63	10.00
0:00:00	3.50	4.00			1.00	1.00			1.00	1.00	6.50	8.00			7.00	7.00	4.14	8.00
0:30:00	2.00	2.00	1.00	1.00	1.00	1.00			2.00	2.00	6.50	8.00			1.00	1.00	2.63	8.00
BUS001	**1.96**	**6.00**	**1.67**	**3.00**	**1.00**	**1.00**			**1.33**	**3.00**	**12.18**	**210.00**	**1.00**	**1.00**	**4.78**	**22.00**	**7.69**	**210.00**
1:00:00	4.50	6.00							1.00	1.00	4.67	10.00			2.50	4.00	3.63	10.00
1:30:00	1.50	2.00							1.00	1.00	4.33	8.00					2.83	8.00
2:00:00	2.67	4.00									5.25	11.00			1.00	1.00	3.75	11.00
2:30:00	3.50	6.00									3.40	8.00			1.00	1.00	3.13	8.00
3:00:00	2.50	4.00									4.00	7.00			1.00	1.00	3.00	7.00
3:30:00	1.00	1.00	1.00	1.00							3.75	7.00					2.83	7.00
4:00:00			1.00	1.00							3.33	8.00					2.75	8.00
18:00:00											8.00	8.00					8.00	8.00
18:30:00									1.00	1.00	75.50	150.00			3.00	3.00	38.75	150.00
19:00:00			3.00	3.00							210.00	210.00					106.50	210.00
19:30:00	2.00	2.00							3.00	3.00	53.00	53.00					19.33	53.00
20:00:00											4.00	4.00					4.00	4.00
20:30:00	1.00	1.00									2.75	4.00			3.00	5.00	2.38	5.00
21:00:00											4.75	6.00			22.00	22.00	8.20	22.00
21:30:00	1.00	1.00									4.50	11.00			10.50	18.00	5.71	18.00
22:00:00	1.00	1.00							2.00	2.00	3.00	8.00			2.67	6.00	2.60	8.00
22:30:00	1.00	1.00			1.00	1.00			1.00	1.00	13.25	39.00			5.50	6.00	7.44	39.00
23:00:00	1.00	1.00							1.00	1.00	17.25	49.00	1.00	1.00	2.50	4.00	7.18	49.00
23:30:00	1.67	3.00							1.00	1.00	6.00	9.00			3.50	6.00	3.70	9.00
0:00:00											11.75	26.00			8.00	14.00	10.50	26.00
0:30:00	1.50	2.00							1.00	1.00	11.00	36.00			3.00	3.00	6.38	36.00
BUS002	**1.00**	**1.00**	**1.25**	**2.00**	**1.00**	**1.00**			**1.50**	**2.00**	**3.95**	**17.00**			**41.98**	**45.00**	**25.73**	**45.00**
1:00:00											1.00	1.00			32.25	45.00	26.00	45.00
1:30:00			1.00	1.00											42.67	45.00	32.25	45.00
2:00:00			2.00	2.00							6.00	6.00			42.67	45.00	27.20	45.00
2:30:00											1.00	1.00			42.67	45.00	32.25	45.00
3:00:00											4.00	4.00			42.67	45.00	33.00	45.00
3:30:00	1.00	1.00									12.00	12.00			42.67	45.00	28.20	45.00
4:00:00											17.00	17.00					17.00	17.00
4:30:00									1.00	1.00							1.00	1.00
18:00:00											5.00	5.00					5.00	5.00
18:30:00											14.00	14.00					14.00	14.00
19:00:00									1.00	1.00							1.00	1.00
19:30:00			1.00	1.00	1.00	1.00					1.00	1.00					1.00	1.00
20:00:00											3.00	3.00			44.00	45.00	30.33	45.00
20:30:00											1.00	1.00			44.00	45.00	22.50	45.00
21:00:00											1.50	2.00			44.00	45.00	22.75	45.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
21:30:00			1.00	1.00					1.50	2.00					44.00	45.00	18.40	45.00
22:00:00									2.00	2.00	1.50	2.00			42.67	45.00	22.17	45.00
22:30:00					1.00	1.00			2.00	2.00					42.67	45.00	26.20	45.00
23:00:00															42.67	45.00	42.67	45.00
23:30:00											1.00	1.00			42.67	45.00	26.00	45.00
0:00:00															42.67	45.00	42.67	45.00
0:30:00											1.00	1.00			42.67	45.00	32.25	45.00
BUS003			**1.25**	**2.00**							**1.00**	**1.00**					**1.20**	**2.00**
18:00:00			2.00	2.00													2.00	2.00
18:30:00			1.00	1.00													1.00	1.00
20:00:00											1.00	1.00					1.00	1.00
21:00:00			1.00	1.00													1.00	1.00
23:00:00			1.00	1.00													1.00	1.00
BUS004	**1.50**	**2.00**	**1.71**	**4.00**	**1.33**	**2.00**			**1.00**	**1.00**	**4.39**	**15.00**	**1.00**	**1.00**	**2.50**	**5.00**	**3.00**	**15.00**
1:00:00			2.00	2.00							3.00	3.00	1.00	1.00			2.00	3.00
1:30:00	2.00	2.00	2.00	2.00							4.00	4.00					2.67	4.00
2:00:00	1.00	1.00															1.00	1.00
2:30:00					1.00	1.00			1.00	1.00	2.00	2.00					1.33	2.00
3:00:00			1.00	1.00							2.00	2.00					1.50	2.00
3:30:00											3.00	3.00					3.00	3.00
4:00:00											3.00	3.00					3.00	3.00
18:00:00			1.00	1.00													1.00	1.00
19:00:00															2.00	2.00	2.00	2.00
19:30:00			1.00	1.00							4.50	8.00			2.00	2.00	3.00	8.00
20:00:00			4.00	4.00	1.00	1.00			1.00	1.00	15.00	15.00					5.25	15.00
20:30:00					2.00	2.00					1.00	1.00					1.50	2.00
21:00:00											3.00	3.00					3.00	3.00
21:30:00											4.00	4.00					4.00	4.00
22:00:00			1.00	1.00							15.00	15.00			1.00	1.00	5.67	15.00
22:30:00											3.00	3.00					3.00	3.00
23:00											2.00	2.00					2.00	2.00
23:30:00											4.00	4.00					4.00	4.00
0:00:00											3.00	3.00			5.00	5.00	4.00	5.00
0:30:00											3.00	3.00					3.00	3.00
BUS005	**1.60**	**5.00**	**1.00**	**1.00**	**1.00**	**1.00**			**1.33**	**2.00**	**3.94**	**10.00**			**1.50**	**3.00**	**2.50**	**10.00**
1:00:00	1.00	1.00									2.00	2.00					1.50	2.00
1:30:00	1.00	1.00							1.00	1.00	3.00	3.00					1.67	3.00
2:00:00	1.00	1.00									6.00	6.00					2.67	6.00
2:30:00	1.00	1.00							2.00	2.00	3.00	3.00					2.00	3.00
3:00:00			1.00	1.00							10.00	10.00					5.50	10.00
3:30:00											1.00	1.00			1.00	1.00	1.00	1.00
19:30:00											2.00	2.00			1.00	1.00	1.50	2.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
20:00:00									1.00	1.00	8.00	8.00					4.50	8.00
20:30:00	1.00	1.00									3.00	3.00					2.00	3.00
21:00:00	1.00	1.00			1.00	1.00					2.00	3.00			1.00	1.00	1.33	3.00
21:30:00											8.00	8.00					8.00	8.00
22:00:00	1.00	1.00									4.00	4.00			2.00	2.00	2.33	4.00
22:30:00			1.00	1.00							4.00	4.00					2.50	4.00
23:00:00	5.00	5.00									5.00	5.00					5.00	5.00
23:30:00											2.00	2.00			3.00	3.00	2.50	3.00
0:00:00															1.00	1.00	1.00	1.00
0:30:00	3.00	3.00									2.00	2.00					2.50	3.00
BUS006	**1.95**	**5.00**	**1.60**	**4.00**	**2.14**	**8.00**			**2.37**	**16.00**	**4.44**	**55.00**			**12.80**	**20.00**	**4.27**	**55.00**
1:00:00	1.50	2.00	3.00	4.00					2.00	2.00	2.25	3.00			10.50	20.00	3.73	20.00
1:30:00	1.50	2.00	2.00	2.00					1.00	1.00	2.25	4.00			20.00	20.00	3.89	20.00
2:00:00	1.50	2.00	1.33	2.00							2.00	3.00			20.00	20.00	3.50	20.00
2:30:00	2.00	2.00	1.50	2.00							1.75	3.00			20.00	20.00	4.00	20.00
3:00:00	2.00	3.00	2.00	2.00							1.67	3.00			20.00	20.00	3.89	20.00
3:30:00	2.75	5.00	2.00	2.00					1.00	1.00	2.33	3.00			20.00	20.00	3.82	20.00
4:00:00	3.00	5.00									3.00	4.00					3.00	5.00
4:30:00	1.00	1.00							3.00	3.00	3.00	3.00					2.33	3.00
5:00:00	5.00	5.00							3.00	3.00							4.00	5.00
17:30:00			2.00	2.00					2.00	2.00	55.00	55.00					19.67	55.00
18:00:00			1.00	1.00	1.00	1.00			1.00	1.00	15.00	15.00					3.33	15.00
18:30:00	2.00	2.00			1.00	1.00			2.00	2.00	22.50	28.00					8.50	28.00
19:00:00	2.00	3.00	1.00	1.00					16.00	16.00	21.00	21.00					8.40	21.00
19:30:00	3.00	3.00			1.00	1.00			3.00	3.00	2.50	4.00					2.43	4.00
20:00:00	2.00	2.00							1.00	1.00	5.25	13.00			3.00	5.00	3.75	13.00
20:30:00	2.33	4.00	2.00	2.00	8.00	8.00			1.50	2.00	7.00	16.00			11.50	20.00	5.46	20.00
21:00:00	2.00	2.00	1.00	1.00	2.00	2.00			1.50	2.00	3.25	7.00			11.00	20.00	3.67	20.00
21:30:00	1.20	2.00	1.00	1.00							2.50	5.00			11.50	20.00	3.15	20.00
22:00:00	1.50	2.00	1.50	2.00	1.00	1.00			1.00	1.00	3.20	5.00			7.67	20.00	3.36	20.00
22:30:00	2.00	3.00	1.50	2.00							1.67	3.00			20.00	20.00	4.00	20.00
23:00:00	1.00	1.00	2.00	2.00							1.50	3.00			10.50	20.00	3.75	20.00
23:30:00	2.00	2.00	2.00	2.00							1.80	3.00			10.50	20.00	3.60	20.00
0:00:00	1.00	1.00	1.50	2.00					1.00	1.00	2.33	3.00			20.00	20.00	3.67	20.00
0:30:00			1.50	2.00							3.75	7.00			20.00	20.00	5.43	20.00
BUS007	1.25	2.00	1.50	4.00											2.67	4.00	1.69	4.00
19:00:00															3.00	3.00	3.00	3.00
19:30:00			1.00	1.00											4.00	4.00	2.50	4.00
20:30:00			1.00	1.00													1.00	1.00
21:00																		
21:00:00			1.00	1.00													1.00	1.00
21:30:00			4.00	4.00													4.00	4.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
22:00:00	1.00	1.00	1.00	1.00													1.00	1.00
22:30:00	1.00	1.00															1.00	1.00
23:30:00			1.00	1.00													1.00	1.00
0:30:00	2.00	2.00													1.00	1.00	1.50	2.00
BUS008	**1.13**	**2.00**	**1.60**	**7.00**	**1.00**	**1.00**			**1.00**	**1.00**	**2.44**	**10.00**			**2.21**	**9.00**	**1.84**	**10.00**
1:00:00			1.00	1.00					1.00	1.00	6.00	6.00					2.25	6.00
1:30:00									1.00	1.00	2.00	3.00			2.00	2.00	1.60	3.00
2:00:00	1.00	1.00									1.00	1.00			3.00	3.00	1.67	3.00
2:30:00			1.00	1.00							1.00	1.00					1.00	1.00
3:00:00											6.00	6.00					6.00	6.00
3:30:00	1.00	1.00	1.00	1.00	1.00	1.00					1.50	2.00					1.17	2.00
4:00:00			2.00	2.00							1.00	1.00					1.33	2.00
17:30:00	1.00	1.00															1.00	1.00
18:00:00	2.00	2.00															2.00	2.00
18:30:00											1.00	1.00					1.00	1.00
20:00:00			1.00	1.00							10.00	10.00					5.50	10.00
20:30:00	1.00	1.00	4.00	7.00	1.00	1.00					2.00	2.00			1.00	1.00	2.00	7.00
21:00:00			1.00	1.00	1.00	1.00					2.00	2.00			1.00	1.00	1.20	2.00
21:30:00			1.00	1.00							1.00	1.00			1.00	1.00	1.00	1.00
22:00:00											2.00	2.00					2.00	2.00
22:30:00			1.00	1.00											1.00	1.00	1.00	1.00
23:00:00															2.00	2.00	2.00	2.00
23:30:00			1.00	1.00							1.00	1.00			2.50	4.00	1.75	4.00
0:00:00			1.50	2.00											5.50	9.00	3.50	9.00
0:30:00	1.00	1.00	2.00	2.00	1.00	1.00									1.50	2.00	1.40	2.00
BUS009	**1.43**	**3.00**	**2.00**	**4.00**			**1.00**	**1.00**	**3.00**	**3.00**	**1.50**	**3.00**			**1.60**	**3.00**	**1.66**	**4.00**
1:00											2.00	2.00					2.00	2.00
1:30:00	2.00	2.00													2.50	3.00	2.33	3.00
2:00:00	3.00	3.00													1.00	1.00	2.00	3.00
2:30:00									3.00	3.00							3.00	3.00
3:00:00			2.00	2.00							1.00	1.00					1.50	2.00
18:00:00											1.00	1.00					1.00	1.00
18:30:00			2.00	2.00													2.00	2.00
19:30:00			1.00	1.00													1.00	1.00
20:00:00											1.00	1.00					1.00	1.00
20:30:00			1.00	1.00													1.00	1.00
21:00:00	1.00	1.00															1.00	1.00
21:30:00	1.00	1.00	4.00	4.00							3.00	3.00					2.67	4.00
22:00:00	1.00	1.00	2.50	4.00			1.00	1.00			1.00	1.00					1.60	4.00
22:30:00	1.00	1.00													1.00	1.00	1.00	1.00
23:00:00	1.00	1.00					1.00	1.00									1.00	1.00
0:30:00			1.00	1.00											1.00	1.00	1.00	1.00

Site and time	Chocolate Wattled Bat		Gould's Wattled Bat		Greater Long-eared Bat		Holt's Long-eared Bat		Lesser Long-eared Bat		Southern Forest Bat		Western False Pipistrelle		White-striped Free-tailed Bat		Total mean	Max.# calls detected
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.		
BUS010	**1.67**	**3.00**	**1.33**	**2.00**							**1.00**	**1.00**			**1.00**	**1.00**	**1.31**	**3.00**
1:00:00															1.00	1.00	1.00	1.00
1:30:00			1.00	1.00													1.00	1.00
2:00:00			1.00	1.00							1.00	1.00					1.00	1.00
20:30:00	1.00	1.00	2.00	2.00							1.00	1.00					1.33	2.00
21:00:00	1.00	1.00															1.00	1.00
22:00:00			2.00	2.00													2.00	2.00
23:00:00			1.00	1.00													1.00	1.00
23:30:00	3.00	3.00															3.00	3.00
0:00:00															1.00	1.00	1.00	1.00
0:30:00			1.00	1.00													1.00	1.00
BUS011	**1.00**	**1.00**	**2.00**	**4.00**					**1.67**	**3.00**	**2.61**	**11.00**	**1.00**	**1.00**	**2.83**	**8.00**	**2.45**	**11.00**
1:00:00											1.00	1.00					1.00	1.00
1:30:00															3.00	3.00	3.00	3.00
2:00:00											2.00	2.00			1.00	1.00	1.50	2.00
2:30:00			1.00	1.00							3.50	6.00					2.67	6.00
3:00:00											2.00	2.00					2.00	2.00
3:30:00											2.50	4.00					2.50	4.00
4:00:00											5.00	5.00					5.00	5.00
18:00:00															1.00	1.00	1.00	1.00
18:30:00			4.00	4.00							2.00	2.00					3.00	4.00
19:00:00											4.00	4.00					4.00	4.00
19:30:00											1.00	1.00					1.00	1.00
20:00:00	1.00	1.00	2.00	2.00							6.00	11.00	1.00	1.00			3.67	11.00
20:30:00									3.00	3.00	3.00	5.00					3.00	5.00
21:00:00			2.00	2.00							2.33	5.00			1.50	2.00	2.00	5.00
21:30:00	1.00	1.00	1.00	1.00							1.50	2.00			3.00	3.00	1.60	3.00
22:00:00											1.00	1.00			8.00	8.00	4.50	8.00
22:30:00			2.00	2.00							2.50	4.00			2.67	5.00	2.50	5.00
23:00:00									1.00	1.00	1.67	3.00					1.50	3.00
23:30:00									1.00	1.00	1.00	1.00			6.00	6.00	2.25	6.00
0:20:00											2.00	2.00			1.00	1.00	1.50	2.00
BUS012															**1.00**	**1.00**	**1.00**	**1.00**
18:30:00															1.00	1.00	1.00	1.00
Grand Total	**3.45**	**23.00**	**2.00**	**26.00**	**1.40**	**8.00**	**1.11**	**2.00**	**2.82**	**150.00**	**11.37**	**2000.00**	**1.00**	**1.00**	**12.95**	**61.00**	**7.95**	**2000.00**





BEENUP WIND FARM

Shadow Flicker and Blade Glint Assessment

Urbis Ltd

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Applicable contract(s) governing the provision of this Report:

Urbis Sub Consultancy Agreement “Beenup Wind Farm Project: Provision of services by DNV Australia Pty Ltd”, dated 11 October 2024

Objective: Beenup Wind Farm Shadow Flicker and Blade Glint Assessment

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EXECUTIVE SUMMARY

DNV has been commissioned by Urbis Ltd ("Urbis" or "the Customer") to independently assess the expected annual shadow flicker durations in the vicinity of the proposed Beenup Wind Farm ("the Project") in Western Australia. The results of the shadow flicker assessment are described in this document.

Background and methodology

DNV has assessed the expected annual shadow flicker durations for the Project against limits specified in the Draft National Wind Farm Development Guidelines (Draft National Guidelines) [1]. The methodology used in this assessment has been informed by these guidelines and various standard industry practices.

The Draft National Guidelines recommend limits of 30 hours per year on the theoretical shadow flicker duration, and 10 hours per year on the actual shadow flicker duration.

A Project layout consisting of 20 wind turbines with a maximum rotor diameter of 172 m and a hub height of 164 m has been considered in this assessment. The locations of 34 potentially sensitive shadow receptors in the vicinity of the Project have been provided by the Customer. For clarity, note that all potentially sensitive shadow receptors in this report will be referred to as dwellings, even though this list also includes a commercial premises ("dwelling" 12). The Customer has advised that 13 of these dwellings are "involved" dwellings, either as landowners or by commercial agreement, including four dwellings where it is agreed they won't be used for residential or accommodation purposes.

The theoretical shadow flicker durations at dwellings in the vicinity of the Project have been determined using a purely geometric analysis. The actual shadow flicker duration likely to be experienced at each dwelling has also been predicted by estimating the possible reduction in shadow flicker due to turbine orientation and cloud cover.

Outcomes of the assessment

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling number "12") is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number "32"), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

The calculation of the predicted actual shadow flicker duration does not take into account other potential reductions due to low wind speed, vegetation, or other shielding effects around each house.

If required, the effects of shadow flicker may be reduced through a number of mitigation measures such as the removal or relocation of turbines, the use of smaller turbines, installation of screening

structures or planting of trees to block shadows cast by the turbines, or the use of turbine control strategies to shut down turbines when shadow flicker is likely to occur.

The effects of blade glint have not been quantified in this study as the Draft National Guidelines [1] do not provide any quantification methodology. The guidelines, however, recommend that the Customer ensures that the turbine blades used have a surface finish with a low reflectivity to avoid occurrences of blade glint.

1 INTRODUCTION

Urbis Ltd ("Urbis" or "the Customer") has commissioned DNV to independently assess the expected annual shadow flicker durations in the vicinity of the proposed Beenup Wind Farm ("the Project") in Western Australia. The results of this work are reported here. This document has been prepared in accordance with Urbis Sub Consultancy Agreement "Beenup Wind Farm Project: Provision of services by DNV Australia Pty Ltd", dated 11 October 2024, and is subject to the terms and conditions in that agreement.

This assessment evaluates the shadow flicker durations in the vicinity of the Project for the current proposed turbine layout and configuration in accordance with the Draft National Wind Farm Development Guidelines (Draft National Guidelines) [1]. The methodology used in this study has been informed by these guidelines and various standard industry practices.

2 DESCRIPTION OF THE SITE AND PROJECT

2.1 The site

The Project is located approximately 58 km south of Busselton and 12 km northeast of Augusta.

The terrain at the site is relatively simple with elevations ranging from approximately 10 m to 40 m above sea level. The site is comprised of mainly agricultural land with sparse pockets of shrubs throughout. A digital elevation model of the Project terrain was provided by the Customer [2] and was supplemented by a digital elevation model of the surrounding terrain, extending approximately 10 km from the site, derived from publicly available SRTM1 data [3].

2.2 The Project

2.2.1 Proposed wind farm layout

The Project is proposed to consist of 20 wind turbines [4]. A map of the site showing the turbine layout and terrain elevations considered in this assessment is shown in Figure 3, and the coordinates of the proposed turbine locations are given in Table 1.

DNV has modelled the shadow flicker based on a theoretical turbine model with a rotor diameter of 172 m and hub height of 164 m.

2.2.2 Dwelling locations

The locations of 34 dwellings in the vicinity of the Project have been provided by the Customer [5]. For clarity, all potentially sensitive shadow receptors will be referred to as dwellings in this report, even though this list includes a commercial premises ("dwelling" 12). The Customer has advised that 13 of these dwellings are "involved" dwellings, either as landowners or by commercial agreement, including a number of dwellings where it is agreed they won't be used for residential or accommodation purposes.

For the purposes of this assessment, 25 dwellings have been identified as having the potential to experience shadow flicker, based on their distances from the proposed turbine locations. Of those 25 dwellings, nine have been identified by the Customer as involved dwellings, including four where it is agreed they won't be used for residential or accommodation purposes.

The remaining nine dwellings are at locations that are considered unlikely to be impacted by shadow flicker at intensities typically considered sufficient to cause annoyance, as discussed further in Sections 3.1 and 4.1.2, and have not been considered further in this assessment.

The 25 dwellings considered in this assessment are shown in Figure 3 and presented in Table 2.

It should be noted that the scope of the work reported here does not include a comprehensive survey of dwellings in the vicinity of the Project, and so DNV is relying on dwelling information provided by the Customer.

3 REGULATORY REQUIREMENTS

3.1 Shadow flicker

The development of wind farms in Western Australia is governed by the Western Australian Planning Commission's Position Statement on renewable energy facilities ("the WA Position statement"), published in March 2020 [6]. However, the WA Position Statement does not address the potential for wind farms to cause shadow flicker impacts at nearby dwellings. Therefore DNV has relied on other suitable guidelines to assess the shadow flicker for the Project, as discussed below.

The Environment Protection and Heritage Council (EPHC), in conjunction with Local Governments and the Planning Ministers' Council, released a draft version of the National Wind Farm Development Guidelines in July 2010 (Draft National Guidelines) [1]. The Draft National Guidelines cover a range of issues across the different stages of wind farm development. In relation to shadow flicker, the Draft National Guidelines provide background information, a proposed methodology, recommended limits, and a suite of assumptions for assessing shadow flicker durations in the vicinity of a wind farm.

The Draft National Guidelines recommend that the modelled theoretical shadow flicker duration at any dwelling should not exceed 30 hours per year at any dwelling, and that the actual or measured shadow flicker duration should not exceed 10 hours per year. The Draft National Guidelines also recommend that the shadow flicker duration at a dwelling be assessed by calculating the maximum shadow flicker occurring within 50 m of the centre of the dwelling. These limits are assumed to apply to a single dwelling, and it is noted that there is no requirement under the Draft National Guidelines to assess shadow flicker durations at locations other than in the vicinity of dwellings.

The impact of shadow flicker is typically only significant up to a limited distance from the wind turbines. Beyond this distance limit the shadow is diffused such that the variation in light levels is not likely to be sufficient to cause annoyance. This issue is discussed in the Draft National Guidelines, where it is stated that:

> *"Shadow flicker can theoretically extend many kilometres from a wind turbine. However the intensity of the shadows decreases with distance. While acknowledging that different individuals have different levels of sensitivity and may be annoyed by different levels of shadow intensity, these guidelines limit assessment to moderate levels of intensity (i.e., well above the minimum theoretically detectable threshold) commensurate with the nature of the impact and the environment in which it is experienced."*

The Draft National Guidelines suggest a shadow flicker distance limit equal to 265 times the maximum blade chord length, which would correspond to approximately 1000 to 1600 m for modern wind turbines (which typically have maximum blade chord lengths of 4 to 6 m). However, the UK wind industry considers that a distance limit of around 10 rotor diameters from a turbine [7, 8] or approximately 1200 m to 1900 m for modern wind turbines (which typically have rotor diameters of 120 m to 190 m), is appropriate.

For the purposes of this assessment, DNV has considered the guidance and recommendations given in the Draft National Guidelines in relation to shadow flicker along with the shadow flicker distance limit applied by the UK wind industry, as discussed further in Section 4.1.2.

3.2 Blade glint

Blade glint involves the regular reflection of the sun off rotating turbine blades. Its occurrence depends on a combination of circumstances arising from the orientation of the nacelle, angle of the blade and the angle of the sun. The reflectiveness of the surface of the blades is also important. Blade glint is not generally a problem for modern wind turbines [1].

A methodology for the quantification of blade glint impacts as well as a regulatory limit are not provided by the Draft National Guidelines [9]. However, the Draft National Guidelines suggest that the Customer ensures the blades of the wind turbines have a finish with low reflectivity.

In relation to blade glint, guidance from the Draft National Guidelines [1] states that:

> *"Blade glint can be produced when the sun's light is reflected from the surface of wind turbine blades. Blade glint has potential to annoy people.*
>
> *All major wind turbine blade manufacturers currently finish their blades with a low reflectivity treatment. This prevents a potentially annoying reflective glint from the surface of the blades and the possibility of a strobing reflection when the turbine blades are spinning. Therefore the risk of blade glint from a new development is considered to be very low.*
>
> *Proponents should ensure that blades from their supplier are of low reflectivity."*

4 ASSESSMENT METHODOLOGY

4.1 Shadow flicker

4.1.1 Overview

Shadow flicker may occur under certain combinations of geographical position and time of day when the sun passes behind the rotating blades of a wind turbine and casts a moving shadow over neighbouring areas. When viewed from a stationary position the moving shadows cause periodic flickering of the light from the sun, giving rise to the phenomenon of 'shadow flicker'.

The effect is most noticeable inside buildings, where the flicker appears through a window opening. The likelihood and duration of the effect depends upon a number of factors, including:

- the direction of the property relative to the turbine
- the distance of the property from the turbine (the further the observer is from the turbine, the less pronounced the effect will be)
- the turbine height and rotor diameter
- the time of year and day (the position of the sun in the sky)
- the weather conditions (cloud cover reduces the occurrence of shadow flicker)
- the wind direction (the shape of the shadow will be determined by the position of the sun relative to the blades which will be oriented to face the wind).

Example photographs of wind turbines and associated shadows which have the potential to cause flicker are shown in Figure 1 below.



Figure 1 Examples of wind turbine shadows

4.1.2 Theoretical modelled duration

The theoretical number of hours of shadow flicker experienced annually at a given location can be calculated using a geometrical model which incorporates the sun path, topographic variation over the site area, and wind turbine details such as rotor diameter and hub height.

The wind turbines have been modelled assuming they are spherical objects, which is equivalent to assuming the turbines are always oriented perpendicular to the sun-turbine vector. This assumption will mean the model calculates the maximum duration for which there is potential for shadow flicker to occur, up to a specified distance limit.

In line with the methodology proposed in the Draft National Guidelines, DNV has assessed the shadow flicker at the provided dwellings and has determined the highest shadow flicker duration within 50 m of each of these locations.

In the absence of detailed dwelling height information, shadow flicker has been calculated at the dwellings at heights of 2 m, to represent ground floor windows, and 6 m, to represent second floor windows. The shadow receptors are simulated as fixed points, representing the worst-case scenario, as real windows could be facing a particular direction less affected by shadows cast from the turbines. The shadow flicker calculations for dwelling locations have been carried out with a temporal resolution of 1 minute. The shadow flicker map was generated using a temporal resolution of 5 minutes and a spatial resolution of 10 m to reduce computational requirements to acceptable levels.

As part of the shadow flicker assessment, it is necessary to make an assumption regarding the maximum length of a shadow cast by a wind turbine that is likely to cause annoyance due to shadow flicker. As noted in Section 3.1, the UK wind industry considers that 10 rotor diameters is appropriate [7, 8] while the Draft National Guidelines suggest a distance limit equivalent to 265 times the maximum blade chord [1].

For the current assessment, DNV has applied a maximum shadow length of 10 times the rotor diameter (10D), corresponding to a distance limit of 1720 m for the Project, which DNV considers is more appropriate than a limit of 265 times the maximum blade chord. Beyond this distance limit, it is assumed that any shadow flicker experienced will be below a "moderate level of intensity" and unlikely to cause annoyance. However, it is recognised that different people have different levels of sensitivity to shadow flicker and may therefore be affected by shadow flicker intensities below the "moderate level of intensity" assumed by this distance limit. To account for this possibility, DNV has also calculated the shadow flicker to a distance of up to 15 times the rotor diameter (15D), or 2580 m, which should include shadow flicker below a "moderate level of intensity".

In this assessment, shadow flicker of a moderate level of intensity or above is assumed to occur up to a distance of approximately 10D from the wind farm. Conversely, shadow flicker below a moderate level of intensity, described as "low intensity" shadow flicker in this report, is assumed to occur beyond a distance of 10D and up to a distance of approximately 15D from the wind farm.

The model also makes the following assumptions and simplifications:

- there are clear skies every day of the year
- the blades of the turbines are always perpendicular to the direction of the line of sight from the location of interest to the sun
- the turbines are always rotating.

The first two of these items are addressed in the calculation of the predicted actual shadow flicker duration as described in Section 4.1.4. The third item is not considered but is unlikely to have a significant impact on the results. The settings used to execute the model can be seen in Table 3.

To illustrate typical results, an indicative shadow flicker map for a turbine located in a flat area is shown in Figure 4. The geometry of the shadow flicker map can be characterised as a butterfly shape, with the four protruding lobes corresponding to slowing of solar north-south travel around the summer and winter solstices for morning and evening. The lobes to the north of the indicative turbine location result from the summer months and conversely the lobes to the south result from the winter months. The lobes to the west result from morning sun while the lobes to the east result from evening sun. When the sun is low in the sky, the length of shadows cast by the turbine increases, increasing the area around the turbine affected by shadow flicker.

4.1.3 Factors affecting duration

Shadow flicker duration calculated in this manner overestimates the annual number of hours of shadow flicker experienced at a specified location for several reasons, including:

1. The wind turbine will not always be oriented such that its rotor is in the worst-case position (i.e., perpendicular to the sun-turbine vector). Any other rotor orientation will reduce the area of the projected shadow and hence the shadow flicker duration.

   The wind speed frequency distribution or wind rose at the site can be used to determine probable turbine orientation and to calculate the resulting reduction in shadow flicker duration.

2. The occurrence of cloud cover has the potential to significantly reduce the number of hours of shadow flicker. Cloud cover measurements recorded at nearby meteorological stations may be used to estimate probable levels of cloud cover and to provide an indication of the resulting reduction in shadow flicker duration.

3. Aerosols (moisture, dust, smoke, etc.) in the atmosphere have the ability to influence shadows cast by a wind turbine. The length of the shadow cast by a wind turbine is dependent on the degree that direct sunlight is diffused, which is in turn dependent on the amount of dispersants (humidity, smoke, and other aerosols) in the path between the light source (sun) and the receiver.

4. The modelling of the wind turbine rotor as a sphere rather than individual blades results in an overestimation of the shadow flicker duration. Turbine blades are of non-uniform thickness with the thickest part of the blade (maximum chord) close to the hub and the thinnest part (minimum chord) at the tip. Diffusion of sunlight, as discussed above, results in a limit to the maximum distance that a shadow can be perceived. This maximum distance will also be dependent on the thickness of the turbine blade, and the human threshold for perception of light intensity variation. As such, a shadow cast by the blade tip will be shorter than the shadow cast by the thickest part of the blade.

5. The analysis does not consider that when the sun is positioned directly behind the wind turbine hub, there is no variation in light intensity at the receiver location and therefore no shadow flicker.

6. The presence of vegetation or other physical barriers around a shadow receptor location may shield the view of the wind turbine, and therefore reduce the incidence of shadow flicker.

7. Periods where the wind turbine is not in operation due to low winds, high winds, or for operational and maintenance reasons will also reduce the annual shadow flicker duration.

4.1.4 Predicted actual duration

As discussed above in Section 4.1.3, there are a number of factors which may reduce the incidence of shadow flicker that are not taken into account in the calculation of the theoretical shadow flicker duration. An attempt has been made to quantify the likely reduction in shadow flicker duration due to cloud cover and, therefore, produce a prediction of the actual shadow flicker duration likely to be experienced at a dwelling.

Cloud cover is typically measured in 'oktas', effectively eighths of the sky covered with cloud. DNV has obtained data from the following Bureau of Meteorology (BoM) stations:

- Cape Leeuwin (9518), located approximately 22 km southwest of the centre of the Project site [10]
- Jarrahwood (9842), located approximately 58 km northeast of the centre of the Project site [11]
- Pemberton (9592), located approximately 74 km southwest of the centre of the Project site [12]
- Manjimup (9573), located approximately 78 km east of the centre of the Project site [13].

The number of oktas of cloud cover visible across the sky at these stations is recorded twice daily, at 9 am and 3 pm, and the observations are provided as monthly averages. After averaging the 9 am and 3 pm observations for the stations considered, the results indicate that the average monthly cloud cover in the region ranges between 50% and 71%, and the average annual cloud cover is approximately 63%. This implies that on an average day, 63% of the sky in the vicinity of the wind farm is covered with clouds. Although it is not possible to definitively calculate the effect of cloud cover on shadow flicker duration, a reduction in the shadow flicker duration proportional to the amount of cloud cover is considered to be a reasonable assumption.

Similarly, turbine orientation can have an impact on the shadow flicker duration. The shadow flicker duration is greatest when the turbine rotor plane is approximately perpendicular to a line joining the sun and an observer, and a minimum when the rotor plane is approximately parallel to a line joining the sun and an observer. A wind direction frequency distribution at the site was derived from publicly available wind direction data [14] [15] [16] and used to estimate the reduction in shadow flicker duration due to rotor orientation. The resulting wind rose is shown overlaid on the indicative shadow flicker map in Figure 4. The assessment of the likely reduction in shadow flicker duration due to variation in turbine orientation was conducted on an annual basis.

It should be noted that the method prescribed by the Draft National Guidelines for assessing actual shadow flicker duration recommends that only reductions due to cloud cover, and not turbine orientation, be included. However, DNV considers that the additional reduction due to turbine orientation is appropriate as the projected area of the turbine, and therefore the expected shadow flicker duration, is reduced when the turbine rotor is not perpendicular to the line joining the sun and dwelling. Due to limitations in the availability of suitable cloud cover data, the methodology used in this assessment also deviates somewhat from the method recommended by the Draft National Guidelines for assessing the reduction in shadow flicker due to cloud cover. However, considering the available cloud cover data, the approach described above is deemed to provide a reasonable estimate of the likely impact of cloud cover on the shadow flicker duration.

While the calculation of the predicted actual shadow flicker duration considers the likely reductions due to cloud cover and rotor orientation, it does not take into account other potential reductions due to low wind speed (or turbine shutdown), vegetation, or other shielding effects around each dwelling.

4.2 Blade glint

Blade glint involves the regular reflection of sun off rotating turbine blades. Its occurrence depends on a combination of circumstances arising from the orientation of the nacelle, angle of the blade and the angle of the sun. The reflectiveness of the surface of the blades is also important. Blade glint is not generally a problem for modern wind turbines, provided the blades are coated with a non-reflective paint, and it is not considered further here.

5 ASSESSMENT RESULTS

5.1 Shadow flicker

5.1.1 Predicted shadow flicker durations

Shadow flicker predictions were generated at the provided dwelling locations, and the results are summarised in Table 4.

The results of the theoretical and predicted actual shadow flicker modelling are also shown in the form of shadow flicker maps in Figure 5 and Figure 6 respectively. The shadow flicker values presented in these maps represent the worst case between the results calculated at 2 m and 6 m above ground level for each modelled grid point.

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling 12) is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number “32”), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

Beyond the 10D distance limit, it is assumed that any shadow flicker experienced will be below a moderate level of intensity and unlikely to cause annoyance. However, as discussed in Section 4.1.2, it is recognised that different people have different levels of sensitivity to shadow flicker and may therefore be affected by low intensity shadow flicker assumed by this distance limit. To inform the potential for this outcome, although not part of the methodology outlined in the Draft National Guidelines, DNV has also calculated the theoretical shadow flicker impacts for the Project for an increased distance limit of 15D that is intended to include shadow flicker of low intensity. The results of this additional assessment are also included in the map presented in Figure 5. These results indicate that, in addition to the dwellings expected to be affected by shadow flicker above a moderate level of intensity, 12 dwellings may have the potential to be exposed to low intensity shadow flicker. These dwellings are noted in Table 2.

5.1.2 Mitigation options

If required, the effects of shadow flicker may be reduced through a number of mitigation measures. These include the removal or relocation of turbines, the use of turbines with a smaller rotor diameter, installation of screening structures or planting of trees to block shadows cast by the turbines, or the use of turbine control strategies to shut down turbines when shadow flicker is likely to occur.

5.2 Blade glint

As discussed in Section 4.2, blade glint is not expected to be an issue for the Project provided that a non-reflective paint is applied to the wind turbine blades.

6 CONCLUSIONS

A shadow flicker assessment was carried out for dwelling locations in the vicinity of the Project.

For the purpose of this assessment, DNV has considered a layout consisting of 20 turbines with a rotor diameter of 172 m and a hub height of 164 m. These dimensions represent the maximum turbine dimensions currently under consideration for the Project.

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling number "12") is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number "32"), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

It is recommended that the Customer ensures the turbine blades are coated with a non-reflective paint to avoid the occurrence of blade glint from the wind farm.

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Table 1 Proposed turbine layout for the Project [4]

Turbine ID	Easting[1] [m]	Northing[1] [m]	Base elevation [m]	Turbine ID	Easting[1] [m]	Northing[1] [m]	Base elevation [m]
T1	341140	6216362	35	T11	340893	6210691	24
T2	340789	6215512	32	T12	342468	6210422	32
T3	341919	6215415	37	T13	345296	6209961	27
T4	345089	6214694	35	T14	340963	6209853	22
T5	343989	6214377	36	T15	344918	6209443	28
T6	343100	6213973	35	T16	343579	6209172	31
T7	343658	6211892	35	T17	341749	6209112	19
T8	345139	6211672	32	T18	343609	6208448	30
T9	341439	6211432	28	T19	342822	6208140	28
T10	343229	6211314	34	T20	343193	6207619	28

1. Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.

Table 2 Locations of dwellings considered in this assessment [5]

Dwelling ID	Easting[1] [m]	Northing[1] [m]	Nearest turbine	
			Distance [m][2]	Turbine ID
1	339933	6218621	2560	T1
2	340681	6218532	2216	T1
3	340855	6218801	2454	T1
6	341069	6218432	2069	T1
7	*341528*	*6217917*	*1600*	*T1*
9	342689	6218169	2378	T1
11[3]	*343529*	*6214483*	*473*	*T5*
12	340601	6214584	949	T2
13	338389	6215122	2433	T2
14	*338449*	*6214374*	*2604*	*T2*
17	*340918*	*6213803*	*1715*	*T2*
18	*341404*	*6213392*	*1794*	*T6*
19	*338804*	*6211699*	*2319*	*T11*
20	340479	6207562	2006	T17
21	340818	6207345	2000	T17
22	341298	6207232	1775	T19
23	341567	6206855	1798	T19
24	341486	6206578	2000	T20
25[3]	*342442*	*6208726*	*698*	*T19*
26[3]	*344715*	*6209164*	*346*	*T15*
27[3]	*345037*	*6210146*	*318*	*T13*
28	347594	6209196	2421	T13
32	341223	6207695	1513	T13
33	341234	6207287	1804	T19
34	339819	6217839	1981	T1

1. Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.
2. The shadow flicker assessment has considered dwellings up to a maximum distance of 15D + 50 m from the Project wind turbines.
3. Involved dwelling where there is a commercial agreement such that the dwelling will not be used for residential or accomodation purposes.
4. Involved dwellings are indicated by *underlined italic text*.

Table 3 Shadow flicker model settings for theoretical shadow flicker calculation

Model setting	
Shadow distance limit (10D)	1720 m
Year of calculation	2037
Minimum elevation of the sun	3°
Time step	1 min (5 min for map)
Rotor modelled as	Sphere (disc for turbine orientation reduction calculation)
Sun modelled as	Disc
Offset between rotor and tower	None
Receptor height (single storey)	2 m
Receptor height (double storey)	6 m
Locations used for determining maximum shadow flicker within 50 m of each dwelling	8 points evenly spaced (every 45°) on 25 m and 50 m radius circles centred on the provided dwelling location

Table 4 Theoretical and predicted actual annual shadow flicker duration

Dwelling ID	Easting[1] [m]	Northing[1] [m]	Landowner status	Contributing turbines[2]	Theoretical annual				Predicted actual annual[3]			
					At dwelling [hr/yr]		Max within 50 m [hr/yr]		At dwelling [hr/yr]		Max within 50 m [hr/yr]	
					2 m	6 m	2 m	6 m	2 m	6 m	2 m	6 m
12	340601	6214584	Non-involved	T3 T6	**33.0**	**32.6**	**35.1**	**34.4**	5.9	5.8	6.1	6.0
13[4]	338389	6215122	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14[4]	338449	6214374	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17[4]	340918	6213803	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18[4]	341404	6213392	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19[4]	338804	6211699	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20[4]	340479	6207562	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21[4]	340818	6207345	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22[4]	341567	6206855	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23[4]	341486	6206578	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24[4]	338804	6211699	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30[4]	347593	6209195	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	341223	6207695	Non-involved	T18 T19 T20	12.1	12.0	12.8	12.8	2.5	2.4	2.6	2.6
33[4]	341234	6207287	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recommended duration limits (hr/yr)					**30**	**30**	**30**	**30**	**10**	**10**	**10**	**10**

1. Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.
2. Contributing turbines shown are for the theoretical shadow flicker calculated at 2 m above ground level.
3. Considering likely reductions in shadow flicker duration due to cloud cover and turbine orientation.
4. Dwelling is not predicted to experience any shadow flicker above a moderate level of intensity, but may experience low intensity shadow flicker.

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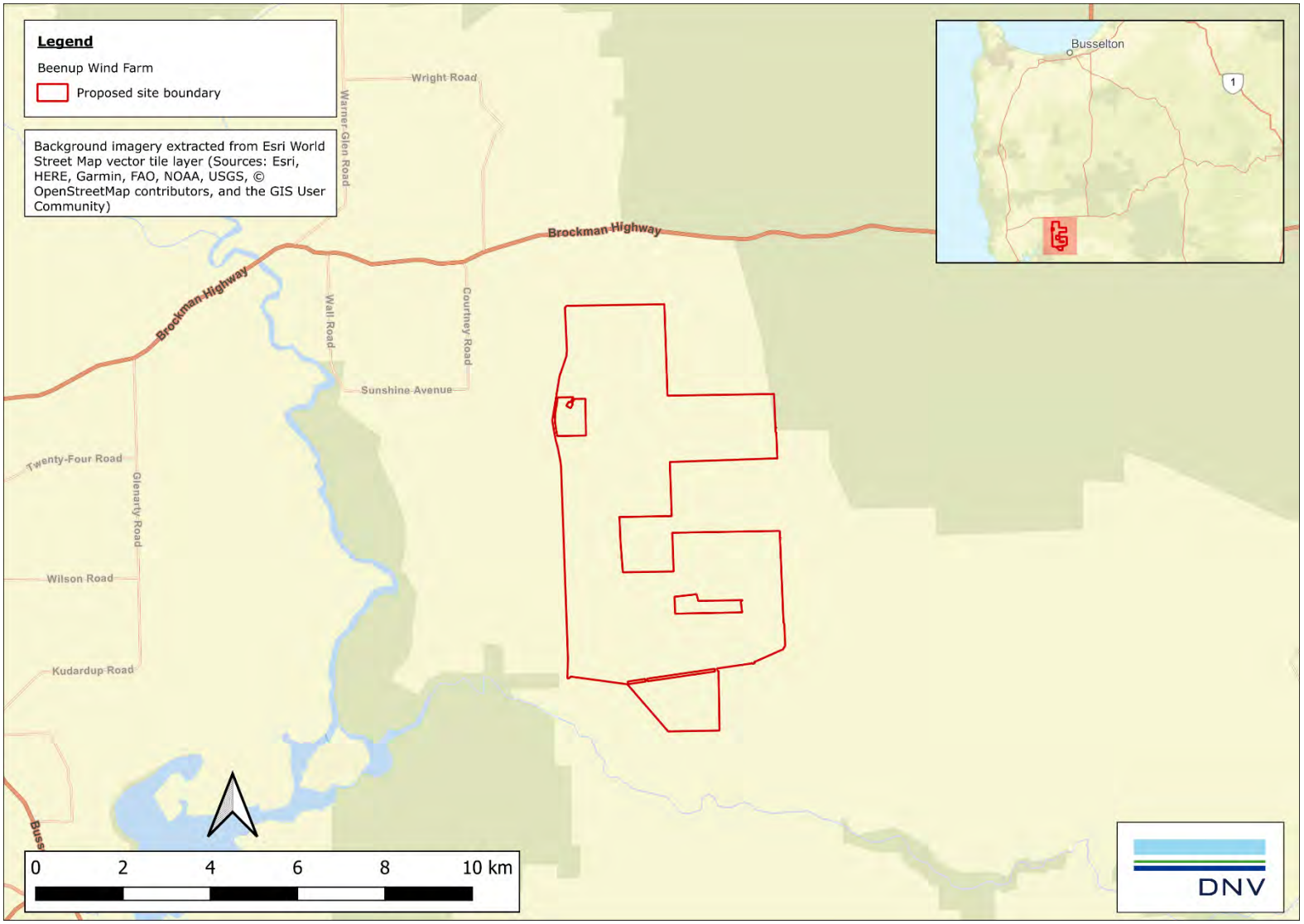

Figure 2 Location of the Project

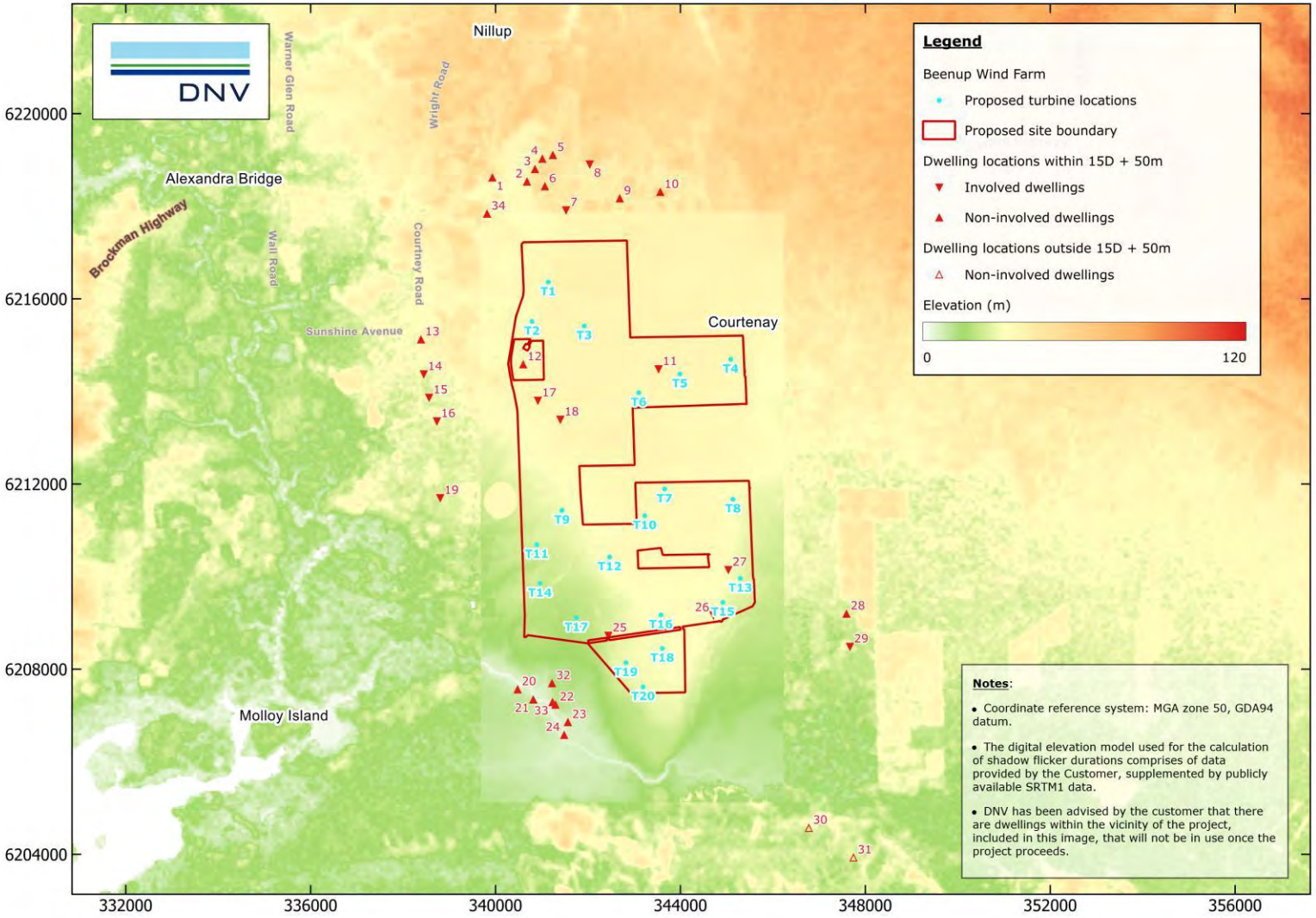

Figure 3 Map of the proposed Project, showing proposed turbine locations, nearby dwellings, and terrain elevation

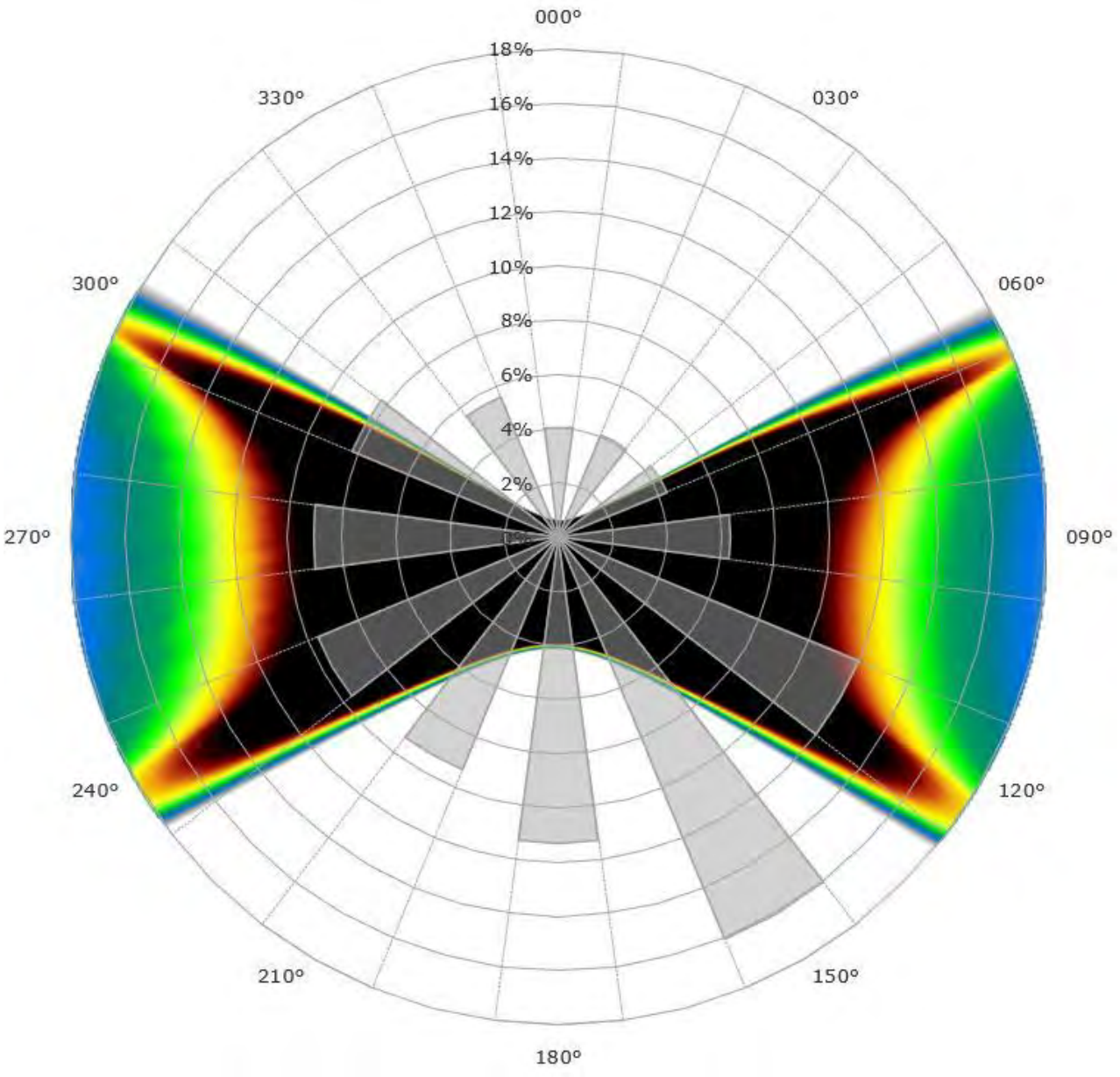

Figure 4 Indicative shadow flicker map and wind direction frequency distribution

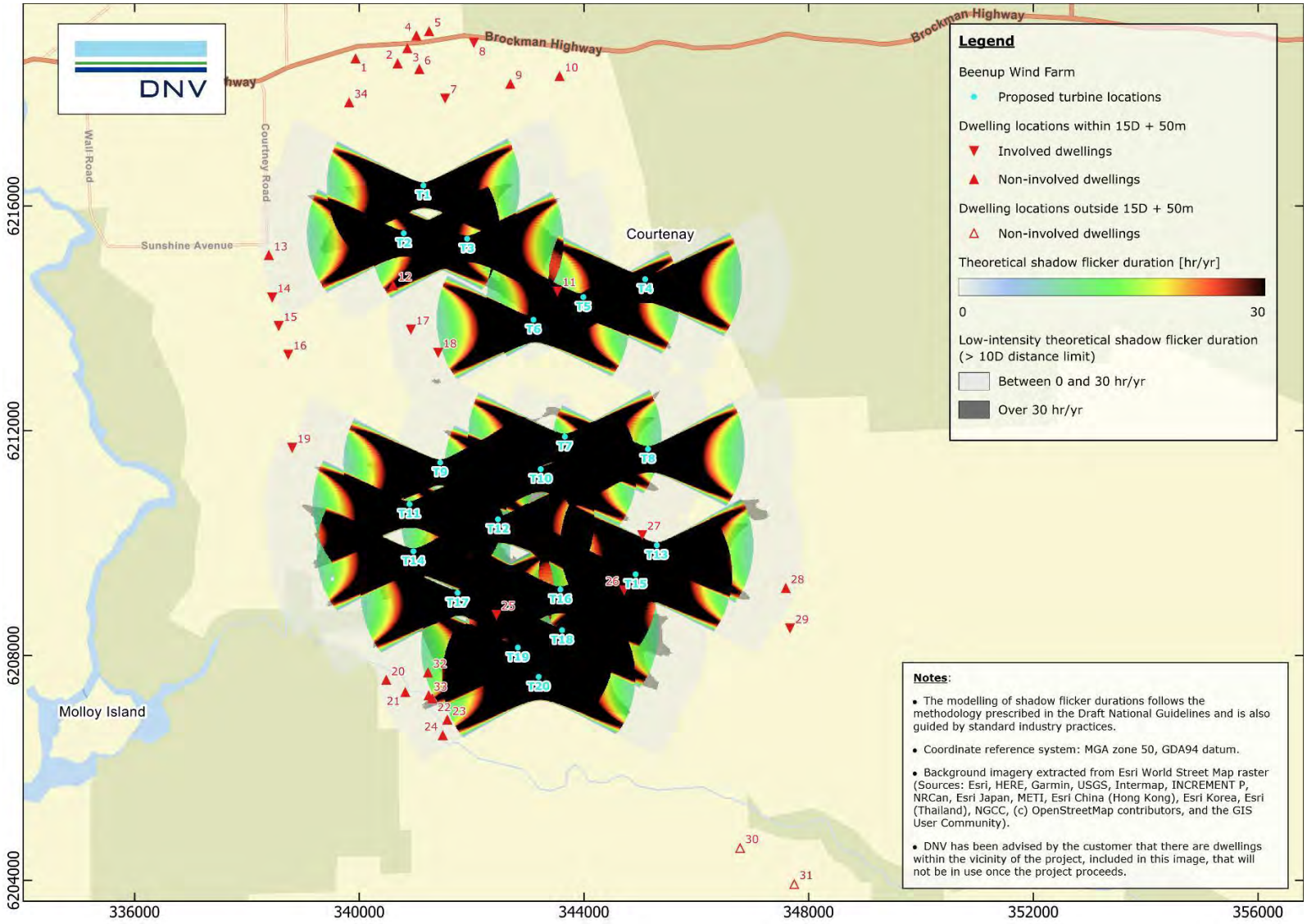

Figure 5 Theoretical annual shadow flicker duration map for the Project

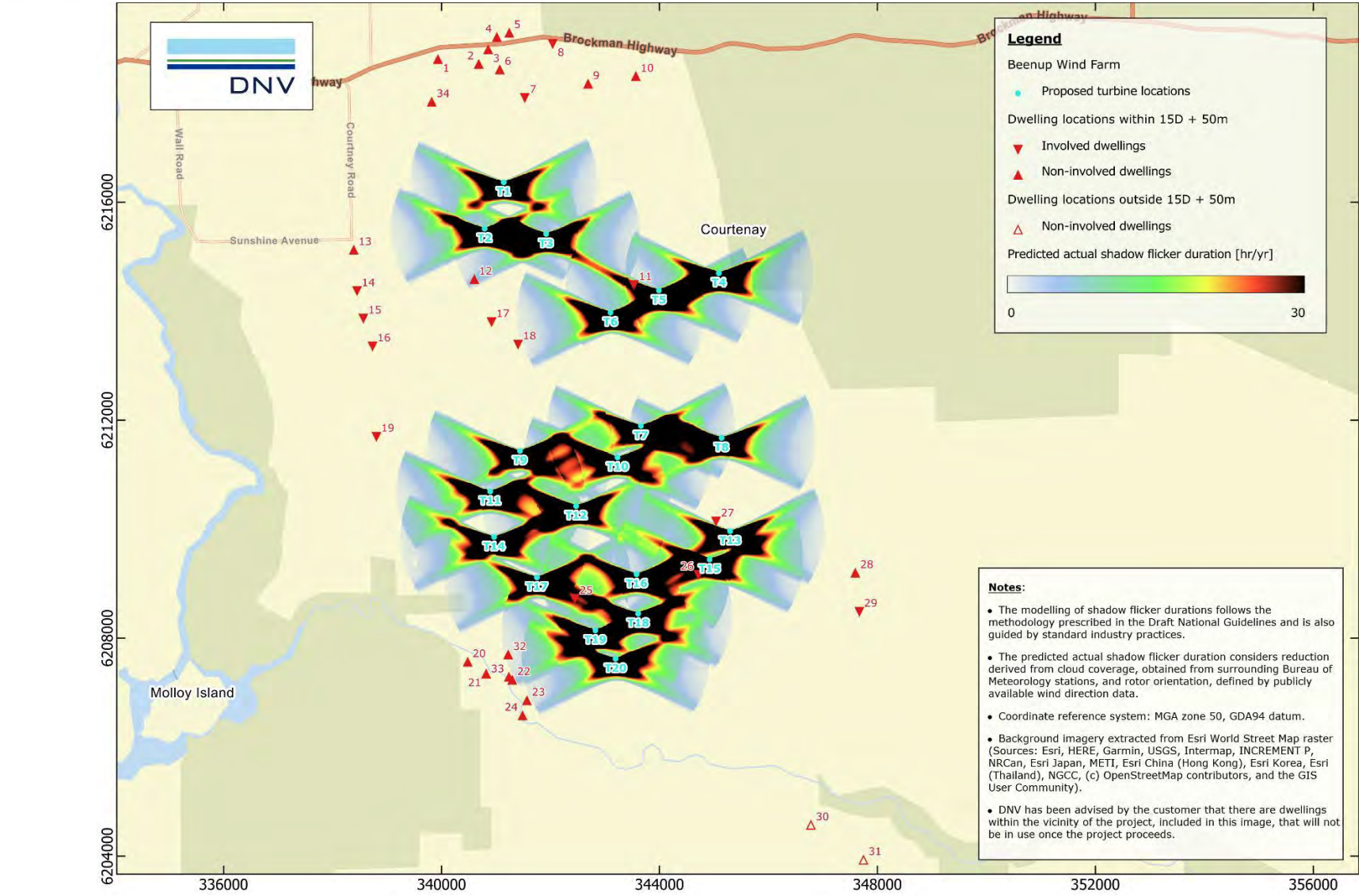

Figure 6 Predicted actual annual shadow flicker duration map for the Project



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BEENUP WIND FARM

Shadow Flicker and Blade Glint Assessment

Urbis Ltd

Report No.: 10532262-AUMEL-R-01, Rev. C
Document No.: 10532262-AUMEL-R-01-C
Date: 30 April 2025
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DNV Australia Pty Ltd

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EXECUTIVE SUMMARY

DNV has been commissioned by Urbis Ltd ("Urbis" or "the Customer") to independently assess the expected annual shadow flicker durations in the vicinity of the proposed Beenup Wind Farm ("the Project") in Western Australia. The results of the shadow flicker assessment are described in this document.

Background and methodology

DNV has assessed the expected annual shadow flicker durations for the Project against limits specified in the Draft National Wind Farm Development Guidelines (Draft National Guidelines) [1]. The methodology used in this assessment has been informed by these guidelines and various standard industry practices.

The Draft National Guidelines recommend limits of 30 hours per year on the theoretical shadow flicker duration, and 10 hours per year on the actual shadow flicker duration.

A Project layout consisting of 20 wind turbines with a maximum rotor diameter of 172 m and a hub height of 164 m has been considered in this assessment. The locations of 34 potentially sensitive shadow receptors in the vicinity of the Project have been provided by the Customer. For clarity, note that all potentially sensitive shadow receptors in this report will be referred to as dwellings, even though this list also includes a commercial premises ("dwelling" 12). The Customer has advised that 13 of these dwellings are "involved" dwellings, either as landowners or by commercial agreement, including four dwellings where it is agreed they won't be used for residential or accommodation purposes.

The theoretical shadow flicker durations at dwellings in the vicinity of the Project have been determined using a purely geometric analysis. The actual shadow flicker duration likely to be experienced at each dwelling has also been predicted by estimating the possible reduction in shadow flicker due to turbine orientation and cloud cover.

Outcomes of the assessment

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling number "12") is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number "32"), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

The calculation of the predicted actual shadow flicker duration does not take into account other potential reductions due to low wind speed, vegetation, or other shielding effects around each house.

If required, the effects of shadow flicker may be reduced through a number of mitigation measures such as the removal or relocation of turbines, the use of smaller turbines, installation of screening

structures or planting of trees to block shadows cast by the turbines, or the use of turbine control strategies to shut down turbines when shadow flicker is likely to occur.

The effects of blade glint have not been quantified in this study as the Draft National Guidelines [1] do not provide any quantification methodology. The guidelines, however, recommend that the Customer ensures that the turbine blades used have a surface finish with a low reflectivity to avoid occurrences of blade glint.

1 INTRODUCTION

Urbis Ltd ("Urbis" or "the Customer") has commissioned DNV to independently assess the expected annual shadow flicker durations in the vicinity of the proposed Beenup Wind Farm ("the Project") in Western Australia. The results of this work are reported here. This document has been prepared in accordance with Urbis Sub Consultancy Agreement "Beenup Wind Farm Project: Provision of services by DNV Australia Pty Ltd", dated 11 October 2024, and is subject to the terms and conditions in that agreement.

This assessment evaluates the shadow flicker durations in the vicinity of the Project for the current proposed turbine layout and configuration in accordance with the Draft National Wind Farm Development Guidelines (Draft National Guidelines) [1]. The methodology used in this study has been informed by these guidelines and various standard industry practices.

2 DESCRIPTION OF THE SITE AND PROJECT

2.1 The site

The Project is located approximately 58 km south of Busselton and 12 km northeast of Augusta.

The terrain at the site is relatively simple with elevations ranging from approximately 10 m to 40 m above sea level. The site is comprised of mainly agricultural land with sparse pockets of shrubs throughout. A digital elevation model of the Project terrain was provided by the Customer [2] and was supplemented by a digital elevation model of the surrounding terrain, extending approximately 10 km from the site, derived from publicly available SRTM1 data [3].

2.2 The Project

2.2.1 Proposed wind farm layout

The Project is proposed to consist of 20 wind turbines [4]. A map of the site showing the turbine layout and terrain elevations considered in this assessment is shown in Figure 3, and the coordinates of the proposed turbine locations are given in Table 1.

DNV has modelled the shadow flicker based on a theoretical turbine model with a rotor diameter of 172 m and hub height of 164 m.

2.2.2 Dwelling locations

The locations of 34 dwellings in the vicinity of the Project have been provided by the Customer [5]. For clarity, all potentially sensitive shadow receptors will be referred to as dwellings in this report, even though this list includes a commercial premises ("dwelling" 12). The Customer has advised that 13 of these dwellings are "involved" dwellings, either as landowners or by commercial agreement, including a number of dwellings where it is agreed they won't be used for residential or accommodation purposes.

For the purposes of this assessment, 25 dwellings have been identified as having the potential to experience shadow flicker, based on their distances from the proposed turbine locations. Of those 25 dwellings, nine have been identified by the Customer as involved dwellings, including four where it is agreed they won't be used for residential or accommodation purposes.

The remaining nine dwellings are at locations that are considered unlikely to be impacted by shadow flicker at intensities typically considered sufficient to cause annoyance, as discussed further in Sections 3.1 and 4.1.2, and have not been considered further in this assessment.

The 25 dwellings considered in this assessment are shown in Figure 3 and presented in Table 2.

It should be noted that the scope of the work reported here does not include a comprehensive survey of dwellings in the vicinity of the Project, and so DNV is relying on dwelling information provided by the Customer.

3 REGULATORY REQUIREMENTS

3.1 Shadow flicker

The development of wind farms in Western Australia is governed by the Western Australian Planning Commission's Position Statement on renewable energy facilities ("the WA Position

statement"), published in March 2020 [6]. However, the WA Position Statement does not address the potential for wind farms to cause shadow flicker impacts at nearby dwellings. Therefore DNV has relied on other suitable guidelines to assess the shadow flicker for the Project, as discussed below.

The Environment Protection and Heritage Council (EPHC), in conjunction with Local Governments and the Planning Ministers' Council, released a draft version of the National Wind Farm Development Guidelines in July 2010 (Draft National Guidelines) [1]. The Draft National Guidelines cover a range of issues across the different stages of wind farm development. In relation to shadow flicker, the Draft National Guidelines provide background information, a proposed methodology, recommended limits, and a suite of assumptions for assessing shadow flicker durations in the vicinity of a wind farm.

The Draft National Guidelines recommend that the modelled theoretical shadow flicker duration at any dwelling should not exceed 30 hours per year at any dwelling, and that the actual or measured shadow flicker duration should not exceed 10 hours per year. The Draft National Guidelines also recommend that the shadow flicker duration at a dwelling be assessed by calculating the maximum shadow flicker occurring within 50 m of the centre of the dwelling. These limits are assumed to apply to a single dwelling, and it is noted that there is no requirement under the Draft National Guidelines to assess shadow flicker durations at locations other than in the vicinity of dwellings.

The impact of shadow flicker is typically only significant up to a limited distance from the wind turbines. Beyond this distance limit the shadow is diffused such that the variation in light levels is not likely to be sufficient to cause annoyance. This issue is discussed in the Draft National Guidelines, where it is stated that:

> *"Shadow flicker can theoretically extend many kilometres from a wind turbine. However the intensity of the shadows decreases with distance. While acknowledging that different individuals have different levels of sensitivity and may be annoyed by different levels of shadow intensity, these guidelines limit assessment to moderate levels of intensity (i.e., well above the minimum theoretically detectable threshold) commensurate with the nature of the impact and the environment in which it is experienced."*

The Draft National Guidelines suggest a shadow flicker distance limit equal to 265 times the maximum blade chord length, which would correspond to approximately 1000 to 1600 m for modern wind turbines (which typically have maximum blade chord lengths of 4 to 6 m). However, the UK wind industry considers that a distance limit of around 10 rotor diameters from a turbine [7, 8] or approximately 1200 m to 1900 m for modern wind turbines (which typically have rotor diameters of 120 m to 190 m), is appropriate.

For the purposes of this assessment, DNV has considered the guidance and recommendations given in the Draft National Guidelines in relation to shadow flicker along with the shadow flicker distance limit applied by the UK wind industry, as discussed further in Section 4.1.2.

3.2 Blade glint

Blade glint involves the regular reflection of the sun off rotating turbine blades. Its occurrence depends on a combination of circumstances arising from the orientation of the nacelle, angle of the blade and the angle of the sun. The reflectiveness of the surface of the blades is also important. Blade glint is not generally a problem for modern wind turbines [1].

A methodology for the quantification of blade glint impacts as well as a regulatory limit are not provided by the Draft National Guidelines [9]. However, the Draft National Guidelines suggest that the Customer ensures the blades of the wind turbines have a finish with low reflectivity.

In relation to blade glint, guidance from the Draft National Guidelines [1] states that:

> *"Blade glint can be produced when the sun's light is reflected from the surface of wind turbine blades. Blade glint has potential to annoy people.*
>
> *All major wind turbine blade manufacturers currently finish their blades with a low reflectivity treatment. This prevents a potentially annoying reflective glint from the surface of the blades and the possibility of a strobing reflection when the turbine blades are spinning. Therefore the risk of blade glint from a new development is considered to be very low.*
>
> *Proponents should ensure that blades from their supplier are of low reflectivity."*

4 ASSESSMENT METHODOLOGY

4.1 Shadow flicker

4.1.1 Overview

Shadow flicker may occur under certain combinations of geographical position and time of day when the sun passes behind the rotating blades of a wind turbine and casts a moving shadow over neighbouring areas. When viewed from a stationary position the moving shadows cause periodic flickering of the light from the sun, giving rise to the phenomenon of 'shadow flicker'.

The effect is most noticeable inside buildings, where the flicker appears through a window opening. The likelihood and duration of the effect depends upon a number of factors, including:

- the direction of the property relative to the turbine
- the distance of the property from the turbine (the further the observer is from the turbine, the less pronounced the effect will be)
- the turbine height and rotor diameter
- the time of year and day (the position of the sun in the sky)
- the weather conditions (cloud cover reduces the occurrence of shadow flicker)
- the wind direction (the shape of the shadow will be determined by the position of the sun relative to the blades which will be oriented to face the wind).

Example photographs of wind turbines and associated shadows which have the potential to cause flicker are shown in Figure 1 below.



Figure 1 Examples of wind turbine shadows

4.1.2 Theoretical modelled duration

The theoretical number of hours of shadow flicker experienced annually at a given location can be calculated using a geometrical model which incorporates the sun path, topographic variation over the site area, and wind turbine details such as rotor diameter and hub height.

The wind turbines have been modelled assuming they are spherical objects, which is equivalent to assuming the turbines are always oriented perpendicular to the sun-turbine vector. This assumption will mean the model calculates the maximum duration for which there is potential for shadow flicker to occur, up to a specified distance limit.

In line with the methodology proposed in the Draft National Guidelines, DNV has assessed the shadow flicker at the provided dwellings and has determined the highest shadow flicker duration within 50 m of each of these locations.

In the absence of detailed dwelling height information, shadow flicker has been calculated at the dwellings at heights of 2 m, to represent ground floor windows, and 6 m, to represent second floor windows. The shadow receptors are simulated as fixed points, representing the worst-case scenario, as real windows could be facing a particular direction less affected by shadows cast from the turbines. The shadow flicker calculations for dwelling locations have been carried out with a temporal resolution of 1 minute. The shadow flicker map was generated using a temporal resolution of 5 minutes and a spatial resolution of 10 m to reduce computational requirements to acceptable levels.

As part of the shadow flicker assessment, it is necessary to make an assumption regarding the maximum length of a shadow cast by a wind turbine that is likely to cause annoyance due to shadow flicker. As noted in Section 3.1, the UK wind industry considers that 10 rotor diameters is appropriate [7, 8] while the Draft National Guidelines suggest a distance limit equivalent to 265 times the maximum blade chord [1].

For the current assessment, DNV has applied a maximum shadow length of 10 times the rotor diameter (10D), corresponding to a distance limit of 1720 m for the Project, which DNV considers is more appropriate than a limit of 265 times the maximum blade chord. Beyond this distance limit, it is assumed that any shadow flicker experienced will be below a “moderate level of intensity” and unlikely to cause annoyance. However, it is recognised that different people have different levels of sensitivity to shadow flicker and may therefore be affected by shadow flicker intensities below the “moderate level of intensity” assumed by this distance limit. To account for this possibility, DNV has also calculated the shadow flicker to a distance of up to 15 times the rotor diameter (15D), or 2580 m, which should include shadow flicker below a “moderate level of intensity”.

In this assessment, shadow flicker of a moderate level of intensity or above is assumed to occur up to a distance of approximately 10D from the wind farm. Conversely, shadow flicker below a moderate level of intensity, described as “low intensity” shadow flicker in this report, is assumed to occur beyond a distance of 10D and up to a distance of approximately 15D from the wind farm.

The model also makes the following assumptions and simplifications:

- there are clear skies every day of the year

- the blades of the turbines are always perpendicular to the direction of the line of sight from the location of interest to the sun
- the turbines are always rotating.

The first two of these items are addressed in the calculation of the predicted actual shadow flicker duration as described in Section 4.1.4. The third item is not considered but is unlikely to have a significant impact on the results. The settings used to execute the model can be seen in Table 3.

To illustrate typical results, an indicative shadow flicker map for a turbine located in a flat area is shown in Figure 4. The geometry of the shadow flicker map can be characterised as a butterfly shape, with the four protruding lobes corresponding to slowing of solar north-south travel around the summer and winter solstices for morning and evening. The lobes to the north of the indicative turbine location result from the summer months and conversely the lobes to the south result from the winter months. The lobes to the west result from morning sun while the lobes to the east result from evening sun. When the sun is low in the sky, the length of shadows cast by the turbine increases, increasing the area around the turbine affected by shadow flicker.

4.1.3 Factors affecting duration

Shadow flicker duration calculated in this manner overestimates the annual number of hours of shadow flicker experienced at a specified location for several reasons, including:

1. The wind turbine will not always be oriented such that its rotor is in the worst-case position (i.e., perpendicular to the sun-turbine vector). Any other rotor orientation will reduce the area of the projected shadow and hence the shadow flicker duration.

   The wind speed frequency distribution or wind rose at the site can be used to determine probable turbine orientation and to calculate the resulting reduction in shadow flicker duration.

2. The occurrence of cloud cover has the potential to significantly reduce the number of hours of shadow flicker. Cloud cover measurements recorded at nearby meteorological stations may be used to estimate probable levels of cloud cover and to provide an indication of the resulting reduction in shadow flicker duration.

3. Aerosols (moisture, dust, smoke, etc.) in the atmosphere have the ability to influence shadows cast by a wind turbine. The length of the shadow cast by a wind turbine is dependent on the degree that direct sunlight is diffused, which is in turn dependent on the amount of dispersants (humidity, smoke, and other aerosols) in the path between the light source (sun) and the receiver.

4. The modelling of the wind turbine rotor as a sphere rather than individual blades results in an overestimation of the shadow flicker duration. Turbine blades are of non-uniform thickness with the thickest part of the blade (maximum chord) close to the hub and the thinnest part (minimum chord) at the tip. Diffusion of sunlight, as discussed above, results in a limit to the maximum distance that a shadow can be perceived. This maximum distance will also be dependent on the thickness of the turbine blade, and the human threshold for perception of light intensity variation. As such, a shadow cast by the blade tip will be shorter than the shadow cast by the thickest part of the blade.

5. The analysis does not consider that when the sun is positioned directly behind the wind turbine hub, there is no variation in light intensity at the receiver location and therefore no shadow flicker.

6. The presence of vegetation or other physical barriers around a shadow receptor location may shield the view of the wind turbine, and therefore reduce the incidence of shadow flicker.

7. Periods where the wind turbine is not in operation due to low winds, high winds, or for operational and maintenance reasons will also reduce the annual shadow flicker duration.

4.1.4 Predicted actual duration

As discussed above in Section 4.1.3, there are a number of factors which may reduce the incidence of shadow flicker that are not taken into account in the calculation of the theoretical shadow flicker duration. An attempt has been made to quantify the likely reduction in shadow flicker duration due to cloud cover and, therefore, produce a prediction of the actual shadow flicker duration likely to be experienced at a dwelling.

Cloud cover is typically measured in 'oktas', effectively eighths of the sky covered with cloud. DNV has obtained data from the following Bureau of Meteorology (BoM) stations:

- Cape Leeuwin (9518), located approximately 22 km southwest of the centre of the Project site [10]
- Jarrahwood (9842), located approximately 58 km northeast of the centre of the Project site [11]
- Pemberton (9592), located approximately 74 km southwest of the centre of the Project site [12]
- Manjimup (9573), located approximately 78 km east of the centre of the Project site [13].

The number of oktas of cloud cover visible across the sky at these stations is recorded twice daily, at 9 am and 3 pm, and the observations are provided as monthly averages. After averaging the 9 am and 3 pm observations for the stations considered, the results indicate that the average monthly cloud cover in the region ranges between 50% and 71%, and the average annual cloud cover is approximately 63%. This implies that on an average day, 63% of the sky in the vicinity of the wind farm is covered with clouds. Although it is not possible to definitively calculate the effect of cloud cover on shadow flicker duration, a reduction in the shadow flicker duration proportional to the amount of cloud cover is considered to be a reasonable assumption.

Similarly, turbine orientation can have an impact on the shadow flicker duration. The shadow flicker duration is greatest when the turbine rotor plane is approximately perpendicular to a line joining the sun and an observer, and a minimum when the rotor plane is approximately parallel to a line joining the sun and an observer. A wind direction frequency distribution at the site was derived from publicly available wind direction data [14] [15] [16] and used to estimate the reduction in shadow flicker duration due to rotor orientation. The resulting wind rose is shown overlaid on the indicative shadow flicker map in Figure 4. The assessment of the likely reduction in shadow flicker duration due to variation in turbine orientation was conducted on an annual basis.

It should be noted that the method prescribed by the Draft National Guidelines for assessing actual shadow flicker duration recommends that only reductions due to cloud cover, and not turbine orientation, be included. However, DNV considers that the additional reduction due to turbine orientation is appropriate as the projected area of the turbine, and therefore the expected shadow flicker duration, is reduced when the turbine rotor is not perpendicular to the line joining the sun and dwelling. Due to limitations in the availability of suitable cloud cover data, the methodology used in this assessment also deviates somewhat from the method recommended by the Draft National Guidelines for assessing the reduction in shadow flicker due to cloud cover. However,

considering the available cloud cover data, the approach described above is deemed to provide a reasonable estimate of the likely impact of cloud cover on the shadow flicker duration.

While the calculation of the predicted actual shadow flicker duration considers the likely reductions due to cloud cover and rotor orientation, it does not take into account other potential reductions due to low wind speed (or turbine shutdown), vegetation, or other shielding effects around each dwelling.

4.2 Blade glint

Blade glint involves the regular reflection of sun off rotating turbine blades. Its occurrence depends on a combination of circumstances arising from the orientation of the nacelle, angle of the blade and the angle of the sun. The reflectiveness of the surface of the blades is also important. Blade glint is not generally a problem for modern wind turbines, provided the blades are coated with a non-reflective paint, and it is not considered further here.

5 ASSESSMENT RESULTS

5.1 Shadow flicker

5.1.1 Predicted shadow flicker durations

Shadow flicker predictions were generated at the provided dwelling locations, and the results are summarised in Table 4.

The results of the theoretical and predicted actual shadow flicker modelling are also shown in the form of shadow flicker maps in Figure 5 and Figure 6 respectively. The shadow flicker values presented in these maps represent the worst case between the results calculated at 2 m and 6 m above ground level for each modelled grid point.

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling 12) is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number “32”), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

Beyond the 10D distance limit, it is assumed that any shadow flicker experienced will be below a moderate level of intensity and unlikely to cause annoyance. However, as discussed in Section 4.1.2, it is recognised that different people have different levels of sensitivity to shadow flicker and may therefore be affected by low intensity shadow flicker assumed by this distance limit. To inform the potential for this outcome, although not part of the methodology outlined in the Draft National Guidelines, DNV has also calculated the theoretical shadow flicker impacts for the Project for an increased distance limit of 15D that is intended to include shadow flicker of low intensity. The results of this additional assessment are also included in the map presented in Figure 5. These results indicate that, in addition to the dwellings expected to be affected by shadow flicker above a moderate level of intensity, 12 dwellings may have the potential to be exposed to low intensity shadow flicker. These dwellings are noted in Table 2.

5.1.2 Mitigation options

If required, the effects of shadow flicker may be reduced through a number of mitigation measures. These include the removal or relocation of turbines, the use of turbines with a smaller rotor diameter, installation of screening structures or planting of trees to block shadows cast by the turbines, or the use of turbine control strategies to shut down turbines when shadow flicker is likely to occur.

5.2 Blade glint

As discussed in Section 4.2, blade glint is not expected to be an issue for the Project provided that a non-reflective paint is applied to the wind turbine blades.

6 CONCLUSIONS

A shadow flicker assessment was carried out for dwelling locations in the vicinity of the Project.

For the purpose of this assessment, DNV has considered a layout consisting of 20 turbines with a rotor diameter of 172 m and a hub height of 164 m. These dimensions represent the maximum turbine dimensions currently under consideration for the Project.

Based on this assessment, two dwellings are expected to experience shadow flicker above a moderate level of intensity within 50 m of the dwelling. For the purposes of this assessment, shadow flicker above a moderate level of intensity is assumed to occur up to a distance of 10 rotor diameters from the wind turbines. Both of these dwellings are not involved with the Project.

Of these dwellings, one of them (dwelling number "12") is predicted to experience theoretical shadow flicker above a moderate level of intensity for durations above the recommended limit of 30 hours per year within 50 m of the dwelling. When considering the likely reduction in this shadow flicker due to cloud cover and rotor orientation, the predicted actual shadow flicker durations within 50 m of this dwelling reduce below the recommended limit of 10 hours per year. For the other dwelling (number "32"), the durations of theoretical and actual shadow flicker above a moderate level of intensity are predicted to be below the recommended limits.

It is recommended that the Customer ensures the turbine blades are coated with a non-reflective paint to avoid the occurrence of blade glint from the wind farm.

7 REFERENCES

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Table 1 Proposed turbine layout for the Project [4] (continued)

Turbine ID	Easting[1] [m]	Northing[1] [m]	Base elevation [m]	Turbine ID	Easting[1] [m]	Northing[1] [m]	Base elevation [m]
T1	341140	6216362	35	T11	340893	6210691	24
T2	340789	6215512	32	T12	342468	6210422	32
T3	341919	6215415	37	T13	345296	6209961	27
T4	345089	6214694	35	T14	340963	6209853	22
T5	343989	6214377	36	T15	344918	6209443	28
T6	343100	6213973	35	T16	343579	6209172	31
T7	343658	6211892	35	T17	341749	6209112	19
T8	345139	6211672	32	T18	343609	6208448	30
T9	341439	6211432	28	T19	342822	6208140	28
T10	343229	6211314	34	T20	343193	6207619	28

[1] . Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.

Table 2 Locations of dwellings considered in this assessment [5]

Dwelling ID	Easting[1] [m]	Northing[1] [m]	Nearest turbine	
			Distance [m][2]	Turbine ID
1	339933	6218621	2560	T1
2	340681	6218532	2216	T1
3	340855	6218801	2454	T1
6	341069	6218432	2069	T1
7	*341528*	*6217917*	*1600*	*T1*
9	342689	6218169	2378	T1
11[3]	*343529*	*6214483*	*473*	*T5*
12	340601	6214584	949	T2
13	338389	6215122	2433	T2
14	*338449*	*6214374*	*2604*	*T2*
17	*340918*	*6213803*	*1715*	*T2*
18	*341404*	*6213392*	*1794*	*T6*
19	*338804*	*6211699*	*2319*	*T11*
20	340479	6207562	2006	T17
21	340818	6207345	2000	T17
22	341298	6207232	1775	T19
23	341567	6206855	1798	T19
24	341486	6206578	2000	T20
25[3]	*342442*	*6208726*	*698*	*T19*
26[3]	*344715*	*6209164*	*346*	*T15*
27[3]	*345037*	*6210146*	*318*	*T13*
28	347594	6209196	2421	T13
32	341223	6207695	1513	T13
33	341234	6207287	1804	T19
34	339819	6217839	1981	T1

1. Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.
2. The shadow flicker assessment has considered dwellings up to a maximum distance of 15D + 50 m from the Project wind turbines.
3. Involved dwelling where there is a commercial agreement such that the dwelling will not be used for residential or accomodation purposes.
4. Involved dwellings are indicated by *underlined italic text*.

Table 3 Shadow flicker model settings for theoretical shadow flicker calculation

Model setting	
Shadow distance limit (10D)	1720 m
Year of calculation	2037
Minimum elevation of the sun	3°
Time step	1 min (5 min for map)
Rotor modelled as	Sphere (disc for turbine orientation reduction calculation)
Sun modelled as	Disc

Offset between rotor and tower	None
Receptor height (single storey)	2 m
Receptor height (double storey)	6 m
Locations used for determining maximum shadow flicker within 50 m of each dwelling	8 points evenly spaced (every 45°) on 25 m and 50 m radius circles centred on the provided dwelling location

Table 4 Theoretical and predicted actual annual shadow flicker duration

Dwelling ID	Easting[1] [m]	Northing[1] [m]	Landowner status	Contributing turbines[2]	Theoretical annual				Predicted actual annual[3]			
					At dwelling [hr/yr]		Max within 50 m [hr/yr]		At dwelling [hr/yr]		Max within 50 m [hr/yr]	
					2 m	6 m	2 m	6 m	2 m	6 m	2 m	6 m
12	340601	6214584	Non-involved	T3 T6	**33.0**	**32.6**	**35.1**	**34.4**	5.9	5.8	6.1	6.0
13[4]	338389	6215122	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14[4]	338449	6214374	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17[4]	340918	6213803	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18[4]	341404	6213392	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19[4]	338804	6211699	Involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20[4]	340479	6207562	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21[4]	340818	6207345	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22[4]	341567	6206855	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23[4]	341486	6206578	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24[4]	338804	6211699	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30[4]	347593	6209195	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	341223	6207695	Non-involved	T18 T19 T20	12.1	12.0	12.8	12.8	2.5	2.4	2.6	2.6
33[4]	341234	6207287	Non-involved	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recommended duration limits (hr/yr)					**30**	**30**	**30**	**30**	**10**	**10**	**10**	**10**

1. Coordinate system: MGA zone 50, GDA94 datum. Coordinates were provided by the Customer in a different coordinate system and/or datum and have been converted using mapping software, which may result in small discrepancies depending on the software and transformation approach used.
2. Contributing turbines shown are for the theoretical shadow flicker calculated at 2 m above ground level.
3. Considering likely reductions in shadow flicker duration due to cloud cover and turbine orientation.
4. Dwelling is not predicted to experience any shadow flicker above a moderate level of intensity, but may experience low intensity shadow flicker.

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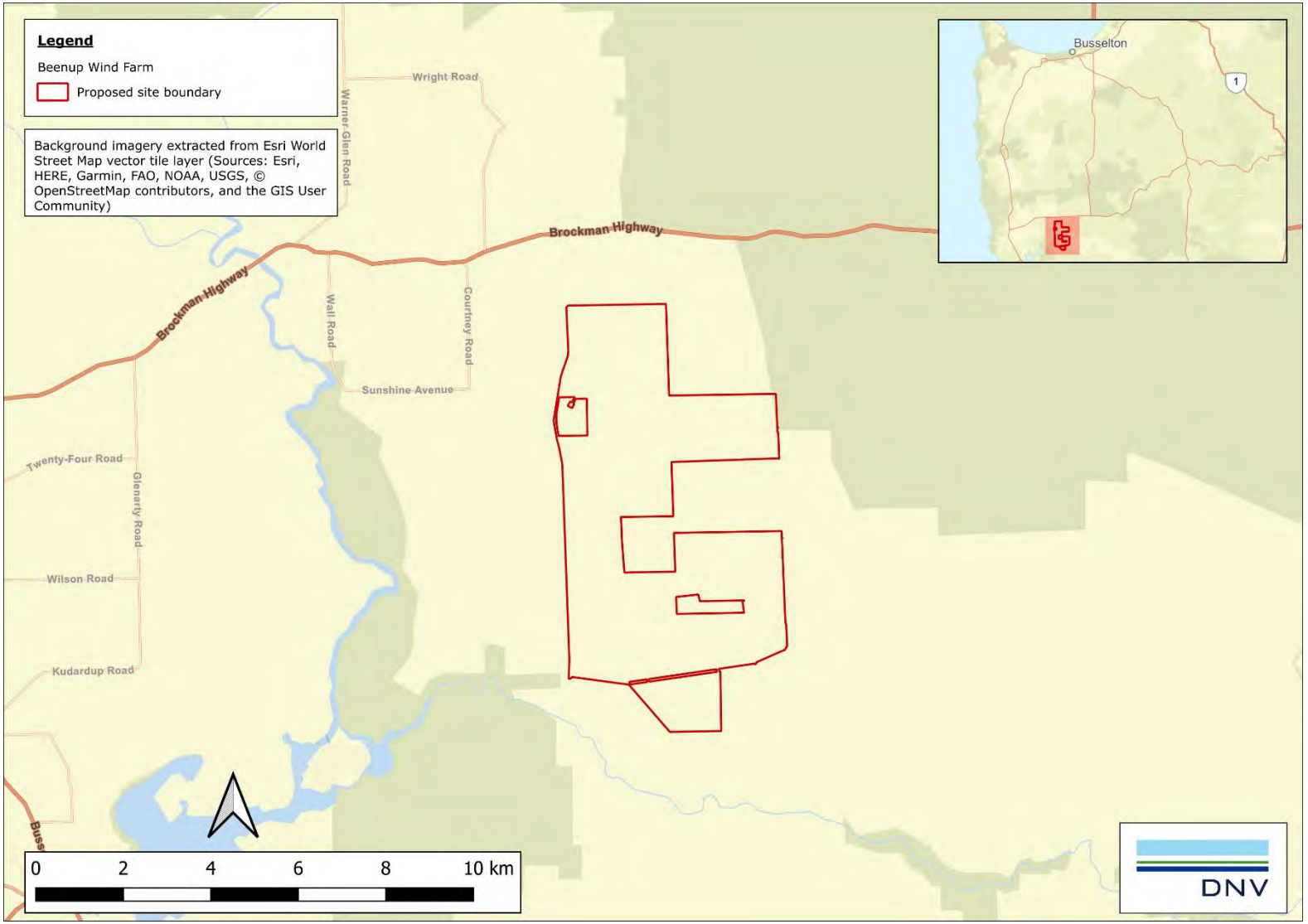
Legend
Beenup Wind Farm
Proposed site boundary
Background imagery extracted from Esri World Street Map vector tile layer (Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community)
Busselton
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Warner Glen Road
Brockman Highway
Brockman Highway
Wall Road
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Twenty-Four Road
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Wilson Road
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Figure 2 Location of the Project

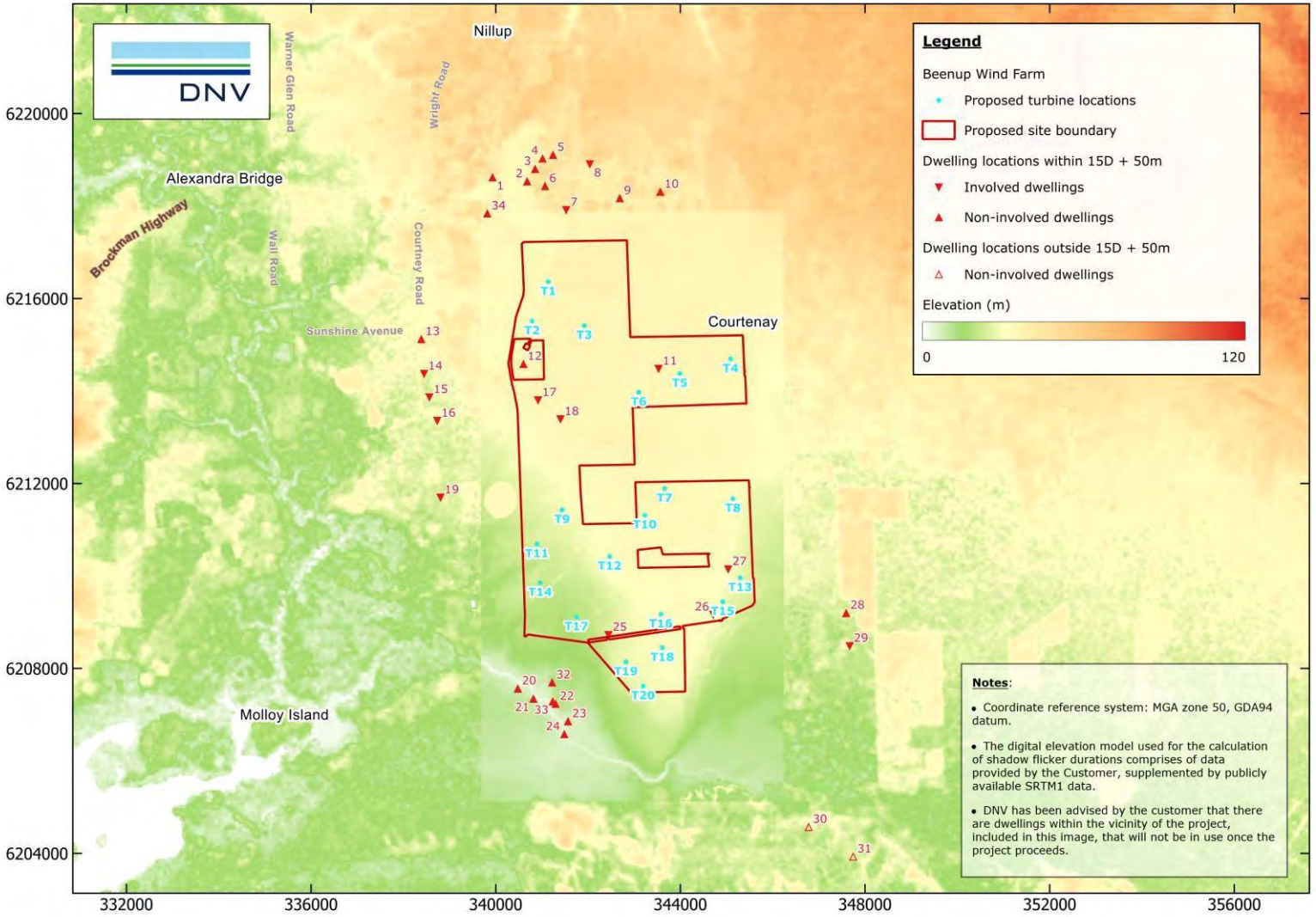
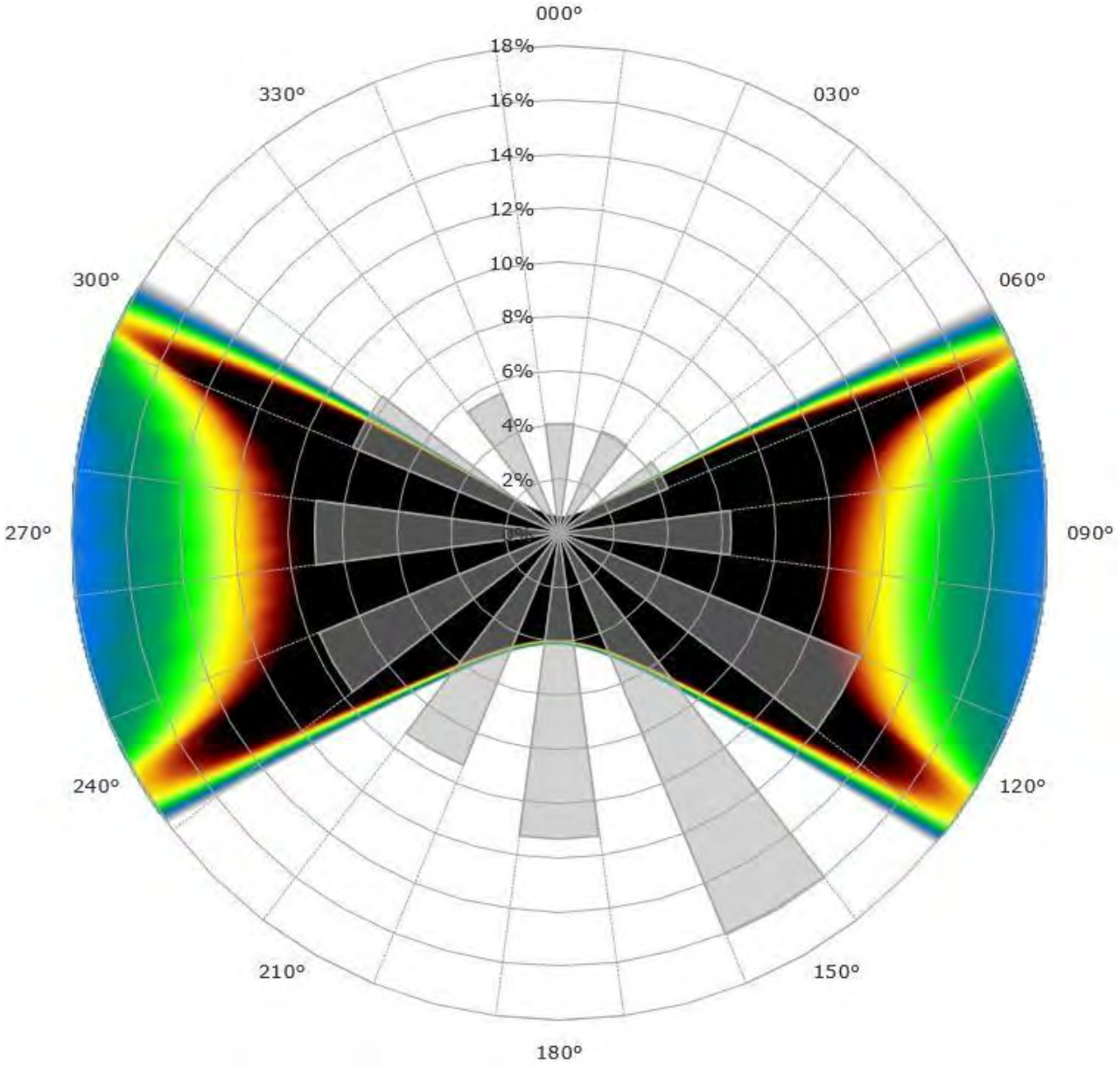


Figure 3 Map of the proposed Project, showing proposed turbine locations, nearby dwellings, and terrain elevation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180°
210°
240°
270°
300°
330°
18%
16%
14%
12%
10%
8%
6%
4%
2%

Figure 4 Indicative shadow flicker map and wind direction frequency distribution

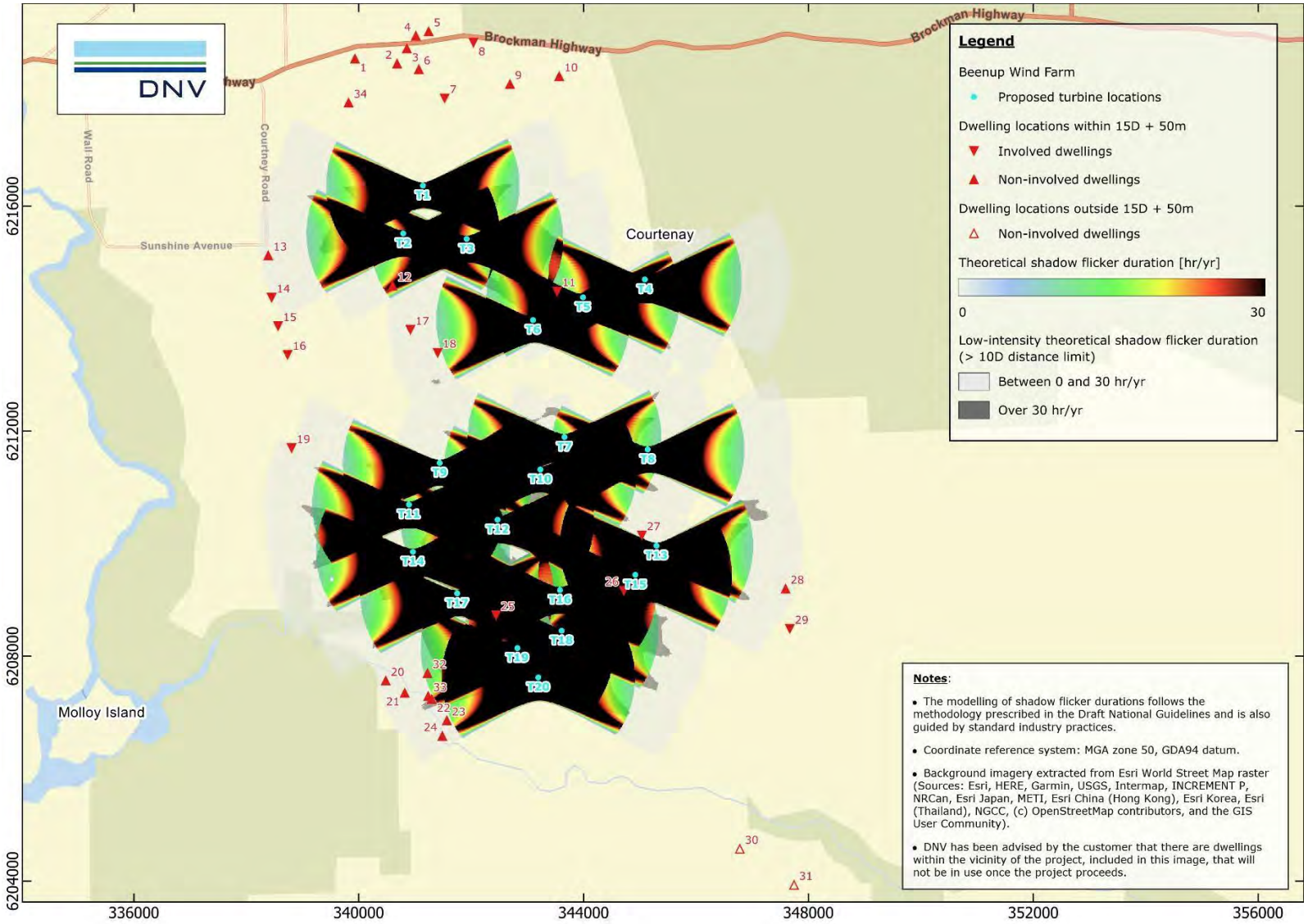

Figure 5 Theoretical annual shadow flicker duration map for the Project

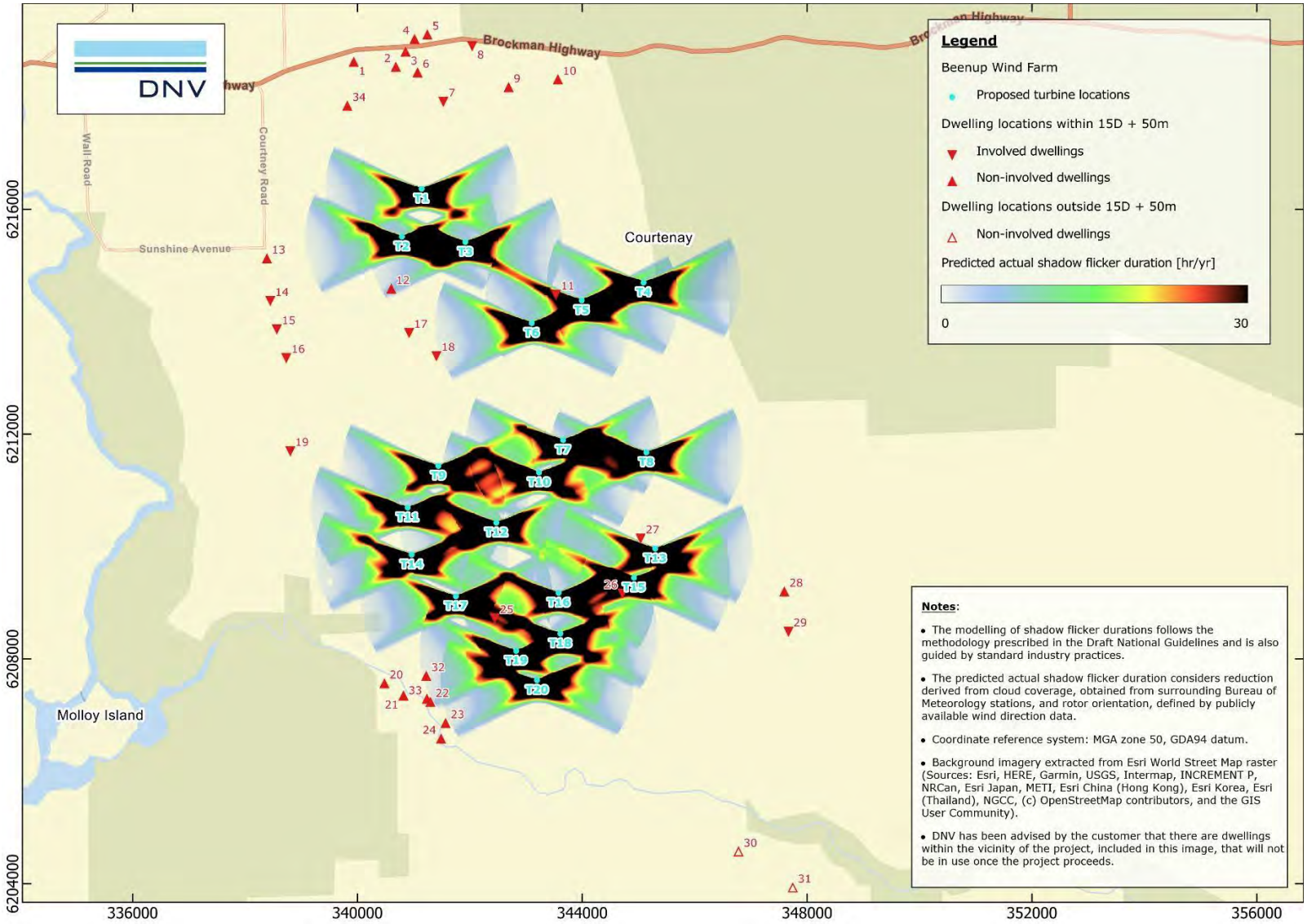

Figure 6 Predicted actual annual shadow flicker duration map for the Project



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Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.

Attachment 4 (RSD) - Appendix Q

Aviation Impact Assessment

AVIATION PROJECTS

April 2025

AVIATION IMPACT ASSESSMENT

BEENUP WIND FARM

Prepared for SynergyRED

AVIATION PROJECTS

DOCUMENT CONTROL

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ACRONYMS

AAAA	Aerial Application Association of Australia
AC	Advisory Circular
AFAC	Australasian Fire and Emergency Services Council
AGL	above ground level
AHD	Australian Height Datum
AIA	aviation impact assessment
AIP	Aeronautical Information Package
AIS	aviation impact statement
ALA	aircraft landing area
ALARP	as low as reasonably practicable
AMSL	above mean sea level
ARP	Aerodrome Reference Point
AS	Australian Standards
AsA	Airservices Australia
ATSB	Australian Transport Safety Bureau
BoM	Bureau of Meteorology
CAAP	Civil Aviation Advisory Publications
CAO	Civil Aviation Orders
CAR	Civil Aviation Regulation (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation (1998)
CFIT	controlled flight into terrain
CNS	communications, navigation and surveillance
CTAF	common traffic advisory frequency
DAH	Designated Airspace Handbook
EIS	environmental impact statement
ERC-H	en-route chart high
ERC-L	en-route chart low
ERSA	En Route Supplement Australia
GA	general aviation

ICAO	International Civil Aviation Organization
IFR	instrument flight rules
IMC	instrument meteorological conditions
LGA	local government area
LSALT	lowest safe altitude
MOC	minimum obstacle clearance
MOS	Manual of Standards
MSA	minimum sector altitude
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
NDB	non-directional (radio) beacon
OLS	obstacle limitation surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operations
PSR	primary surveillance radar
RAAF	Royal Australian Air Force
RFDS	Royal Flying Doctor Service
RPT	regular public transport
RSR	route surveillance radar
SSR	secondary surveillance radar
VFR	visual flight rules
VFRG	visual flight rules guide
VMC	visual meteorological conditions
WMTs	wind monitoring towers
WTGs	wind turbine generators

UNITS OF MEASUREMENT

ft	feet	(1 ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

DEFINITIONS

Definitions of key aviation terms are included in **Annexure 2**

NOTES

Nil

EXECUTIVE SUMMARY

Introduction

SynergyRED is preparing a proposal for the development of the proposed Beenup Wind Farm project, which is located in the Shire of Augusta Margaret River Local Government Area (LGA).

The current proposed layout includes 20 wind turbines.

SynergyRED has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) to support the proposed application and formally consult with aviation agencies.

The Project requires an aviation impact assessment to be undertaken in accordance with the:

- Civil Aviation Safety Regulations 1998
- National Airspace Safeguarding Framework Guideline D: *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012*
- Western Australia Government, Department of Planning, Lands and Heritage, *Position Statement: Renewable energy facilities, March 2020*
- Specific requirements as advised by Airservices Australia

This AIA assesses the potential aviation impacts, provides aviation safety advice in respect of relevant requirements of air safety regulations and procedures and informs and documents consultation with relevant aviation agencies.

This AIA report includes an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine the need for obstacle lighting.

Project description

Beenup Wind Farm includes the following:

- Up to 20 wind turbine generators (WTGs) with a maximum tip height of 250 m AGL
- The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

Conclusions

Based on a comprehensive analysis and assessment detailed in this report, the following conclusions were made:

Planning considerations

1. The Project, as proposed, satisfies the planning provisions of Shire of Augusta Margaret River's Planning Scheme 2024, *Shire of Augusta-Margaret River's* Local Planning Strategy, City of Busselton's Local Planning Strategy 2014 and will not create incompatible intrusions or compromise the safety of existing airports and associated navigation and communication facilities

Certified airports

2. The project site is located within 30 nm (55.56 km) of one certified airport – Busselton Airport (YBLN)
    a. The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients

i. 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm

ii. GNSS Arrival Sector A approach surfaces.

- The initial approach minimum altitude needs to be increased to 2000 ft.
- The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.

Obstacle Limitation Surfaces

3. The Project is located outside the horizontal extent of obstacle limitation surfaces (OLS) of Busselton Airport (YBLN).

Uncertified Aerodromes

4. There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome

- Unknown Aerodrome 1

i. The proposed wind farm would be considered potentially hazardous obstacles

ii. When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial in understanding the potential extent of these impacts.

- Boley Aerodrome

- The proposed wind farm would be considered potentially hazardous obstacles
- When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

Air Routes and Lowest Safe Altitude (LSALT)

5. The WTGs will not impact the Grid LSALT and any Air Route LSALT

Airspace

6. The project area is located within Class G airspace and outside all controlled airspace, Prohibited, Restricted and Danger areas.

Aviation Facilities

7. The WTGs will not penetrate any protection areas associated with aviation facilities.

ATC Surveillance Radar

8. The project site is located outside the area of interest to assess the potential impact of the development on surveillance radar. The Project will not impact the Perth Preliminary Surveillance Radar (PSR)/ Secondary Surveillance Radar (SSR) and Kalamunda Air Route Surveillance Radar (RSR).

Aviation Impact Statement (AIS)

9. Based on the proposed WTG layout and maximum blade tip height of 250 m AGL, the blade tip elevation of the highest wind turbine will not exceed 290 m (951.4 ft AMSL).

    a. There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)

        i. The WTGs will not impact on the OLS of YBLN

        ii. The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients

            - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
            - GNSS Arrival Sector A approach surfaces.
                - The initial approach minimum altitude needs to be increased to 2000 ft.
                - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.

    b. There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome

        i. Unknown Aerodrome 1

            - The proposed wind farm would be considered potentially hazardous obstacles
            - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts

        ii. Boley Aerodrome

            - The proposed wind farm would be considered potentially hazardous obstacles
            - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

    c. The WTGs will not impact the Grid LSALT and any air route LSALT

    d. The project area is located within Class G airspace and outside all controlled airspace, Prohibited, Restricted and Danger areas.

    e. The WTGs will not impact the aviation facilities of nearby certified airports.

    f. The WTGs will not impact the closest radar installations.

    g. The WTGs must be reported to CASA, and construction details must be provided to Airservices.

    h. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

Obstacle lighting risk assessment

10. Aviation Projects has undertaken a safety risk assessment of the Project and concludes that the proposed WTGs would not require obstacle lighting to maintain an acceptable level of safety to aircraft.
11. Over the 12-year period between 2010-2022, no aircraft collided with a WTG or a WMT in Australia.
12. There is no regulatory requirement to mark or light power poles or overhead transmission lines.

Consultation

Refer to **Section 5** for detailed responses from relevant aviation stakeholders once received.

The consultation process will commence after approval of the Final Draft AIA and authorisation to proceed from the client. It will continue throughout the review of the Development Application.

The risk assessment will be updated, and this report will be finalised based on the feedback received during the consultation process. Feedback will be documented in this report.

Summary of key recommendations

Recommended actions resulting from the conduct of this assessment are provided below:

Notification and reporting

1. Details of WTGs exceeding 100 m AGL must be reported to CASA *as soon as practicable after forming the intention to construct or erect the proposed object or structure,* in accordance with CASR Part 139.165(1)(2).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
3. Any obstacles above 100 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details:
    a. The planned operational timeframe and maximum height of the crane; and
    b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow.
4. Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs and overhead transmission lines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.
6. The closest WTG is approximately 1.2 km from the boundary of Scott National Park. Regarding the buffer area of the boundary, liaison with the Western Australia Department of Biodiversity, Conservation and Attractions—Parks and Wildlife Service will be required.

Marking of WTGs

7. The rotor blades, nacelle, and supporting mast of the WTGs should be painted white, as is typical of most WTGs operational in Australia. No additional marking measures are required for WTGs.

Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. Lighting the WTGs is not a formal requirement.

Micrositing

9. Providing the micrositing is within 100 m of the WTGs, it will not likely result in a change in the maximum overall blade tip height of the Project. No further assessment is likely to be required from micrositing and the conclusions of this AIA would remain the same.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:
    a. Liaison with the relevant fire and land management agencies is ongoing and effective
    b. Access is available to the wind farm site by emergency services for on-ground firefighting operations.

Triggers for review

11. Triggers for review of this risk assessment are provided for consideration:
    a. Prior to construction to ensure the regulatory framework has not changed
    b. Following any significant changes to the context in which the assessment was prepared
    c. Following any near miss, incident or accident associated with operations considered in this risk assessment.

1. INTRODUCTION

1.1. Situation

SynergyRED is preparing a proposal for the development of the proposed Beenup Wind Farm project, which is located in the Shire of Augusta Margaret River Local Government Area (LGA).

The current proposed layout includes 20 wind turbines.

SynergyRED has engaged Aviation Projects to prepare an Aviation Impact Assessment (AIA) to support the proposed application and formally consult with aviation agencies.

1.2. Purpose and Scope

The purpose and scope of the work are to prepare an AIA for consideration by Airservices Australia, CASA, and the Department of Defence and support the development application.

The AIA specifically responds to the following key legislation, approvals, and guidance material:

- Civil Aviation Safety Regulations 1998
- National Airspace Safeguarding Framework Guideline D: *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers effective July 2012*
- Western Australia Government, Department of Planning, Lands and Heritage, *Position Statement: Renewable energy facilities, March 2020*
- Specific requirements as advised by Airservices Australia

1.3. Methodology

Aviation Projects conducted the task in accordance with the following methodology:

- Confirm the scope and deliverables
- Review client material
- Conduct a site visit to properly investigate aviation safety aspects of the proposed project site
- Review relevant regulatory requirements and information sources
- Identify and assess any likely impacts to:
    - Certified aerodromes within 30 nm (55.5 km) of the project
    - Uncertified aerodromes within 5 nm (9.3 km) of the project
    - Military aerodromes and associated Special Use Airspace (SUA)
    - Other SUA in the vicinity of the project.
- Prepare a draft aviation impact assessment and supporting technical data that provides evidence and analysis for the planning application to demonstrate that appropriate risk mitigation strategies have been identified. The draft aviation impact assessment report will include an Aviation Impact Statement (AIS) and a qualitative risk assessment to determine need for obstacle lighting and of applicable aspects for client review and acceptance before submission to external aviation regulators

- Identify risk mitigation strategies that provide an acceptable alternative to night lighting. The risk assessment will be completed following the guidelines in *ISO 31000:2018 Risk Management – Guidelines*
- Consult with aviation regulators, consisting of Airservices Australia (and other Part 173 procedure designers if applicable), and the Department of Defence
- Consult with relevant Council (s), and aerodrome operators of the nearby aerodrome/s to seek endorsement of the proposal to change instrument procedures (if applicable)
- Consult/engage with stakeholders (including RFDS) to negotiate acceptable outcomes (if required)
- Finalise the aviation impact assessment report when responses are received from stakeholders for client review and acceptance.

1.4. Aviation Impact Statement (AIS)

The AIS included in this report (see Section 6) includes the following specific requirements as advised by Airservices Australia:

Aerodromes:

- Specify all certified aerodromes that are located within 30 nm (55.6 km) of the project site
- Nominate all instrument approach and landing procedures at these aerodromes
- Review the potential effect of project operations on the operational airspace of the aerodrome(s).

Air Routes:

- Nominate air routes published in ERC-L & ERC-H which are located near/over the project site and review potential impacts of project operations on aircraft using those air routes.

Airspace:

- Nominate the airspace classification – A, C, D, E, G etc where the project site is located.

Navigation/Radar:

- Nominate aviation navigation systems in proximity to the project site.

1.5. Material reviewed

The material provided by the Proponent for the preparation of this assessment includes:

- 00039_BNWFCadastral.pdf
- 00040_BNWFProposedRoad.pdf
- 00041_BNWF.pdf
- 00043_BNWF.pdf
- Beenup - 29.06.2024 - DA development layout 20 WTG with Roads.kmz
- Ground elevation and coordinates in email (received on 30 July 2024 from Wilson Mandisodza)

2. BACKGROUND

2.1. Site Overview

The project site boundary is approximately 13.5 km northeast of Augusta, within the Shire of Augusta Margaret River Local Government Area (LGA).

An overview of the site relative to Augusta is provided in Figure 1 (source: SynergyRED, Google Earth).

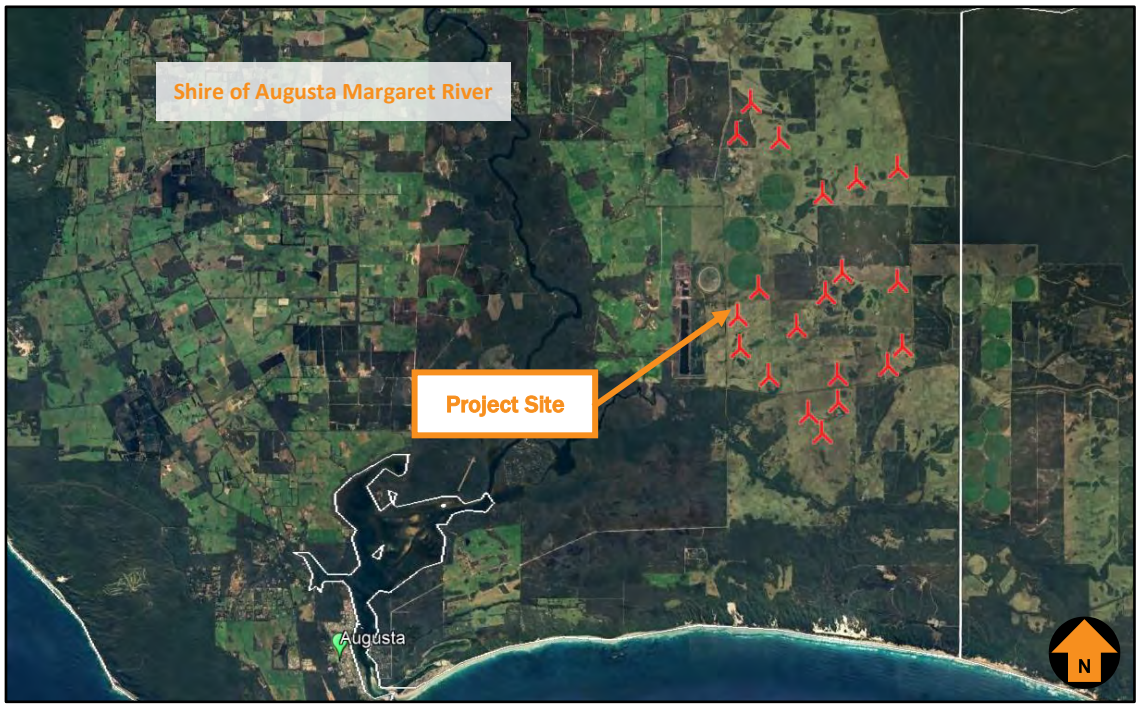


Figure 1 Project site overview

2.2. Project Description

The Project involves constructing, operating, maintaining and decommissioning the Beenup Wind Farm, including a final layout of up to 20 wind turbine generators (WTGs).

The WTGs will have a rotor diameter of approximately 180 m, with a maximum tip height of 250 m AGL.

The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

3. EXTERNAL CONTEXT

3.1. National Airports Safeguarding Framework

The National Airports Safeguarding Advisory Group (NASAG) was established by Commonwealth Department of Infrastructure and Transport to develop a national land use planning framework called the National Airports Safeguarding Framework (NASF). The purpose of the NASF is to enhance the current and future safety, viability, and growth of aviation operations at Australian airports through:

- The implementation of best practice in relation to land use assessment and decision making in the vicinity of airports
- Assurance of community safety and amenity near airports
- Better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions
- The provision of greater certainty and clarity for developers and landowners
- Improvements to regulatory certainty and efficiency
- The publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

NASF Guideline D: *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers*, provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and WMTs.

The methodology for preparing the risk assessment is contained in the NASF Guideline D.

The risk assessment will have regard to all potential aviation activities within the vicinity of the project site including recreation, commercial, civil (including for agricultural purposes) and military operations.

NASF Guideline D strongly encourages consultation with aviation stakeholders in the early stages of wind farm development planning, including with aerodrome owners and operators, regional aircraft operators and CASA and Airservices.

3.2. Western Australia Government, Department of Planning, Lands and Heritage

The Western Australian Planning Commission administers responsibility for approving renewable energy facilities through local councils. The Department of Planning, Lands and Heritage has published *Position Statement: Renewable energy facilities* (March 2020) on behalf the Western Australia Planning Commission. These guidelines provide advice to inform planning decisions about a wind energy facility proposal.

The intent of this position statement is to:

- Outline the Western Australian Planning Commission (WAPC) requirements to support the consistent consideration and provision of renewable energy facilities within Western Australia
- Identify assessment measures to facilitate appropriate development of renewable energy facilities.

The position statement applies to the preparation and assessment of planning instruments including regional and local planning schemes and strategies.

The position statement supersedes Planning Bulletin 67 Guidelines for Wind Farm Development (2004).

Section 5.3.1 *Community Consultation* and Section 5.3.5 *Public and Aviation safety* are relevant to this assessment and are extracted below:

> ***Section 5.3.1 Community Consultation***
>
> *Early consultation with the community and stakeholders by the proponents is encouraged to ensure that the proposal is compatible with existing land uses on and near the site. The local government should be consulted with respect to the community consultation program. Relevant stakeholders may include:*
>
> - *Air Services Australia*
> - *Australian Wind Alliance*
> - *Civil Aviation Safety Authority*
>
> ***5.3.5 Public and aviation safety***
>
> *Proponents of wind turbine proposals should refer to the National Airports Safeguarding Framework (NASF) Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installation (Wind Farms) / Wind Monitoring Towers to determine any potential aviation safety risks and possible mitigation measures.*
>
> *Any potential aviation safety risks identified require consultation with Civil Aviation Safety Authority (CASA), Air Services Australia and/or the Commonwealth Department of Defence.*

The position paper defines Renewable energy facility as premises used to generate energy from a renewable energy source and includes any building or other structure used in, or relating to, the generation of energy by a renewable resource. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on selling to the grid is secondary.

An aviation impact assessment would include consultation with relevant aviation stakeholders and address aviation-related matters included in the Position Statement

3.3. Shire of Augusta-Margaret River Planning Scheme

The Project will be subject to Shire of Augusta-Margaret River's planning scheme, amended May 2024. Section 1.5 of the scheme provides the purpose of the scheme, including to:

a) Set out the local government's planning aims and intentions for the Scheme area;

b) Set aside land for public purposes;

c) Zone land within the Scheme area for the purposes defined in the Scheme;

d) *Control and guide land use and development;*

e) *Set out procedures for the assessment and determination of planning applications;*

f) *Make provisions for the administration and enforcement of the Scheme; and*

g) *Address other matters set out in the Schedule 7 to the Planning and Development Act 2005;*

3.4. Shire of Augusta-Margaret River Planning Strategy

The Shire of Augusta-Margaret River's Local Planning Strategy was endorsed by the Western Australia Planning Commission *on* 18 January 2022. The strategy *sets a vision for the size, look and feel of the Shire's neighbourhoods, towns and natural areas over a 10 to15-year period*.

The Local Planning Strategy identifies the Busselton Margaret Rive Airport (Busselton Airport), located in the City of Busselton LGA, referencing the 2018 major works that were undertaken on the airport to facilitate tourism and economic growth by accommodating larger passenger aircraft types.

Public and private landing strips are also referenced in the planning strategy:

> *Two dedicated public landing strips are located at Margaret River and Augusta (see Figure 5), providing opportunities for limited recreational and commercial air transport, together with facilities for the Royal Flying Doctor Service. A number of private landing strips are also located within the Shire, which have limited impacts owing to the low level of airport operations in the Shire.*

There is no specific aerodrome safeguarding policy or framework established in the planning strategy. This assessment considers that the Project is not affected by the Shire of Augusta-Margaret River Planning Strategy in relation to aviation impacts. Based on the proposed WTG layout (where there is no WTG located within 30 nm of the NDB or ARP of Busselton Airport), there is no impact to Busselton airport caused by the Project.

3.5. City of Busselton

The City of Busselton's Local Planning Strategy was endorsed by the Western Australia Planning Commission on 15 October 2014.

> *5.8 AIRPORT PROTECTION AREA (Amendment No. 46 - GG. 30 July 2021)*
>
> *5.8.1 Development within the Airport Protection Area requires the prior development approval of the local government.*
>
> *5.8.2 The Airport Protection area generally contains all lands likely to be within the predicted 55dB(A)Ldn noise contour for the Busselton Regional Airport.*
>
> *5.8.3 The local government will not grant development approval for uses in the Airport Protection area that involve residential use, schools, hospitals, overnight tourist accommodation or other habitable buildings unless those uses are ancillary to the operations of the Busselton Regional Airport and/or where the proponent for the use can demonstrate that the design of buildings is such that noise not louder than 55dB(A)Ldn will be experienced by residents or occupants of those buildings.*
>
> *5.8.4 Notwithstanding any other provisions of this Scheme, the local government shall not grant development approval for any development unless it is satisfied that such development will not constitute an obstruction, hazard or potential hazard to aircraft flying in the vicinity and may consult with and consider the advice of the Civil Aviation Safety Authority in making such determination.*

3.6. Aircraft operations at non-controlled aerodromes

There are several uncontrolled aerodromes in the vicinity of the project area. Advisory Circulars (ACs) provide advice and guidance from CASA to illustrate a means, but not necessarily the only means, of complying with the regulations, or to explain certain regulatory requirements. Advisory Circular (AC) 91-10 v1.1 *Operations in the vicinity of non-controlled aerodromes* provides guidance for pilots flying at or in the vicinity of non-controlled aerodromes, with respect to CASR 91.

3.7. Civil Aviation Safety Authority (CASA)

CASA provides the following guidance to inform pilots of their obligations at non-certified aerodromes.

3.7.1. Advisory Circular (AC) 91-02 V1.2, Guidelines for aeroplanes with MTOW not exceeding 5700 kg – suitable places to take off and land, dated November 2022

This Advisory Circular (AC) provides guidance for pilots of:

- Aeroplanes with maximum take-off weight (MTOW) not exceeding 5700 kg that are operated under Part 91 of CASR, including experimental aircraft, and
- Light sport aircraft (LSA) under Part 103 of CASR.

Purpose

This AC provides guidance to assist aeroplane pilots when determining the suitability of a place to safely take off and land. It provides an overview of pilot responsibilities, discusses the relevant circumstances recommended to be considered and includes general information and advice to enhance the safety of taking off and landing at any place.

2 Introduction

2.2 Use of Aerodromes

2.2.1 Regulation 91.410 authorises a place for use as an aerodrome if: (i) it is suitable for the landing and taking-off of aircraft; and (ii) an aircraft can land at or take off from the place safely, having regard to all the circumstances of the proposed landing or take-off (including the prevailing weather conditions).

4.2.4 The examples below are two of many possible considerations:

- the obstacles surrounding the aerodrome have been accurately described and are still current (e.g. have the trees on final grown taller since last reported), and

– the information provided enables the pilot to judge whether or not a landing approach can be made from both runway directions.

3.7.2. AC 91-10 v1.1, Operations in the vicinity of non-controlled aerodromes, dated November 2021

This AC provides guidance on procedures that, when followed, will improve situational awareness and safety for all pilots when flying at, or in the vicinity of, non-controlled aerodromes.

7.2 Traffic circuit direction

7.2.1 The standard aerodrome traffic circuit facilitates the orderly flow. Unless an alternative requirement for an aerodrome is stated in the ERSA or NOTAMs, all turns must be made to the left (regulation 91.385).

7.2.2 When arriving at an aerodrome to land, the pilot will normally join the circuit on upwind, crosswind (midfield), or at or before mid-downwind. Landings and take-offs should be made on the active runway or the runway most closely aligned into wind.

7.4.2 During initial climb-out, the turn onto crosswind should be appropriate to the performance of the aircraft but, in any case, not less than 500 ft above terrain so as to be at circuit height when turning downwind (regulation 91.390). Pilots may vary the size of the circuit depending on:

– the performance of the aircraft

– *AFM/Pilot's Operating Handbook requirements*

– *company standard operating procedures*

– *other safety reasons.*

7.7 Final approach

7.7.1 The turn onto final approach should be:

– *completed by a distance and height that is common to all operations at the aerodrome*

– *commensurate with the speed flown in the circuit for all aircraft of the same type.*

Illustrations of the standard aerodrome traffic circuit procedures provided in AC 91-10 v1.1. are shown in Figure 3 and Figure 2.

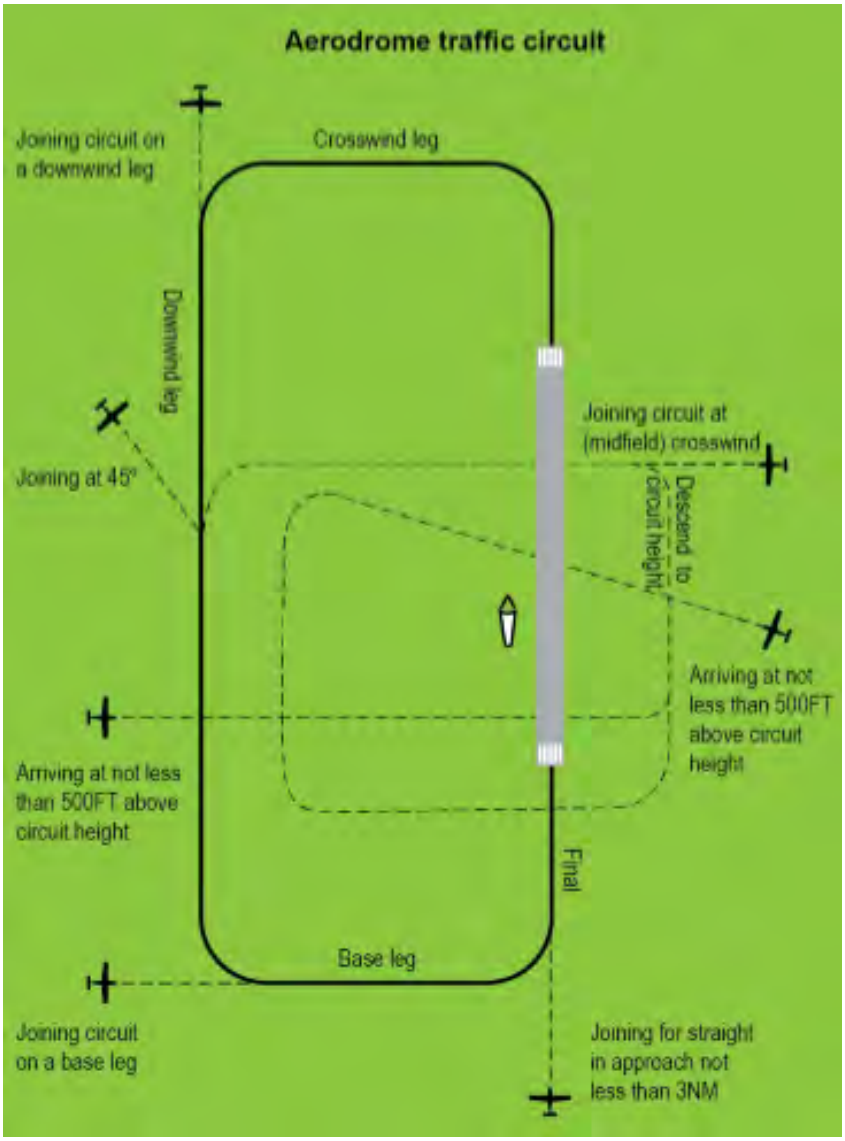


Figure 2 Aerodrome standard traffic circuit, showing arrival and joining procedures.

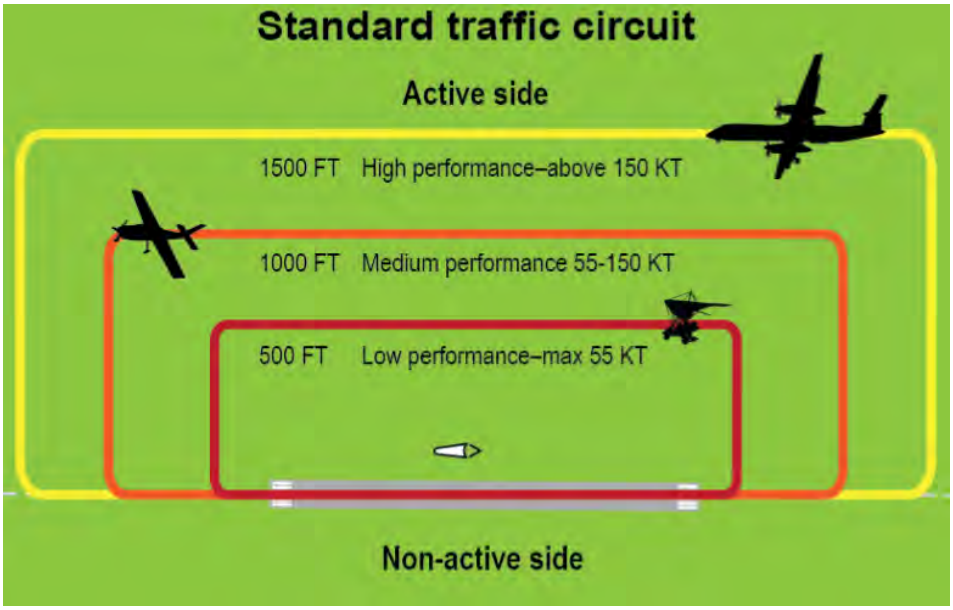


Figure 3 Lateral and vertical separation in the standard aerodrome traffic circuit

AC 91-10 v1.1. paragraph 7.10 refers to a distance that is "normally" well outside the circuit area and where no traffic conflict exists, which is at least 3 nm. The paragraph is copied below:

> *7.10 Departing the circuit area*
>
> *7.10.1 Aircraft should depart the aerodrome circuit area by extending one of the standard circuit legs or climbing to depart overhead. However, the aircraft should not execute a turn to fly against the circuit direction unless the aircraft is well outside the circuit area and no traffic conflict exists. This will normally be at least 3 NM from the departure end of the runway but may be less for aircraft with high climb performance. In all cases, the distance should be based on the pilot's awareness of traffic and the ability of the aircraft to climb above and clear of the circuit area.*

3.8. Rules of flight

3.8.1. Flight under Day Visual Flight Rules (Day VFR)

According to Australia's Aeronautical Information Package (AIP) the meteorological conditions required for visual flight in the applicable (class G) airspace at or below 3,000 ft AMSL or 1,000 ft AGL (whichever is the higher) are: 5,000 m visibility, clear of clouds and in sight of ground or water.

CASR 91.267 (Minimum height rules—other areas) prescribes the minimum height for flight. Generally speaking, and unless otherwise approved, aircraft are restricted to a minimum height of 500 ft AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas, and 1000 ft AGL over built up areas (within a horizontal radius of 600 m of the point on the ground or water immediately below the aeroplane).

These height restrictions do not apply if through stress of weather or any other unavoidable cause it is essential that a lower flying height be maintained.

Flight below these height restrictions is also permitted in certain other circumstances.

3.8.2. Flight under Night Visual Flight Rules (Night VFR)

With respect to flight under the VFR at night CASR 91.277 requires that the pilot in command of an aircraft flying VFR at night must not fly below the appropriate lowest safe altitude (unless during take-off and landing operations, within 3 nm of an aerodrome).

3.8.3. Flight under Instrument Flight Rules (Day or Night) (IFR)

According to CASR 91, flight under the instrument flight rules (IFR) requires an aircraft to be operated at a height clear of obstacles that is calculated according to an approved method.

Obstacle lights on structures not within the vicinity of an aerodrome are effectively redundant to an aircraft being operated under the IFR.

3.9. Aircraft operator characteristics

Flying training may be conducted under either the instrument flying rules (IFR) or visual flying rules (VFR). Other general aviation operations under either IFR or VFR are also likely to be conducted at various aerodromes in the area.

Flight under day VFR is conducted above 500 ft above the highest point of the terrain within a 300 m radius unless the operation is approved to operate below 500 ft above the highest point of the terrain.

It is expected that the proposed WTGs will be sufficiently visually conspicuous to pilots conducting VFR operations within the vicinity of the project area to enable appropriate obstacle avoidance manoeuvring.

IFR and Night VFR (which are required to conform to IFR applicable altitude requirements) aircraft operations are addressed in Section 6.

3.10. Passenger transport operations

Scheduled and non-scheduled passenger transport operations are generally operated under the IFR.

3.11. Private operations

Private operations are generally conducted under day or night VFR, with some IFR. Flight under day VFR is conducted above 500 ft AGL in areas outside city and township built-up areas.

3.12. Military operations

There may be some high-speed low-level military jet aircraft and helicopter operations conducted in the area. Military operations are conducted under separate but compatible regulations and standards, including obstacle separation requirements.

Refer to Section 5 for a detailed response from the Department of Defence.

3.13. Aerial application operations

Aerial application operations including such activities as fertiliser, pest and crop spraying are generally conducted under day VFR below 500 ft AGL: usually between 6.5 ft and 100 ft AGL.

The low flight operations conducted by NSW National Parks and Wildlife Service (NPWS) in Goodiman State Conservation Area are often concentrated along the boundaries of the park.

Due to the nature of the operations conducted, aerial agriculture pilots are subject to rigorous training and assessment requirements to obtain and maintain their licence to operate under these conditions.

The Aerial Application Association of Australia (AAAA) has a formal risk management program (which is recommended for use by its members) to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

The impact of the proposed WTGs on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the site was assessed.

3.13.1. Aerial Agricultural Association of Australia (AAAA)

In previous consultation with the AAAA, Aviation Projects has been directed to the AAAA Windfarm Policy (dated March 2011), now superseded by the AAAA Tall Structures Policy dated March 2024, which states in part:

> *The development of tall structures in agricultural and bush fire prone areas can pose a direct threat to aviation safety, particularly where fixed and rotary aircraft may be requested to operate for agricultural or bush/grass fire control.*
> *The absence of historical aircraft use in an area is considered an insufficient reason to discount the threat to Aviation Operations.*
>
> *The AAAA will oppose any development application or similar process unless the proponent has:*
> - *Identified the structure as posing a low-level flying risk that needs to be managed on an ongoing basis*
> - *Consulted honestly and in detail with local aerial application operators or the AAAA where a local operator cannot be identified*
> - *Consulted with adjoining landowners regarding the impact on adjacent properties*
> - *Included appropriate lighting and marking in the development proposal, consistent with providing a warning to low level flying*
> - *Identified the process for advising of the location height and presence of the structure to the relevant authorities, and*

Ensure that the proposal is in keeping with CASA requirements for structures near aerodromes, including temporary landing areas.

3.13.2. Local aerial application operators

Local aerial application operators consulted in previous studies undertaken by Aviation Projects have stated that a wind farm would, in all likelihood, prevent aerial agricultural operations in that particular area, but that properties adjacent to the wind farm would have to be assessed on an individual basis.

Aerial application operators generally align their positions with the AAAA policies.

Based on previous studies for other wind farm projects undertaken by Aviation Projects, and the results of consultation with AAAA and local aerial application operators, it is reasonable to conclude that safe aerial application operations would be possible on properties within the project site and on neighbouring properties, subject to final WTG locations and by implementing recommendations provided in this report at Section 11.

To facilitate the flight planning of aerial application operators, details of the Project, including location and height information of WTGs, wind monitor towers (WMTs) and overhead powerlines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

The use of helicopters enables aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.

3.14. Emergency services

3.14.1. Royal Flying Doctor Service

Royal Flying Doctor Service (RFDS) and other emergency services operations are generally conducted under the IFR, except when arriving/departing a destination that is not serviced by instrument approach aids or procedures, in which case they would be operating day or night VFR.

Most emergency aviation services organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained.

For example, pilots and crew require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

3.14.2. Aerial firefighting

Aerial firefighting operations (firebombing in particular) are conducted under Day VFR, sometimes below 500 ft AGL. Under certain conditions visibility may be reduced/limited by smoke/haze.

Most aerial firefighting organisations have formal risk management programs to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. For example, pilots require specific training and approvals, additional equipment is installed in the aircraft, and special procedures are developed.

The Australasian Fire and Emergency Services Council (AFAC) has developed a national position on wind farms, their development and operations in relation to bushfire prevention, preparedness, response and recovery, set out in the document titled *Wind Farms and Bushfire Operations*, version 3.0, dated 25 October 2018.

Of specific interest in this document is the section extracted from under the 'Response' heading, copied below:

> *Wind farm operators should be responsible for ensuring that the relevant emergency protocols and plans are properly executed in an emergency event. During an emergency, operators need to react quickly to ensure they can assist and intervene in accordance with their planned procedures.*
>
> *The developer or operator should ensure that:*
>
> - *liaison with the relevant fire and land management agencies is ongoing and effective*
> - *access is available to the wind farm site by emergency services response for on-ground firefighting operations*
> - *wind turbines are shut down immediately during emergency operations – where possible, blades should be stopped in the 'Y' or 'rabbit ear' position, as this positioning allows for the maximum airspace for aircraft to manoeuvre underneath the blades and removes one of the blades as a potential obstacle.*
>
> *Aerial personnel should assess risks posed by aerial obstacles, wake turbulence and moving blades in accordance with routine procedures.*

4. INTERNAL CONTEXT

4.1. Wind farm site description

The project site boundary is approximately 13.5 km northeast of Augusta, within the Shire of Augusta Margaret River Local Government Area (LGA).

Figure 4 and Figure 5 show a few roadside views of the Project site. (Source: Aviation Projects).



Figure 4 Project Site roadside view 1



Figure 5 Project Site roadside view 2

4.2. Wind turbine generator (WTG) description

The project site will comprise up to 20 WTGs, with a maximum blade tip height of 250 m above ground level (AGL).

The ground elevation for the highest WTG location is 40 m AHD, which, with a 250 m WTG height, results in a maximum overall height of 290 m AHD (951.4 ft AMSL).

Figure 6 Illustrates the project layout identifying the highest WTGs' location (source: Google Earth).

'Micrositing' of WTGs means an alteration to the siting of a WTG by not more than 100 m and any consequential changes to access tracks and internal power cable routes. The potential micrositing of the WTGs has been considered in the assessment. The estimate of the overall maximum height being based on the highest ground level is within 100 m of the nominal WTG position. The micrositing of the WTGs is not likely to result in a change in the Project's maximum overall blade tip height. This AIA assumes a maximum blade tip height of 250 m AGL is implemented at all WTG locations.

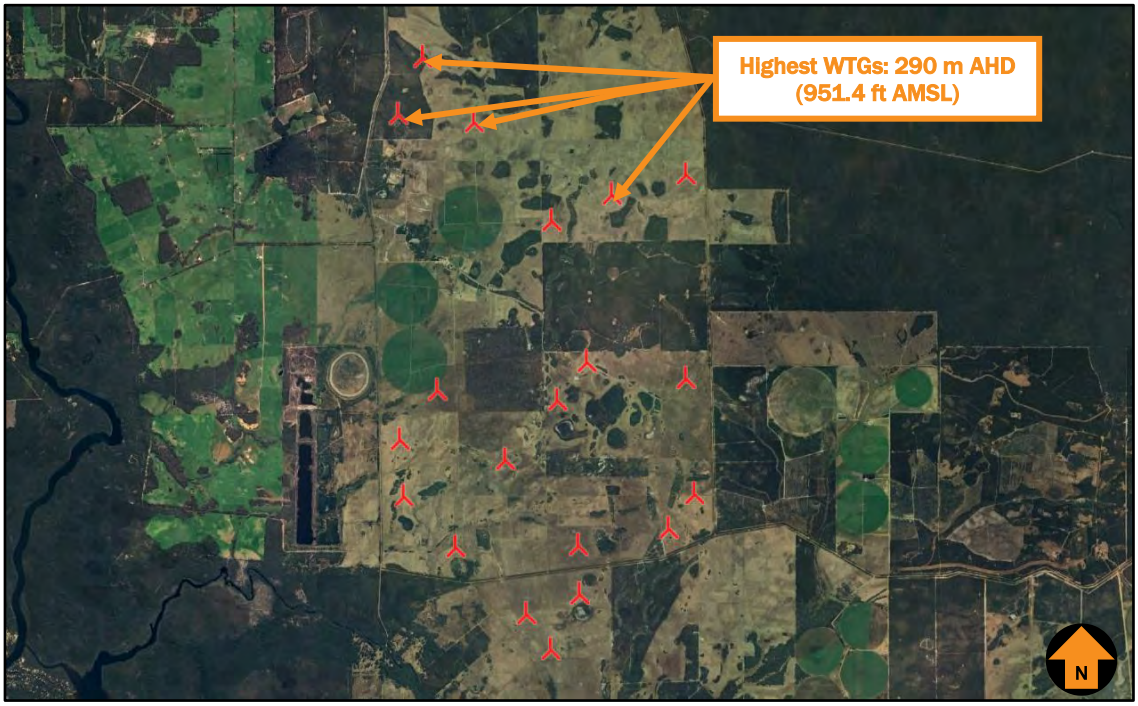


Figure 6 Project layout and highest WTG location

5. CONSULTATION

The following list of stakeholders were identified as requiring consultation:

1. Airservices Australia
2. Department of Defence
3. Shire of Augusta Margaret River
4. City of Busselton
5. Global Airspace Solutions
6. Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service
7. Royal Flying Doctor Service
8. St John WA
9. Western Australia Department of Fire and Emergency Services
10. Western Australia Police Force.

Details and results of the consultation activities are provided in Table 1.

Table 1 Stakeholder consultation details

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Airservices Australia	Email sent on 06 November 2024 to Airservices Australia	Email received on 25 February 2025 from Airport Development & Protection	**Airspace Procedures** With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Doc 9905, at a maximum 290 m (952 ft) AHD the wind farm will affect the minimum sector altitude and GNSS arrival instrument procedures at Busselton aerodrome. In order to accommodate the wind farm the minimum sector altitude and GNSS arrival SECTOR A instrument procedures will need to be re-designed. The maximum height of wind farm without affecting any procedures at Busselton aerodrome is 274.3m (900ft) AHD. Note: Procedures not designed by Airservices at Busselton aerodrome were not considered in this assessment. **Communications/Navigation/Surveillance (CNS) Facilities** We have assessed the proposed activity to the above specified height for any impacts to Airservices Precision/Non-Precision Navigation Aids, Anemometers, HF/VHF/UHF Communications, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links and have no objections to it proceeding. Note: Meteorological instruments not owned by Airservices were not considered in this assessment.	Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes. All amendments to airspace procedures are made on a commercial basis. **Vertical Obstacle Notification** As this proposed activity is more than 30m (99ft) AGL, please follow the below notification process: 1. Complete the Vertical Obstacle Notification Form: ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf (airservicesaustralia.com) 2. Submit completed form to: VOD@airservicesaustralia.com as soon as the development reaches the maximum height. For further information regarding the reporting of tall structures, please contact the VOD team: • Phone - (02) 6268 5622 • Email - VOD@airservicesaustralia.com

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			Please consult with the Bureau of Meteorology to ensure that the proposed activity does not adversely impact their equipment. **Air Traffic Control (ATC) Operations** There are no additional instructions or concerns from ATC. **Summary – permanent impact (WF)** The proposed activity will penetrate the current Airservices-designed airspace procedures and/or impact CNS facilities or ATC operations at Busselton aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes. All amendments to airspace procedures are made on a commercial basis.	• Or refer to: Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)
Department of Defence	Email sent on 06 November 2024 to Department of Defence	Email received on 09 January 2025 from Anthony Deutschmann (Assistant Director)	The Department of Defence (Defence) has conducted an assessment of the proposed Beenup Wind Farm Project for potential impacts on the safety of military low flying operations as well as possible interference to Defence communications and radar. As the proposed wind farm meets the requirement for reporting tall structures, Defence requests that you provide Air Services Australia (AsA) with vertical obstacle notification. Marking tall structures on aeronautical charts assists pilot navigation and enhances flight safety. Airservices Australia (ASA) is responsible for recording the location	Defence therefore requests that the following processes to be followed: 1. Complete the Vertical Obstacle Notification Form: ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf (airservicesaustralia.com) 2. Submit completed form to: VOD@airservicesaustralia.com as soon as the development reaches the maximum height.

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			and height of tall structures. The information is held in a central database managed by ASA and relates to the erection, extension, or dismantling of tall structures, the top of which is above: a. 30 metres AGL, that are within 30 kilometres of an aerodrome; and b. 45 metres AGL elsewhere for RAAF.	For further information regarding the reporting of tall structures, please contact the VOD team: • Phone - (02) 6268 5622 • Email - VOD@airservicesaustralia.com • Or refer to: Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)
Shire of Augusta Margaret River	Email sent on 06 November 2024 to Shire of Augusta Margaret River	Email received on 28 February 2025 from Nick Logan (Director Sustainable Development and Infrastructure)	We don't have anything to add at this point. We have a statutory function in assessing the complete form of the formal application against a number of criteria and will give full consideration if it progresses to that point. Just to note that: • The AMR Shire Tallinup Augusta Aerodrome is used relatively consistently and more so than Margaret River. • Aerial bushfire suppression is used in this area from time to time	No Action Required
City of Busselton	Email sent on 06 November 2024 to City of Busselton	Email received on 13 March 2025 from Bonnie Allen (Senior Airport Administration Officer)	The City of Busselton acknowledges receipt of the AIA of the Beenup WF and authorises Airservices Australia to make the required changes to the 25 nm MSA and GNSS Arrival.	The approval letter was sent to Airservices Australia, and in Annexure 6

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Global Airspace Solutions	Email sent on 11 March 2025 to Global Airspace Solutions	Email received on 11 March 2025 from Bas Smeulders (Chief Designer)	• Airservices probably did not provide you with the information of the other IFPs, because AsA only assesses the IFPs under their responsibility. • The NDB RWY 21 MSA is certainly affected by the one wind turbine, because the MSA centre-point is the NDB. Aircraft OPS not impacted, but the plate is. • Every IFP plate is affected by the one wind turbine located within the MSA PANS-OPS surfaces with the NDB as the centre-point. Even if the ARP is the centre-point and the MSA surfaces are not overlapping the one wind turbine, the western sector has to be revised to 2000 ft, to maintain the same MSA values on all IFP plates. We do not publish different MSA values for the same aerodrome. • There is no impact on aircraft ops, but there is an impact on the IFP plates and changing them would probably come with a cost.	There is no impact on aircraft ops, but there is an impact on the IFP plates and changing them would probably come with a cost.
Royal Flying Doctor Service	Email sent on 06 November 2024 to Royal Flying Doctor Service	No Response received by 14 April 2025		
St John WA	Email sent on 06 November 2024 to St John WA	No Response received by 14 April 2025		

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Western Australia Department of Fire and Emergency Services / Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service	Email sent on 06 November 2024 to Western Australia Department of Fire and Emergency Services and Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service	Email received on 09 December 2024 from Mathew Wansborough (Regional Coordinator) and Email received on 21 March 2025 from Ray Buchan (Superintendent – Aviation Services)	A few meetings have been set up, and further communication will continue. Meeting Summary – 17 February 2025: • Aerial fire suppression activities are not prohibited within wind farms. There are currently no procedures specific to aerial fire suppression operations around wind farms. • Aerial firefighting around wind farms is not treated any differently to other aerial firefighting i.e. the same risk assessment processes are undertaken to ensure the aerial fire suppression operation can be undertaken safely as for all fires. • Aerial operations are via contractors, and they will have their own Standard Operating Procedures and risk assessment processes that form part of their Safety Management System. • Pilots will take the wind turbines into consideration in their risk assessments and will make a determination on the day whether it is safe to operate inside the wind farm envelope. • If the wind farm is operating during a bushfire, suppression operations will be modified or suspended. • If the wind farm is able to be shutdown / paused remotely (i.e. blades moving at approx. 1 RPM), then suppression operations will be considered	• Synergy will notify CASA, Air Services Australia, DBCA and DFES notification of all turbine locations • Turbines at least 300 metres apart • Meteorological masts and guy wires to be marked to ensure visibility to aircraft as per CASA regulations • Synergy will investigate lighting for wind turbines (for rescue helicopters) • Synergy will not oppose shutting down the wind farm in the case of an emergency • Synergy will provide data in the preferred format for DBCA and DFES to inform their risk assessment. • Synergy will provide opportunities for site familiarisation and orientations • Should the project go ahead, the preferred turbine technology will have a fire suppression system. • Synergy to provide a detailed BMP / EMP which includes emergency contacts (Detail slides are in Annexure 7)

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			based on a risk assessment and conditions on the day. • DFES acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. However, pausing turbines to approx. 1 RPM is recommended. • DFES will prioritise static fresh water supplies over salt or brackish water i.e. preference is to not take salt water for firefighting • While aerial firefighting only operates during the day, rescue services operate day and night – 24/7/365 • DFES recommends medium intensity lighting on wind turbines for rescue purposes due to operating at night. Refer to 2017 NSW CASA guidance. • Emphasised the significance of operator and DFES/DBCA Incident Controllers in the decision-making process for firefighting operations near wind farms. • Provision of information regarding tall objects within the wind farm at the point of construction is critical in being able to assess the risk during a bushfire emergency.	

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			• Emphasised importance of local/regional involvement in the planning and development of the wind farm. • Emergency Response Plan to be developed and shared with DFES. Must have contact details for wind farm and available 24/7 to first responders and Incident Controllers. Meeting Summary - 24 February 2025 • Aerial fire suppression and pest control operate under daytime VFR (visual flight rules). No rescue services operated by DBCA. • Aerial fire suppression will consider the risk on the day and location, will be at the pilot's discretion. Dispatch operators will always flag the coordinates of any obstacles / tall objects (such as wind turbines). • DBCA also acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. • There are currently no procedures specific to wind farms. • Need to confirm secondary airstrips have been assessed. • Feedback from DBCA forum with Chief pilots is that there is no special consideration for wind	

Agency/Contact	Activity/Date	Response/ Date	Issues Raised During Consultation	Action Proposed
			farms but as the decision to is at the pilot's discretion.	
Western Australia Police Force	Email sent on 06 November 2024 to Western Australia Police Force	No Response received by 14 April 2025		

6. AVIATION IMPACT STATEMENT

6.1. Overview

Potential safety risks include (but are not limited to) impacts on flight procedures and aviation communications, navigation, and surveillance (CNS) facilities, which require assessment by Airservices Australia.

To facilitate these assessments, all wind farm proposals submitted to Airservices Australia must include an Aviation Impact Statement (AIS).

This analysis considers the aeronautical impact of the WTGs on the following:

- The operation of certified aerodromes within 30 nm of the wind farm
- The operation of nearby aircraft landing areas within 3 nm of the wind farm
- Grid and air route Lowest Safe Altitudes (LSALTs)
- Airspace protection
- Aviation navigation facilities
- ATC surveillance radar installations
- Local aircraft operations.

6.2. Nearby certified aerodromes

One airport, Busselton Airport (YBLN), is certified by the CASA under CASR Part 139 and is located within 30 nm of the proposed site.

The location of the project site relative to Busselton (YBLN) is shown in Figure 7 (Source: SynergyRED, Google Earth). The orange circle around Busselton Airport represents a distance of 30 nm from the airport's aerodrome reference point (ARP). The green circle represents a distance of 30 nm from the Non-Directional Beacon (NDB). There is one WTG within the 30 nm from NDB.

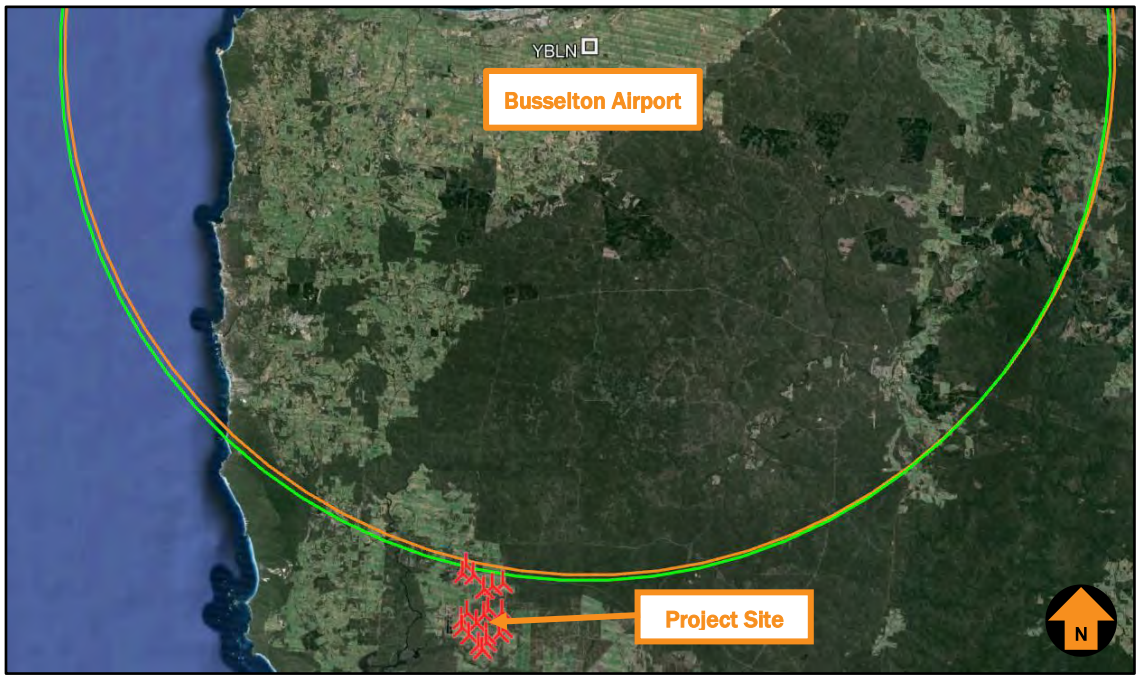


Figure 7 Location of Certified Airports in relation to Project Area

6.3. Obstacle Limitation Surfaces

Obstacle Limitation Surfaces (OLS) are established for each certified aerodrome runway.

For the Code 4 non-precision runway at Busselton Airport, the maximum lateral extent of the OLS is up to 6 km for the conical surface and 15 km for the take-off and approach surfaces.

The closest WTG in the project area is approximately 56 km south of Busselton Airport's aerodrome reference point, which is beyond the horizontal extent of the obstacle limitation surfaces of Busselton Aerodromes.

6.4. Busselton Airport (YBLN)

Busselton Airport is a certified aerodrome operated by the City of Busselton. Its published aerodrome elevation is 17 m AHD (56 ft AMSL) (source: AIP, effective 28 November 2024).

Busselton Airport's aerodrome reference point (ARP) coordinates published in Airservices Australia's Designated Airspace Handbook (DAH) are Latitude 33°41'14" S and Longitude 115°24'01" E (Source: AIP, effective 28 November 2024).

6.4.1. Instrument approach and departure procedures

A check of the Aeronautical Information Package (AIP) via the Airservices Australia website showed that Busselton Airport is served by non-precision instrument flight procedures for each runway (source: AIP, effective 28 November 2024).

Table 2 Identifies the aerodrome and procedure charts for Busselton Airport, which were designed by AsA and Global Airspace Solution (GAS) as indicated.

Table 2 Busselton Airport (YBLN) aerodrome and procedure charts

Chart name	*Effective date*
AERODROME CHART (AsA)	13 June 2024 (Am 179)
SID Busselton one departure (GAS)	17 June 2021 (Am 167)
GNSS Arrival (AsA)	23 May 2019 (Am 159)
RNP Z RWY 03 (GAS)	07 September 2023 (Am 176)
RNP X RWY 03 (AR) (GAS)	07 September 2023 (Am 176)
RNP W RWY 03 (AR) (GAS)	07 September 2023 (Am 176)
NDB RWY 03 (GAS)	25 March 2021 (Am 166)
RNP RWY 21 (GAS)	07 September 2023 (Am 176)
RNP RWY 21 (AR) (GAS)	07 September 2023 (Am 176)
NDB RWY 21 (GAS)	21 March 2024 (Am 178)

6.4.2. PANS-OPS Surfaces

A detailed assessment of the PANS-OPS surfaces associated with the published instrument approach procedures was undertaken:

- MSA Surfaces
- IFR Circling Areas
- PANS-OPS Approach and Departure Procedure Surfaces.

MSA surfaces

The minimum sector altitude (MSA) applies to each instrument approach procedure at Busselton Airport. Images of the MSA published for Busselton Airport are shown in Figure 8 (source: AIP, effective 28 November 2024).

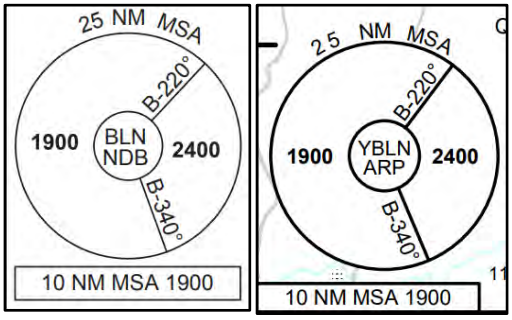


Figure 8 MSA at Busselton Airport

The CASR Part 173 MOS requires a minimum obstacle clearance (MOC) of 984 ft to be applied above the highest terrain or obstacle within the applicable segment.

Obstacles within the 25 nm MSA of Busselton Airport's ARP or NDB define the minimum height at which an IFR aircraft can fly when within 25 nm of the airport when not in visual flight conditions.

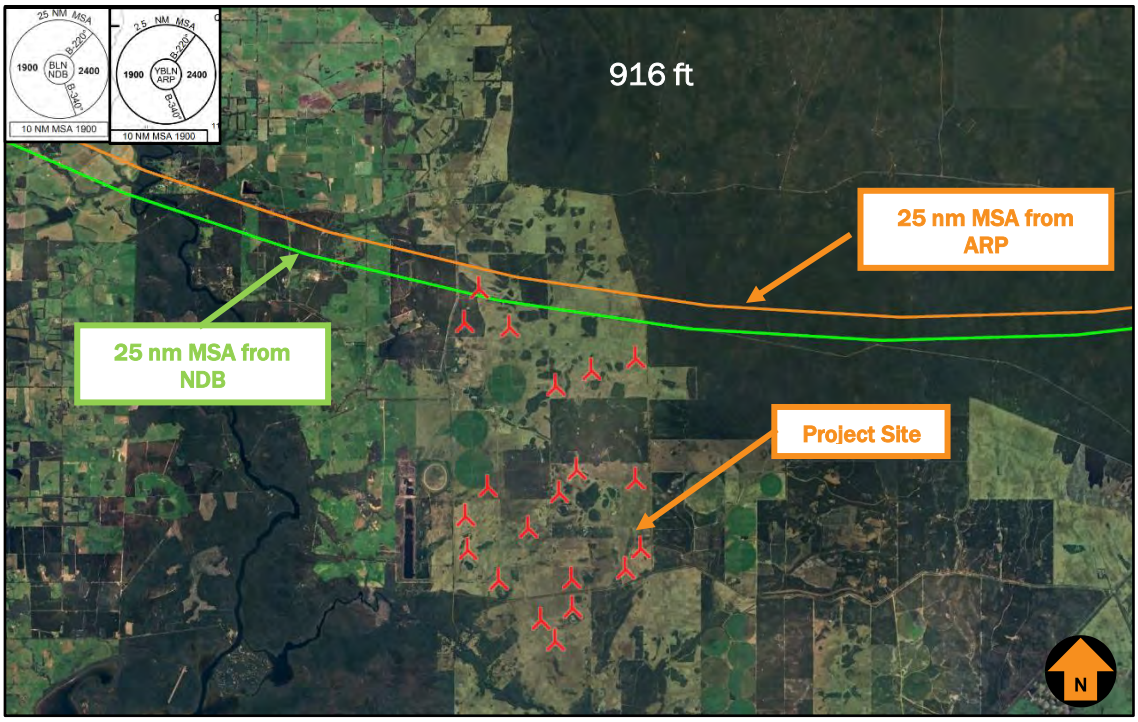


Figure 9 Busselton Airport MSA

One of the highest WTGs will be within Busselton Airport's 25 nm MSA western sector. Figure 9 (Source: SynergyRED, Google Earth) shows Busselton Airport's 25 nm MSA from ARP (orange) and NDB (green) and their related PANS-OPS surface heights (ft AMSL).

The 25 nm MSA western sector's minimum altitude is 579 m AHD (1900 ft AMSL), with a PANS-OPS surface elevation of 279 m AHD (916 ft AMSL). An impact analysis of Busselton Airport's MSA is provided in Table 3.

Table 3 Busselton Airport MSA Impact Analysis

MSA	*Minimum altitude (ft AMSL)*	*PANS-OPS surface (ft AMSL)*	*Impact on airspace design*	*Potential solution*	*Impact on aircraft ops*
10 nm MSA	1900	916	Nil – outside the protection surface	N/A	N/A
25 nm MSA – Eastern Sector	2400	1416	Nil – outside the protection surface	N/A	N/A
25 nm MSA – Western Sector	1900	916	The highest WTG is higher than the PANS-OPS surface by 35.4 ft	Increase minimum altitude by 100 ft or sectorise to exclude the WF	Minor. No change to flight paths.

There is only one WTG within the MSA surface, and its height is 290 m AHD (951.4 ft AMSL). It will be higher than Busselton Airport's 25 nm MSA western sector by 10.8 m (35.4ft).

The Project will impact Busselton Airport's 25 nm MSA western sector surfaces, which will need to be increased by 100 ft to 2000 ft or sectorised to exclude the wind farm.

The increase to the 25 nm MSA will require a proportional increase in the commencement altitude and the minimum holding altitude for the GNSS Arrival approach procedures. There is sufficient distance between the procedures' initial approach fixes to accommodate the minimum altitude increase without affecting aircraft operations or efficiency.

IFR Circling areas.

A circling approach is an extension of an instrument approach to the specified circling minima (lowest altitude permitted without visual reference to the ground) at which point the pilot will visually manoeuvre the aircraft to align with the runway for landing. Typically, a circling approach is only conducted where there is no runway-aligned instrument procedure or if the runway used for the approach procedure is not suitable for landing.

Circling areas are established by the instrument flight procedure designer based on ICAO specifications related to the performance category of the designed aircraft. The circling area is determined by drawing an arc centred on the threshold of each usable runway and joining these arcs by tangents. Category D is the most demanding aircraft category provided for in Busselton Airport's instrument flight procedures.

The radii for each relevant category of aircraft are provided below:

- Category A – 1.68 nm / 3.11 km
- Category B – 2.66 nm / 4.93 km
- Category C – 4.20 nm / 7.78 km
- Category D – 5.28 nm / 9.78 km

The closed WTG is 29.5 nm / 54.7 km from Runway 03's threshold and beyond the circling area for all runway ends at Busselton Airport.

The Project will not impact circling areas established for instrument flight procedures.

PANS-OPS Approach Procedure Surfaces

A detailed assessment of the PANS-OPS surfaces associated with the published instrument approach procedures was undertaken. Table 4 Details the assessment for each instrument approach procedure.

Table 4 Busselton Airport PANS-OPS Assessment

Busselton Airport Instrument Approach Title	*Minimum Altitude over Project (ft AMSL)*	*PANS-OPS Surface (ft AMSL)*	*Impact on the procedure by WTGs*	*Potential solution*	*Impact on aircraft ops*
SID Busselton one departure	Nil	Nil	Nil – outside the protection surface	N/A	N/A
GNSS Arrival – Sector A	1900	900	Yes – penetrate the initial approach protection surface	Need to raise by 100 ft	Minor. No change to flight paths.
GNSS Arrival – Sector B	2400 (MSA)	1416	Nil – underneath protection surface	N/A	N/A
RNP Z RWY 03	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP X RWY 03 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP W RWY 03 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
NDB RWY 03	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP RWY 21	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
RNP RWY 21 (AR)	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A
NDB RWY 21	2400 (MSA)	1416	Nil – Outside protection surface	N/A	N/A

GNSS Arrival

A DME/GPS arrival procedure is designed to permit an aircraft to descend from an en-route altitude at or above the lowest safe altitude to a minimum altitude at an aerodrome using DME or GPS distance measurement and ground based azimuth guidance facilities. The procedure is prescribed for particular tracks or sectors and takes the form of a series of descending steps at appropriate distances.

DME/GPS arrivals are instrument approach procedures. DME and DME/GPS arrival procedures are not included in ICAO DOC 8168 – OPS/611 Volume II, but are designed using the criteria contained in that document applicable to non-precision approaches and therefore have initial, intermediate and final approach segments. To account for control area steps, the step information is frequently extended beyond the initial approach fix (IAF) into the en-route segment.

Minimum obstacle clearance is as follows:

- Initial approach and en-route segments – 1,000 ft;
- Intermediate approach segment – 500 ft;
- Final approach segment – 300 ft.

Figure 10 Shows Busselton Airport GNSS Arrival Sector A display (Source: AsA: GNSS Arrival Procedures – 23 May 2019).

The only WTG within the GNSS Arrival—Sector A will infringe on the initial approach area's minimum altitude. The WTG will be 290 m AHD (951.4 ft AMSL), which is 51.4 ft higher than the minimum altitude. The minimum altitude for the initial approach area will need to be increased from 1900 ft to 2000 ft.

The commencement altitude would need to be increased due to the requirement to increase the 25 nm MSA to 2000 ft. However, the flight path gradient will not change.

This procedure will need to be amended, and the procedure designer will make a detailed assessment.

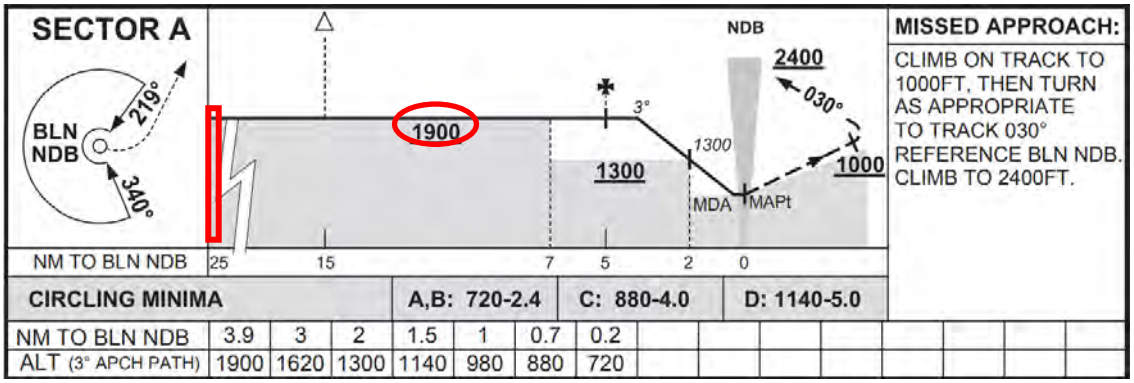


Figure 10 Busselton Airport GNSS Arrival – Sector A

Rest Procedures:

All procedures need the same MSA values to reflect the 2000ft in the western sector. Therefore, all other procedures will need to be updated.

6.5. Nearby uncertified aerodrome

A search of various aviation datasets identified uncertified aerodromes in proximity to the project area. These are non-certified aerodromes and are not subject to CASR Part 139 regulations.

The aviation datasets used for the search are:

- AIP aeronautical charts effective 05 September 2024
- OzRunways - which sources its data from Airservices Australia (AIP). The aeronautical data provided by OzRunways is approved under CASA CASR Part 175
- Australian Government National Map online.

As a guide, an area of interest within a 3 nm radius of an uncertified aerodrome is used to assess the potential impacts of proposed developments on aircraft operations at or within the vicinity of the uncertified aerodrome.

Figure 11 Shows the location of nearby uncertified aerodromes relative to the project site and a nominal 3 nm buffer from the closer uncertified aerodromes (source: Google Earth).

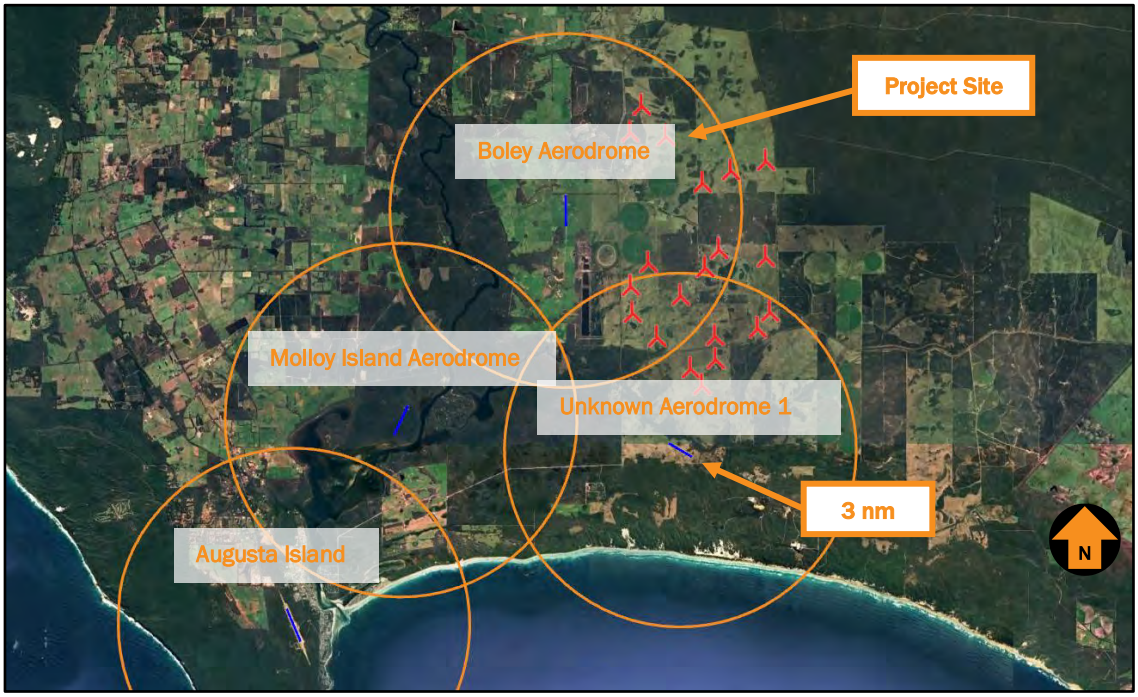


Figure 11 Uncertified Aerodromes in the vicinity of the project site

Unknown uncertified aerodromes 1 and Boley Aerodrome are the closest in relation to the Project. The Project is located within a radius of 3 nm of those uncertified aerodromes.

6.5.1. Unknown Aerodrome 1

The Unknown Aerodrome 1 is approximately 2 km south of the closest WTG. Limited published information about the aerodrome is available. Satellite imaging shows a prepared runway, as shown in Figure 12 (Source: Google Earth).

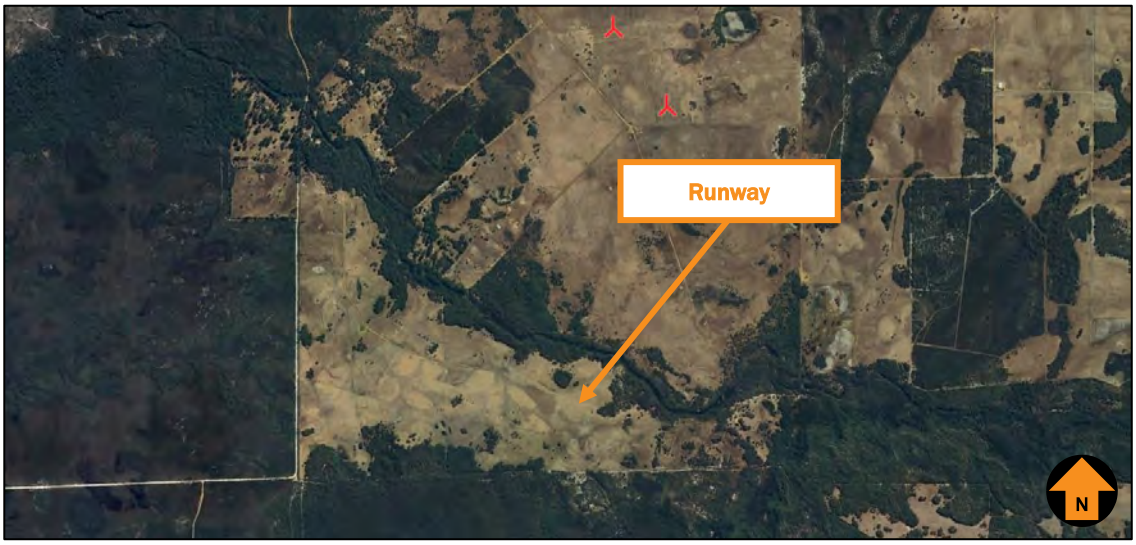


Figure 12 Close-up Google Earth image of Unknown Aerodrome 1's runway

Approximately 10 WTGs are proposed to be located within 3 nm of this aerodrome, as shown in Figure 13 (Source: SynergyRED, Google Earth).

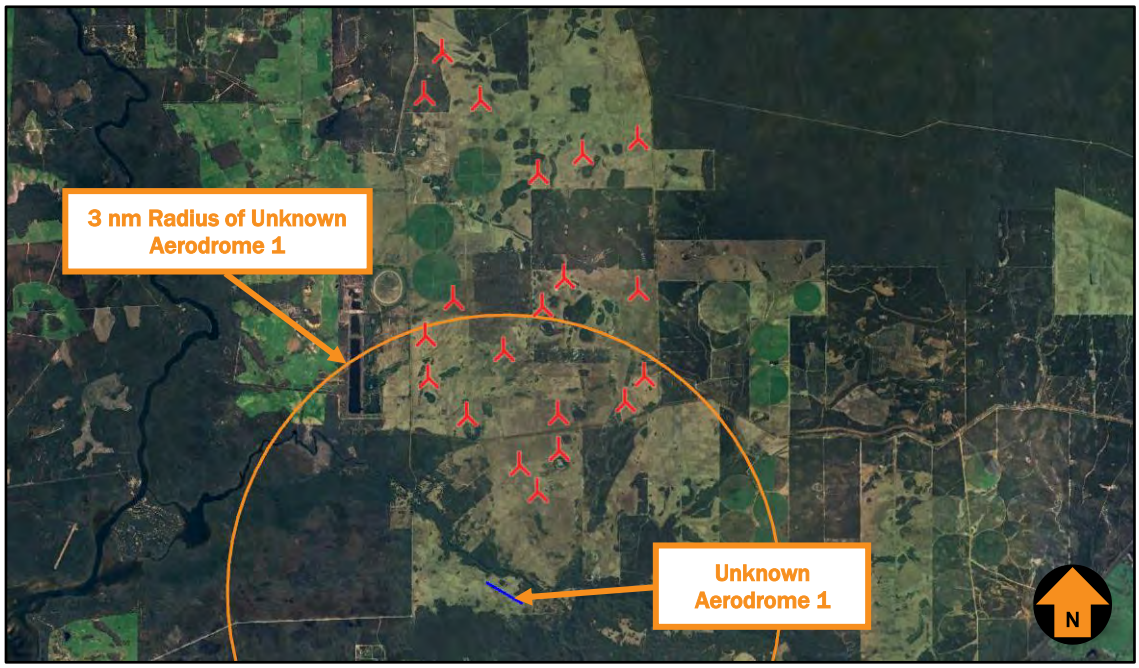


Figure 13 Unknown Aerodrome 1 in relation to The Project

Aircraft typically operate in circuit patterns when arriving and departing from an aerodrome. AC 91-10 '*Operations in the vicinity of non-controlled aerodromes*' describes the standard traffic circuit and heights at which aircraft should fly. This is shown in Figure 3 (Section 3.7.2).

In addition, various entry and departure procedures for aircraft joining and departing a standard traffic circuit are described. Figure 2 in Section 3.7.2 shows the standard arrival and joining procedures for a standard traffic circuit.

By regulation and for safety reasons, aircraft are required to conduct left-hand circuits when operating at an aerodrome unless otherwise not available due to terrain or populous areas, etc., and they are notified in AIP. Left-hand circuits after take-off and landing on the runways would need to fly above the proposed wind farm. WTGs within 3nm of Unknown Aerodrome 1 that would be considered potentially hazardous obstacles, shown in Figure 14 (Source: SynergyRED, Google Earth).

Uncertified aerodromes do not have the same regulatory status and protections as certified aerodromes. Potential impacts upon a private aerodrome caused by a wind farm would not preclude the regulatory approval of the wind farm under the Position Statement. However, it is highly recommended that any wind farm be designed to avoid, minimise, and/or mitigate impact(s) on private aerodromes.

During the site visit, the aerodrome is unlikely to be activity. The status of the aerodrome needs to be confirmed with the owner.

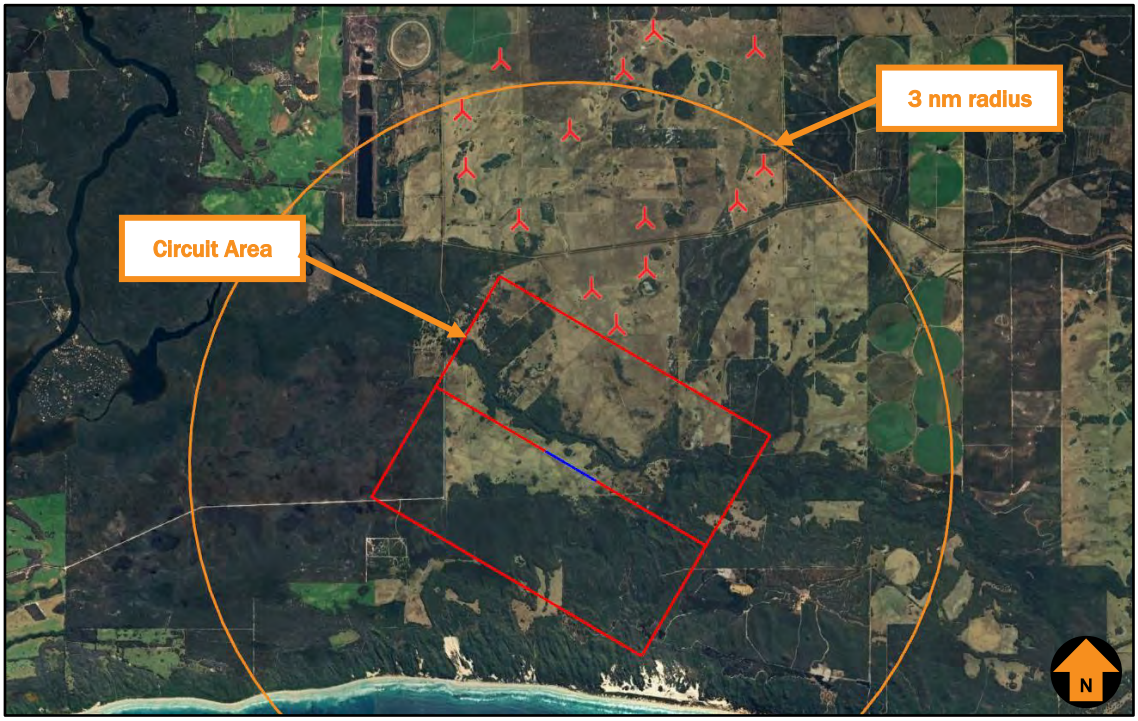


Figure 14 WTGs in relation to circuit operation of Unknown Aerodrome 1

6.5.2. Boley Aerodrome

The Boley Aerodrome is approximately 2.7 km west of the closest WTG. Limited published information about the aerodrome is available. Satellite imaging shows a prepared runway, as shown in Figure 15 (Source: Google Earth).



Figure 15 Close-up Google Earth image of aerodrome's runway

Approximately 12 WTGs are proposed to be located within 3 nm of this aerodrome, as shown in Figure 16 (Source: SynergyRED, Google Earth).

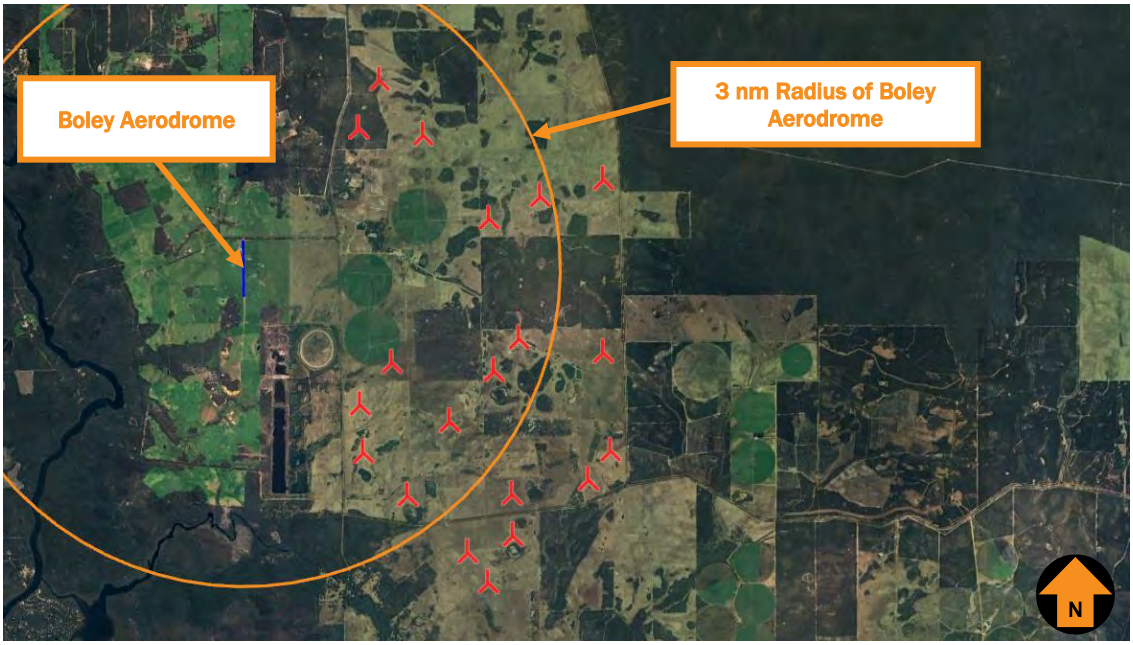


Figure 16 Boley Aerodrome in relation to The Project

WTGs within 3 nm of Boley Aerodrome that would be considered potentially hazardous obstacles, shown in Figure 17 (Source: SynergyRED, Google Earth).

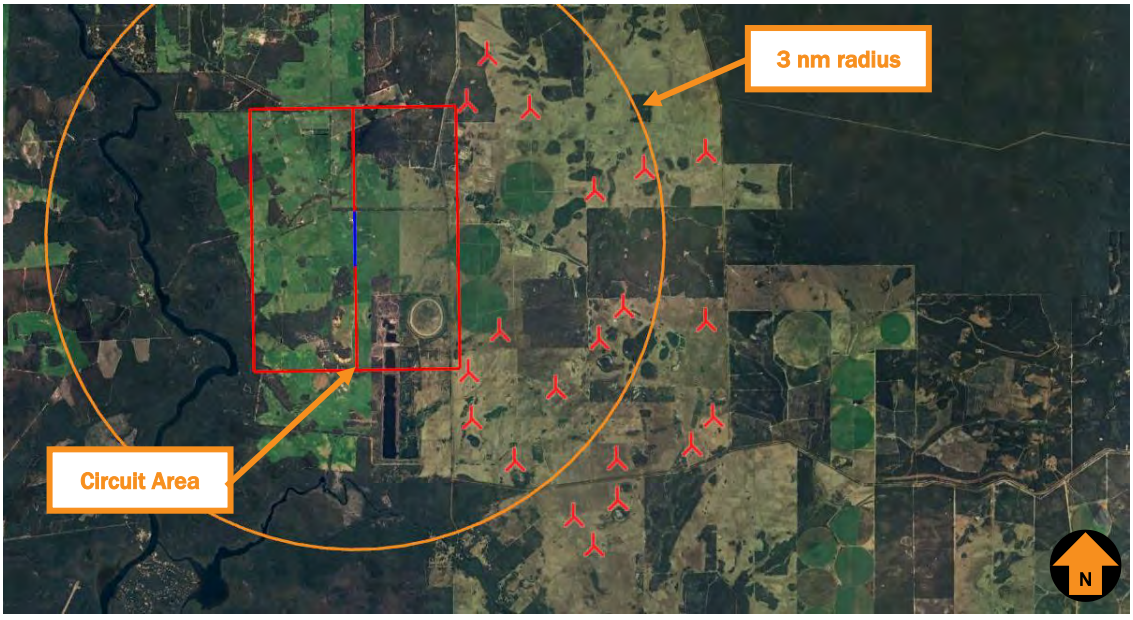


Figure 17 WTGs in relation to circuit operation of Boley Aerodrome

6.6. Potential wake turbulence impacts

National Airports Safeguarding Framework (NASF) Guideline D – *Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and WMTs.

NASF Guideline D provides guidance regarding WTG wake turbulence which states:

> *Wind farm operators should be aware that wind turbines may create turbulence which noticeable up to 16 rotor diameters from the turbine. In the case of one of the larger wind turbines with a diameter of 150 metres, turbulence may be present two kilometres downstream. At this time, the effect of this level of turbulence on aircraft in the vicinity is not known with certainty. However, wind farm operators should be conscious of their duty of care to communicate this risk to aviation operators in the vicinity of the wind farm…*

The key wording in the NASF guidance is "*noticeable*" and that "*the level of turbulence in the vicinity is not known with certainty.*"

There are many situations in aviation where pilots "notice" their aircraft moving away from the desired flight path or altitude and take appropriate action to maintain control of the aircraft with minimal input.

Pilot training standards are regulated by CASA to ensure that all qualified pilots have demonstrated to a suitably qualified and authorised check pilot that they can maintain control of their aircraft along the chosen flight path, across a significant range of atmospheric conditions that cause the aircraft to deviate from the pilot's chosen flight path.

Aircraft are designed to withstand a significant variation in atmospheric disturbances to ensure airframe integrity is maintained. The limits of the airframe's integrity are known by the pilot and considered in every flight activity. Significant weather events such as thunderstorms are avoided because of the likelihood of airframe limits being exceeded by the strong wind shear type conditions within, beneath and surrounding thunderstorm cells.

Wind turbines have been assessed in a limited number of studies, in which the highest classification of hazard is considered to be medium only within approximately 7 rotor diameters (RD) downwind of the wind turbine. There are no assessments that consider that the downwind turbulence is significant and outside the ability of the aircraft to endure the impacts and for the pilot to be able to control the aircraft using normal control inputs.

There also have been no reported aircraft accidents or incidents involving an aircraft encounter with the turbulence downwind of a wind turbine.

Assessment

A 180 m rotor diameter has been used for the wake turbulence analysis. Based on this scenario, NASF Guideline D suggests the effects of wake turbulence could be noticeable from the WTGs within 2880 m of the runway and the nominal circuit area, depending on wind direction.

Based on the results of published scientific studies which indicate that any medium level of turbulence would in most circumstances be confined to within 7 rotor diameters of a wind turbine generator (WTG), Aviation Projects considers that a conservative area of 10 rotor diameters is likely to be the maximum area where wake turbulence from WTGs would be noticed by pilots of light aircraft operating downstream of a WTG.

These studies also indicated that where any such turbulence is experienced, the pilot would be able to control the aircraft using normal control inputs.

Two of those studies are referred to below.

The *European Academy of Wind Energy* published an open access report titled "*Do wind turbines pose roll hazards to light aircraft?*" dated 2 November 2018. This study concluded:

> *In neutral conditions, the largest of these hazards are classified as medium hazards and exist 6.5 D downwind of the turbine in the bottom-left portion of the rotor disk. The highest hazards in the stable case also remained within the medium threshold and are located in two separate regions of the wake: approximately 4 D downwind in the bottom-right quadrant of the rotor and 6 D downwind in the top-left quadrant of the rotor.*

The United Kingdom (UK) Civil Aviation Authority commissioned the University of Liverpool to conduct a *Wind Turbine Wake Encounter Study*, the results of which were published in March 2015.

> *At University of Liverpool, a full CFD method [4] was used with the HMB solver to study wind turbine wakes. The CFD results showed good agreement for the blade surface pressure distributions and flow field velocities with the wind tunnel measurements. The wake was then solved on a very fine mesh able to capture the wake vortices up to 8 radii downstream of the blades on the MEXICO wind turbine rotor.*
>
> *In general, the LIDAR measurements captured the regular wake mean velocity patterns. Statistic LIDAR data indicate that the effects of wind turbine rotor wake, in term of velocity deficit, are limited within a downwind distance of 5D. This is generally in agreement with the results of the full CFD method and the velocity deficit models.*
>
> *For a wind turbine with size similar to the WTN250, and using the Beddoes circulation formula, the off-line simulation results indicate that the wind turbine wake did not pose any hazards to the encountering aircraft 5 diameters further from the wind turbine. The dominant upset that the wake generated is a yawing moment on the aircraft. The wake generated crosswind, is smaller than the maximum crosswind of 17.75 ft/s for an airport (codes A-I or B-I) that is expected to accommodate single engine aircraft. These conclusions are in line with that found in the piloted flight simulation.*

These two studies are the only major studies of their kind.

Wind farm designers and developers recognise the impact of downwind changes in wind strength and direction when designing the overall wind farm to ensure that the turbines are located at minimum distances from each other in order to prevent turbulence from one or more turbines affecting the operational efficiency of a downwind turbine or causing damage to the downwind turbine blades. The minimum distance between turbines typical wind farms is approximately 800 m, a significantly shorter distance than either 16 RD or 10 RD presents.

The turbulence from a wind turbine could be described as a shear type turbulence which is caused by the difference of the free flow wind speed at the edge of the turbine rotor (the blade tip) being disrupted by the turbine blade being rotated by the wind and altering the wind speed within the rotor diameter moving downwind from the turbine. This shear type turbulence descends and weakens as it gets further away from the turbine. It is not a stream of turbulence being generated by the blades being turned by a mechanical force such as occurs with an aircraft propellor or ceiling fan in a house or factory.

The WTG blades change pitch, dependent on the wind strength, to maintain a constant rotor speed. They interfere with the natural wind flow and cause some degree of turbulence downwind of the WTG. A consistent theme among the studies was that the higher turbulence exists very close to the WTG and rapidly dissipates due to the effect of convection, mechanical turbulence from other sources such as the wind flowing over trees, buildings and terrain undulations.

The studies indicate that turbulence is likely to dissipate below a level that could be felt by pilots within 7 rotor diameters (RD) from the WTG. Aviation Projects considers that a more conservative value of 10 RD is best used

to assess areas where the likely turbulence created downwind of a WTG will not be felt by or impact pilots of light aircraft.

The studies referenced above also indicate that aircraft controllability is maintained when experiencing the likely turbulence when the aircraft is approximately 6 RD from a WTG.

Table 5 Wake Turbulence Distances

1 RD (m)	*16 RD (m)*	*10 RD (m)*	*7 RD (m)*
180	2880	1800	1260

In conditions of high wind speed the WTGs are "parked" with the blades in a "feathered" condition to reduce the wind impact upon them. Turbulence from the "feathered" blades still exists but would be less than when the turbine is rotating. Other mechanical turbulence generated by trees, hills and other objects during high winds would significantly exceed and break up any minor turbulence from a stationary WTG.

Aircraft are designed to withstand significant turbulence according to aviation meteorological standards that are recognised and accepted worldwide. Even in recent circumstances with an airliner experiencing severe turbulence which injured passengers, the aircraft was controllable (except for the first part of the event where it descended rapidly) and has not suffered any significant damage (although it will undergo a major inspection). It was an encounter with severe turbulence far greater than normally experienced and is avoided wherever areas of severe turbulence is forecast or known to exist.

The downwind turbulence from WTGs beyond 7RD may be felt by the pilot of a light aircraft but the pilot will only need to make minor control adjustments to maintain control of the aircraft's attitude, altitude and heading. Such turbulence is likely to be classified as Light on an intensity scale published by the Australian Bureau of Meteorology shown in Figure 18.

Within the 7 RD boundary the turbulence is considered to create a medium hazard which is likely to equate to pilots experiencing "Moderate" turbulence in which the *"Pilot remains in control at all times."* (Figure 18)

Intensity	Airspeed Fluctuat-ions (kt/s)	Vertical Gust (ft/s)	G Load	Aircraft Reaction	Reaction Inside Aircraft
Light	5 – 14	5 - 19	0.15 – 0.49	Momentary slight and erratic changes in attitude and/or altitude. Rhythmic bumpiness.	Little effect on loose objects.
Moderate	15 – 24	20 - 35	0.50 – 0.99	Appreciable changes in attitude and/or altitude. Pilot remains in control at all times. Rapid bumps or jolts.	Unsecured objects move. Appreciable strain on seatbelts.
Severe	≥ 25	36 -49	1.0 – 1.99	Large abrupt changes in attitude and/or altitude. Momentary loss of control.	Unsecured objects are tossed about. Occupants violently forced against seatbelts.
Extreme	≥ 25	≥ 50	> 2.0	Very difficult to control aircraft. May cause structural damage.	

Figure 18 Turbulence intensities[1]

[1] Bureau of Meteorology – Hazardous Weather Phenomena – Turbulence

Light and moderate turbulence can be generated by lines of trees near runways.

> *Turbulence may disturb an aircraft's attitude about its major axis, and cause rapid bumps or jolts to be experienced, but in most cases it does not significantly alter the aircraft's flight path.* [2]

Adverse turbulence from any source is most critical during initial climb after take-off until the aircraft is established in a climb and at the appropriate speed, and during final approach where the aircraft is configured for landing and operating at a slow speed prior to landing. The research studies indicate that adverse or severe turbulence is not created by wind turbines outside the 5 RD distance.

6.6.1. Unknown Aerodrome 1

Figure 19 Shows 10 times (1800 m) around the relevant boundary WTGs in relation to the Unknown Aerodrome 1 (sources: Google Earth).

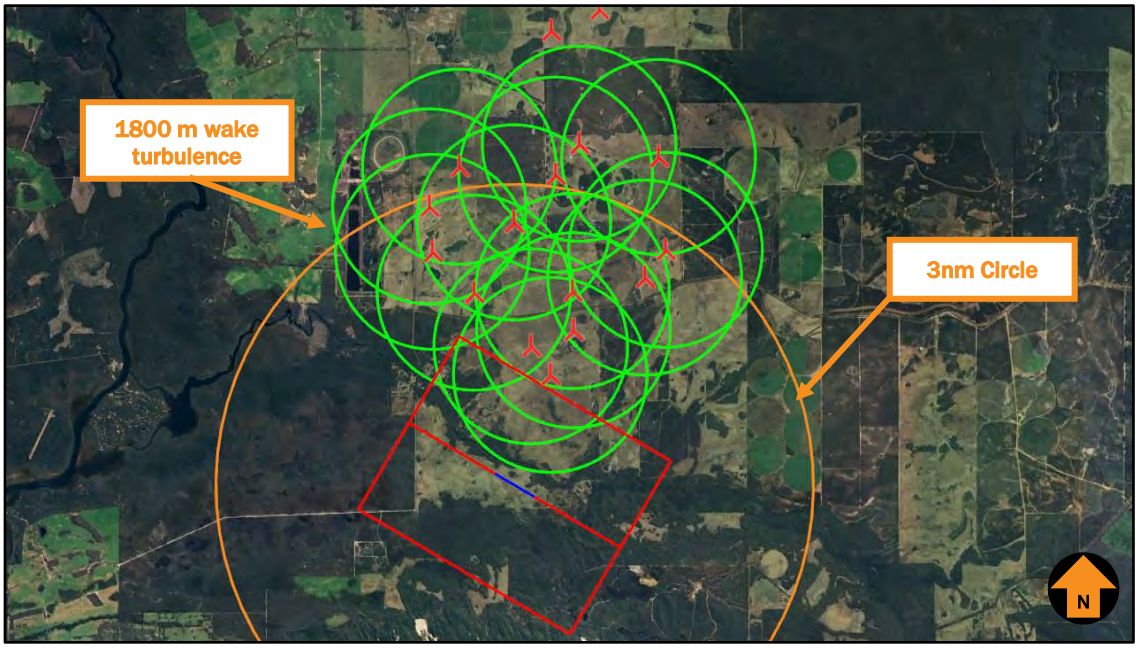


Figure 19 Possible extent of wake turbulence from WTGs to Unknown Aerodrome 2

When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area.

Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts

6.6.2. Boley Aerodrome

Figure 20 Shows 10 times (1800 m) around the relevant boundary WTGs in relation to the Boley Aerodrome (sources: Google Earth).

When the wind blows from the east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area.

[2] Bureau of Meteorology – Hazardous Weather Phenomena – Turbulence

Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

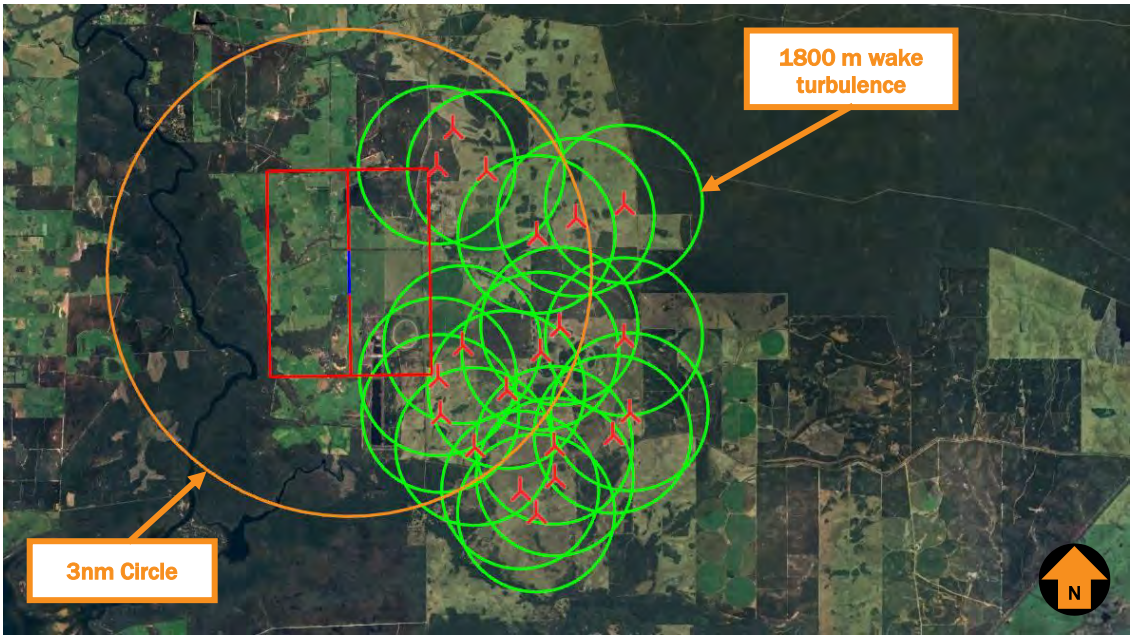


Figure 20 Possible extent of wake turbulence from WTGs to Boley Aerodrome

6.7. Grid and Air routes LSALT

CASR Part 173 MOS requires the published LSALT for a particular airspace grid or air route to provide a minimum of 1000 ft clearance above the controlling (highest) obstacle within the relevant airspace grid or air route tolerances.

6.7.1. Grid LSALT

The project site is located within an airspace grid with LSALT of 2600 ft AMSL, which provides clearance above obstacles with heights up to 1600 ft AMSL.

Figure 21 shows the grid LSALT in proximity to the project site (source: ERC Low National, OzRunways, October 2024, Google Earth).

The highest WTG is 290 m AHD (951.4 ft AMSL), below the 1600 ft obstacle height limit.

Therefore, the WTGs will not impact the 2600 Grid LSALT.



Figure 21 Grid LSALT in proximity to the project site

6.7.2. Air Route LSALTs

A protection area of 7 nm laterally on either side of an air route is used to assess the LSALT for the air route.

There is no air route within 7 nm of the project site. Therefore, the WTGs will not impact any Air Route LSALT.

6.8. Airspace Protection

The project site is located outside of controlled airspace (wholly within Class G airspace) and is not located in any Prohibited, Restricted and Danger areas.

The Project will not have an impact on controlled or designated airspace.

6.9. Aviation facilities

NASF Guideline G, *Protection of Aviation Facilities - Communication, Navigation and Surveillance (CNS)* and CASR Part 139 MOS specify the area where development of buildings and structures has the potential to cause unacceptable interference to CNS facilities.

The project site is located a sufficient distance away from nearby certified airports and aviation facilities and will not have an impact.

6.10. ATC Surveillance Radar installations

Airservices Australia requires an assessment of the potential for the WTGs that may affect radar line of sight. The three closest radar facilities to the project site are:

- Perth Preliminary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR), which is located approximately 260 km south of the project site.
- Kalamunda Air Route Surveillance Radar (RSR), which is located approximately 256 km south of the project site.

EUROCONTROL guidelines for assessing the potential impact on wind turbines on radar surveillance sensors stipulate the following assessment requirements:

Primary Surveillance Radar (PSR)

- Zone 1 0-500 m: Not permitted
- Zone 2 500 m – 15 km: Detailed assessment
- Zone 3: Further than 15 km but within maximum instrumented range and in radar line of sight: Simple assessment
- Zone 4: Anywhere within maximum instrumented range but not in radar line of sight or outside the maximum instrumented range: No assessment.

Secondary Surveillance Radar (SSR)

- Zone 1: 0 - 500 m: Not permitted
- Zone 2: 500 m - 16 km but within maximum instrumented range and in radar line of sight: Detailed assessment
- Zone 4: Further than 16 km or not in radar line of sight: No assessment

(Zone 3 is not established for secondary surveillance radar)

The project site is outside the line-of-sight range of Perth PSR/SSR and Kalamunda RSR radars and will not impact these facilities.

6.11. Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service

Scott National Park is only 1.2 km from the project's boundary. Some low-level flight operations might occur in Scott National Park, which will require a safe flight corridor without turbines along the park's boundaries.

Figure 22 (Source: Google Earth) shows the park boundary in relation to the Project. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

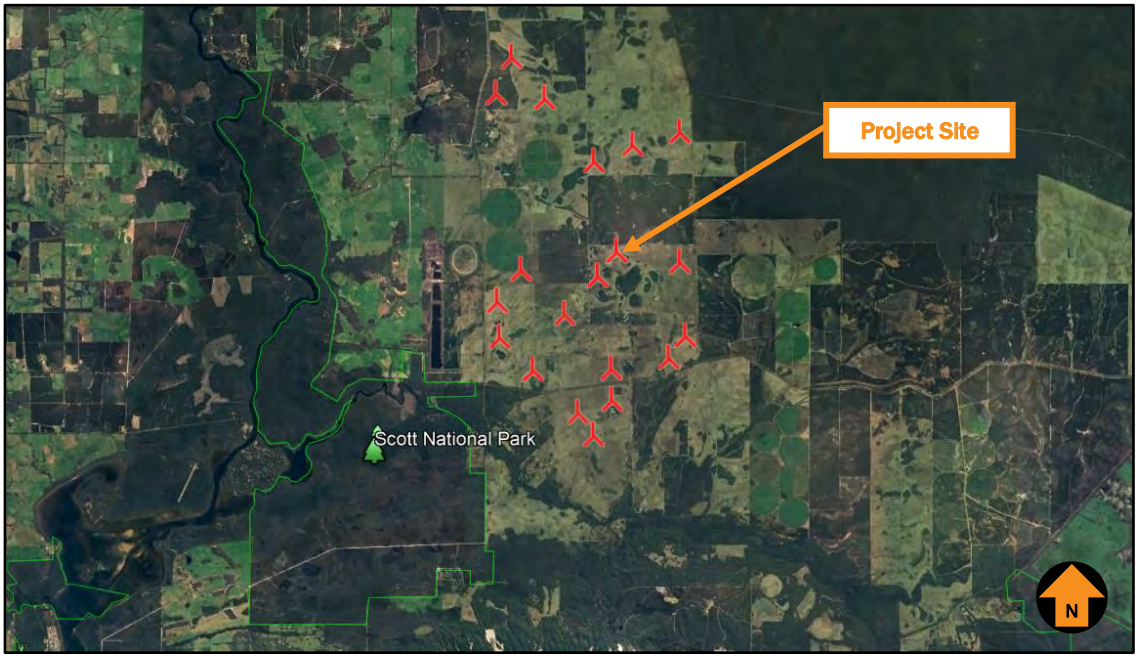


Figure 22 National Park boundary related to WTGs

6.12. AIS Summary

Based on the WTG layout and maximum blade tip height of up to 250 m AGL, the blade tip elevation of the highest WTG, will not exceed 290 m AHD (951.4 ft AMSL) and;

- There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)
  - The WTGs will not impact on the OLS of YBLN
  - The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients
    - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
    - GNSS Arrival Sector A approach surfaces.
      - The initial approach minimum altitude needs to be increased to 2000 ft.
      - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.
- There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome .
  - Unknown Aerodrome 1
    - The proposed wind farm would be considered potentially hazardous obstacles
    - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further

consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

- Boley Aerodrome
  - The proposed wind farm would be considered potentially hazardous obstacles
  - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.

- The WTGs will not impact the Grid LSALT and any air route LSALT
- The project area is located within Class G airspace and outside all controlled airspace, Prohibited Restricted and Danger areas.
- The WTGs will not impact the aviation navigation facilities.
- The WTGs will not impact the closest ATC surveillance radar installations.
- The WTGs must be reported to CASA, and construction details must be provided to Airservices.
- The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

6.13. Assessment recommendations

Recommended actions resulting from the conduct of this assessment are provided below.

1. Details of WTGs exceeding 100 m AGL must be reported to CASA *as soon as practicable after forming the intention to construct or erect the proposed object or structure,* in accordance with CASR 139.165(1)(2).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
3. Any obstacles above 100 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details:
   a. The planned operational timeframe and maximum height of the crane; and
   b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow.
4. Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs and overhead transmission lines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

6. Consultation with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary

Marking of WTGs

7. The rotor blades, nacelle, and supporting mast of the WTGs should be painted white, as is typical of most WTGs operational in Australia. No additional marking measures are required for WTGs.

Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. Lighting the WTGs is not a formal requirement.

Micrositing

9. Providing the microsite is within 100 m of the planned WTGs, it is not likely to change the project's maximum overall blade tip height. No further assessment is likely to be required from the microsite, and the conclusions of this AIA would remain the same.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:
    a. Liaison with the relevant fire and land management agencies is ongoing and effective
    b. Access is available to the wind farm site by emergency services for on-ground firefighting operations.

Triggers for review

11. Triggers for review of this risk assessment are provided for consideration:
    a. Prior to construction to ensure the regulatory framework has not changed
    b. Following any significant changes to the context in which the assessment was prepared, including the regulatory framework
    c. Following any near miss, incident or accident associated with operations considered in this risk assessment.

7. HAZARD LIGHTING AND MARKING

Based on the risk assessment set out in Section 9 It is concluded that aviation lighting is not likely to be required.

For completeness, relevant lighting standards and guidelines are summarised in **Annexure 3.**

Once the details of the wind farm, along with this report, are provided by the planning authority to CASA, CASA is likely to recommend obstacle lighting be fitted to sufficient obstacles to delineate the outline of the wind farm and the highest WTGs within it.

8. ACCIDENT STATISTICS

This section establishes the external context to ensure that stakeholders and their objectives are considered when developing risk management criteria and that externally generated threats and opportunities are properly considered.

8.1. General aviation operations

The general aviation (GA) activity group is considered by the Australian Transport Safety Bureau (ATSB) to be all flying activities that do not involve commercial air transport (activity group), which includes scheduled (RPT) and non-scheduled (charter) passenger and freight type. It may involve Australian civil (VH–) registered aircraft, or aircraft registered outside of Australia. General aviation/recreational encompasses:

- Aerial work (activity type). Includes activity subtypes: agricultural mustering, agricultural spreading/spraying, other agricultural flying, photography, policing, firefighting, construction – sling loads, other construction, search and rescue, observation and patrol, power/pipeline surveying, other surveying, advertising, and other aerial work.
- Own business travel (activity type).
- Instructional flying (activity type). Includes activity subtypes: solo and dual flying training, and other instructional flying.
- Sport and pleasure flying (activity type). Includes activity subtypes: pleasure and personal transport, glider towing, aerobatics, community service flights, parachute dropping, and other sport and pleasure flying.
- Other general aviation flying (activity type). Includes activity subtypes: test flights, ferry flights and other flying.

8.2. ATSB occurrence taxonomy

The ATSB uses a taxonomy of occurrence sub-type. Of specific relevance to the subject assessment are terms associated with **terrain collision**. Definitions sourced from the ATSB website are provided below:

- **Collision with terrain**: Occurrences involving a collision between an airborne aircraft and the ground or water, where the flight crew were aware of the terrain prior to the collision.
- **Controlled flight into terrain (CFIT):** Occurrences where a serviceable aircraft, under flight crew control, is inadvertently flown into terrain, obstacles, or water without either sufficient or timely awareness by the flight crew to prevent the event.
- **Ground strike:** Occurrences where a part of the aircraft drags on, or strikes, the ground or water while the aircraft is in flight, or during take-off or landing.
- **Wirestrike:** Occurrences where an aircraft strikes a wire, such as a powerline, telephone wire, or guy wire, during normal operations.

8.3. National aviation occurrence statistics 2010-2019

The Australian Transport Safety Bureau (ATSB) published a summary of aviation occurrence statistics for the period 2010-2019 (AR-2020-047, Final - 4 November 2020).

According to the report, there were no fatalities in high or low capacity RPT operations during the period 2010-2019. In 2019, 220 aircraft were involved in accidents in Australia, and a further 154 aircraft involved in serious incidents (an incident with a high probability of becoming an accident). In 2019 there were 35 fatalities from 22 fatal accidents. There have been no fatalities in scheduled commercial air transport in Australia since 2005.

Of the 326 fatalities recorded in the 10-year period, almost two thirds (175 or 53.68%) occurred in the general aviation segment. On average, there were 1.51 fatalities per aircraft associated with a fatality in this segment. The fatalities to aircraft ratio ranges from 1.09 to 177:1. Whilst it can be inferred from the data that the majority of fatal accidents are single person fatalities, it is reasonable to assert that the worst credible effect of an aircraft accident in the general aviation category will be multiple fatalities.

A breakdown of aircraft and fatalities by general aviation sub-categories is provided in Table 6 (source: ATSB).

Table 6 Number of fatalities by General Aviation sub-category – 2010 to 2019

Sub-category	*Aircraft assoc. with fatality*	*Fatalities*	*Fatalities to aircraft ratio*
Aerial work	37	44	1.18:1
Instructional flying	11	19	1.72:1
Own business travel	3	5	1.6:1
Sport and pleasure flying	53	94	1.77:1
Other general aviation flying	11	12	1.09:1
Totals	115	174	1.51:1

Figure 23 refers to Fatal Accident Rate by operation type per million departures over the 6-year period (source: ATSB). Note the rates presented are not the full year range of the study (2010–2019). This was due to the availability of exposure data (departures and hours flown) which was only available between these years. According to the ATSB report, the number of fatal accidents per million departures for GA aircraft over the 6-year reporting period ranged between 6.6 in 2014 and 4.9 in 2019.

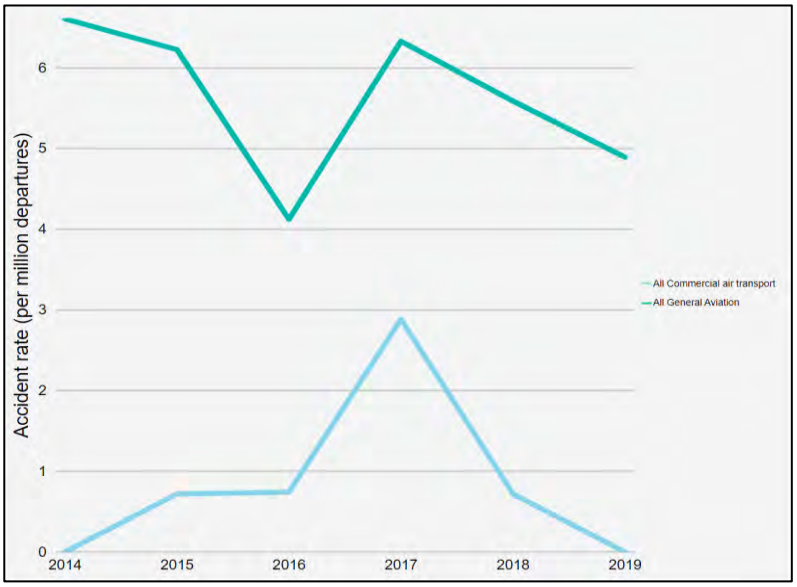


Figure 23 Fatal Accident Rate (per million departures) by Operation Type

In 2018, there were 9 fatal accidents and 9 fatalities involving GA aircraft, resulting in a rate of 5.6 fatal accidents per million departures and 7.7 fatal accidents per million hours flown.

In 2019, there were 1,760,000 landings, and 1,320,000 hours flown by VH-registered general aviation aircraft in Australia, with 8 fatal accidents and 17 fatalities. Based on these results, in 2019 there were 4.9 fatal accidents per million departures and 6.4 fatal accidents per million hours flown. A summary of fatal accidents from 2010-2019 by GA sub-category is provided in Table 7 (source: ATSB).

Table 7 Fatal accidents by GA sub-category – 2010 -2019

Sub-category	*Fatal accidents*	*Fatalities*
Agricultural spreading/spraying	13	13
Agricultural mustering	11	12
Other agricultural	1	1
Survey and photographic	5	10
Search and rescue	2	2
Firefighting	2	2
Other aerial work	3	4
Instructional flying	11	19
Own business travel	3	5
Sport and pleasure flying	53	94
Other general aviation flying	11	12
Total	**115**	**174**

Over the 10-year period, no aircraft collided with a WTG or a WMT in Australia.

Of the 20,529 incidents, serious incidents and accidents in GA operations in the 10-year period, 1,404 (6.83%) were terrain collisions.

The underlying fatality rate for GA operations discussed above is considered tolerable within Australia's regulatory and social context.

8.4. Worldwide accidents involving wind farms

Worldwide since aviation accident statistics have been recorded, there have been a total of 5 aviation accidents involving a wind farm (i.e. where WTGs were erected). To provide some perspective on the likelihood of a VFR aircraft colliding with a WTG, a summary of the 5 accidents and the relevant factors applicable to this assessment is incorporated in this section.

Based on the statistics set out in the Global Wind Energy Council (GWEC) report 2023, approximately 77.6 GW of wind power had been installed worldwide around the world at the end of 2022.

Based on the Australia's Clean Energy Council statistics there were 110 wind farms in Australia at 2023. Aviation Projects has researched public sources of information, accessible via the world wide web, regarding aviation safety occurrences associated with wind farms. Occurrence information published by Australia, Canada, Europe (Belgium, Denmark, France, Germany, Norway, Sweden and The Netherlands), New Zealand, the United Kingdom and the United States of America was reviewed.

The 5 recorded aviation accidents involving a wind farm are summarised as follows:

- One accident occurred in Texas, United States in October 2019 resulting in minor aircraft damage no injury to the pilot and significant injury to a person on the ground. The aircraft, an Air Tractor AT502, was returning from a local aerial application flight and was flown deliberately at low-level in close vicinity to a wind turbine generator (WTG) because the pilot believed his friend was working on the turbine. The aircraft collided with a tagline rope that was attached to a blade of the WTG and which was being held by a person working on the ground. The worker was thrown about 20 ft in the air and experienced significant non-life-threatening injuries. The aircraft sustained minor damage however the pilot landed the aircraft without further incident.
- One accident, which resulted in 2 fatalities, occurred in Palm Springs in 2001. This accident involved a wind farm but was not caused by the wind farm. The cause of the accident was the inflight separation of the majority of the right canard and all of the right elevator resulting from a failure of the builder to balance the elevators per the kit manufacturer's instructions. The accident occurred above a wind farm, and the aircraft struck a WTG on its descent and therefore the cause of the accident was not attributable to the wind farm and not applicable to this AIA.
- Two accidents involving collision with a WTG were during the day, as follows:
    - One accident occurred in Melle, Germany in 2017 as the result of a collision with a WTG mounted on a steel lattice tower at a very low altitude during the day with good visibility and no cloud. The accident resulted in one fatality. If the tower was solid and painted white, as is standard on contemporary wind farms, then it more than likely would have been more visible than if it were to be equipped with an obstacle light which in all likelihood would not have been operating during daylight with good visibility conditions.
    - One accident occurred in Plouguin, France in 2008 when the pilot decided to descend below cloud in an attempt to find the destination aerodrome. The aircraft was flying in conditions of significantly reduced horizontal visibility in fog where the top of the WTGs were obscured by cloud. The WTGs became visible too late for avoidance manoeuvring and the aircraft

made contact with two WTGs. The aircraft was damaged but landed safely. No fatalities were recorded.

- In both of the above cases, it is difficult to conclude that obstacle lighting would have prevented the accidents.

- One fatal accident, near Highmore, South Dakota in 2014 occurred at night in Instrument Meteorological Conditions (IMC).

There is one other accident mentioned in a database compiled by an anti-wind farm lobby group (wind-watch.org), which suggests a Cessna 182 collided with a WTG near Baraboo, Wisconsin, on 29 July 2000. The NTSB database records details of an accident involving a Cessna 182 that occurred on 28 July 2000 in the same area. For this particular accident, NTSB found that the probable cause of the accident was VFR flight into IMC encountered by the pilot and exceeding the design limits of the aircraft. A factor was flight to a destination alternate not performed by the pilot. No mention in the NTSB database is made of WTGs or a wind farm.Based on the statistics set out in the Global Wind Energy Council (GWEC) report 2016, there were 341,320 WTGs operating around the world at the end of 2016. In 2019, approximately 60.4 GW of wind power had been installed worldwide.

A summary of the 4 accidents is provided in Table 8.

Table 8 Summary of accidents involving collision with a WTG

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
1	Air Tractor AT502 N9143F collided with a tagline rope attached to wind turbine generator blade while being flown deliberately in close proximity to the WTG.	22 October 2019	Dawson County, Texas	0	Day VFR	Not specified	Not specified	The pilot's improper decision to manoeuvre at a low altitude and in close proximity to a wind turbine undergoing maintenance, which resulted in a collision with a tagline rope being held by a worker on the ground and serious injury to the worker.	Not applicable
2	Diamond DA320-A1 D-EJAR Collided with a WTG approximately 20 m above the ground, during the day in good visibility. The mast was grey steel lattice, rather than white, although the blades were painted in white and red bands.	02 Feb 2017	Melle, Germany	1	Day VFR No cloud and good visibility	Not specified	Not specified	Not specified	Not applicable

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
3	The Piper PA-32R-300, N8700E, was destroyed during an impact with the blades of a WTG, at night in IMC. The wind farm was not marked on either sectional chart covering the accident location; however, the pilot was reportedly aware of the presence of the wind farm.	27 Apr 2014	10 miles south of Highmore, South Dakota	4	Night IMC Low cloud and rain	420 ft AGL overall	Fitted but reportedly not operational on the WTG that was struck	The NTSB determined the probable cause(s) of this accident to be the pilot's decision to continue the flight into known deteriorating weather conditions at a low altitude and his subsequent failure to remain clear of an unlit WTG. Contributing to the accident was the inoperative obstacle light on the WTG, which prevented the pilot from visually identifying the WTG.	An operational obstacle light may have prevented the accident.

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
4	Beechcraft B55 The pilot was attempting to remain in VMC by descending the aircraft through a break in the clouds. The pilot, distracted by trying to visually locate the aerodrome, flew into an area of known presence of WTGs. After sighting the WTGs he was unable to avoid them. The tip of the left wing struck the first WTG blade, followed by the tip of the right wing striking the blade of a second WTG. The pilot was able to maintain control of the aircraft and landed safely.	04 Apr 2008	Plouguin, France	0	Day VFR The weather in the area of the WTGs had deteriorated to an overcast of stratus cloud, with a base between 100 ft to 350 ft and tops of 500 ft.	328 ft AGL hub height, 393 ft AGL overall	Not specified	This pilot reported having been distracted by a troubling personal matter which he had learned of before departing for the flight. The wind farm was annotated on aeronautical charts.	Not applicable

ID	Description	Date	Location	Fatalities	Flight rules	WTG height	Obstacle lighting	Cause of accident	Relevant to obstacle lighting at night
5	VariEze N25063 The aircraft collided with a WTG following in-flight separation of the majority of the right canard and all of the right elevator.	20 July 2001	Palm Springs, USA	2	Day VFR	N/A	N/A	The failure of the builder to balance the elevators per the kit manufacturer's instructions. The cause of this accident is not attributable to the wind farm.	Not applicable

9. RISK ASSESSMENT

A risk management framework comprises likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects and risk event description is provided in **Annexure 4.**

9.1. Risk Identification

The primary risk being assessed is that of aviation safety associated with the height and location of WTGs and WMTs proposed by the Project.

Based on an extensive review of accident statistics data (see summary in Section 8 above) and stakeholders who were consulted during the preparation of this AIA (see Section 5), 5 identified risk events associated with WTGs and WMTs relate to aviation safety or potential visual impact, and are listed as follows:

1. Potential for an aircraft to collide with a WTG, controlled flight into terrain (CFIT) (related to aviation safety).
2. Potential for a pilot to initiate manoeuvring in order to avoid colliding with a WTG or WMT resulting in collision with terrain (related to aviation safety).
3. Potential for the hazards associated with the Project to invoke operational limitations or procedures on operating crew (related to aviation safety).
4. Potential effect of obstacle lighting on neighbours (related to potential visual impact).

It should be noted that according to guidance provided by the Commonwealth Department of Infrastructure Transport, Regional Development, Communications and the Arts (Airspace and Air Traffic Management Risk Management Policy Statement). and in line with generally accepted practice, the risk to be assessed should primarily be associated with passenger transport services. Therefore, the risk being assessed herein is primarily associated with smaller aircraft likely to be flying under the VFR, and so the maximum number of passengers exposed to the nominated consequences is likely to be limited.

The five risk events identified here are assessed in detail in the following section.

9.2. Risk Analysis, Evaluation and Treatment

For the purpose of considering applicable consequences, the concept of worst credible effect has been used. Untreated risk is first evaluated, then, if the resulting level of risk is unacceptable, further treatments are identified to reduce the residual level of risk to an acceptable level.

A summary of the level of risk associated with the Project, under the proposed treatment regime, with specific consideration of the effect of obstacle lighting, is provided in Table 9 through to Table 12.

Table 9 Aircraft collision with wind turbine generator (WTG)

Risk ID:	1. Aircraft collision with wind turbine generator (WTG) (CFIT)
Discussion An aircraft collision with a WTG would result in harm to people and damage to property. Property could include the aircraft itself, as well as the WTG. There have been 5 reported occurrences worldwide of aircraft collisions with a component of a WTG structure since the year 2000 as discussed in Section 8. These reports show a range of situations where pilots were conducting various flying operations at low level and in the vicinity of wind farms in both IMC and VMC. No reports of aircraft collisions with wind farms in Australia have been found. In consideration of the circumstances that would lead to a collision with a WTG: • GA VFR aircraft operators generally don't individually fly a significant number of hours in total, let alone in the area in question • There is a very small chance that a pilot, suffering the stress of weather, will continue into poor weather conditions (contrary to the rules of flight) rather than divert away from it, is not aware of the wind farm, will not consider it or will not be able to accurately navigate around it. • If the aircraft was flown through the wind farm, there is still a very small chance that it would hit a WTG. Refer to the discussion of worldwide accidents in Section 8. There are no known aerial application operations conducted at night in the vicinity of the Project site. If a proposed object or structure is identified as likely to be an obstacle, details of the relevant proposal must be referred to CASA for CASA to determine, in writing: (a) whether the object or structure will be a hazard to aircraft operations (b) whether it requires an obstacle light that is essential for the safety of aircraft operations The Project site is clear of the obstacle limitation surfaces (OLS) of any aerodrome.	
Consequence If an aircraft collided with a WTG, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.	
Consequence	Catastrophic
Untreated Likelihood There have been 5 reports of aircraft collisions with WTGs worldwide, which have resulted in a range of consequences, where aircraft occupants sustained minor injury in some cases and fatal injuries in others (see Section 8). Similarly, aircraft damage sustained ranged from minor to catastrophic. One of these accidents resulted from structural failure of the aircraft before the collision with the WTG. Only two relevant accidents occurred during the day, and only one resulted in a single fatality. It is assessed that collision with a WTG resulting in multiple fatalities and damage beyond repair is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.	
Untreated Likelihood	Possible

- ***Current Treatments (without lighting)***
- The Project site is clear of the obstacle limitation surfaces (OLS) of any certified aerodrome.
- Aircraft are restricted to a minimum height of 500 ft (152.4 m) AGL above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. The proposed WTGs will be a maximum height of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).
- In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5,000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.
- Aircraft are restricted to a minimum height of 304.8 m (1,000 ft) above obstacles (including terrain) which are within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).
- Aircraft authorised to intentionally fly below 152.4 m (500 ft) AGL (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities undertaken specifically for and prior to undertaking such authorised flights. Any obstacle including WTGs in the path of the authorised flight would be specifically risk assessed during that process.
- The WTGs are typically coloured white so they should be visible to pilots during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of all WTGs can be noted on aeronautical maps and charts.
- Because the Project WTGs are proposed to be above 100 m AGL, there is a statutory requirement to report the WTGs to CASA and notified to Airservices Australia prior to construction.

Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8 (Unacceptable).

Current Level of Risk	8 - Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

The following treatments which can be implemented at little cost will provide an acceptable level of safety:

- Details of the Project should be communicated to local and regional aircraft operators prior to construction to heighten their awareness of its location and so that they can plan their operations accordingly. Specifically:

a. Engage with local aerial agricultural and aerial firefighting operators to develop procedures, which may include, for example, stopping the rotation of the WTG blades prior to the commencement of the subject aircraft operations within the Project site. b. Arrangements should be made to publish details of the Project in ERSA for surrounding aerodromes, which would involve notification to Airservices Australia.	
Residual Risk With the implementation of the Recommended Treatments listed above, the likelihood of an aircraft collision with a WTG resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 - Tolerable**. It is considered that the significant cost of obstacle lighting (which is not a preventative control), may only slightly reduce the likelihood of a collision given that the pilot is already in a highly undesirable situation (and not in all situations – such as where the obstacle light may be obscured by cloud) and hence is not justified. In the circumstances, the level of risk under the proposed treatment plan is considered **as low as reasonably practicable (ALARP)**. **It is our assessment that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a wind turbine, without obstacle lighting on the turbines of the Project.**	
Residual Risk	7 - Tolerable

Table 10 Harsh manoeuvring leading to controlled flight into terrain

Risk ID:	2. Harsh manoeuvring leads to controlled flight into terrain (CFIT)

Discussion

An aircraft colliding with terrain as a result of manoeuvring to avoid colliding with a WTG would result in harm to people and damage to property.

There are a few ground collision accidents resulting from manoeuvring to avoid wind farms, but none in Australia, and all were during the day.

The Project is clear of the OLS of any aerodrome.

Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built up areas.

The proposed WTGs will be a maximum of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 ft) above aircraft flying at the minimum altitude of 152.4 m (500 ft) AGL.

Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.

If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective.

Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).

Aircraft authorised to intentionally fly below 152.4 m (500 ft) AGL (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.

Assumed risk treatments

- The WTGs are typically coloured white so they should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of WTGs can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTG to CASA.

Consequence

If an aircraft collided with terrain, the worst credible effect would be multiple fatalities and damage beyond repair. This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There are a few ground collision accidents resulting from manoeuvring to avoid WTGs, but none in Australia, and all were during the day (see Section 8). It is assessed that a ground collision accident following manoeuvring to avoid a WTG is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.

Untreated Likelihood	Possible

Current Treatments (without lighting)

- The Project is clear of the OLS of any aerodrome.

- Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas.
- WTGs will be a maximum of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft).
- Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs.
- The WTGs and masts will be shown on aeronautical charts at the next publication cycle date available and NOTAMS prior to the publication date. This allows pilots to be aware of the existence of the wind farm at the pre-flight planning stage and during flight with reference to the aeronautical chart.
- If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective.
- Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).
- Aircraft authorised to intentionally fly below 152.4 m AGL (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.
- The WTGs are typically coloured white, typical of most WTGs operational in Australia, so they should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of wind farms can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTGs to CASA.

Level of Risk

The level of risk associated with a Possible likelihood of a Catastrophic consequence is 8.

Current Level of Risk	8 – Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

The following treatments which can be implemented at little cost will provide an acceptable level of safety:

- Ensure details of the Project WTGs have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators prior to construction.

• Although there is no requirement to do so, the Proponent may consider engaging with local aerial agricultural and aerial firefighting operators to develop procedures for their safe operation within the Project site.	
With the additional recommended treatments, the likelihood of ground collision resulting from manoeuvring to avoid a wind turbine resulting in multiple fatalities and damage beyond repair will be **Unlikely**, and the consequence remains **Catastrophic**, resulting in an overall risk level of **7 – Tolerable**. It is considered that the significant cost of obstacle lighting (which is not a preventative control), may only slightly reduce the likelihood of a collision given that the pilot is already in a highly undesirable situation (and not in all situations – such as where the obstacle light may be obscured by cloud) and hence is not justified. In the circumstances, the level of risk under the proposed treatment plan is considered **ALARP**. **It is our assessment that there is an acceptable level of aviation safety risk associated with the potential for ground collision resulting from manoeuvring to avoid a wind turbine, without obstacle lighting on the turbines of the Project.**	
Residual Risk	7 – Tolerable

Table 11 Effect of the Project on operating crew

Risk ID:	**3. Effect of the Project on operating crew**
Discussion Introduction or imposition of additional operating procedures or limitations can affect an aircraft's operating crew. There are no known aerial application operations conducted at night in the vicinity of the Project site.	
Consequence The worst credible effect a wind farm could have on flight crew would be the imposition of operational limitations, and in some cases, the potential for use of emergency procedures. This would be a Minor consequence.	
Consequence	Minor
Untreated Likelihood The imposition of operational limitations is unlikely to occur, but possible (has occurred rarely), which is classified as Possible.	
Untreated Likelihood	Possible
Current Treatments • The Project is clear of the OLS of any aerodrome. • Aircraft are restricted to a minimum height of 152.4 m (500 ft) above the highest point of the terrain and any object on it within a radius of 300 m in visual flight during the day when not in the vicinity of built-up areas. • The WTGs and masts will be shown on aeronautical charts at the next publication cycle date available and NOTAMS prior to the publication date. This allows pilots to be aware of the existence of the wind farm at the pre-flight planning stage and during flight with reference to the aeronautical chart. • WTGs will be a maximum of 250 m (820.2 ft) AGL at the top of the blade tip. The rotor blade at its maximum height will be approximately 97.6 m (320.2 ft) above aircraft flying at the minimum altitude of 152.4 m AGL (500 ft). • In the event that descending cloud forces an aircraft lower than 500 ft (152.4 m) AGL, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs. • Nevertheless, the minimum visibility of 5000 m required for visual flight during the day should provide adequate time for pilots to observe and manoeuvre their aircraft clear of WTGs. • If cloud descends below the WTG hub, obstacle lighting would be obscured and therefore ineffective. • Aircraft are restricted to a minimum height of 304.8 m (1000 ft) above obstacles within 10 nm of the aircraft in visual flight at night and potentially even higher during instrument flight (day or night).	

- Aircraft authorised to intentionally fly below 152.4 m AGL (500 ft) (day) or below safety height (night) are operated in accordance with procedures developed as an outcome of thorough risk management activities.
- The WTGs are typically coloured white so they should be visible during the day.
- The 'as constructed' details of WTGs are required to be notified to Airservices Australia so that the location and height of wind farms can be noted on aeronautical maps and charts.
- Since the WTGs will be higher than 100 m AGL, there is a statutory requirement to report the WTGs to CASA.

Level of Risk

The level of risk associated with a Possible likelihood of a Moderate consequence is 5.

Current Level of Risk	5 - Tolerable

Risk Decision

A risk level of 6 is classified as Tolerable: Treatment action possibly required to achieve ALARP - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.

Risk Decision	Accept, conduct cost benefit analysis

Recommended Treatments

WMTs installed prior to WTG installation and those that are not in relatively close proximity to a WTG should be lit to ensure they are visible in low light and deteriorating atmospheric conditions

The following additional treatments will provide an additional margin of safety:

- Ensure details of the Project WTGs and WMTs have been communicated to Airservices Australia, and local and regional aerodrome and aircraft operators prior to construction.
- Although there is no requirement to do so, the Proponent may consider engaging with local aerial agricultural and aerial firefighting operators to develop procedures for such aircraft operations in the vicinity of the Project site.

Residual Risk

Notwithstanding the current level of risk is considered **Tolerable,** the additional Recommended Treatments listed above will enhance aviation safety. The likelihood remains **Possible**, and consequence remains **Minor**. In the circumstances, the risk level of 5 is considered **Tolerable.**

It is our assessment that there is an acceptable level of aviation safety risk associated with the potential for operational limitations to affect aircraft operating crew, without obstacle lighting on the Project WTGs and Permanent WMTs in close proximity to a WTG, and with obstacle lighting for temporary WMTs installed prior to WTG installation and WMTs that are not in close proximity to a WTG.

Residual Risk	5 – Tolerable

Table 12 Effect of obstacle lighting on neighbours

Risk ID:	***4.*** **Effect of obstacle lighting on neighbours**

Discussion

This scenario discusses the consequential impact of a decision to install obstacle lighting on the wind farm.

Installation and operation of obstacle lighting on WTGs or WMT can have an effect on neighbours' visual amenity and enjoyment, specifically at night and in good visibility conditions.

If a proposed object or structure is identified as likely to be an obstacle, details of the relevant proposal must be referred to CASA for CASA to determine, in writing:

(a) whether the object or structure will be a hazard to aircraft operations

(b) whether it requires an obstacle light that is essential for the safety of aircraft operations.

In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.

Consequence

The worst credible effect of obstacle lighting specifically at night in good visibility conditions would be:

- Moderate site impact, minimal local impact, important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.

This would be a Moderate consequence.

Consequence	Moderate

Untreated Likelihood

The likelihood of moderate site impact, minimal local impact is Almost certain - the event is likely to occur many times (has occurred frequently).

Untreated Likelihood	Almost certain

Current Treatments

If the WTGs or WMTs will be higher than 150 m (492 ft) AGL, they must be regarded as obstacles unless CASA assess otherwise. In general, objects outside an OLS and above 100 m would require obstacle lighting unless CASA, in an aeronautical study, assesses it is shielded by another lit object or it is of no operational significance.

Level of Risk

The level of risk associated with an Almost certain likelihood of a Moderate consequence is 8.

Current Level of Risk	8 - Unacceptable

Risk Decision

A risk level of 8 is classified as Unacceptable: Immediate action required by either treating or avoiding risk. Refer to executive management.

Risk Decision	Unacceptable

Recommended Treatments

Not installing obstacle lighting would completely remove the source of the impact.

As per the above safety risk assessment, the provision of lighting for the WTGs and permanent WMTs is not necessary to provide an acceptable level of safety. For temporary WMTs installed prior to WTG installation and WMTs that are not in close proximity to a WTG, obstacle lighting is recommended to ensure visibility in low light and deteriorating atmospheric conditions.

If CASA or a planning authority decide that obstacle lighting is required there are impact reduction measures that can be implemented to reduce the impact of lighting on surrounding neighbours, including:

- reducing the number of WTGs with obstacle lights
- specifying an obstacle light that minimises light intensity at ground level
- specifying an obstacle light that matches light intensity to meteorological visibility
- mitigating light glare from obstacle lighting through measures such as baffling.

These measures are designed to optimise the benefit of the obstacle lights to pilots while minimising the visual impact to residents within and around the Project site.

Consideration may be given to activating the obstacle lighting via a pilot activated lighting system.

An option is to consider using Aircraft Detection Lighting Systems (referred in the United States Federal Aviation Administration Advisory Circular AC70/7460-1L CHG1 – *Obstruction Marking and Lighting*). Such a system would only activate the lights when an aircraft is detected in the near vicinity and deactivate the lighting once the aircraft has passed. This technology reduces the impact of night lighting on nearby communities and migratory birds and extends the life expectancy of obstruction lights.

Residual Risk

Not installing obstacle lights would clearly be an acceptable outcome to those potentially affected by visual impact.

If lighting is required, consideration of visual impact in the lighting design should enable installation of lighting that reduces the impact to neighbours.

The likelihood of a **Moderate** consequence remains **Likely**, with a resulting risk level of **7 – Tolerable**.

It is our assessment that visual impact from obstacle lights can be negated if they are not installed. If obstacle lights are to be installed, they can be designed so that there is an acceptable risk of visual impact to neighbours.

Residual Risk	**7 - Tolerable**

10. CONCLUSIONS

The key conclusions of this AIA are summarised as follows:

10.1. Planning considerations

The Project, as proposed, satisfies the planning provisions of Shire of Augusta Margaret River's Planning Scheme 2024, *Shire of Augusta-Margaret River's* Local Planning Strategy, City of Busselton's Local Planning Strategy 2014 and will not create incompatible intrusions or compromise the safety of existing airports and associated navigation and communication facilities.

10.2. Aviation Impact Statement

Based on the WTG layout and maximum blade tip height of 250 m AGL, the blade tip elevation of the highest WTG will not exceed 290 m AHD (951.4 ft AMSL) and:

- There is one certified airport located within 30 nm (56 km) from the Project - Busselton Airport (YBLN)
    - The WTGs will not impact on the OLS of YBLN
    - The WTGs will infringe the YBLN PANS-OPS surfaces of the following procedures but will not change flight paths or descent gradients
        - 25 nm MSA surfaces, which need to be increased by 100 ft to 2000 ft or sectorised to exclude the Wind Farm
        - GNSS Arrival Sector A approach surfaces.
            - The initial approach minimum altitude needs to be increased to 2000 ft.
            - The commencement altitude would need to be increased to meet the requirement of increasing the 25 nm MSA to 2000 ft.
- There are two uncertified aerodromes identified within 3 nm of the project site – Unknown Aerodrome 1 and Boley Aerodrome .
    - Unknown Aerodrome 1
        - The proposed wind farm would be considered potentially hazardous obstacles
        - When the wind blows from north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.
    - Boley Aerodrome
        - The proposed wind farm would be considered potentially hazardous obstacles
        - When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.
- The WTGs will not impact the Grid LSALT and any air route LSALT

- The project area is located within Class G airspace and outside all controlled airspace, Prohibited Restricted and Danger areas..
- The WTGs will not impact the aviation navigation facilities.
- The WTGs will not impact the closest ATC surveillance radar installations.
- The WTGs must be reported to CASA, and construction details must be provided to Airservices.
- The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

10.3. Aircraft operator characteristics

Aircraft will be required to navigate around the project site in low cloud conditions where aircraft need to fly at 500 ft AGL.

Aircraft flying at night in visual conditions are permitted to descend or climb to or from an appropriate minimum altitude only when within 3 nm of the aerodrome.

WTGs are generally not a safety concern to aerial agricultural operators.

The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

10.4. Hazard marking and lighting

The following conclusions apply to hazard marking and lighting:

- With respect to CASR Part 139 Division 139.E., the proposed WTGs must be reported to CASA.
- CASA will review the proposed WTG development and make a recommendation for obstacle lighting if required.
- With respect to marking of WTGs, a white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

10.5. Summary of risks

A summary of the level of residual risk associated with the Project with the Recommended Treatments implemented is provided in Table 13.

Table 13 Summary of Residual Risks

Identified Risk	*Consequence*	*Likelihood*	*Risk*	*Actions Required*
Aircraft collision with wind turbine generator (WTG)	Catastrophic	Unlikely	7	**Acceptable without obstacle lighting (ALARP).** Communicate details of the Project WTGs to local and regional operators and make arrangements to publish details in ERSA for surrounding

Identified Risk	*Consequence*	*Likelihood*	*Risk*	*Actions Required*
				aerodromes before, during and following construction.
Avoidance manoeuvring leads to ground collision	Catastrophic	Unlikely	7	**Acceptable without obstacle lighting (ALARP).** Communicate details of the Project WTGs and WMTs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes before, during and following construction.
Effect on crew	Minor	Possible	5	**Acceptable without obstacle lighting (ALARP)** Communicate details of the Project WTGs and WMTs to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes before, during and following construction.
Visual impact from obstacle lights	Moderate	Likely	7	**Acceptable without obstacle lighting** (zero risk of visual impact from obstacle lighting). If lights are installed, design to minimise impact.

11. RECOMMENDATIONS

Recommended actions resulting from the conduct of this assessment are provided below.

Notification and reporting

1. Details of WTGs exceeding 100 m AGL must be reported to CASA *as soon as practicable after forming the intention to construct or erect the proposed object or structure,* in accordance with CASR Part 139.165(1)(2).
2. 'As constructed' details of WTG coordinates and elevation should be provided to Airservices Australia, by submitting the form at this webpage: https://www.airservicesaustralia.com/wp-content/uploads/ATS-FORM-0085_Vertical_Obstruction_Data_Form.pdf to the following email address: vod@airservicesaustralia.com
3. Any obstacles above 100 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details:
    a. The planned operational timeframe and maximum height of the crane; and
    b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow.
4. Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations.
5. To facilitate the flight planning of aerial application operators, details of the Project, including the 'as constructed' location and height information of WTGs and overhead transmission lines should be provided to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.
6. The closest WTG is approximately 1.2 km away from the boundary of the Scott National Park. Liaison with Western Australia Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service will be required regarding the buffer area of the boundary.

Marking of WTGs

7. The rotor blades, nacelle and the supporting mast of the WTGs should be painted white, typical of most WTGs operational in Australia. No additional marking measures are required for WTGs.

Lighting of WTGs

8. CASA will determine whether obstacle lighting is recommended for the WTGs. It is not a formal requirement to light the WTGs.

Micrositing

9. Providing the micrositing is within 100 m of the planned WTGs it is not likely to result in a change in the maximum overall blade tip height of the Project. No further assessment is likely to be required from micrositing and the conclusions of this AIA would remain the same.

Aerial firefighting

10. The developer or operator should consider the guidance contained in the National Council for Fire and Emergency Services, Wind Farms and Bushfire Operations to ensure:

a. Liaison with the relevant fire and land management agencies is ongoing and effective

b. Access is available to the wind farm site by emergency services for on-ground firefighting operations

Triggers for review

11. Triggers for review of this risk assessment are provided for consideration:

    a. Prior to construction to ensure the regulatory framework has not changed

    b. Following any significant changes to the context in which the assessment was prepared

    c. Following any near miss, incident or accident associated with operations considered in this risk assessment.

ANNEXURES

1. References
2. Definitions
3. CASA regulatory requirements – Lighting and Marking
4. Risk Framework
5. WTG coordinates and heights
6. Approval Letter from the City of Busselton
7. Agreed presentation slide for DFES and DBCA Feedback – Aerial Firefighting

ANNEXURE 1 – REFERENCES

References used or consulted in the preparation of this report include:

- Airservices Australia
    - Aeronautical Information Package, effective 28 November 2024
    - Designated Airspace Handbook, effective 28 November 2024.
- Civil Aviation Safety Authority
    - Civil Aviation Regulations 1988 (CAR)
    - Civil Aviation Safety Regulations 1998 (CASR)
    - Advisory Circular (AC) 91-02 V1.2, *Guidelines for aeroplanes with MTOW not exceeding 5700 kg – suitable places to take off and land*, dated November 2022
    - Advisory Circular (AC) 91-10 v1.1: *Operations in the vicinity of non-controlled aerodromes*, dated November 2021
    - CASR Part 173 MOS– *Standards Applicable to Instrument Flight Procedure Design*, version 1.8, dated August 2022
    - CASR Part 139 MOS– *Aerodromes*, F2024C00161 registered 16/02/2024
    - Advisory Circular 139.E-01 v1.0—*Reporting of Tall Structures*, dated December 2021
    - Advisory Circular (AC) 139.E-05 v1.1 *Obstacles (including wind farms) outside the vicinity of a CASA certified aerodrome* (October 2022)
- City of Busselton's Local Planning Strategy, 15 October 2014
- Department of Infrastructure, Transport, Regional Development, Communications and Arts, Australian Government, National Airport Safeguarding Framework, Guideline D *Managing the Risk to aviation safety of wind turbine installations (wind farms)/Wind Monitoring Towers*, dated July 2012
- International Civil Aviation Organization (ICAO) Doc 8168 *Procedures for Air Navigation Services—Aircraft Operations* (PANS-OPS)
- ICAO Standards and Recommended Practices, Annex 14—*Aerodromes*
- OzRunways, dated October 2024
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines*
- Shire of Augusta-Margaret River's planning scheme, amended May 2024
- Shire of Augusta-Margaret River's Local Planning Strategy

ANNEXURE 2 – DEFINITIONS

Term	*Definition*
Aerial Agricultural Operator	Specialist pilot and/or company who are required to have a commercial pilot's licence, an agricultural rating and a chemical distributor's licence
Aerodrome	A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure, and surface movement of aircraft.
Aerodrome facilities	Physical things at an aerodrome which could include: a. the physical characteristics of any movement area including runways, taxiways, taxilanes, shoulders, aprons, primary and secondary parking positions, runway strips and taxiway strips; b. infrastructure, structures, equipment, earthing points, cables, lighting, signage, markings, visual approach slope indicators.
Aerodrome reference point (ARP)	The designated geographical location of an aerodrome.
Aeronautical Information Publication (AIP)	Details of regulations, procedures, and other information pertinent to the operation of aircraft
Aeronautical Information Publication En-route Supplement Australia (AIP ERSA)	Contains information vital for planning a flight and for the pilot in flight as well as pictorial presentations of all licensed aerodromes
Civil Aviation Safety Regulations 1998 (CASR)	Contain the mandatory requirements in relation to airworthiness, operational, licensing, enforcement.
Instrument meteorological conditions (IMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minimum specified for visual meteorological conditions.
Manual of Standards (MOS)	The means CASA uses in meeting its responsibilities under the Act for promulgating aviation safety standards
National Airports Safeguarding Framework (NASF)	The Framework has the objective of developing a consistent and effective national framework to safeguard both airports and communities from inappropriate on and off airport developments.
Obstacles	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

Term	*Definition*
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway strip	A defined area including the runway and stopway, if provided, intended: a. to reduce the risk of damage to aircraft running off a runway; and b. to protect aircraft flying over it during take-off or landing operations.
Safety Management System	A systematic approach to managing safety, including organisational structures, accountabilities, policies and procedures.

ANNEXURE 3 – CASA REGULATORY REQUIREMENTS – LIGHTING AND MARKING

In considering the need for aviation hazard lighting and marking, the applicable regulatory context was determined.

The Civil Aviation Safety Authority (CASA) regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Regulations 1988 (CAR), Civil Aviation Safety Regulations 1998 (CASR) and associated Manual of Standards (MOS) and other guidance material. Relevant provisions are outlined in further detail in the following section.

Civil Aviation Safety Regulations 1998, Part 139—Aerodromes

CASR 139.165 requires the owner of a structure (or proponents of a structure) that will be 100 m or more above ground level to inform CASA. This must be given in written notice and contain information on the proposal, the height and location(s) of the object(s) and the proposed timeframe for construction. This is to allow CASA to assess the effect of the structure on aircraft operations and determine whether the structure will be hazardous to aircraft operations.

Manual of Standards Part 139—Aerodromes

Chapter 9 sets out the standards applicable to Visual Aids Provided by Aerodrome Lighting.

Section 9.30 provides guidance on Types of Obstacle Lighting and Their Use:

1. *The following types of obstacle lights must be used, in accordance with this MOS, to light hazardous obstacles:*
    a. *low-intensity;*
    b. *medium-intensity;*
    c. *high-intensity;*
    d. *a combination of low, medium or high-intensity.*
2. *Low-intensity obstacle lights:*
    a. *are steady red lights; and*
    b. *must be used on non-extensive objects or structures whose height above the surrounding ground is less than 45 m.*
3. *Medium-intensity obstacle lights must be:*
    a. *flashing white lights; or*
    b. *flashing red lights; or*
    c. *steady red lights.*

    Note CASA recommends the use of flashing red medium-intensity obstacle lights.
4. *Medium-intensity obstacle lights must be used if:*
    a. *the object or structure is an extensive one; or*

b. *the top of the object or structure is at least 45 m but not more than 150 m above the surrounding ground; or*

c. *CASA determines in writing that early warning to pilots of the presence of the object or structure is desirable in the interests of aviation safety.*

Note For example, a group of trees or buildings is regarded as an extensive object.

5. *For subsection (4), low-intensity and medium-intensity obstacle lights may be used in combination.*

6. *High-intensity obstacle lights:*

a. *must be used on objects or structures whose height exceeds 150 m; and*

b. *must be flashing white lights.*

7. *Despite paragraph (6) (b), a medium-intensity flashing red light may be used if necessary, to avoid an adverse environmental impact on the local community.*

Sections 9.31 (8) and (9) provide guidance on obstacle lighting specific to wind farms:

8. *Subject to subsection (9), for wind turbines in a wind farm, medium-intensity obstacle lights must:*

a. *mark the highest point reached by the rotating blades; and*

b. *be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, but such that intervals between lit turbines do not exceed 900 m; and*

c. *all be synchronised to flash simultaneously; and*

d. *be seen from every angle in azimuth.*

Note: This is to prevent obstacle light shielding by the rotating blades of a wind turbine and may require more than 1 obstacle light to be fitted.

9. *If it is physically impossible to light the rotating blades of a wind turbine:*

a. *the obstacle lights must be placed on top of the generator housing; and*

b. *a note must be published in the AIP-ERSA indicating that the obstacle lights are not at the highest position on the wind turbines.*

10. *If the top of an object or structure is more than 45 m above:*

a. *the surrounding ground (ground level); or*

b. *the top of the tallest nearby building (building level); then the top lights must be medium-intensity lights, and additional low-intensity lights must be:*

c. *provided at lower levels to indicate the full height of the structure; and*

d. *spaced as equally as possible between the top lights and the ground level or building level, but not so as to exceed 45 m between lights.*

Advisory Circular 139.E-01 v1.0—Reporting of Tall Structures

In Advisory Circular (AC) 139.E-01 v1.0—Reporting of Tall Structures, CASA provides guidance to those

authorities and persons involved in the planning, approval, erection, extension or dismantling of tall structures so that they may understand the vital nature of the information they provide.

Airservices Australia has been assigned the task of maintaining a database of tall structures. RAAF and Airservices Australia require information on structures which are:

a) 30 metres or more above ground level—within 30 kilometres of an aerodrome; or

b) 45 metres or more above ground level elsewhere for the RAAF, or

c) 30 m or more above ground level elsewhere for Airservices Australia.

The purpose of notifying Airservices Australia of these structures is to enable their details to be provided in aeronautical information databases and maps/charts etc used by pilots, so that the obstacles can be avoided.

The proposed WTGs must be reported to Airservices Australia. This action should occur once the final layout after micrositing is confirmed and prior to construction.

International Civil Aviation Organisation

Australia, as a contracting State to the International Civil Aviation Organisation (ICAO) and signatory to the Chicago Convention on International Civil Aviation (the Convention), has an obligation to implement ICAO's standards and recommended practices (SARPs) as published in the various annexes to the Convention.

Annex 14 to the Convention — *Aerodromes, Volume 1,* Section 6.2.4 provides SARPs for the obstacle lighting and marking of WTGs, which is copied below:

> *6.2.4 Wind turbines*
>
> *6.2.4.1 A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.*
>
> *Note 1. — Additional lighting or markings may be provided where in the opinion of the State such lighting or markings are deemed necessary.*
>
> *Note 2. — See 4.3.1 and 4.3.2*
>
> *Markings*
>
> *6.2.4.2 Recommendation. — The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.*
>
> *Lighting*
>
> *6.2.4.3 Recommendation. — When lighting is deemed necessary, in the case of a wind farm, i.e. a group of two or more wind turbines, the wind farm should be regarded as an extensive object and the lights should be installed:*
>
> > *a) to identify the perimeter of the wind farm;*
> >
> > *b) respecting the maximum spacing, in accordance with 6.2.3.15, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;*
> >
> > *c) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;*
> >
> > *d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and*
> >
> > *e) at locations prescribed in a), b) and d), respecting the following criteria:*

i) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium-intensity lighting on the nacelle should be provided;

ii) for wind turbines from 150 m to 315 m in overall height, in addition to the medium-intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light. The lights should be installed to assure that the output of either light is not blocked by the other; and

iii) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low-intensity Type E lights, as specified in 6.2.1.3, should be provided. If an aeronautical study shows that low-intensity Type E lights are not suitable, low-intensity Type A or B lights may be used.

Note. — The above 6.2.4.3 e) does not address wind turbines of more than 315 m of overall height. For such wind turbines, additional marking and lighting may be required as determined by an aeronautical study.

6.2.4.4 Recommendation. — The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

6.2.4.5 Recommendation. — Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with 6.2.4.3 e) or as determined by an aeronautical study.

As referenced in Section 6.2.4.3(e)(iii), Section 6.2.1.3 is copied below:

6.2.1.3 The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

As referenced in Section 6.2.4.3(b), Section 6.2.3.15 is copied below:

6.2.3.15 Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

a) low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m; and

b) medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

Section 4.3 Objects outside the OLS states the following:

4.3.1 Recommendation.— Arrangements should be made to enable the appropriate authority to be consulted concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height established by that authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.

4.3.2 Recommendation. — In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded

as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.

Note. — This study may have regard to the nature of operations concerned and may distinguish between day and night operations.

ICAO Doc 9774 Manual on Certification *of Airports* defines an aeronautical study as:

An aeronautical study is a study of an aeronautical problem to identify potential solutions and select a solution that is acceptable without degrading safety.

Light characteristics

If obstacle lighting is required, installed lights should be designed according to the criteria set out in the applicable regulatory material and taking CASA's recommendations into consideration in the case that CASA has reviewed this risk assessment and provided recommendations.

The characteristics of the obstacle lights should be in accordance with the applicable standards in Part 139 MOS 2019.

The characteristics of low and medium intensity obstacle lights specified in Part 139 MOS 2019, Chapter 9, are provided below.

CASR Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.32 outlines Characteristics of Low Intensity Obstacle Lights.

1. *Low-intensity obstacle lights must have the following:*
    a. *fixed lights showing red;*
    b. *a horizontal beam spread that results in 360-degree coverage around the obstacle;*
    c. *a minimum intensity of 100 candela (cd);*
    d. *a vertical beam spread (to 50% of peak intensity) of 10 degrees;*
    e. *a vertical distribution with 50 cd minimum at +6 degrees and +10 degrees above the horizontal;*
    f. *not less than 10 cd at all elevation angles between –3 degrees and +90 degrees above the horizontal.*

    Note: The intensity requirement in paragraph (c) may be met using a double-bodied light fitting. CASA recommends that double-bodied light fittings, if used, should be orientated so that they show the maximum illuminated surface towards the predominant, or more critical, direction of aircraft approach.

2. *To indicate the following:*
    a. *taxiway obstacles;*
    b. *unserviceable areas of the movement area; low-intensity obstacle lights must have a peak intensity of at least 10 cd.*

Part 139 MOS 2019 Chapter 9 Division 4 – Obstacle Lighting section 9.33 outlines Characteristics of Medium Intensity Obstacle Lights.

1. *Medium-intensity obstacle lights must:*

a. *be visible in all directions in azimuth; and*

b. *if flashing — have a flash frequency of between 20 and 60 flashes per minute.*

2. *The peak effective intensity of medium-intensity obstacle lights must be 2 000 ☐ 25% cd with a vertical distribution as follows:*

a. *for vertical beam spread — a minimum of 3 degrees;*

b. *at -1-degree elevation — a minimum of 50% of the lower tolerance value of the peak intensity;*

c. *at 0 degrees elevation — a minimum of 100% of the lower tolerance value of the peak intensity.*

3. *For subsection (2), vertical beam spread means the angle between 2 directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the peak intensity.*

4. *If, instead of obstacle marking, a flashing white light is used during the day to indicate temporary obstacles in the vicinity of an aerodrome, the peak effective intensity of the light must be increased to 20 000 ± 25% cd when the background luminance is 50 cd/m² or greater.*

Visual impact of night lighting

Annex 14 Section 6.2.4 and Part 139 MOS 2019 Chapter 9 are specifically intended for WTGs and recommends that medium intensity lighting is installed.

Generally accepted considerations regarding minimisation of visual impact are provided below for consideration in this aeronautical study:

- To minimise the visual impact on the environment, some shielding of the obstacle lights is permitted, provided it does not compromise their operational effectiveness;
- Shielding may be provided to restrict the downward component of light to either, or both, of the following:
    - such that no more than 5% of the nominal intensity is emitted at or below 5 degrees below horizontal; and
    - such that no light is emitted at or below 10 degrees below horizontal;
- If a light would be shielded in any direction by an adjacent object or structure, the light so shielded may be omitted, provided that such additional lights are used as are necessary to retain the general definition of the object or structure.
- If flashing obstacle lighting is required, all obstacle lights on a wind farm should be synchronised so that they flash simultaneously; and
- A relatively small area on the back of each blade near the rotor hub may be treated with a different colour or surface treatment, to reduce reflection from the rotor blades of light from the obstacle lights, without compromising the daytime visibility of the overall WTG.

Marking of WTGs

ICAO Annex 14 Vol 1 Section 6.2.4.2 recommends that the rotor blades, nacelle and upper 2/3 of the supporting mast of the WTGs should be painted a shade of white, unless otherwise indicated by an aeronautical study.

It is generally accepted that a shade of white colour will provide sufficient contrast with the surrounding environment to maintain an acceptable level of safety while lowering visual impact to the neighbouring residents.

ANNEXURE 4 – RISK FRAMEWORK

A risk management framework is comprised of likelihood and consequence descriptors, a matrix used to derive a level of risk, and actions required of management according to the level of risk.

The risk assessment framework used by Aviation Projects has been developed in consideration of ISO 31000:2018 *Risk management—Guidelines* and the guidance provided by CASA in its Safety Management System (SMS) for Aviation guidance material, which is aligned with the guidance provided by the International Civil Aviation Organization (ICAO) in Doc 9589 *Safety Management Manual*, Third Edition, 2013. Doc 9589 is intended to provide States (including Australia) with guidance on the development and implementation of a State Safety Programme (SSP), in accordance with the International SARPs, and is therefore adopted as the primary reference for aviation safety risk management in the context of the subject assessment.

Section 2.1 of the ICAO Doc 9589 *The concept of safety* defines safety as follows [author's underlining]:

> *2.1.1 Within the context of aviation, safety is "the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management."*

Likelihood

Likelihood is defined in ISO 31000:2018 as the chance of something happening. Likelihood descriptors used in this report are as indicated in Table 1.

Table 1 Likelihood Descriptors

No	*Descriptor*	*Description*
1	Rare	It is almost inconceivable that this event will occur
2	Unlikely	The event is very unlikely to occur (not known to have occurred)
3	Possible	The event is unlikely to occur, but possible (has occurred rarely)
4	Likely	The event is likely to occur sometimes (has occurred infrequently)
5	Almost certain	The event is likely to occur many times (has occurred frequently)

Consequence

Consequence is defined as the outcome of an event affecting objectives, which in this case is the safe and efficient operation of aircraft, and the visual amenity and enjoyment of local residents.

Consequence descriptors used in this report are as indicated in Table 2.

Table 2 Consequence Descriptors

No	Descriptor	People Safety	Property/Equipment	Effect on Crew	Environment
1	Insignificant	Minor injury – first aid treatment	Superficial damage	Nuisance	No effects or effects below level of perception
2	Minor	Significant injury – outpatient treatment	Moderate repairable damage – property still performs intended functions	Operations limitation imposed. Emergency procedures used.	Minimal site impact – easily controlled. Effects raised as local issues, unlikely to influence decision making. May enhance design and mitigation measures.
3	Moderate	Serious injury - hospitalisation	Major repairable damage – property performs intended functions with some short-term rectifications	Significant reduction in safety margins. Reduced capability of aircraft/crew to cope with conditions. High workload/stress on crew. Critical incident stress on crew.	Moderate site impact, minimal local impact, and important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.
4	Major	Permanent injury	Major damage rendering property ineffective in achieving design functions without major repairs	Large reduction in safety margins. Crew workload increased to point of performance decrement. Serious injury to small number of occupants. Intense critical incident stress.	High site impact, moderate local impact, important consideration at state level. Minor long-term cumulative effect. Design and mitigation measures unlikely to remove all effects.
5	Catastrophic	Multiple Fatalities	Damaged beyond repair	Conditions preventing continued safe flight and landing. Multiple deaths with loss of aircraft	Catastrophic site impact, high local impact, national importance. Serious long-term cumulative effect. Mitigation measures unlikely to remove effects.

Risk matrix

The risk matrix, which correlates likelihood and consequence to determine a level of risk, used in this report is shown in Table 3.

Table 3 Risk Matrix

		CONSEQUENCE				
		INSIGNIFICANT 1	MINOR 2	MODERATE 3	MAJOR 4	CATASTROPHIC
LIKELIHOOD	ALMOST CERTAIN 5	6	7	8	9	10
	LIKELY 4	5	6	7	8	9
	POSSIBLE 3	4	5	6	7	8
	UNLIKELY 2	3	4	5	6	7
	RARE 1	2	3	4	5	6

Actions required

Actions required according to the derived level of risk are shown in Table 4.

Table 4 Actions Required

8-10	**Unacceptable Risk**	Immediate action required by either treating or avoiding risk. Refer to executive management.
5-7	**Tolerable Risk**	Treatment action possibly required to achieve As Low As Reasonably Practicable (ALARP) - conduct cost/benefit analysis. Relevant manager to consider for appropriate action.
0-4/5	**Broadly Acceptable Risk**	Managed by routine procedures, and can be accepted with no action.

ANNEXURE 5 – PROJECT TURBINE COORDINATES AND HEIGHTS

Reference file: email received from Wilson Mandisodza on 30 July 2024

Easting - MGA2020, Zone 50	*Northing – MGA2020, Zone 50*	*Base Elevation (m AHD)*	*Tip Height (m AGL)*	*Max Height (m AHD)*	*Max Height (ft AMSL)*
343,193	6,207,619	30	250	280	918.64
340,893	6,210,691	25.2	250	275.2	902.89
343,579	6,209,172	30	250	280	918.64
340,963	6,209,853	22.7	250	272.7	894.69
344,919	6,209,443	30	250	280	918.64
341,919	6,215,415	40	250	290	951.44
343,230	6,211,314	31	250	281	921.92
343,609	6,208,448	30	250	280	918.64
343,989	6,214,377	40	250	290	951.44
341,439	6,211,432	30	250	280	918.64
341,140	6,216,362	40	250	290	951.44
345,139	6,211,672	30	250	280	918.64
341,749	6,209,113	21.4	250	271.4	890.42
345,089	6,214,695	36.8	250	286.8	940.94
340,789	6,215,512	40	250	290	951.44
345,296	6,209,961	29.2	250	279.2	916.01
343,100	6,213,973	38.7	250	288.7	947.18
342,822	6,208,140	30	250	280	918.64
342,469	6,210,422	30	250	280	918.64
343,658	6,211,892	32.4	250	282.4	926.51

ANNEXURE 6 – APPROVAL LETTER FROM THE CITY OF BUSSELTON

City of Busselton
Geographe Bay

Contact: Jennifer May
Jennifer.may@busselton.wa.gov.au

13 March 2025

Airservices Australia
Airport Development & Protection
Via Email

To Whom it May Concern

RE: REQUEST FOR APPROVAL WA-WF-059 - BEENUP WF- REF - 105603-03 CONSULTATION

The City of Busselton acknowledges receipt of the AIA of the Beenup WF and authorises Airservices Australia to make the required changes to the 25 nm MSA and GNSS Arrival.

Yours sincerely

Jennifer May
AIRPORT MANAGER

All Communications to:
T (08) 9781 0444
E city@busselton.wa.gov.au
Locked Bag 1 Busselton WA 6280
www.busselton.wa.gov.au

Where environment, lifestyle and opportunity thrive.

ANNEXURE 7 – AGREED PRESENTATION SLIDE FOR DFES AND DBCA FEEDBACK – AERIAL FIREFIGHTING



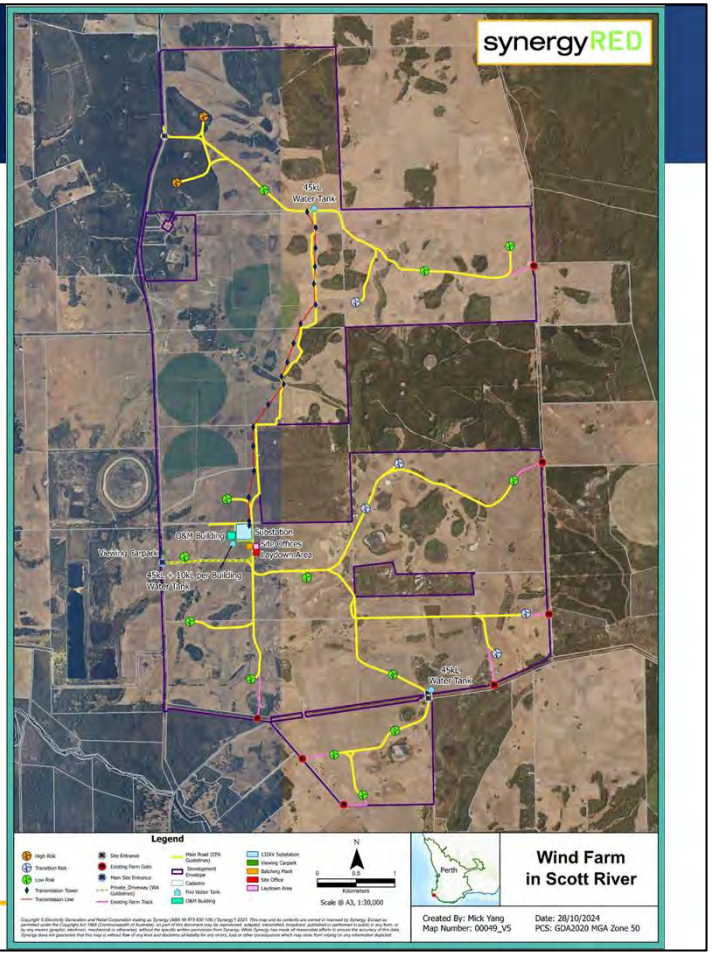
Potential wind farm – Scott River

Proposed facility

- Up to 20 turbines
- 132 kV transmission line, connection into existing Manjimup to Beenup 132 kV line
- Meteorological mast(s) and Substation
- Operations and maintenance (O&M) building / workshop
- Access tracks suitable for firefighting appliances
- Firewater tank(s)

Guidelines referenced

- SPP 3.7 Planning in bushfire prone areas
- CFA (2023) Design Guidelines and Model Requirements: Renewable Energy Facilities
- AFAC (2018) Guideline - Wind farms and bushfire operations



Department of Fire and Emergency Services (DFES)

synergyRED

Meeting summary - 17 February 2025

- **DFES - Ray Buchan – Superintendent Aviation Services; Steven Sartain – Manager Emergency Rescue and Helicopter Services**
- **Synergy – Chris Binstead, Emma Jones and Wilson Mandisodza**
- Aerial fire suppression activities are not prohibited within wind farms. There are currently no procedures specific to aerial fire suppression operations around wind farms.
- Aerial firefighting around wind farms is not treated any differently to other aerial firefighting i.e. the same risk assessment processes are undertaken to ensure the aerial fire suppression operation can be undertaken safely as for all fires.
- Aerial operations are via contractors, and they will have their own Standard Operating Procedures and risk assessment processes that form part of their Safety Management System.
- Pilots will take the wind turbines into consideration in their risk assessments and will make a determination on the day whether it is safe to operate inside the wind farm envelope.
- If the wind farm is operating during a bushfire, suppression operations will be modified or suspended.
- If the wind farm is able to be shutdown / paused remotely (i.e. blades moving at approx. 1 RPM), then suppression operations will be considered based on a risk assessment and conditions on the day.
- DFES acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner. However, pausing turbines to approx. 1 RPM is recommended.
- DFES will prioritise static fresh water supplies over salt or brackish water i.e. preference is to not take salt water for firefighting
- While aerial firefighting only operates during the day, rescue services operate day and night – 24/7/365
- DFES recommends medium intensity lighting on wind turbines for rescue purposes due to operating at night. Refer to 2017 NSW CASA guidance.
- Emphasised the significance of operator and DFES/DBCA Incident Controllers in the decision-making process for firefighting operations near wind farms.
- Provision of information regarding tall objects within the wind farm at the point of construction is critical in being able to assess the risk during a bushfire emergency.
- Emphasised importance of local/regional involvement in the planning and development of the wind farm.
- Emergency Response Plan to be developed and shared with DFES. Must have contact details for wind farm and available 24/7 to first responders and Incident Controllers.

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Department of Biodiversity, Conservation and Attractions (DBCA)

synergyRED

Meeting held 24 February 2025

- DBCA - Erin Tassel – Fire Aviation Manager
- Synergy – Chris Binstead, Emma Jones and Wilson Mandisodza
- DBCA and DFES share similar fire suppression contractors.
- Aerial fire suppression and pest control operate under daytime VFR (visual flight rules). No rescue services operated by DBCA.
- Aerial fire suppression will consider the risk on the day and location, will be at the pilot's discretion. Dispatch operators will always flag the coordinates of any obstacles / tall objects (such as wind turbines).
- DBCA also acknowledges that due to the rapid onset of bushfires it is very difficult to achieve a Y position, it is assumed that it cannot be achieved in a timely manner.
- There are currently no procedures specific to wind farms.
- Need to confirm secondary airstrips have been assessed.
- Feedback from DBCA forum with Chief pilots is that there is no special consideration for wind farms but as the decision to is at the pilot's discretion.

Pre flight risk assessment (DFES)

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DFES and DBCA Process

- Operator and incident control decision making operation
- Pilot's pre-briefing
- Risk assessment by operator at site taking into account the conditions on the day
- AOC to determine operating procedures
- DFES and DBCA procedures may not be the same as Operator procedures.

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Shutdown of turbines in the event of a fire

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DFES Process

- Synergy is not opposed to shutting down the wind farm if required (i.e. pausing the turbine blades)
- Synergy can reduce the ????
- Typically, a wind farm would continue to operate based on the guidance from AEMO, Western Power and other bodies.
- Decision making needs to include DFES as the decisions will influence operator and incident control decision making
- DFES open to some turbines being shut down or sector management if required.

Synergy's commitments

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- Synergy will notify CASA, Air Services Australia, DBCA and DFES notification of all turbine locations
- Turbines at least 300 metres apart
- Meteorological masts and guy wires to be marked to ensure visibility to aircraft as per CASA regulations
- Synergy will investigate lighting for wind turbines (for rescue helicopters)
- Synergy will not oppose shutting down the wind farm in the case of an emergency
- Synergy will provide data in the preferred format for DBCA and DFES to inform their risk assessment.
- Synergy will provide opportunities for site familiarisation and orientations
- Should the project go ahead, the preferred turbine technology will have a fire suppression system.
- Synergy to provide a detailed BMP / EMP which includes emergency contacts



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Next steps
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Next steps

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- Synergy will obtain feedback from DBCA's forum with the Chief Pilots – this can include Chief Pilots for DFES Air Operations contractors as there are combined DFES / DBCA Chief Pilots meetings
- Synergy will finalise the BMP
- If any additional detail or differences arise, Synergy to organise a meeting between Synergy, DFES and DBCA.



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AVIATION PROJECTS

(+61) 7 3371 0788
enquiries@aviationprojects.com.au

www.aviationprojects.com.au

Attachment 4 (RSD) - Appendix R

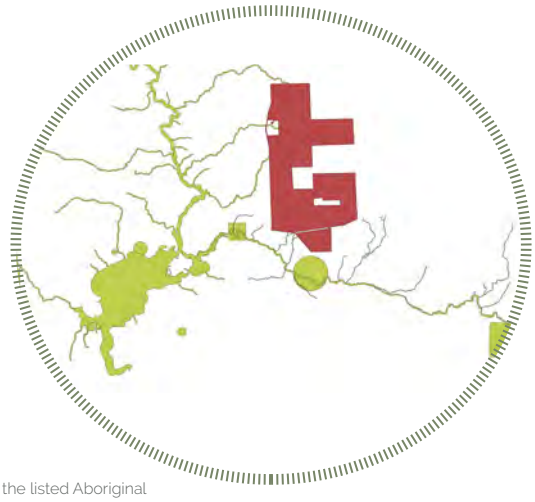
Social Values Assessment

SYNERGYRED SCOTT RIVER WIND FARM FEASIBILITY

SOCIAL VALUES ASSESSMENT REPORT

January 2025 Update

ID.



The adjacent figure shows in green the listed Aboriginal Heritage Sites, 2024 and the waterways that mark the ancient borders of this country.
Source: DPLH Heritage Data QGIS

We acknowledge the Whadjuk people of the Noongar nation as the Traditional Owners of this place and pay our respects to the elders past and present who have cared for this country and its people, and upon which we have the opportunity to learn and work.

The area for this study sits on the traditional lands of the Wardandi and Bibulumin/Piblemen Peoples of the Noongar Nation. We acknowledge and pay our respects to the elders of these peoples and acknowledge their ongoing connection to these lands and waters.

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1. BACKGROUND

Synergy Renewable Energy Developments (SynergyRED), a wholly owned subsidiary of Synergy, is in the process of investigating and developing future renewable energy assets with the intent of helping the WA Government to transition to net zero emissions by 2050. SynergyRED has delivered a range of renewable projects for both Synergy and Bright Energy Investments (BEI)*, including the Warradarge Wind Farm and Greenough River Solar Farm expansion.

In the lead up to the retirement of the Collie Power Station in late 2027 and Muja Power Station in 2029, SynergyRED is investigating the feasibility of developing a wind farm in Scott River, Western Australia, with the intent to connect to the South-West Interconnected System (SWIS).

Electricity from the proposed wind farm would feed into the Beenup substation in Scott River, which connects to homes and businesses in Augusta, Scott River, Molloy Island, Alexandra Bridge, Karridale, Hamelin Bay, East Augusta, and Forest Grove. The remaining electricity from the proposed wind farm would flow along the transmission line to Manjimup, Collie and the rest of the energy grid.

This proposal would see the construction and operation of up to 20 wind turbine generators up to a final tip height of 250m, and associated infrastructure.

The area chosen sits on the traditional lands of the Wardandi and Bibulumin/Piblemen Peoples of the Noongar Nation. The site is in proximity to the recently rehabilitated BHP Beenup Titanium Minerals site, in the catchment of the Scott and Blackwood rivers, and in cattle grazing, and dry land dairy farming areas.

The low-lying Scott Coastal Plain is a gently undulating landscape with a high winter water table and sandy/duplex soils that serve to create a Palusplain and series of scattered wetlands through the area.

The findings of this report are based on the project description of the proposed wind farm in Scott River provided by SynergyRED.

Considerable work has been done by BHP, Syrinx Environmental and several leading universities to define the "stocks of natural assets" in Scott River. These references have been drawn up to provide some initial context into what the likely impacts, challenges and opportunities maybe for this proposed project in this location.

Further secondary research included desktop analysis of State Government registers, DataWA GIS Databases, published reports and ABS Census Data 2021.

This analysis is supplemented by a series of qualitative in-depth interviews with community members representing local organisations and subject matter experts, and the findings of a publicly available digital survey. This survey was also offered in hard copy at all SynergyRED community consultation sessions.

This report summarises the findings of the independent Social Values Assessment, in line with global best practice and Synergy's Social Value Framework, for the proposed wind farm in Scott River.

2. STUDY OBJECTIVES

In March 2024, SynergyRED commissioned Place.ID to undertake a Social Values Assessment to deliver to the intent of Synergy's Social Value Framework and to support the engagement and decision making for the feasibility stage of the proposed wind farm in Scott River.

The Social Values Assessment Process will help guide future engagement (sharing and listening) and understanding of the local and regional context (as illustrated in Figure 1a). These are crucial steps to establish a baseline for the social licence throughout the life of the project.

The objectives of the Scott River Wind Farm Social Values Assessment are to:

- summarise research and evidence gathered to identify key social impacts (both negative and positive) that may result from the proposal, specifically:
  - community and stakeholder engagement perceptions
  - workforce management
  - housing and accommodation
  - local business and industry procurement
  - community health & wellbeing
- prepare a consistent, comprehensive and suitable summary of social values suitable for the anticipated regulatory submissions.

*'BEI is a joint venture between Synergy, Construction and Building Unions Superannuation, and DIF Capital Partners.'

3. METHODOLOGY

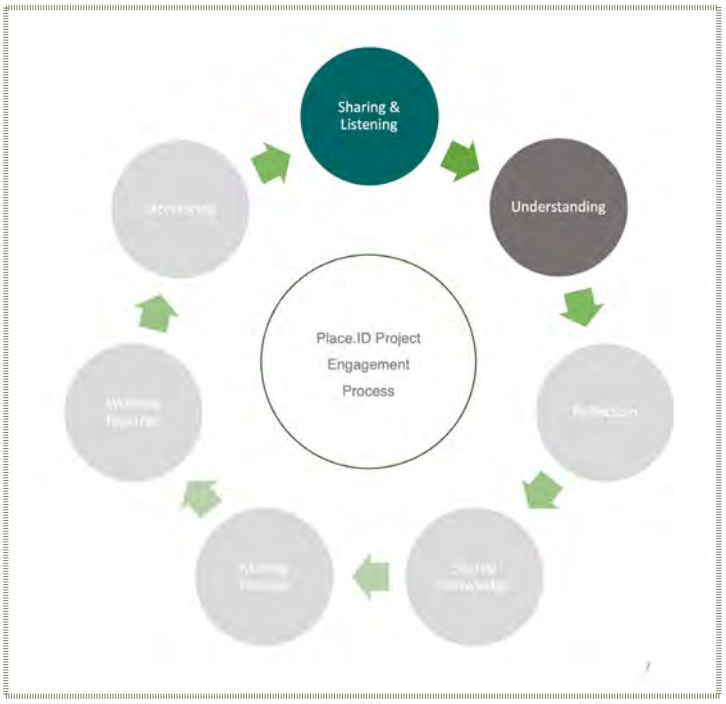


Figure 1a. Place.ID's Project Engagement Process

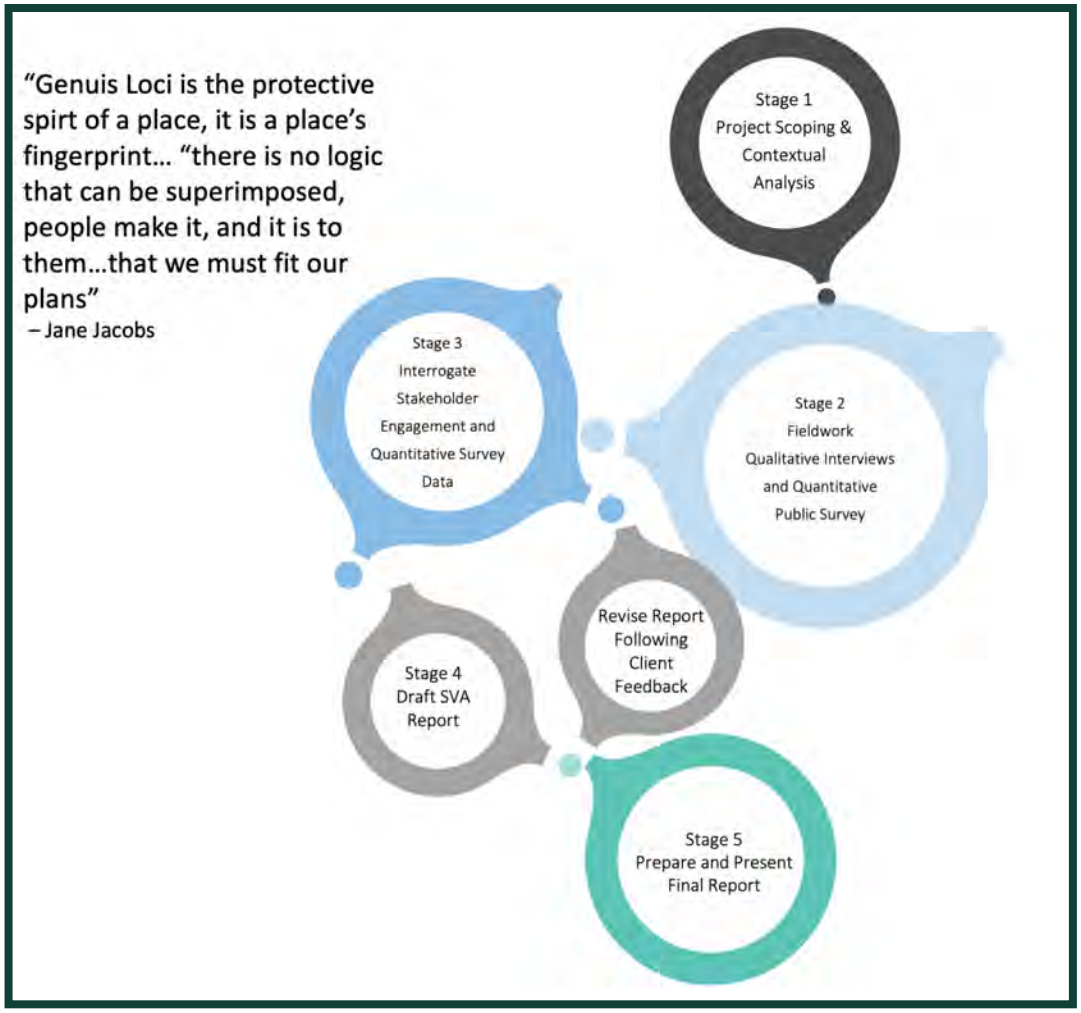


Figure 1b:. Project Methodology

The methodology for this social values assessment uses qualitative and quantitative research techniques, supported by secondary research, to provide a suitable evidence base for decision-making.

The stages undertaken across this project are outlined in Figure 1b and described on the following pages.

3.1. Determine the Context

An initial site orientation and a community profile update (including ABS Census 2021 profiling, geospatial assessment, secondary research, project and qualitative data) was conducted to set the context for the assessment. This provided valuable demographic data that will help determine actual community impacts (illustrated in Appendix 2). This also served as a useful comparison to how the various stakeholders and community define themselves and their perceived needs.

A workshop was also held with the SynergyRED project team leaders to gauge project understanding, status, identified opportunities and constraints, and define the project's key stakeholders and associated communities within the study area.

3.2. Engagement

An engagement strategy was established, in close consultation with SynergyRED and their representatives, to actively recruit and involve property owners and represented stakeholders in the study. This included identification of community leaders and relevant associations, stakeholder mapping, collateral development, and channel confirmation to introduce the study and invite participation.

The stakeholder mapping exercise was conducted of part of the initial scoping workshop to ensure there was a diversity in opinion, background, interests and landholdings. Additional stakeholders who specifically asked to be interviewed for the study were also included. A full list of study invitees and participants is attached as Appendix 1.

A publicly accessible digital survey was developed and ran live from 15 March 2024 to 30 April 2024. A QR code linking to this survey was promoted online, through social media, at all SynergyRED community consultations, to the project's email database, and on a project brochure that was sent to 5,000 homes in the Augusta-Scott River area. The survey was also available in hard copy format at all SynergyRED community consultation sessions.

Engagement in this context related to engagement around the Social Values Assessment component of work (in line with Place.ID's project engagement process (illustrated in Figure 1a), and was established to complement the existing and ongoing engagement work being conducted by SynergyRED.

3.3. The Survey Instruments

A qualitative in-depth discussion guide (attached in Appendix 3) and a publicly available quantitative survey (attached in Appendix 4) was designed to incorporate a set series of identified social value indicators relevant to this proposed project. These were developed following a review of relevant national guidelines, the SynergyRED's Project Leaders workshop, context analysis, desktop research on likely project impacts, and consideration of Synergy's Social Value Framework.

Questions within the survey instruments focused on delivering a holistic and comprehensive assessment of how perceptions around the energy transition, the importance placed on certain social value indicators and confidence in SynergyRED's ability to deliver benefit or mitigate any potential impacts to drive project decisions into the future.

These questions were complemented by a digital geo-spatial questionnaire tool, which was set up to help define nodes/clusters of perceived values and likely impacts and benefits.

3.4. Fieldwork

Following stakeholder identification and mapping, a cross selection of stakeholders was identified to ensure a representative viewpoint of the identified indicators could be achieved. A list of 30 stakeholder organisations were determined and approached to involve a key spokesperson from each representative group, with the objective of achieving a total of 20 in-depth interviews (IDIs).

A total of 20 in-depth interviews were achieved from the initial sample of 30. In addition, a workshop meeting was held with 8 volunteer fire brigade members (representing a range of landowners and local business leaders).

The quantifiable perception survey achieved a statistically significant sample at the 95% confidence level, with a less than 5% margin of error. This framework allows for future tracking of perception data and comparison over time. A total of 257 stakeholders visited the survey site, with a statistically significant response rate of 125 fully completed surveys achieved. Up to a total 156 respondents completed the overall project ratings and indicator questions, and then opted out of completing the full survey. This provided a confidence interval at 0.074 with a standard error of 0.04.

The publicly available survey was complemented by an observational study of the proposed site location and study area during the week starting 22 April 2024.

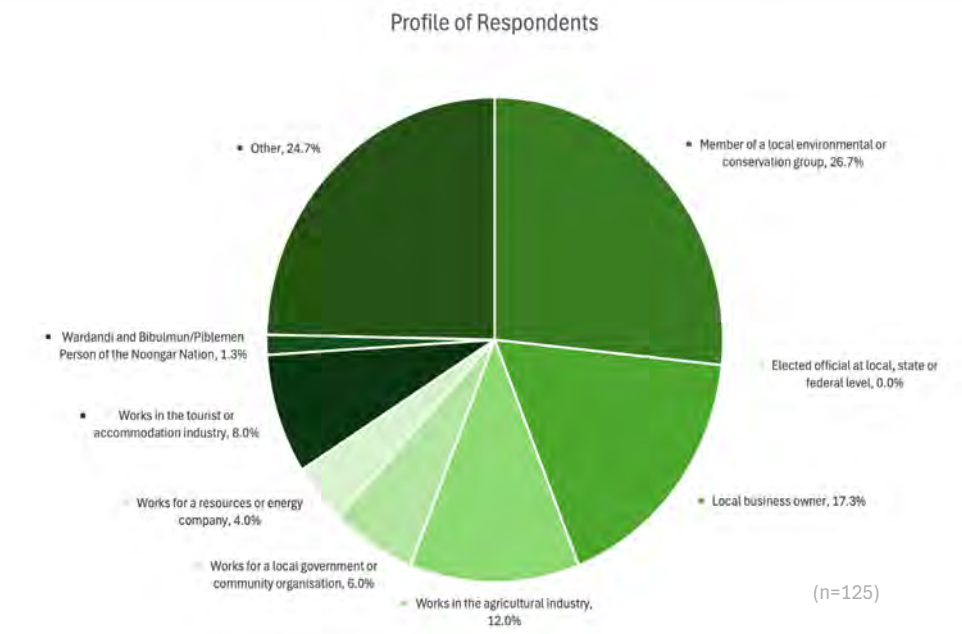
3.5. Analysis

Once all aspects of the fieldwork were complete, qualitative and quantitative analysis was undertaken using appropriate data entry, coding and analysis processes, as guided by the Market Research Society of Australia, IPA2, Social Impact Assessment Guidelines QLD and the Department of Planning and Environment NSW.

This analysis included identification of the social values associated with the study area, in relation to the proposed wind farm in Scott River. As this social values assessment is established as an initial baseline, the primary purpose of the considerations is designed to inform project decisions during the feasibility stage, recognising that many of the project decisions and therefore quantitative input data to complete a full social impact assessment are yet to be finalised.

This social values assessment report is a baseline, based on desktop research and community engagement including fieldwork. At the time of writing this report several elements of Synergy's environmental, technical and heritage assessments are still underway, and therefore have not been considered in this report. Recommendations made in this report are based on the findings of the fieldwork and secondary research for further interrogation as project considerations progress and further decisions are made.

It is recommended that this social values assessment baseline be updated in the subsequent phases of project development.



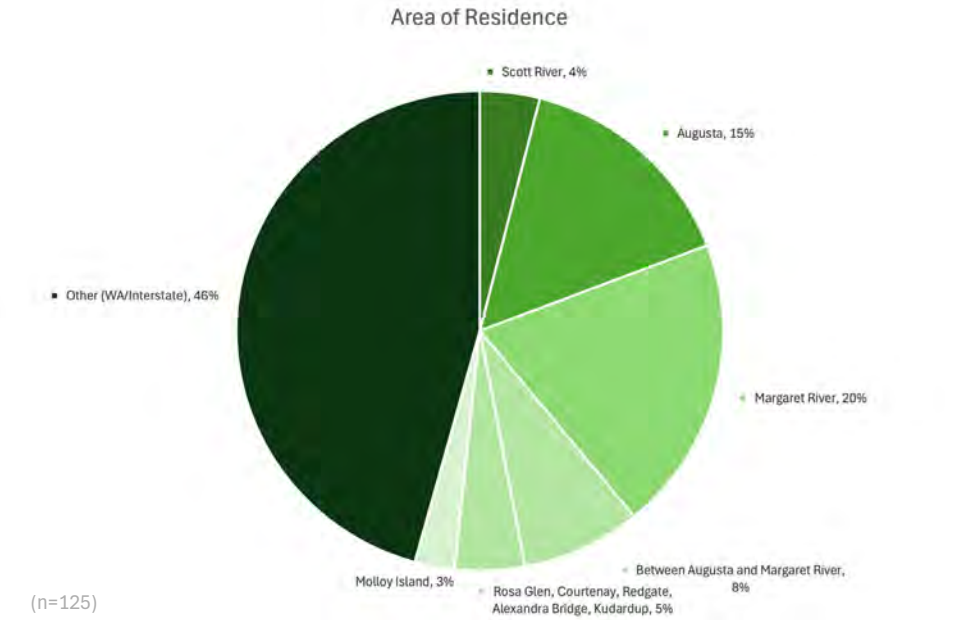


Figure 2a + b Survey Respondent Profiles

4. SOCIAL PERORMANCE GUIDING FRAMEWORK AND APPROACH

Social value is one of Synergy's corporate strategic pillars, formalised with the launch of the organisation's first internal Social Value Framework in late 2023. A full list of Synergy's Social Performance Commitments and Approach, as provided by the organisation on 31 July 2024, is outlined in Section 4.1.

The Framework provides a structured approach to integrating social value considerations into SynergyRED's decision-making processes. In the context of future energy projects, Synergy aspires not only to comply with regulatory standards but actively seeks to contribute to net positive social, environmental and economic outcomes for the people of Western Australia; that is, to deliver social value.

This social values assessment is a strategic tool which aims to provide insights into the unique set of values that contribute to a community or place identity, the net benefit that a project may bring to different stakeholders. It also ensures the social baseline of the project area and broader implications are understood to address any community concerns. It is intended to act as a resource and guide that can be updated as project decisions are firmed up into the future.

This report is structured in the light of the primary project driver being positive energy provision and regeneration for the State of Western Australia, the local contextual drivers, and the communities' expressed priorities in terms of their perceptions around social values of the area, and their confidence in SynergyRED's ability to manage any potential impacts on these values.

It is intended that this structure help appropriately guide decision-making within the context of SynergyRED's proposed project and Synergy's Social Value Framework. That said, the generic indicators of the standard Social Impact Guidelines, for example as per the requirements set out by the NSW and Queensland Governments, have also been considered and included as part of this assessment.

The key social values considered and described within this report are:

- Decarbonisation and the energy transition, i.e. the social value associated with the project's contribution to Synergy's strategy and decarbonisation goals, including energy affordability and equity,
- Community population, demographics and cohesion,
- Environmental stewardship – as the environmental values that drive attachment to place. In the social context, environmental values as considered in terms of how a community derives their income, how they perceive themselves and the world around them, and associated activities relating to experiencing and understanding the natural environment. In this instance, socio-environmental impacts include impacts on tourism, recreation and access to nature. It also addresses the priority issues raised in the fieldwork in terms of expressed values of local importance around water, flora and biodiversity, fauna, soils, fire and sense of place.
- Cultural and Indigenous heritage i.e. heritage as it pertains to registered heritage sites, along with relevant contextual comments provided by local historians, community leaders and community members participating in the study.
- Resilient, prosperous communities in terms of decision-making systems, land tenure, roads and transport, power and telecommunications, community service provision and way of life.
- Thriving, diverse, equitable, and inclusive community and workforce in terms of industry sectors, employment, ability to derive an income, and fair and ethical supply chains.

In addition, this report considers and addresses as appropriate Synergy's Social Value Framework, Environmental Factor Guideline – Social Surroundings (EPA, 2023), Position Statement: Renewable Energy Facilities (WA Planning Commission, March 2020), Social Impact Assessment Guideline and supplementary material (Queensland Government, 2018), Social Impact Assessment Guideline and Technical Supplement (DPHI, 2023) and Social Impact Assessment: Guidance for Assessing and Managing the Social Impacts of Projects (International Association for Impact Assessment, 2015).

Although not strictly required under approval conditions, this social values assessment is being completed as best practice to firstly understand, and subsequently manage/mitigate impacts and improve benefit return, to the communities within which SynergyRED operates.

It is recommended that performance against these commitments and framework is reported annually within Synergy's Annual Report.

4.1. SUMMARY OF SYNERGY'S SOCIAL PERFORMANCE APPROACH

Provided by SynergyRED on 31 July 2024

Social performance is the way Synergy maximises the benefits communities experience during project planning, construction and operation, while minimising disruptions. The social performance approach aligns with Synergy's social value strategic pillar and internal Social Value Framework. This framework identifies Synergy's social value priorities and provides a structured approach to integrating social value considerations into Synergy's decision-making processes.

In the context of this project, Synergy not only aims to mitigate any negative impacts, as described throughout this document, but to contribute to net positive social, environmental, and economic outcomes for the people of Western Australia. Positive outcomes are partially realised through activities such as social procurement, local employment, social investment and stakeholder engagement.

Social procurement
Social procurement involves making procurement decisions that benefit Synergy and society, by taking into consideration environmental, social and economic impacts over the entire life cycle of a product or service.

Synergy has developed an internal Social Procurement Standard which sets out requirements for incorporating social procurement considerations into all procurement activities. This standard aligns to Synergy's social value framework and the Western Australian government's Social Procurement Framework. Additionally, as a Government Trading Enterprise, Synergy complies with the requirements of the WA Government's Aboriginal Procurement Policy (APP) and Western Australian Industry Participation Strategy (WAIPS).

WAIPS requires Synergy to request participation plans (PPs) from contractors for procurement activities over $1 million in metropolitan areas or $500,000 in regional areas. Tenders above these thresholds require tenderers to submit a PP as part of their response. Tenderers must identify how fulfilment of a contract will generate designed economic benefits and demonstrate the means for provision of a full, fair and reasonable opportunity to local industry. Unless an exemption is obtained, the PP requirement must be included in Synergy's evaluation criteria, weighted at a minimum of 10% of the qualitative evaluation criteria. Synergy has also incorporated aspects of the Western Australian Buy Local Policy 2020 (WABLP) into its procurement processes, including providing mechanisms to source directly from regional businesses and allowing tenderers to apply regional price preferences.

The APP sets a target of awarding four per cent of new contracts or stand-alone purchase orders ($50,000 or more) to Aboriginal owned businesses. Synergy is committed to providing employment pathways and subcontracting opportunities for small to medium Aboriginal owned businesses in the delivery of Synergy contracts. Conditions and targets are attached to applicable contracts to ensure these opportunities are realised. Our second Reconciliation Action Plan (RAP) outlines and advances these commitments to increase Aboriginal and Torres Strait Islander supplier diversity to support improved economic and social outcomes.

In addition to local and Aboriginal supply chain opportunities, Synergy is committed to encouraging procurement from social enterprises and women-owned businesses.

Local employment
Synergy is committed to maximising local employment opportunities while mitigating any negative impacts on local labour draw or skills shortages. Synergy adheres to the Priority Start Policy (PSP), a WA state government policy that applies to Synergy's sourcing activities and contracts for building construction, civil constriction and maintenance with a value of $5 million (including GST).

The PSP supports the WA government's Plan for Jobs commitment to maximise opportunities for apprentices and trainees on all major state government funded building, construction and maintenance contracts. It ensures a sustainable construction trades workforce for WA by increasing the overall numbers of apprentices and trainees in the building and construction industry. Contractors awarded a PSP-applicable contract must meet a target training rate across the combined Western Australian construction trades workforce of their company and all sub-contractors used for the contract.

Social investment
Synergy recognises the importance of social investment in creating positive value for communities. The internal Social Investment Standard outlines requirements for community investment and social purpose partnerships. Social investment initiatives relevant to the project include:

1. Community Giving Fund: An annual program offering grants of up to $10,000 for initiatives that align with Synergy's social value Priorities and positively impact the communities in which they operate. Initiatives in the project area are strongly encouraged to apply.
2. Volunteering: Synergy staff can apply for two days volunteer leave annually. Groups and teams may also volunteer with Synergy's social purpose partnerships, community giving fund recipients, or Synergy spirit charities.

In addition to initiatives which are most relevant to the project, Synergy's social investment activities extend to benefit Western Australia as a whole, including the following:

1. Synergy Spirit: Synergy's employee charity program, allowing employees to make pre-tax contributions to up to four chosen charities. Synergy provides an annual financial contribution to the four charities.
2. Social Purpose Partnerships: Synergy has established long-term, collaborative commitments with not-for-profit organisations such as the STARS Foundation, which aims to improve the health, education and employment outcomes for Indigenous girls and young women in Western Australia.

Stakeholder engagement
Synergy's vision for stakeholders is to provide a consistent, fact-based, and transparent engagement process. To achieve this, Synergy's people need to be proactive, accessible, present, collaborative, and consultative.

Synergy has appointed a highly skilled stakeholder engagement team that supports the future energy projects, including this project. Synergy adheres to the IAP2 (International Association for Public Participation) guidelines, widely considered best practice. The IAP2 Public Participation Spectrum defines the public's role in community engagement programs. It recognises that different levels of participation are legitimate based on various factors, such as goals, time frames, resources, and decision concerns.

The spectrum is applied by Synergy's stakeholder engagement team to this project as follows:

1. **Inform**: Share project details, impact assessments, and benefits with the community.
2. **Consult:** Seek feedback on turbine locations, visual impact, and noise concerns.
3. **Involve:** Collaborate on Mitigation strategies, wildlife protection, and community benefits.
4. **Collaborate**: Work jointly on design, land use planning, and economic opportunities.
5. **Empower:** Involve stakeholders in decision-making regarding project aspects, where feasible.

5. STUDY AREA

The *genius loc*i of place, and the social values of a community, are deeply linked to its specific locality and the social, economic and environmental attributes that drive human activity. Defining the study area assists to clarify this spatial context for both analysis purposes and understanding.

The study area for this assessment sits directly within the Scott River and Blackwood River Catchments area, which cover a total area of approximately 64,276 ha. The catchment areas stretch from Molloy Island to Jangardup Road north-west of Lake Jasper.

Approximately 43% of the total catchment area is farmland which includes dairy, beef, sheep and blue gum plantations. The remaining area of this catchment is comprised of reserves (53%) and unallocated crown land, identified as rich in biodiversity (The Scott River Action Plan 2020).

Figure 3 highlights the current area identified for the location of the proposed wind farm in Scott River. This area, as evidenced by the ariel photographs in Figure 3 and 4, and DPIRD land capability definitions in Figure 15, is an established rural agricultural area, sitting in low lying country between two significant reserves – The Scott River National Park and Pagett Nature Reserve.

The proposed wind farm in Scott River is located south of the Brockman Highway between Scott River Road, Dennis Road and north of the Scott River. This site is being investigated by SynergyRED due to the strong south-westerly winds, that blow during the evening periods and the warmer months when electricity demand is high, the existing transmission line from the Beenup substation, and the pre-existence of substantially cleared land.

The adjacent human populations sit primarily outside this catchment. These include the settlements of Scott River (within the catchments), East Augusta, Augusta, Molloy Island and Kudardup. These communities are governed by the Local Government jurisdiction of Augusta-Margaret River. This jurisdiction is considered the broader community for regional context.

This location is evident in both Figure 3 and 4. Figure 3 shows the proposed turbine locations across land boundaries. Figure 4 shows the total proposed project area overlaid across the aerial photograph of the region. Here, it is evident that the project sits on primarily cleared agricultural land, between forested areas and natural watercourses.

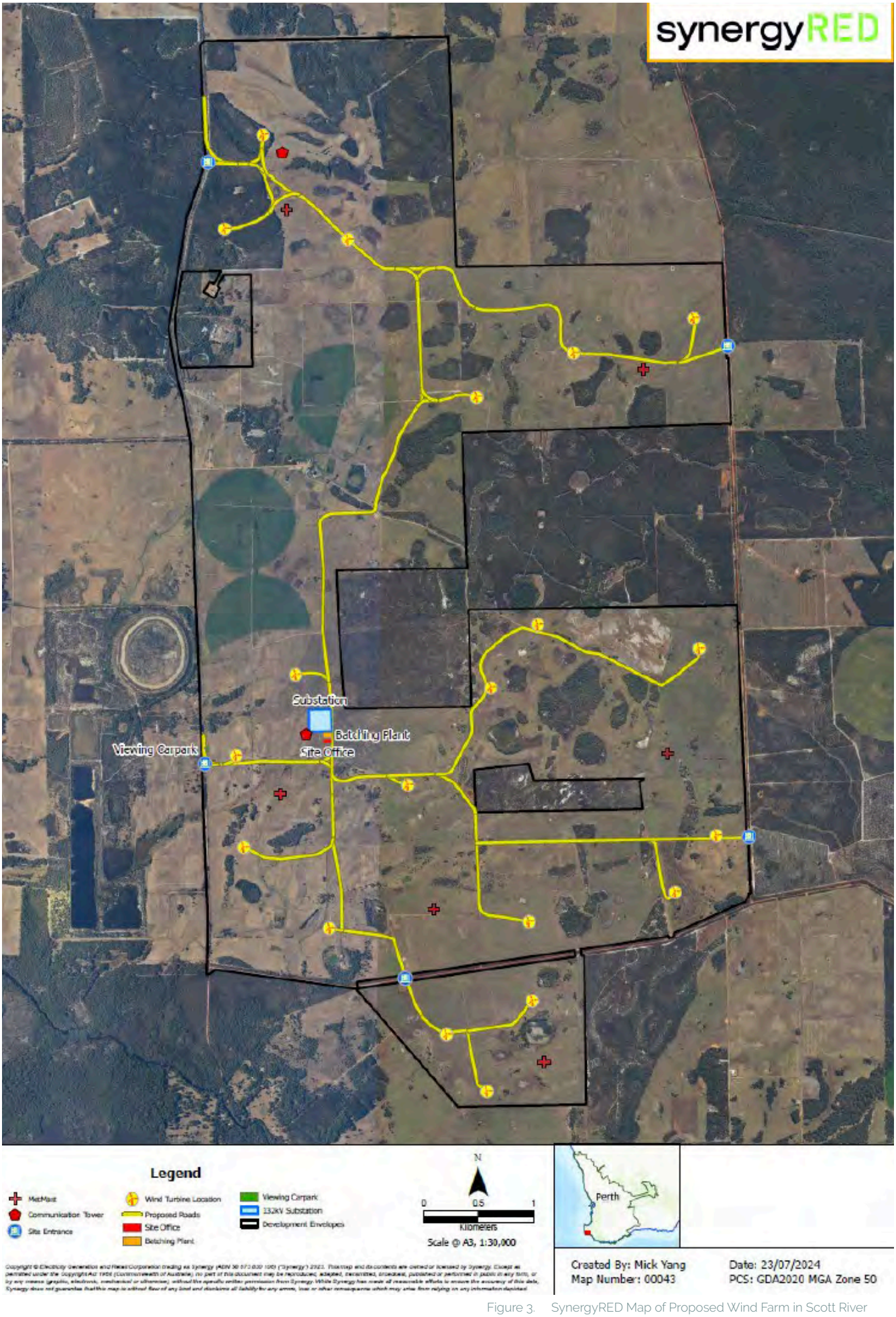


Figure 3. SynergyRED Map of Proposed Wind Farm in Scott River

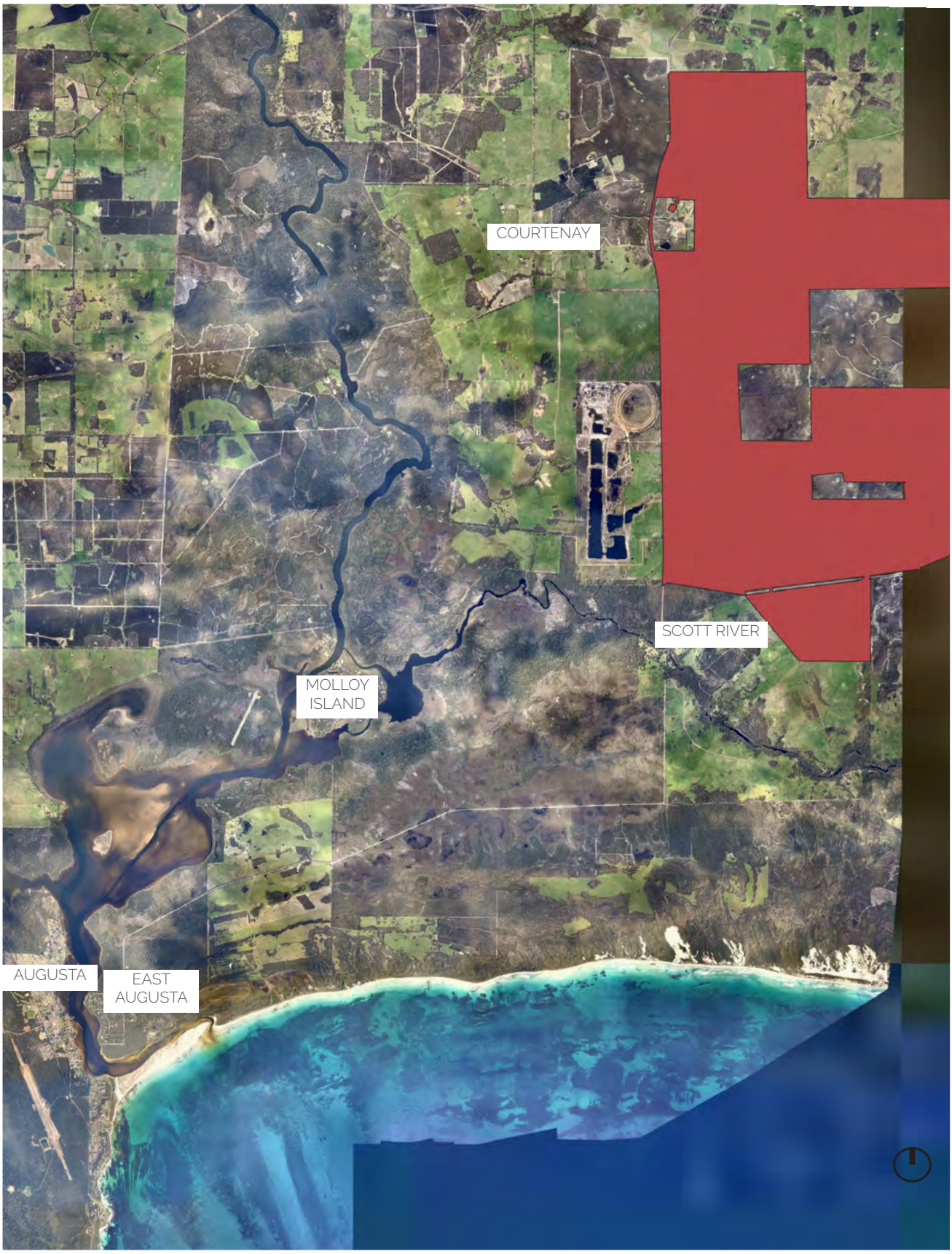


Figure 4. Project Study Area and Identified Communities of Consideration

Scale 1:50000 @A2

6. DESCRIPTION OF SOCIAL VALUES & COMMUNITY ATTITUDES

The Place.ID model of assessing social values and community attitudes tests community perceptions across a series of core social, economic and environmental value indicators/attributes. This enables determination of:

- the most important perceived social values for this region,
- differences in attitudes between different communities, and stakeholder groups, and to
- identify any perceived gaps between the social values identified (as high on the importance scale) and community perceptions in SynergyRED's ability to manage these to their benefit, or detriment.

The Place.ID Social Values Matrix provides a useful overview to set priorities for assessment and decision making. It also sets a baseline in terms of stakeholder confidence that can be measured over time.

The matrix set out as Figure 5, highlights the most important perceived social values to the outside of the chart. All these values are marked by the average score of out of 5, where 1= not at all important and 5=extremely important.

The region's biodiversity of native flora and fauna, water values (such as rivers, wetlands and swamps), unique bird life, preserving what is unique about the area, being able to visit the forest and national parks, environmental conservation and restoration of cleared land, peace and quiet, and being able to see the clouds, horizon and sky were all marked with an average of greater than 4 out of 5. These responses reflect the environmental locality between the nature reserves and water catchments, its isolation and scenic viewpoints.

The Social Values Matrix also shows the community's confidence in SynergyRED's ability to manage any impacts on these social values to their benefit. Generally, an average level of confidence was seen with most values scoring an average of between 2.92 and 3.41 out of 5 (where 1 is not manageable at all and to the community's detriment and 5 is extremely well to community benefit). The lowest scoring social values in terms of confidence to manage were preserving what is unique about this area, unique bird life, peace and quiet and Aboriginal history and culture.

Creation of local employment opportunities, water management and access to the forests and national parks were seen as indicators that SynergyRED was more likely to be able to be managed positively.

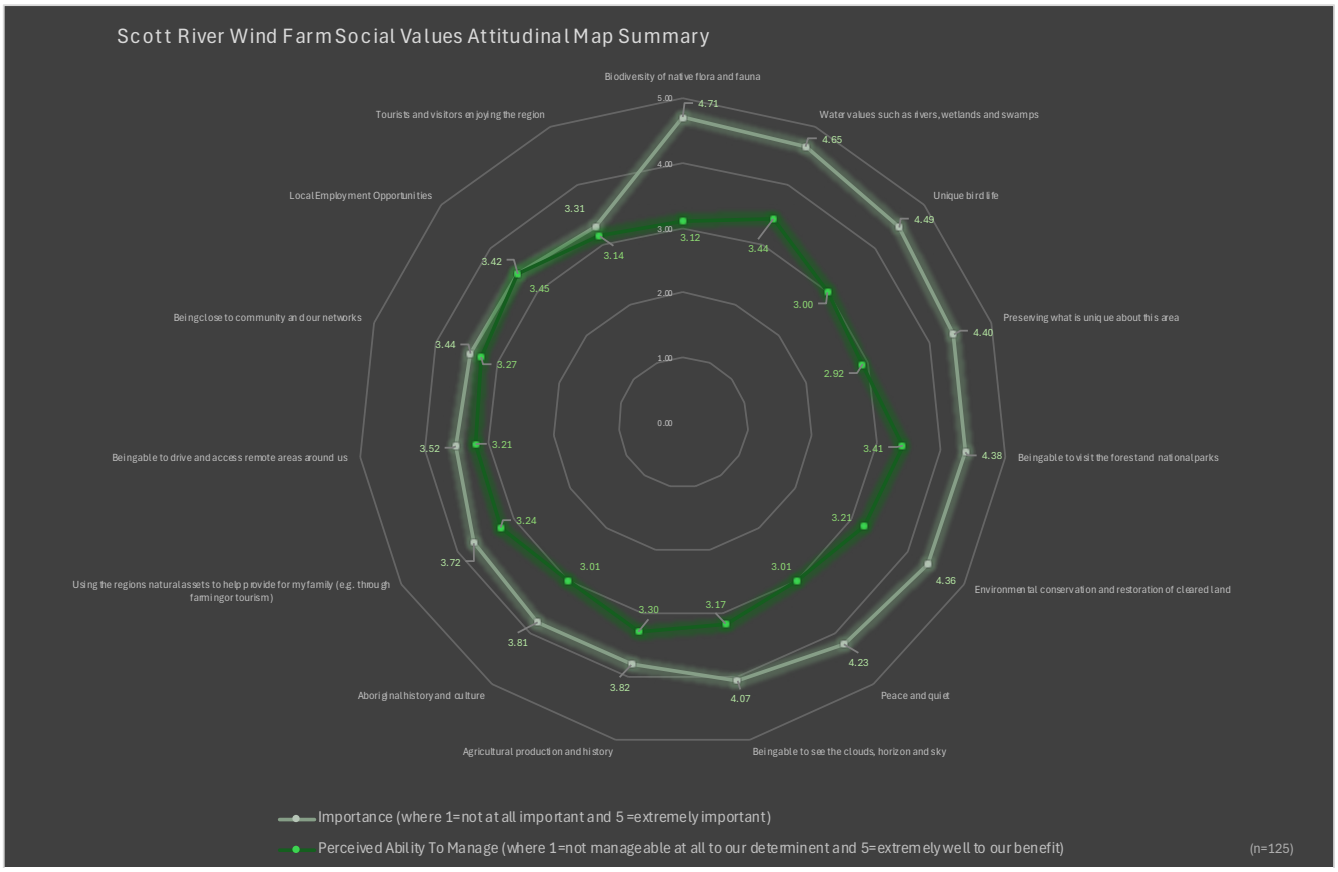


Figure 5. Scott River Wind Farm Social Values Attitudinal Map Summary

6.1. VALUING THE ENERGY TRANSITION

The contribution of the proposed wind farm project in Scott River to a positive energy transition and more sustainable future is its core social deliverable for Western Australia. However, the perceived value of that energy transition by the associated communities within the study area is currently quite a polarising issue, as evidenced in both the qualitative and quantitative fieldwork results.

Half (50.3%) of the quantitative survey respondents were extremely supportive of the proposed wind farm project in Scott River understanding and commenting on its value and need. At the opposite end of this support, were around a third (32.5%) of remaining respondents who were primarily not supportive (rating at a level of support between 0 and 2 out of 10). This is illustrated in Figure 6.

Figure 7 shows how these ratings also differ across the differing communities – with those closer to the project showing a lower positive rating than respondents who lived further afield.

Those who fully support a transition to renewables voiced support for SynergyRED's proposed investment in renewables as part of the decarbonisation journey and saw this project as an important part of this transition with strong sustainable benefits. Those who reject climate change as a principal were vocal in their position with similar comments being consistently cited, for example there is "*no need for renewable energy..this proposal represents an unnecessary investment, power will be further unreliable, inconsistent and is driven by a piece of large physical infrastructure that is a nonrenewable resource with no clear link to recovery of cost.*" (IDI, 2024)

In addition to the transition, access to a reliable power source for the future was raised as a significant local issue driving perceptions. For the remote communities of Scott River, Molloy Island and East Augusta obtaining access to a consistent and suitable power source was cited by both the local government representatives, community members and landowners. This was evident in the community desire for a direct and tangible offset benefit of the energy transition at a local level. Suggestions included requests for a rebate, or actual uplift to local power infrastructure direct to residents and landowners in the region as an offset for the installation of the wind farm in the area.

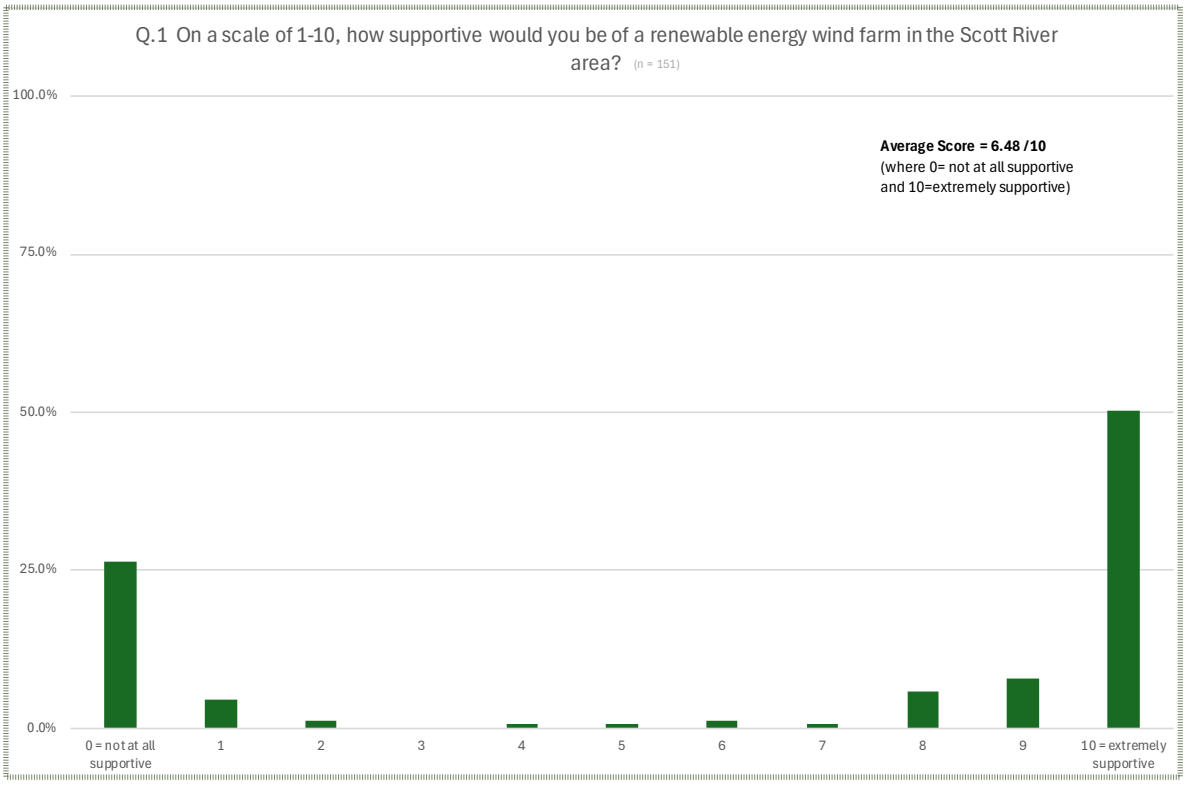


Figure 6. Scott River Wind Farm Overall Support for the Project

"This region produces the milk, the beer, the wool, the timber, and produce for the whole State, producing the electricity from the wind around us creates a positive warm feeling. It's about putting back and sharing the resources around us." (IDI 2024)

"This community is a small footprint producing a lot for the State, the power requirements should be delivered to benefit this community, rather than us trying to fuel the whole State."
In-depth Interview (IDI) Participant 2024

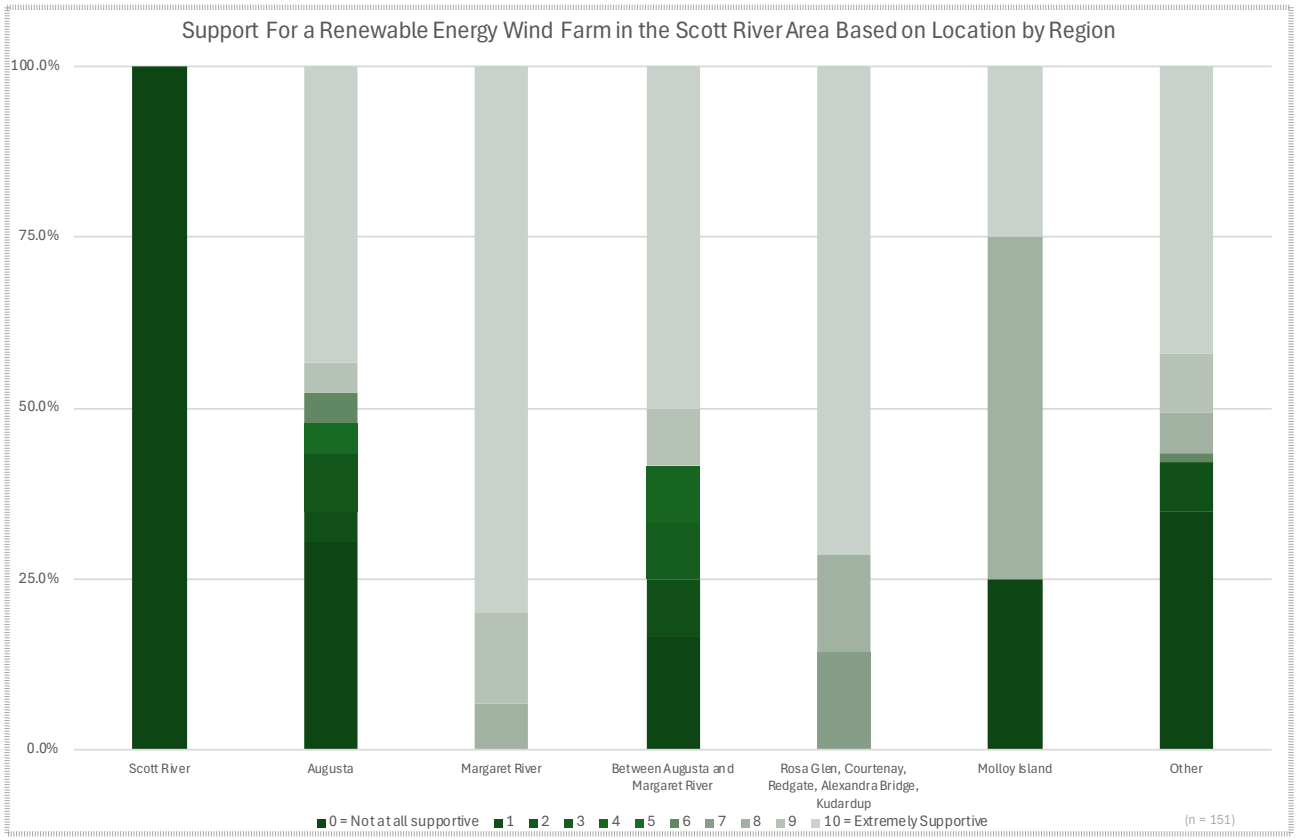


Figure 7. Scott River Wind Farm Overall Support for the Project by Locality

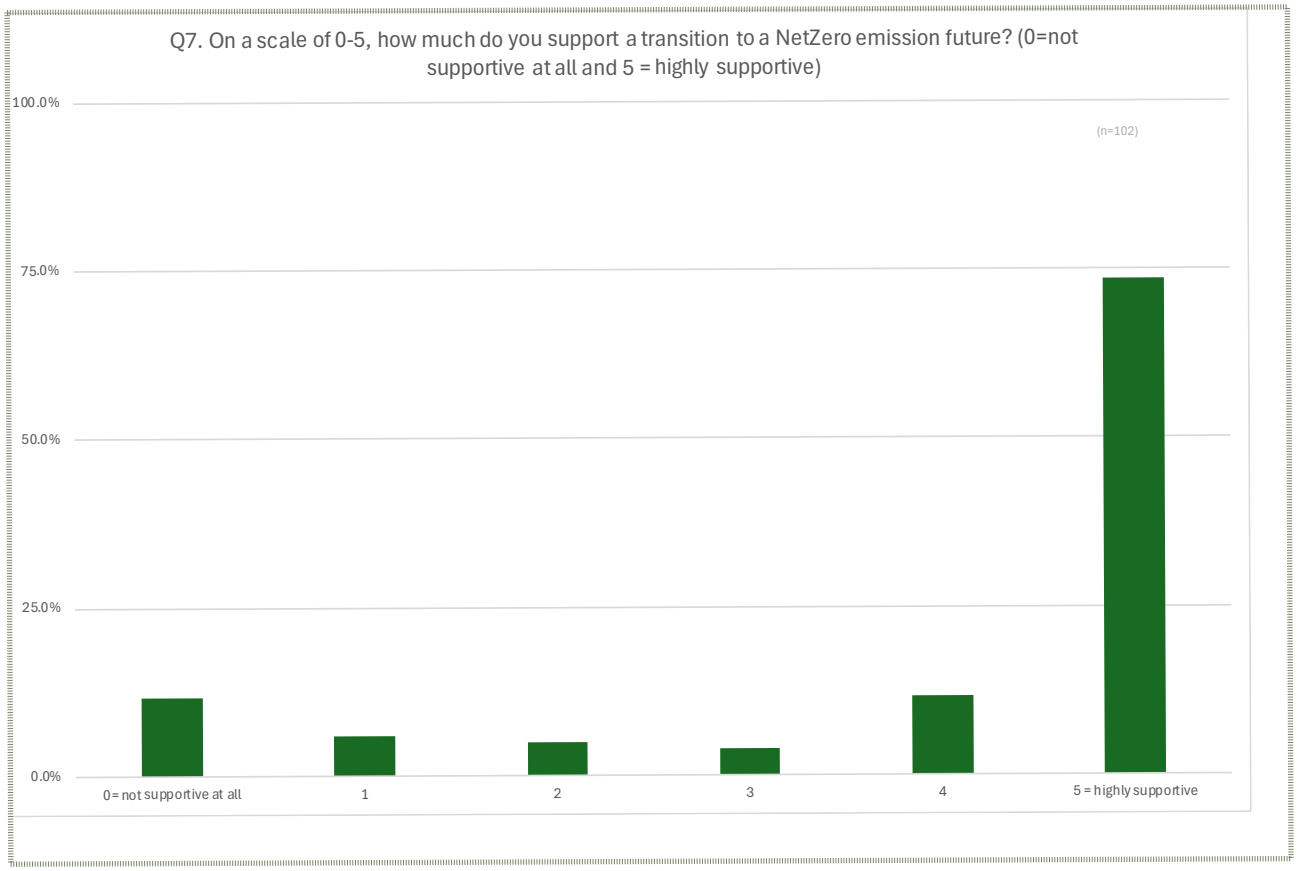


Figure 8. Support for a NET Zero Energy Transition

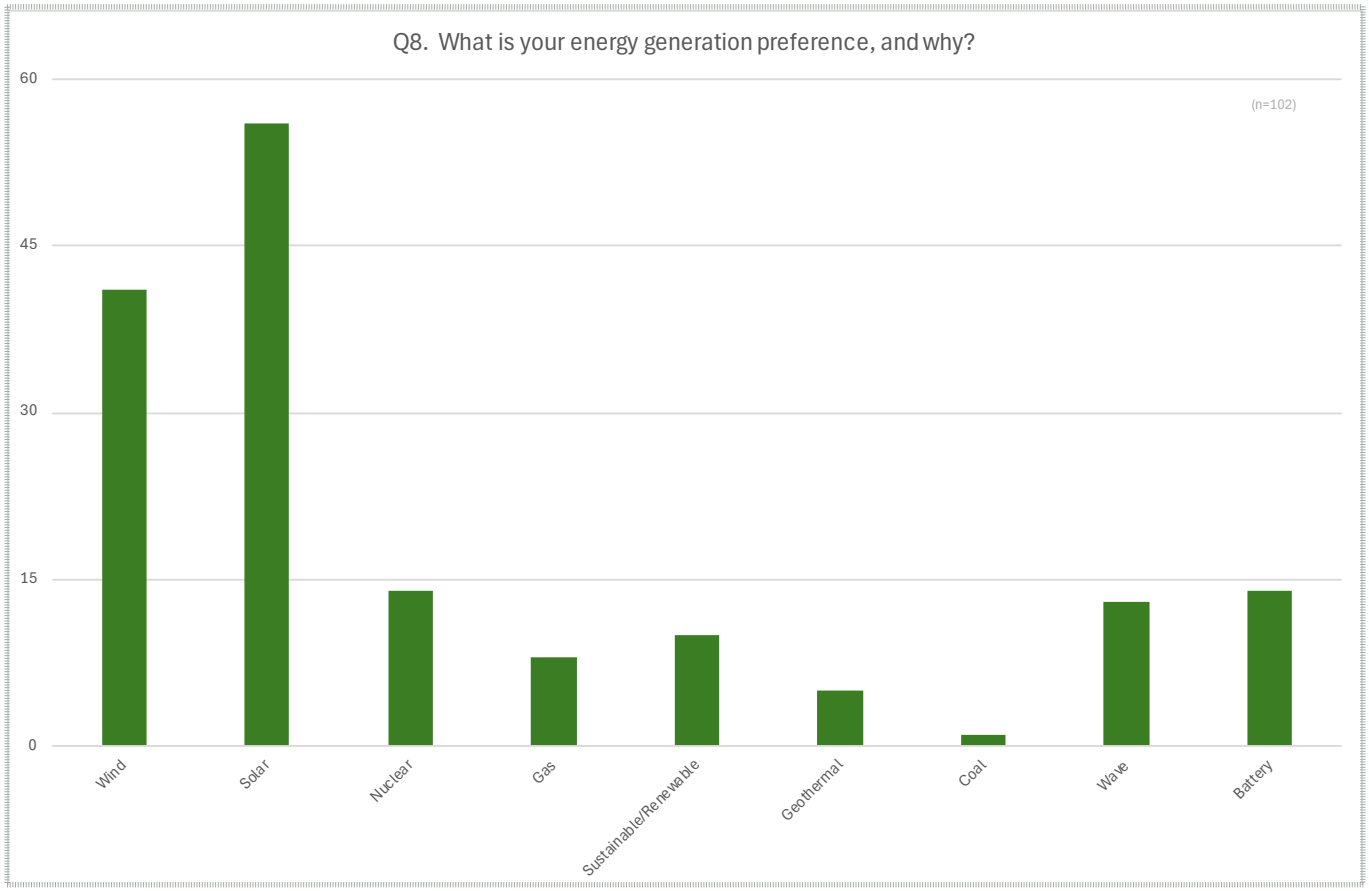


Figure 9. Overall Energy Preferences

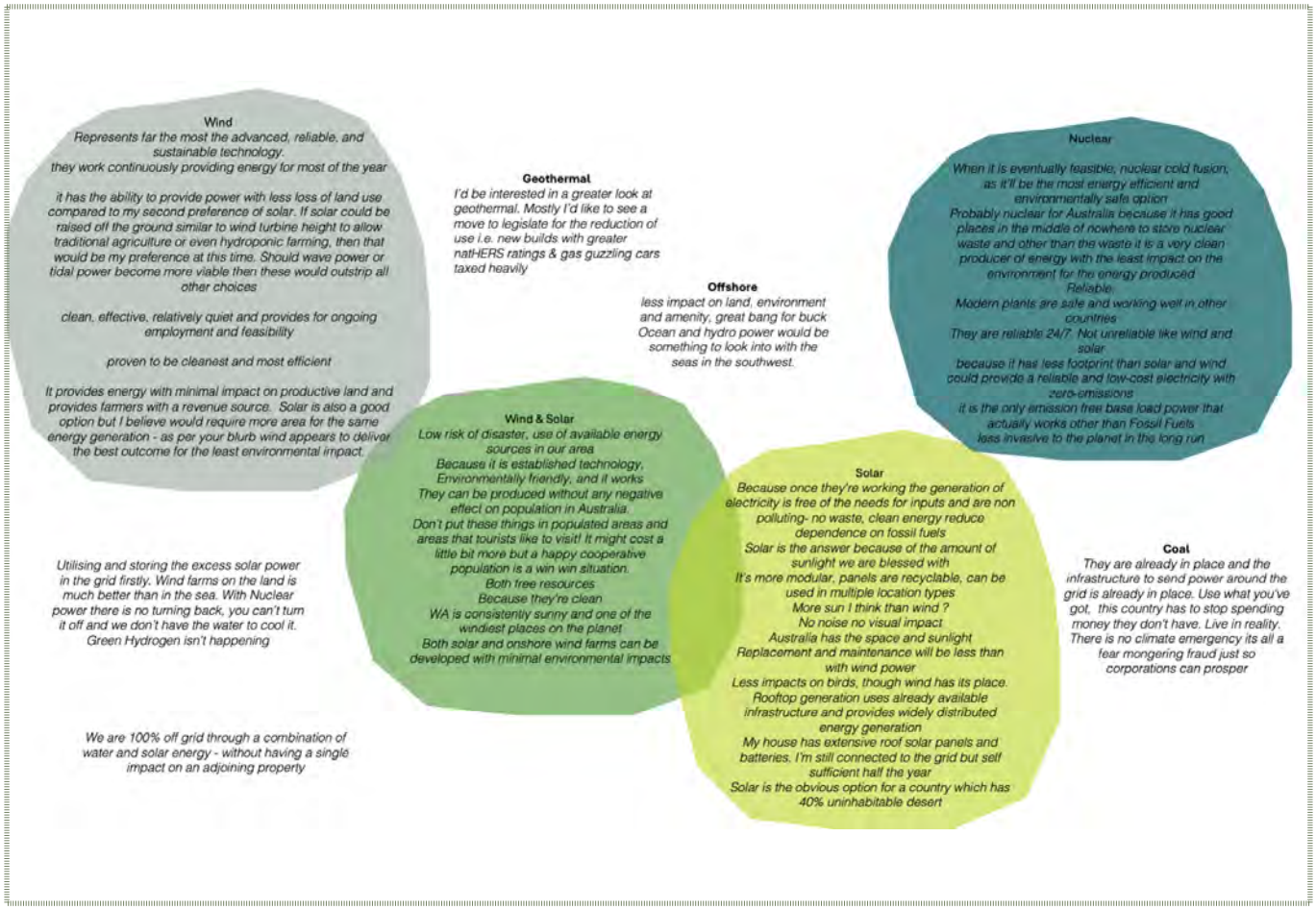


Figure 10. Reason for Energy Preference

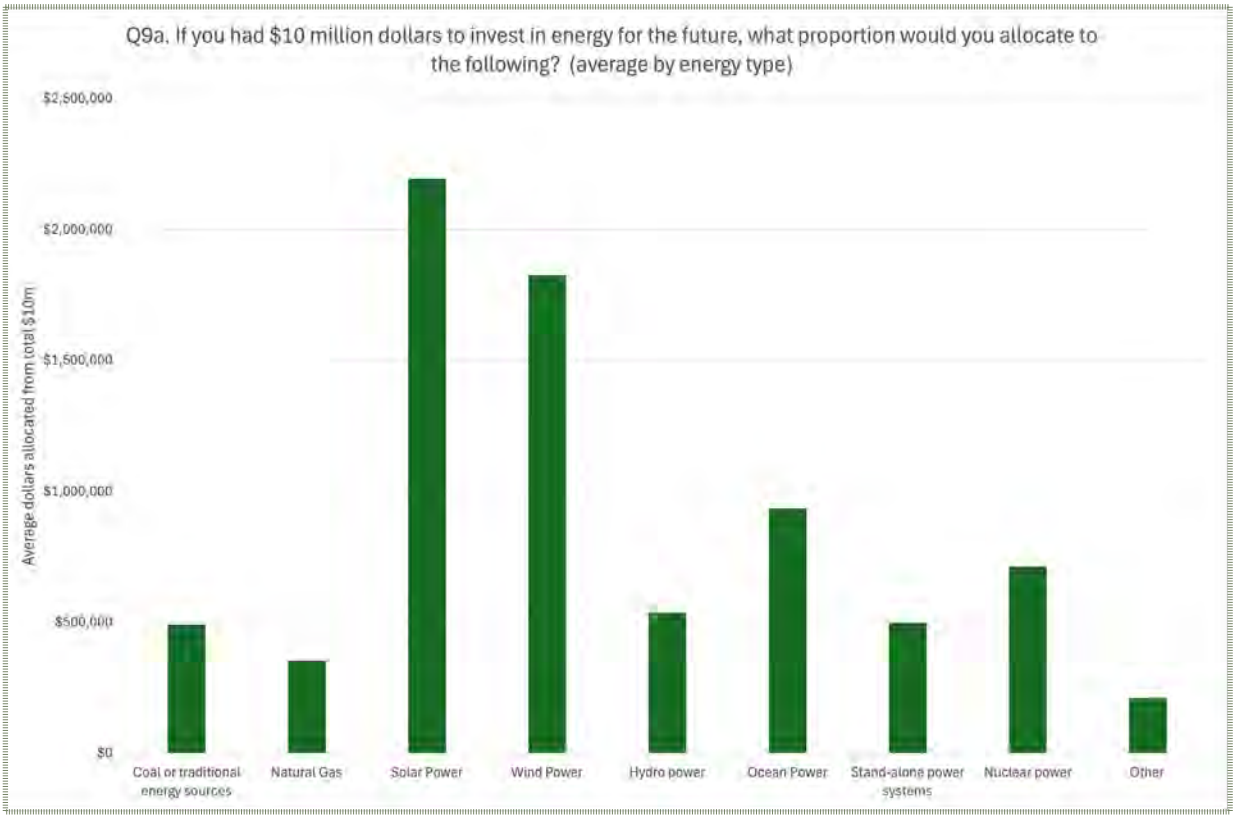


Figure 11a. Investing in Energy for The Future

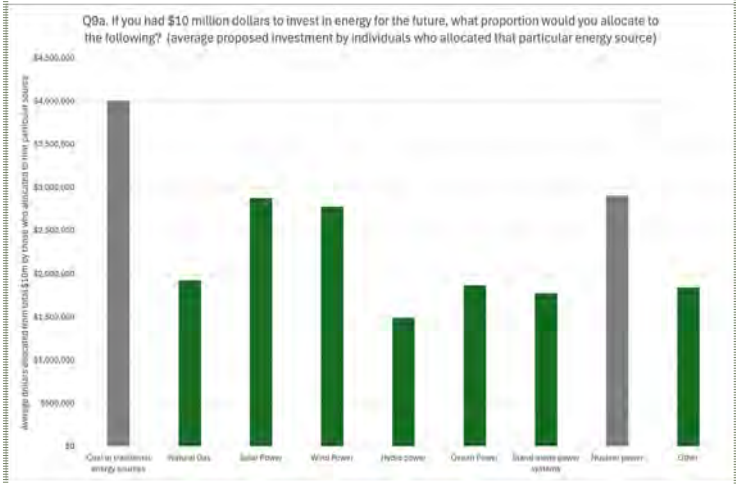


Figure 11b. Investing in Energy for The Future

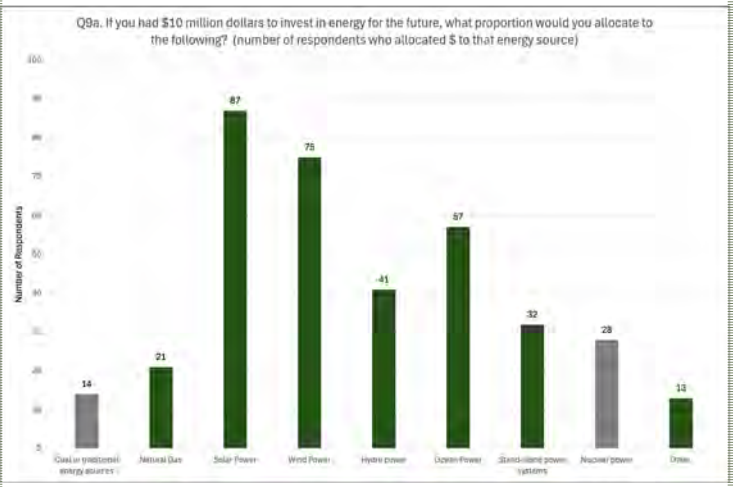


Figure 11c:. Investing in Energy for The Future

Note: Figure 11a-c were designed as an illustrative exercise to highlight preferences for energy sources for the future and consider the impact this preference had on attitudes. This was determined by requesting an allocation of an amount they would personally invest in a particular energy source from a total of $10 million.

Figure 11a shows the results to this question by the average imaginary dollars allocated to each energy type across all respondents.
Figure 11b refers to the average dollars allocated by individuals who had allocated some imaginary dollars to that particular energy source.
Figure 11c illustrates this number of individuals who chose to allocate imaginary dollars to the particular energy source.

The figures show a strong preference for investing in renewable energy for the future, however this preference is often spread across a number of different renewable energy sources - noted as "*not putting all eggs in one basket*" (IDI 2024). While those who chose to invest in more traditional energy sources, such as coal and nuclear, tend to allocate their preferred investment dollars exclusively to these traditional sources.

6.2. THE COMMUNITY – POPULATION & DEMOGRAPHICS

"The community here is changing a lot, particularly in last 10-20 years, it is much more diverse, a growing population, academically trained, less willing to listen to outspoken opinions or aspects of those opinions that are more practical." (IDI 2024)

The demographic profile of a community and the movement of individuals in and out of a community is a strong determinant of community stability, cohesion and social values. The Augusta-Margaret River region has experienced an 18% growth in population between the ABS Census in 2016 and 2021. This has implications for not only infrastructure, accommodation and service provision to meet this growing demand, but also how the community define and see themselves, their lifestyle and their sense of cohesion.

Scott River itself has a small and relatively isolated population of around 46 residents. The area, originally populated by the Wardandi and Bibulumin/Piblemen Peoples of the Noongar Nation, was colonised around 1830 by Thomas Turner and other colonial settlers. Many of these earlier settlers abandoned the region due its isolation (Augusta Historical Society 2001).

Many of the current Scott River landowners are the decedents of post war allocations, and the subsequent drive into the region for agricultural industry development during the 1960s and 1970s. During interviews the current landowners note that their families are intergenerational farmers whose identity is very much linked to the nature of how they derive their income i.e. dairy and beef grazing, plantation timber and horticulture.

Currently each land holding in Scott River houses an average of 3-4 accommodation units on each property. The residents tend to be members of the landowners' families or from nearby properties, representing up to 35 total contractor and permanent employees. (IDI 2024)

Adjacent to the Scott River region sit a further two relatively isolated communities in East Augusta (population 41) and Molloy Island (population 163). These communities have around 54 and 150 permanent private dwellings respectively. Molloy Island is only accessible by a local barge, which contributes to its isolation. The island is said to contain around 275 rural blocks (around 225 houses, half of which are not permanently occupied) (IDI 2024).

Unlike Scott River residents for these two adjacent communities, their identity is not derived from how they draw their income, rather their choice of lifestyle in a remote part of the world. This lifestyle, the positive climate and the natural environment are also said to be driving the population growth across the broader region, as evidenced in the quote below from the qualitative fieldwork.

"The sense of community and its connectedness is so important. You see this through high levels of volunteering, the engaged community from one end of the spectrum of views to the other, and the diversity of the community from so many international travellers, migrants, families, and all those people who come, attracted to the natural beauty of this region." (IDI 2024)

This emphasis on the natural environment, its climate, and the lifestyle it offers is evident in the high importance placed by respondents on environmental values such as water, forests, flora, fauna and preserving what is unique to this area, as illustrated in Figure 5. The close link between social values, identity and the natural environment are explored in next section. This link has implications for both SynergyRED's project decisions, but also the projects engagement strategy, its perceived transparency, and the communities' expressed desire for involvement in decision-making and environmental studies/monitoring/activity.

Across the inlet, the township of Augusta is the closest regional center, home to around 1,211 individuals. The profile of Augusta shows a community of primarily elderly residents (with 42% of the population aged over 70 years), and a slightly higher proportion of female residents than the other townsite communities. This community is described by its residents as "*community-minded, volunteer-orientated and willing to work together – whether it is to fight a fire, join a club activity or fixing up the main street. It is just the way they are!*" (IDI 2024).

It is clear, from the in-depth interviews and qualitative feedback in the publicly available survey, that there are expectations in the Augusta community around active participation, whether that is seen to be part of the community through the establishment of an office in the town or building close networks. These expectations are relevant considerations for SynergyRED's community giving and employee volunteering programs.

The age and gender profile, the growing population and associated pressure on local infrastructure, and the industries from which the population derive their income, are also an important consideration for project decisions around accommodation for the construction workforce.

Table 1 provides a summary profile from the latest census data of the communities under consideration, based on the full profile provided as Appendix 2. Figure 12 illustrates the population density across these potentially impacted communities. This figure shows a low population density around Scott River, and surrounds, with population density concentrated at Molloy Island, Augusta and Margaret River.

Table 1: Summary of Population and Demographic Indictors for Potentially Impacted Communities

	Scott River	East Augusta	Molloy Island	Augusta (townsite)	Augusta. Margaret River. Local Governmen t Area	Residents identifying as Indigenous with the Augusta-Margaret River Local Government Area
Total Population	**46**	**41**	**163**	**1,211**	**16,791**	**231**
Median Age	34	52	63	63	42	26
Gender Ratio (M: F)	1: 0.9	1: 0.8	1: 0.9	1: 1.1	1: 1	1: 1
Median Personal Income (weekly)	843	474	486	541	785	599
Median Family Income (weekly)	1,874	1,125	1,075	1,145	1,871	1,609
Median Rent (weekly) [1]	$200	$150	$275	$280	$350	$350
% Unemployed	9.4%	12.5%	4.0%	1.3%	2.8%	7.8%
Permanency - Lived at same address 5 years ago	46%	41%	90%	59%	58%	40%
Average Household Size	1.9	2.1	1.7	1.9	2.5	2.9
Indigenous %	0	0	0	1.0%	1.3%	

ABS 2021 Community Census Data

Notes:

- Forty-Two Percent (42%) of the population of Augusta are aged over 70 years.
- Domain Real Estate Data shows a year-on-year annual increase in median rentals of 19.3% in the Augusta-Margaret River Region, with March 2024 median rent sitting at $680 per week.

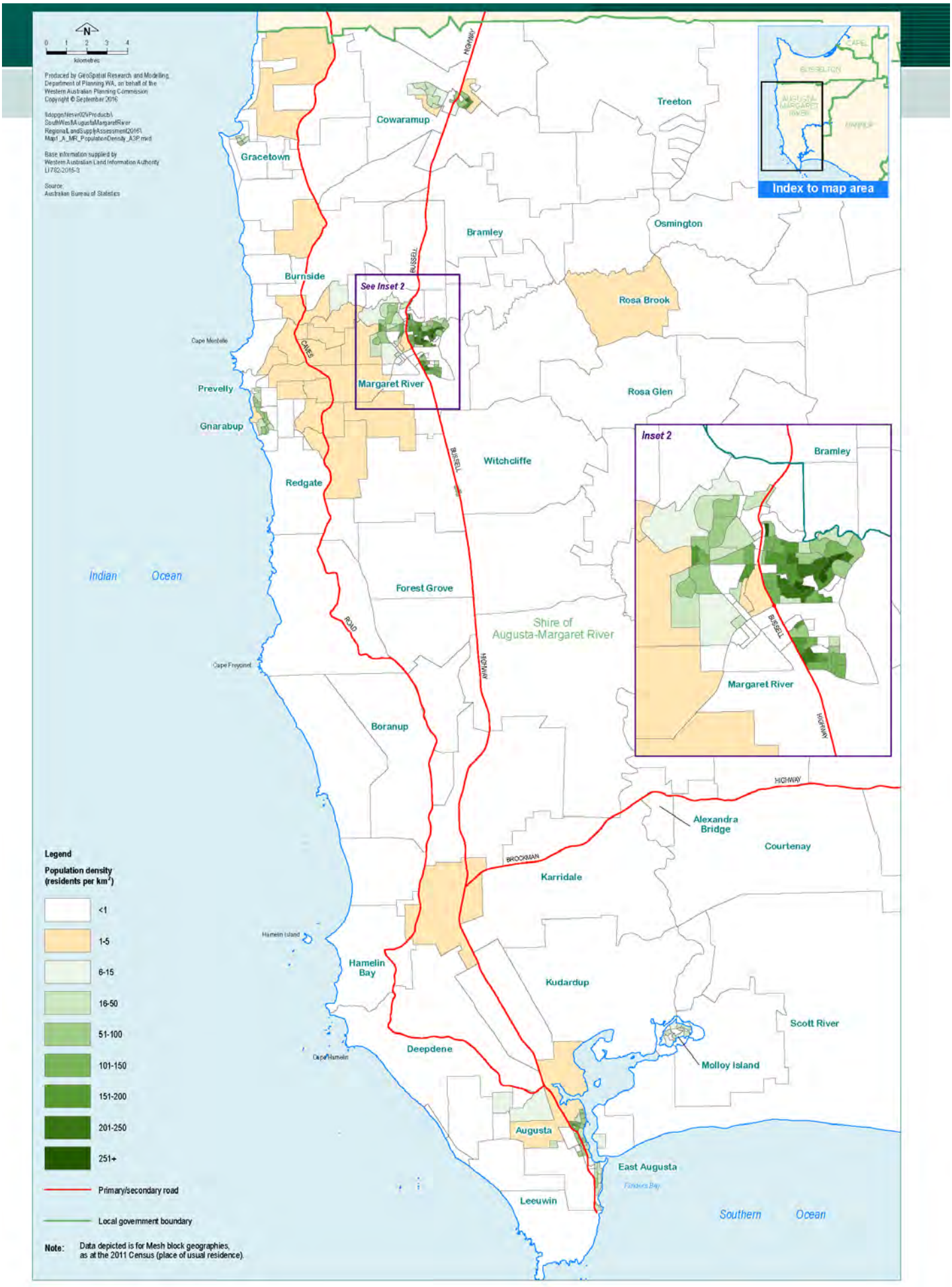


Figure 12. Map of Regional Density

6.3. ENVIRONMENTAL VALUES

"The environment out here is magic, quiet, beautiful waterways, where there is nothing but the sound of birds, you can't change that." (IDI 2024)

The International Association for Impact Assessment notes that good practice of social impact assessment accepts that social, economic and biophysical impacts are inherently and inextricably interconnected. This report considers environmental values and sense of place in the context of how they feed into the social identity of the human population, as discussed in Section 6.2, the way the individuals within the community derive their income and the opportunities to experience nature or participate in cultural and recreational activities.

In the case of this region, the environmental values contained within the natural landscape, its forests, flora, fauna and water networks are cited as the important values for this human population, and drivers of both attachments to place and visitation. This is evident in the secondary research, qualitative and quantitative fieldwork. The high level of attachment to these values indicate that any actual or perceived impact on these environment values will be the most challenging for the project to manage into the future.

The compatibility between particular social and/or ecological goals will have distributive implications for whose interests are realised in environmental decision-making, particularly where the perceived risks to producing goals are not actually aligned with the nuanced aspirations of the community. This process of bounding social aspirations into impacts is an inclusive and deliberative exercise to provide evidence against the values of a human community to make claims about which people's priorities are being represented (or not) in environmental decision-making.

For example - the value of a river for swimming, relates to both the social and biophysical attributes of a river, such as water clarity, water depth, and the number of swimmers per year, the tourists it attracts, the promotion or recognition of it when describing the region as part of its identity, and the sense of visual amenity or calm it provides. Any actual environmental impact on the river must be considered from all these social perspectives, and not just the biophysical. This example from the International Association for Impact Assessment, is relevant in both the role and perceived value of water, the views and landscape, the forests, the flora and fauna of this region in terms of tourism visitation, calm and peace and quiet provided to its residents and visitors, and sense of place for both Indigenous and non-Indigenous community members.

The broader region is situated within the Southwest of Australia, which is one of 36 internationally recognised biodiversity hotspots (Shire of Augusta Margaret River Annual Report 2024). A biodiversity hotspot that has at least 1,500 native vascular plant species found nowhere else on Earth, with around 70% of this original vegetation already lost. The Shire of Augusta Margaret River's Community Strategic Plan 2033 (2015) identifies "*valuing the natural environment*" as one of its key goals with a subsequent outcome being "*healthy waterways and foreshores*" and a key strategy identified as developing "*partnerships to maintain and improve the quality of beaches, waterways, rivers, and wetlands*" (AMRS, 2015 p. 20). Qualitative interviews with the Shire and other stakeholders confirm the critical environmental values of the region as its biodiversity (flora and fauna), its fertile soils, its waterways and wetlands and the way these contribute to a unique sense of place. The adjacent Shire of Nannup's Community Strategic Plan 2017-2027 (Shire of Nannup 2017) also identifies a key focus action item around protecting "*our amazing nature, magnificent forests, managed bushland, rivers, agriculture and our pristine coastline*".

The localised environment of the proposed wind farm in Scott River consists of predominantly undulating to near flat land that has been cleared for agricultural use. However, it is also known to contain a State and Nationally listed Threatened Ecological Communities, known as the Scott River Ironstone Association, that will need to be managed, primarily along the road reserves and in some small clusters on private properties. This is discussed further in Section 6.3.2.

The local area's geomorphic wetlands, ironstone floral communities, rivers and waterways are directly valued by this community and provide a level of benefit in each of the traditionally identified eco-system services. This is despite the area's remoteness and the shared understanding of the flow-on effects or endpoints, as evidenced by the secondary research, qualitative and quantitative fieldwork.

The legacy of the BHP Beenup Titanium Mineral Sands mine is evident in its profile among participants in the qualitative and quantitative fieldwork. In some ways, it appears to have raised understanding of the natural values in the region. However, the short-lived mine has also created some skepticism that significant developments could have a greater impact than initially anticipated or shared by the developer. For many fieldwork participants, it is cited as a cautionary tale of misunderstanding the area's acid sulfate soils and changing market conditions following significant infrastructure construction, or investment.

The Beenup Case Study on the restored wetlands, established in collaboration with the WA Botanical Gardens and Park Authority, Syrinx Environmental, and the community representatives that were part of the Beenup Consultative Group, draws attention to the localised natural environment in Scott River, its wetlands and bird life. This case study points to the opportunity to create values following the negative impact to the local ecosystem created by the mine construction and associated infrastructure (Meney, K et al 2023).

6.3.1 WATER

"From the cooling effect of the Southern oceans to the surface water that makes our soils rich, to the ground water and aquifers, and the inlet and rivers, water is what makes this region so special." (IDI 2024)

Over three quarters (77%) of respondents in the online survey rate water values, such as rivers, wetlands and swamps, as extremely important. This was the second highest importance score in the online survey results after biodiversity.

The qualitative fieldwork indicated that this is being driven by an increased recognition of water as a critical resource in a drying climate, a noticeable drop in ground aquifers "*that just aren't recharging*" and exacerbated attention across the recent dry summer that has seen water being ported into new subdivisions, like Witchcliffe, and localised heath and shrubland being so impacted.

Water is seen as both a natural asset and an important resource for both the local community and the associated agricultural activity. The Scott River and its associated water catchment is cited in the secondary research, qualitative and quantitative fieldwork as a significantly high environmental value in terms of provisioning, regulating, cultural and support services.

The DPIRD 2001 report notes that these areas across the broader Scott River Plain are highly valued for the diversity of functions and values that they provide including the provision of habitat for flora and fauna, biofiltering of sediments and nutrients, flood mitigation, groundwater discharge and erosion control and form corridors that link areas of native vegetation with conservation values (DPRID 2001).

Culturally, the waterways of the region hold significant attachment to the local Indigenous, Traditional Owners and non-Indigenous residents. The waterways serve as sources of amenity, cultural recreation, and home to the natural values of flora and fauna that are consistently rated as high on the importance scale of social values in the region.

The proposed location for the project would be in a high-water table location, subject to seasonal inundation. There is an expressed concern around potential failure of footings which is seen to potentially cause infrastructure failing and subsequently impact access to agricultural properties in the region.

Local landowners suggest dewatering maybe needed during construction to install foundations. They gave examples of fence posts requiring installation in waterlogged soils requiring a depth of 3-4m.

Water is an expressed emotive issue for the local communities, and a detailed water management plan and associated considerations will be required for the project to address this environmental value moving forward.

6.3.2 FLORA

Biodiversity of native flora and fauna received the highest impact score in the quantitative online survey, with 78% of respondents citing it as 5/5 extremely important. In addition, when considering the gap between how important the attribute is to the community and the perceived ability to manage any negative impacts, this gap was the largest of all the indicators assessed.

In the area, there are three vegetation associations (open Jarrah, Marri, Paperbark woodlands, sedgelands/grasslands and heath) with less than 30% of their pre-European extent remaining. As noted in Section 6.2, the Scott River Plain contains two Threatened Ecological Communities, that being the Scott River Ironstone Association Threatened Ecological Community, and the Federal Coastal Saltmarsh Threatened Ecological Community (also a State Priority Ecological Community - and one Priority Ecological Community (salt marsh).

Ironstone occurrences tend to be along the roadsides or on private properties across Price Road, Payne Road, Tutunp Road, Oates Road, Williamson Road, Dennis Road and Governor-Broome Road (Groundwater Consulting Services 2008).

The ironstone communities are closely related to groundwater. The periodic inundation prevents locally occurring plant communities from growing, and results in the specialised community having dominance. The major threats to the community are vegetation clearing, grazing by introduced herbivores, weed invasion, hydrological change, too frequent fire, and dieback disease caused by Phytophthora species (DBCA Facts Sheet).

Additional threats include pumping of groundwater that induces groundwater levels to fall in the aquifer beneath the ironstone, and changes in water quality (salinity or contaminants) in areas up-gradient from a community, such that poorer quality groundwater flows beneath the community (Groundwater Consulting Services, 2008 for Department of Conservation and Land Management).

Vegetation and biodiversity are a key value held by survey participants. Any potential impacts to these values should be a key priority for the project to consider and manage.

"We have to do our best to preserve what little is left, and a significant amount of what is left is on the private properties in Scott River." (IDI 2024)

6.3.3 SOILS

Fertile soil is a critical issue for the local community, and the success of their agricultural pursuits in Scott River. Much of the Scott River Coastal Plain is identified as having a high to moderate risk of Acid Sulfate Soils, occurring within 3m of the natural surface.

Although Acid Sulfate Soils are naturally occurring soils, when they are disturbed and exposed to the air, they can cause issues associated with acidification. These soils are commonly found in low-lying land bordering the coast or estuarine and saline wetlands and freshwater groundwater-dependent wetlands throughout Western Australia.

This issue was raised in both the qualitative and quantitative fieldwork, with suggestions to give due consideration to the peatland areas, water table and soils, for access road design, foundations, drain blocking and re-wetting areas.

The depth of a wind turbine foundation is dependent on soil conditions, geotechnical assessment and design requirements, but is likely to be approximately five metres deep. Anecdotal evidence from local landowners is that this depth is likely to be below the high-water table, and close to the swamp and valley floor.

"The fertility of the local soils on the Scott River Coastal Plain is what has drawn many agricultural landowners to the region and driven the attention around more intensive horticulture and agriculture in the region." (IDI 2024)

6.3.4 FAUNA - BIRDS & BATS

"So many critters out there, there are those tiny sugar possums, the plovers, the black swans and all those wetland birds." (IDI 2024)

The online survey highlights the importance of local fauna to the community identity and sense of place – in particular concern for birds and bats were highlighted by interview respondents. Seventy percent (70%) of respondents in the online survey cited the unique bird life as one of the most important attributes of the Scott River Region, rating it 5/5 on the importance scale.

Attachment to local fauna is cited as an important social value for the community, and local conservation groups in the area. The Scott River Action Plan also highlights the importance of protection of local fauna within the study area to maintaining a sense of place. Some 26 species of fauna are listed as threatened, priority or under protection within the Catchment. Threatened and priority fauna species in the area, as referenced in The Scott River Action Plan, include three Black Cockatoo species, the Rainbow Bee-eater, the Australian Fairy Tern, the Western Ringtail Possum and the White-bellied Creek Frog.

There are several local community and conservation action groups within the region dedicated to the protection of black cockatoos and any potential impacts on these species, and others, and this will need to be managed carefully.

Feedback from the two interviews with Bird Life Australia scientists note that impacts of wind turbines on birds will depend on the surrounding habitat complexity, typography, wind flow, arrangement and nature of turbines and the associated species in the area (IDI 2024). These are currently being explored by SynergyRED in independent Environmental Impact Assessments, and some suggestions for mitigation from Bird Life Australia have been provided in Section 8.7.

6.3.5 FIRE

Concern over fire in the Scott River area was raised in both the qualitative and quantitative components of the study. Reference was made to the area being a fire risk area, with references to the 1961 fires, and losses also experienced in the 1986 and 2018 fires. The low lying sedgelands, cleared paddocks and dry grasses are seen to exacerbate fire spread and fuel load. Access for water planes during a fire incident and storage of water onsite were raised by not only the local fire brigade members but also other participants in the qualitative and quantitative fieldwork.

"Fire roars through those plains and flatlands, we need to understand how close we can get... the strip between the River and the Turbines will be important to ensure we can get air support in close and have permission to fight fires in that low shrubland if we need it." (IDI 2024)

6.3.6 SENSE OF PLACE

Sense of place is defined by "the lens through which people experience and make meaning of their experience in and with place." It can refer to positive bonds of comfort, safety and wellbeing engendered by a place, a home and a dwelling, as well as fear or dysphoria in other contexts. It also includes the distinctiveness or unique character of particular localities and regions" (Foote, K, Azaryahu, M 2009).

As noted in Section 5 and Section 6 the qualitative and quantitative fieldwork shows that the draw to the immediate proposed project area is the agricultural activity, along with its remoteness, silence, its flora/forests, fauna and its quiet water. Its flatness, openness and wide skies are a significant part of the unique character of place. For some interviewed, this openness does create a sense of fear or isolation, but in the main those who call it home are attached to this social value. These are similar attributes found amongst the residents surveyed from Molloy Island.

For those in the larger community centres, such as Augusta, the sense of place described is more closely associated with the people, the community cohesion and activities. The clubs, the ocean for swimming, or watching whales, the inlet for fishing and boating, the built form, the places that people gather, its colonial history and the forests for driving through or adventuring were all mentioned as important social values that contribute to a sense of place.

Those interviewed and those participating in the survey rated peace and quiet (55%) and preserving what is unique about this place (62%) as 5/5 being extremely important attributes of the region. While 35% and 41 % respectively of respondents indicated these could not be managed at all (1/5) or managed to the region's detriment.

Preserving what is unique about the area, and its sense of place will be one of the most challenging areas for SynergyRED to positively manage its social impacts moving forward. The supporting qualitative in-depth interview analysis suggested this is primarily driven by perceived impacts on amenity – both visual and noise. Figure 13a and b show the areas of perceived value, while the verbatim responses provided in relation to why respondents selected and pined these points. These spatial illustrations and comments serve to reinforce the findings of this section.

The Albany Wind Farm is noted as an example by some respondents as having impacted the sense of place, in a positive rather than negative way. It was stated in the context of creating a positive tourism asset, and positively contributed to a unique sense of place on the hill in Albany. This could be a positive reference for this proposed project.

Work is being done by SynergyRED to profile both the visual and noise impacts of the project. Participants in both the qualitative and quantitative stages of the study, highlight a strong interest in viewing the outcomes of these studies. In particularly, noise and light impacts for residents of Molloy Island, and visual impacts from the Hill View Road Lookout in Augusta, the Augusta Hotel and other local and tourist viewing areas.

This perceived impact is exacerbated by the fact that one of the core values noted in the study is the attraction of the area due to its "*openness,*" "*remoteness,*" "*quiet*" and "*night sky*".

Suggestions of how this could be mitigated were provided by respondents to the quantitative online survey and in the qualitative fieldwork. These are listed under Section 8.

"The uniqueness of this area – the whole lot – there is a lot of get your head around, looking out over the Scott River National Park, you may not see it all but when you are out in the field a lot you are so aware of the environment, how special it is and how it needs protection." (IDI 2024)

Note: Verbatim comments listed in the text boxes adjacent to Figure 13a and 13b were provided by the digital online survey respondents as the reason for why they placed a pin of value on the spatial map. The comments in the upper text box relate to the heat map that shows the density of pins dropped in a certain location in the vicinty of the project area, while the comments in the lower text box relate to the green dots provide the points at a broadscale.

"My Important Places" are marked with a point any areas that have an important value to respondents with a qualitative description associated with each point.

Blackwood and Scott River. Recreational, spiritual and environmental value
Camping areas
Wetlands of heightened environmental sensitivity.
Molloy island community
Old BHP mine
Significant tree
The river is an important biodiverse area for native flora and fauna, local wildlife and the agricultural uses for the surrounding areas.
Molloy island, bird migration
Do not feel sufficiently qualified to comment DBCA have mapped rare flora & fauna in the area
Aboriginal groups know of historically significant sites
Farmers know of productive farm land area
Place of beauty and historical value .
I live, farm, breathe, look, walk, swim, shop and relax at the marked areas in peace.
These are places where I feel calm and connected to my home
The whole place is important with significant connection to the land.
I spent time at all these places with work or in my own time on days off and have the potential to at some point live in a few of these places
It is where I live and where our business is located
Best beaches, surfing, fishing and forest in the world!
This is where I live, work and play
The beautiful clear view across the countryside
A place frequently visited
Many memories made by the ocean with family
We want our adult children to be part of the last remaining farming communities left in the Augusta Margaret River shire.
These are locations I regularly find Wedge-tailed Eagles and all 3 Species of Black Cockatoos to photograph.

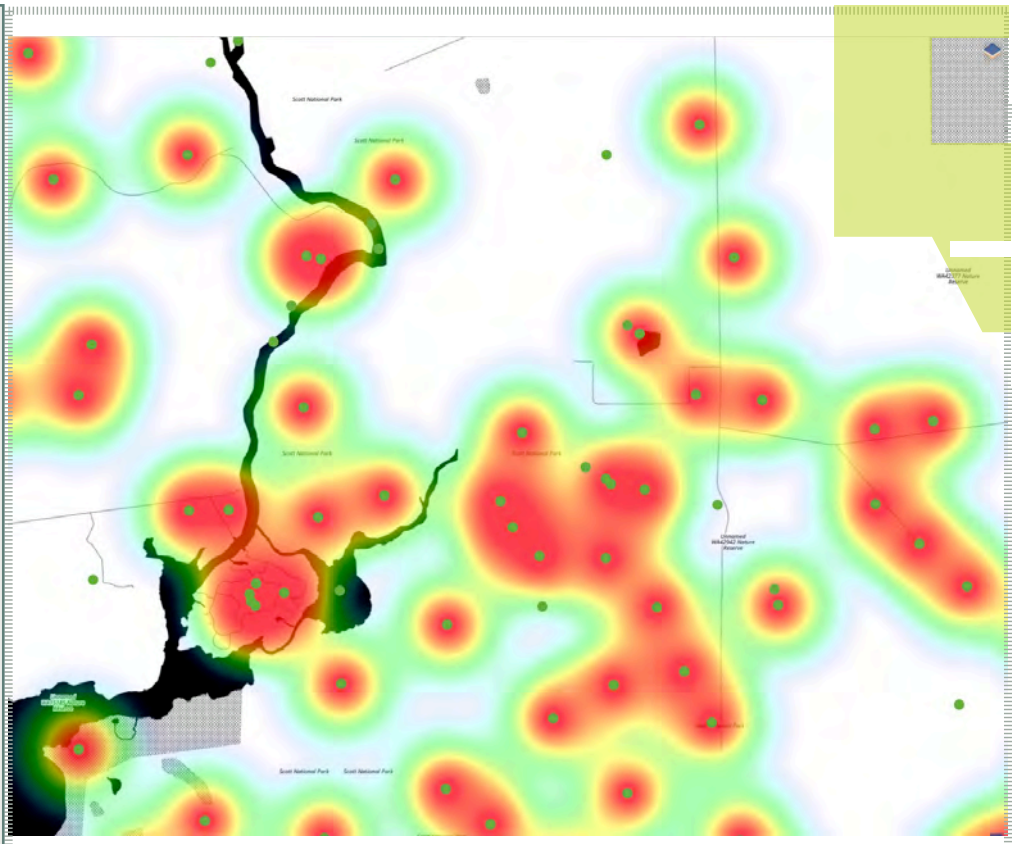


Figure 13 a.Community Survey Spatial Analysis on Places of Perceived Value in the vicinity of the project area

The coastal heath is relatively untouched and important for biodiversity.
The Blackwood and Scott Rivers are important to the region and past use has led to deterioration.
The view from Augusta hotel and the view from Hillview lookout are important places to view the area from, and where, no doubt, the turbines will be most prominently viewed from in Augusta.
Prevelly and Redgate are my favourite beaches
Augusta Light Station is registered on the National Heritage List
White Point and Black Point are beautiful wild places
They are where I regularly go
Love swimming and snorkling/Walking in forests
National Parks along Leeuwin Coast, Blackwood River & remnant forests. Important as they are integral to our living as well as that of the flora and fauna.
Generally natural bushland including rivers and streams are important to rehabilitate and maintain.
The places chosen around Augusta are because of their extreme beauty of natural coastlines
We live in this area, own properties in locations where the pins have been dropped and also spend significant time and recreate in other locations.
Corner of Brockman Highway and Scott River Road. Remnant bushland.
The whole of the Leeuwin-Naturaliste National Park and coastline
Cape to Cape is important to me in terms of conservation, biodiversity and recreation.
Spiritual, environmental cultural significance
The Scott National Park and Scott River system are important habitat for wildlife.
The whole coastline, Capes, forest areas, bush corridors, remnant vegetation - protect biodiversity.
That's where we live/Home
Our forests are unique and under threat from dramatic climate changes and we must protect them
All these places offer scenic views, access to our clean seas, walking trails and recreational activities
Forest & beaches

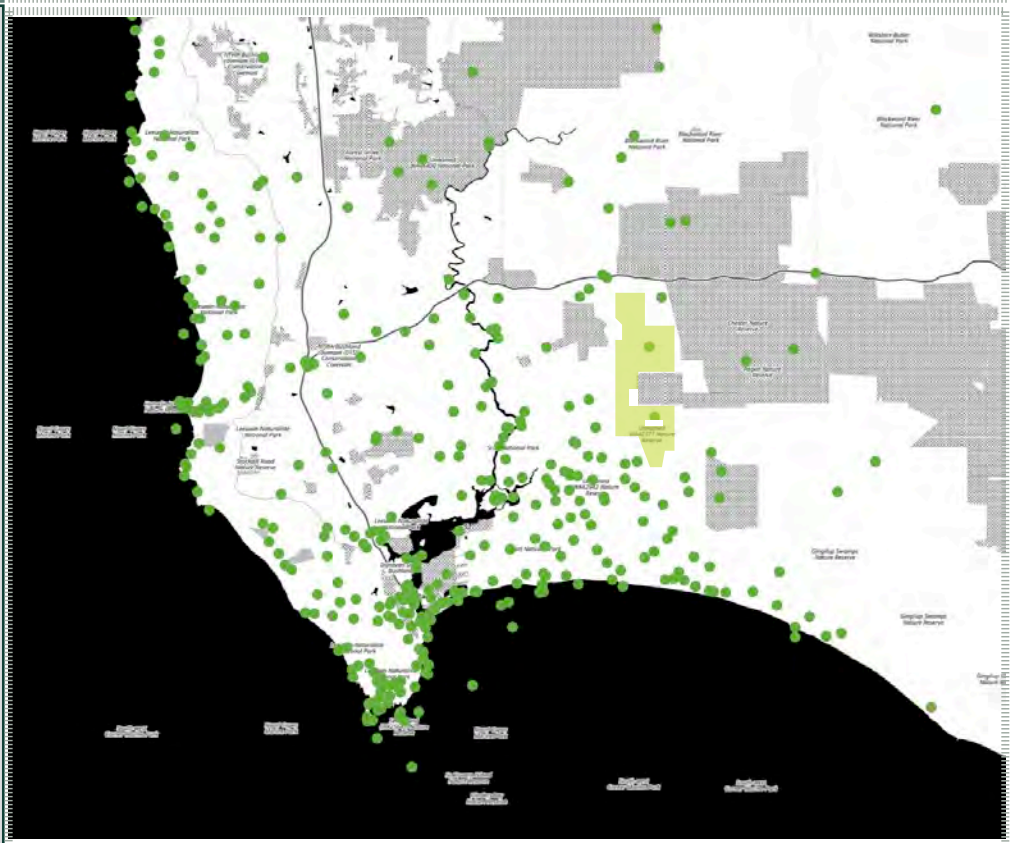


Figure 13 b. Community Survey Spatial Analysis on Places of Perceived Value across the region

Proposed location area for Scott River Wind Farm

6.4. CULTURE & HERITAGE

6.4.1 INDIGENOUS CONNECTIONS

Almost half (46.7%) of respondents to the quantitative survey noted Aboriginal heritage and culture as an extremely important local value.

The Wardandi and Bibulumin / Piblemen Peoples of the Noongar nation are the Traditional Owners of the Scott River Catchment. The area is covered by the South West Boojarah Indigenous Land Use Agreement as part of the South West Native Title Settlement, which formally recognises Noongar people as the Traditional Owners of the south-west region. The South West Boojarah region is supported by the Karri Karrak Aboriginal Corporation and umbrella group, the South West Aboriginal Land and Sea Council.

The Traditional Owners west of the Blackwood River are the Wardandi and east of the Blackwood (including Scott River) are the Pibelmen. Archaeological evidence suggests that humans were in the area by 48,000 BP. Hearths, bones, stone artefacts, campsites, painted hand stencils, a Peppermint 'killing stick', the Kybra rock engravings, and several other Aboriginal sites on the Scott Plain reveal the culture of the first inhabitants in the region (The Scott River Action Plan 2020).

Under the Settlement process led by the South-West Aboriginal Land and Sea Council (SWALSC), the Southwest Boojarah #2 Indigenous Land Use Agreement has been negotiated with the Wardandi-Pibelmen people. The Undalup Association and the Bibelmen Mia Aboriginal Corporation (BMAC) are two current Aboriginal entities that speak culturally on behalf of this Country (The Scott River Action Plan 2020).

A register of Aboriginal cultural heritage sites kept by the Department of Planning, Lands and Heritage lists several sites of Aboriginal significance in the vicinity of this study area, see Figure 6. The waterways are spiritually, culturally and economically important to Wardandi-Pibelmen people including as spiritual reference points, campsites, food collection, and water supply, and this is clearly illustrated in Figure 14 (The Scott River Action Plan 2020).

Figure 14 indicates that the study area sits outside any registered or noted sites and mirrors the findings of SynergyRED's initial heritage surveys. However, feedback from Karri Karrak during the fieldwork process notes that the visual and significant infrastructure change to the region and its landscape, may impact Traditional Owner's sense of place.

Ongoing consultation and engagement with Karri Karrak and Traditional Owners via the Cultural Advice Committee through subsequent stages of the project feasibility will assist to confirm the social values and a path of partnership moving forward.

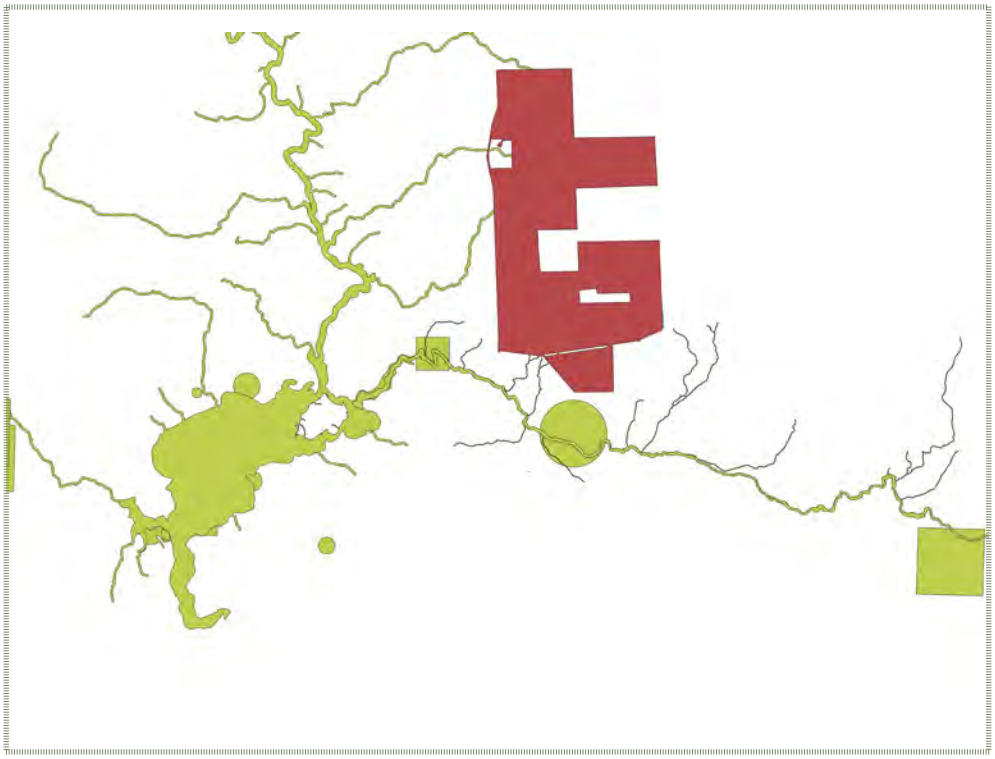


Figure 14. QGIS Aboriginal Heritage Places DPLH 0001

"This is going to significantly change the landscape and country down there, and our Traditional Owners need to be involved in that conversation." (IDI 2024)

6.4.2 COLONIAL CONNECTIONS

Colonial connection to the Scott River region was limited to early explorations by the Turner and Bussell families, along with some fledgling farming and timber milling activity. The pre-colonial landscape was originally dominated by a series of vegetated wetlands, with low dense heath and pockets of tall open forest on more drained areas. Water logging and other challenges of this landscape limited access and desirability for Scott River for a permanent settlement. This assisted in the preservation of the natural environment and protection of its ironstone flora communities and other natural values discussed in Section 6.3.

Those who took up farming in the area in the 1900s used the catchment primarily for dairy grazing, but it wasn't until post war that the area was cleared for primary agriculture. Several local intergenerational families remain in the area since this time, and they have contributed to the colonial history of this remote place. This contribution primarily took place post war, and then again through the growth period in 1960s and 1970s. The Scott River, Warner Glen and Karridale communities do have a shared and collective history of this area, which primarily relates to the commercialisation of the natural assets of the region via agricultural endeavour.

Molloy Island and East Augusta were granted title in the mid 1800s but were only developed for residential housing and a community from the mid 1970s and 80s. Molloy Island had its historic roots in a failed possum farm in the 1920s and was left vacant for many decades, until the recent lifestyle driven residential development.

The other relevant chapter in the historical context of the region was the early 90s efforts by BHP to develop a titanium mineral sand mine adjacent to the study area. Despite a $280m investment, commercial and technical issues forced the mine closure, and its extensive rehabilitation.

This colonial history supports the investment in the region, and use of natural assets in a sensitive way to deliver commercial benefit. It is an isolated region that has historically seen a balance and restoration in the natural environment post human activity.

There is a potential net benefit gained from this project in relation to building on the colonial history of dairy farming in the region to prepare it for the future. Several local landowners and commercial stakeholders interviewed cited the opportunity from a landowner rental contribution as a potential passive income that has the potential to improve borrowing capacity to reinvest in secondary processing and take the local agricultural industry into the future.

"This is land that has been in my family for generations, I want to retire here or have the option to capitalise off the investment my family has made in the land here."
(IDI 2024)

6.5. RESILIENT & PROSPEROUS COMMUNITIES

6.5.1 DECISION-MAKING SYSTEMS

"Include the people affected in the discussions. Reassure local people that wind farms are nothing to be feared. Explain the economic benefits and efficient use of land for multiple purposes." (Survey Respondent 2024)

Local decision-making systems are those that enable a community to contribute and determine their own future. There are several local decision-making systems that contribute to the governance and protection of the community, and its environment, in the face of change. These include:

- Local Government – who has two main responsibilities to the community that relate to this project. Firstly, the preparation and implementation of a district planning scheme, including development control, under the Planning and Development Act 2005, which allows Councils to control the use and development of land by way of the planning approval process. Secondly, the provision and maintenance of the local road system in accordance with the Local Government Act, provides Councils with an ability to limit or control heavy vehicle transport on its road system.
- Western Australian Planning Commission - under the Planning and Development Act 2005, the Commission has responsibility for determining applications to subdivide freehold land and is required to make recommendations to the Minister for Planning on proposed town or district planning schemes and amendments thereto. In addition, the Commission carries a regional and strategic planning function.
- Department of Primary Industries and Resource Development and the Commissioner of Soil and Land Conservation under the Soil and Land Conservation Act 1945, has control over the clearing of land or actions that may cause land degradation.
- Department of Water & Environmental Regulation - the Commissioner has the responsibility of managing the State's water resources, including the assessment and approval of applications for water bore licenses. Approvals can be given for limited periods and may contain specific conditions designed to protect the environment and the water resource.
- The Environmental Protection Authority (EPA) administers the Environmental Protection Act 1986. Projects referred for assessment under the EPA Act, are independently assessed by the EPA and determination is made whether the activities proposed are significant or not. The EPA prepares a report for the Minister of Environment for any significant projects, and the Minister makes the ultimate determination including the setting of any conditions.
- Department of Biodiversity, Conservation and Attractions - the Department is responsible for the management of State forests, national parks and nature reserves, and for the protection of rare and endangered species.
  (Scott Coastal Plain Land Use Strategy 1996).

These regulatory and management authorities provide appropriate levels of governance to contribute to the development of management plans and monitoring across the proposed project lifecycle. They also offer opportunities for local stakeholders to be actively involved the decisions being made in the region.

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the Australian Government's central piece of environmental protection legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as "matters of national environmental significance." The EPBC Act also provides guidance about acid sulfate soils (The Scott River Action Plan 2020).

There are also three pieces of State legislation that protect environmental values and that are relevant to the Scott River Catchment. These are the Biodiversity Conservation Act 2016, the Environmental Protection Act 1986 and the Conservation and Land Management Act 1984. The Biodiversity Conservation Act 2016 provides for the listing of threatened native plants (flora), threatened native animals (fauna) and threatened ecological communities that require greater protection (The Scott River Action Plan 2020).

Department of Primary Industries and Regional Development (DPIRD) set its priorities for declared pests by a declaration under the Biosecurity and Agriculture Management Act 2007 (BAM Act). It is the landholders' legal obligation to manage/control invasive species (weeds and feral animals) on their land and this governance would apply to SynergyRED's activities on land within the designated area. Under the Act, there is a greater responsibility for the community and industry to identify, prioritise, and control established biosecurity threats (The Scott River Action Plan 2020).

These regulatory and decision-making bodies should provide re-assurance to landowners, stakeholders and the broader community that there are appropriate decision-making and governance structures in place to address raised concerns. As noted above for members of the community associated with the BHP Beenup Titanium Mine's model of engagement and subsequent closure, there is some skepticism about these decision-making bodies' ability to protect the natural environment in the face of industry pressure. That said, the BHP Beenup Consultative Group model that sought to actively involve stakeholders in decision-making was well received by the broader community and serves as a positive example for managing engagement processes over the lifecycle of a project in this region.

6.5.2 LAND TENURE

Strengthening the governance and security of land and housing tenure is an important part of building resilient communities.

The Scott Coastal Plain has been identified by the Western Australian State Planning Strategy 2050, as being an agricultural area of state/ regional significance. As such, its productive agricultural capacity is seen as the primary focus of secure land tenure in the region, and under the State Planning Strategy is to be protected against inappropriate subdivision or development.

The Department of Primary Industries and Regional Development (DPIRD) and other government agencies continue to investigate the region to capitalise on these natural assets for further food cultivation and secondary processing, biomass and more innovative dairy agricultural solutions (IDI 2024, DPIRD 1996, The Scott River Action Plan 2020).

Any impact that restricts agricultural lot sizes, or usable land area, is noted to impinge on the productive capacity of the land by restricting the operational flexibility and by reducing the scale and viability of the farming enterprise. Subdivision is also noted by the State Planners to lead to speculative pressures and artificial increases of land values. In turn these effects may limit the financial capacity of that landowner to carry out the appropriate land management procedures.

In both the Shire of Augusta-Margaret River Town Planning Scheme No. 11 and the Shire of Nannup Town Planning Scheme No. 1, the privately owned land within the study area is currently zoned "Rural". These schemes allow for a wide range of uses to be permitted at the discretion of the Council, some requiring prior public advertising. Figure 17a and b shows the growth and shifts in land planning over the respective periods and by number respectively, highlighting both shifts in land tenure and increases in dwelling numbers at a regional level.

The Scott River Catchment is approximately 64,276ha, of which approximately 43% (27,000 ha) is farmland, 53% (34,700 ha) reserves, and 3% unallocated Crown land (UCL) (DWER 2019 land use data). There is a total of 53 properties used for agriculture or lifestyle purposes in the Catchment. There are six dairy farms, one dryland and five both irrigated and dryland. Three of the six dairy farms are managed by four family-owned businesses. One corporate company manages the remaining three farms. The other industries are beef and sheep, blue gum plantations, and native vegetation (White, 2012 and Whitfield, 2019 in The Scott River Action Plan 2020).

Most of the private land holdings on the Scott Coastal Plain are much larger in area than those in other parts of the South West. The lots north of the Scott River and east of Scott River Road are between 600ha and 1,200ha in area and few at around 50ha. Most of the holdings are family owned, and some have two or more lots forming the total farming enterprise. The large lot sizes, relatively low land values and minimal land speculation pressures in this area have provided a favourable basis for developing large scale agricultural enterprises. The placement of 40ha centre pivot irrigation systems throughout these lots have improved the productivity of the restrictions placed on the region by lot boundaries, streamlines, remnant vegetation, poorer soils or other constraints. To the west of Scott River Road, the lot sizes are generally in the range of 40ha to 200ha, with a few smaller lots. South of the Scott River the lot areas are much more variable, ranging generally from 100ha to 500ha. Several land holdings consist of a few much smaller lots (Scott River Action Plan 2020).

In the area known as East Augusta, on the eastern bank of the Hardy Inlet and at the end of Scott River Road, there is a precinct of about 50 lots around 4,000m2 to 8,000m2 in area (DPIRD 1996).

Land in the area has been tightly held since the 1960s as evidenced by property turnover data. Risks to land tenure and enterprise include the deep leached sandy soils and high-water tables, combined with the widespread applications of high levels of fertilisers that could lead to nutrient overload in the adjoining waterways, and a loss of important ecological habitats and recreational areas (DPIRD 1996).

Those landowners interviewed felt that there is significant opportunity to increase the value derived from the land through secondary processing, plantations and horticulture opportunities, however these opportunities are constrained by limited infrastructure, water, power, telecommunications and accommodation. This was supported by the aforementioned findings of the DPIRD study.

The proposed wind farm in Scott River will have a positive financial benefit on the host property owners and the passive income from wind turbines is seen as way to improve resilience and debt proof property for future investment borrowings.

The requirement for buffer zones associated with the wind turbine locations are perceived as a negative to land tenure security and capitalising on the land in the eyes of some landowners – particularly adjoining neighbours who perceive that they will not receive the passive income contribution for hosting the turbine. There will be a requirement to work with neighbours to ensure any plans for their property aren't affected by the proposed wind farm, or appropriate compensations for any required adjustment to their plans or compliance with certain building conditions is addressed.

Distances from wind turbines to dwellings is primarily based on noise compliance. A dwelling describes an existing or proposed building used for residential or accommodation purposes, that is, a building used for a 'noise sensitive purpose' as defined in the Environmental Protection (Noise) Regulations 1997. Figure 16 shows the number of buildings across the Scott River and Molloy Island areas and demonstrates a low dispersal of buildings across the proposed project area.

"Access to land in Scott River is already a challenge, it is tightly held, wedged between national parks and state significant habitats, the perched water table and over 30% of wetland areas are on the farms. These are all excluded out of arable land, The proposed buffer is an additional issue that inhibits productivity and negatively impacts land value, and that is a key driver for me." (IDI 2024)

As per the Western Australian Planning Commission's Position Statement on Renewable Energy Facilities (2020), a buffer zone is required at a calculated distance between wind turbines and habitable dwellings. This distance is calculated based on noise modelling studies and landowner/neighbour agreements. In all cases, SynergyRED note that the priority is in ensuring that noise is compliant.

To maintain noise compliance throughout the life of the proposed wind farm in Scott River SynergyRED offer landowners and neighbours an annual fee to maintain a buffer zone around each wind turbine. This buffer zone limits the construction of new habitable dwellings within the zone.

There are no sensitive land uses i.e. those that are residential or institutional in nature such as a hospital, school or aged care facility where people live or regularly spend extended periods of time that would be compromised under the proposal land use by the proposed wind farm in Scott River.

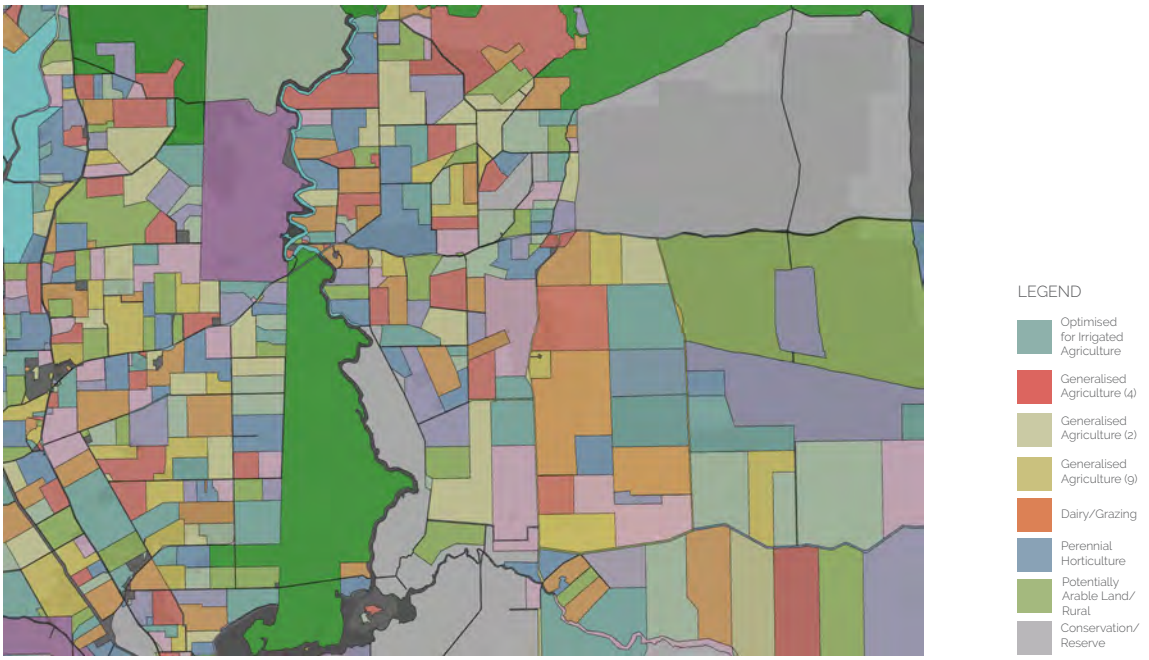


Figure 15. Land Capability across the Proposed Wind Farm in Scott River Area is classified by DPIRD as Rural Agricultural Scale 1: 50000 @A2



Figure 16. Study Area and Existing Buildings (Buildings_of_WA_DPIRD_084) - Scale 1: 50000 @A2

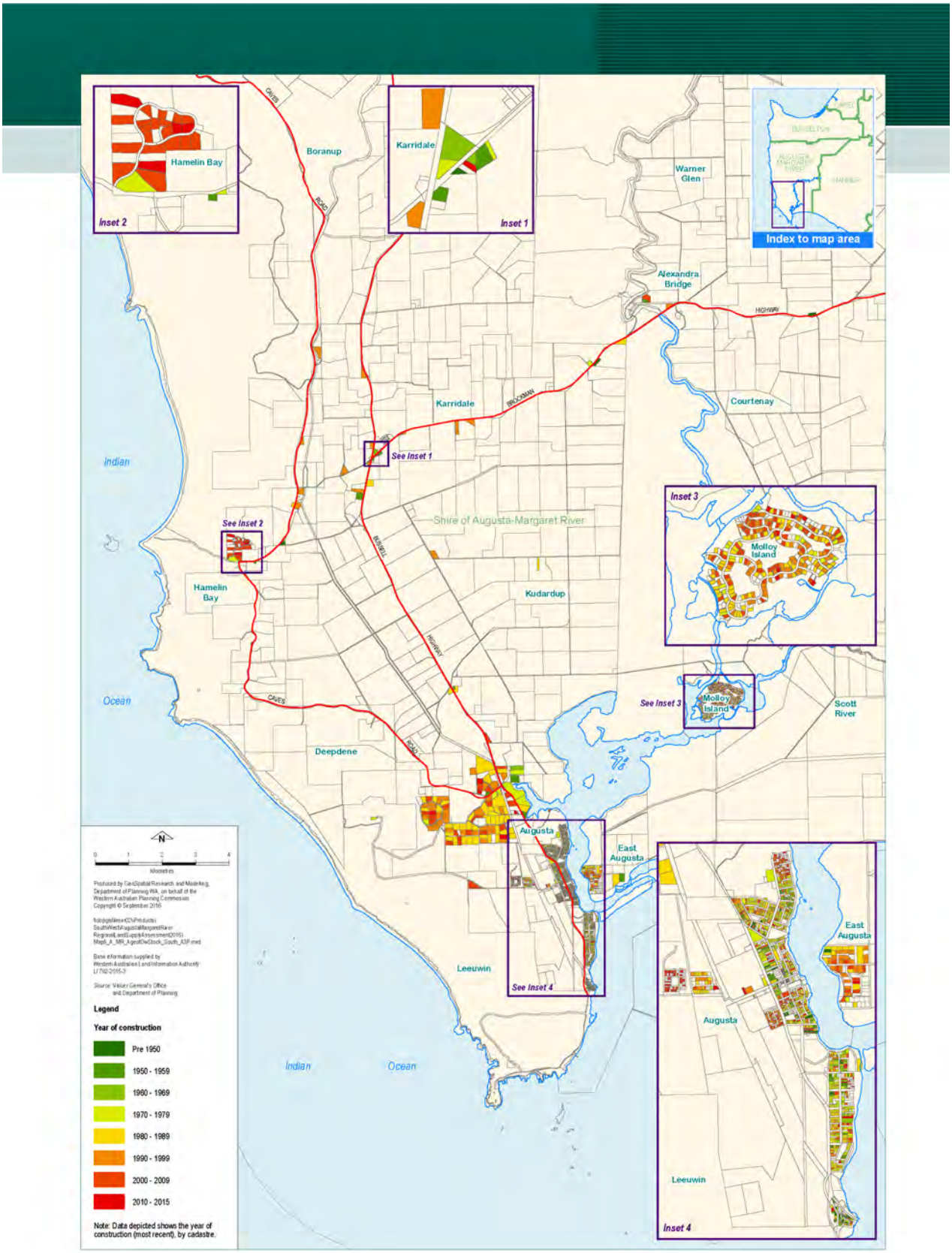


Figure 17a. Town Centre Land Planning and Period of Dwelling Construction

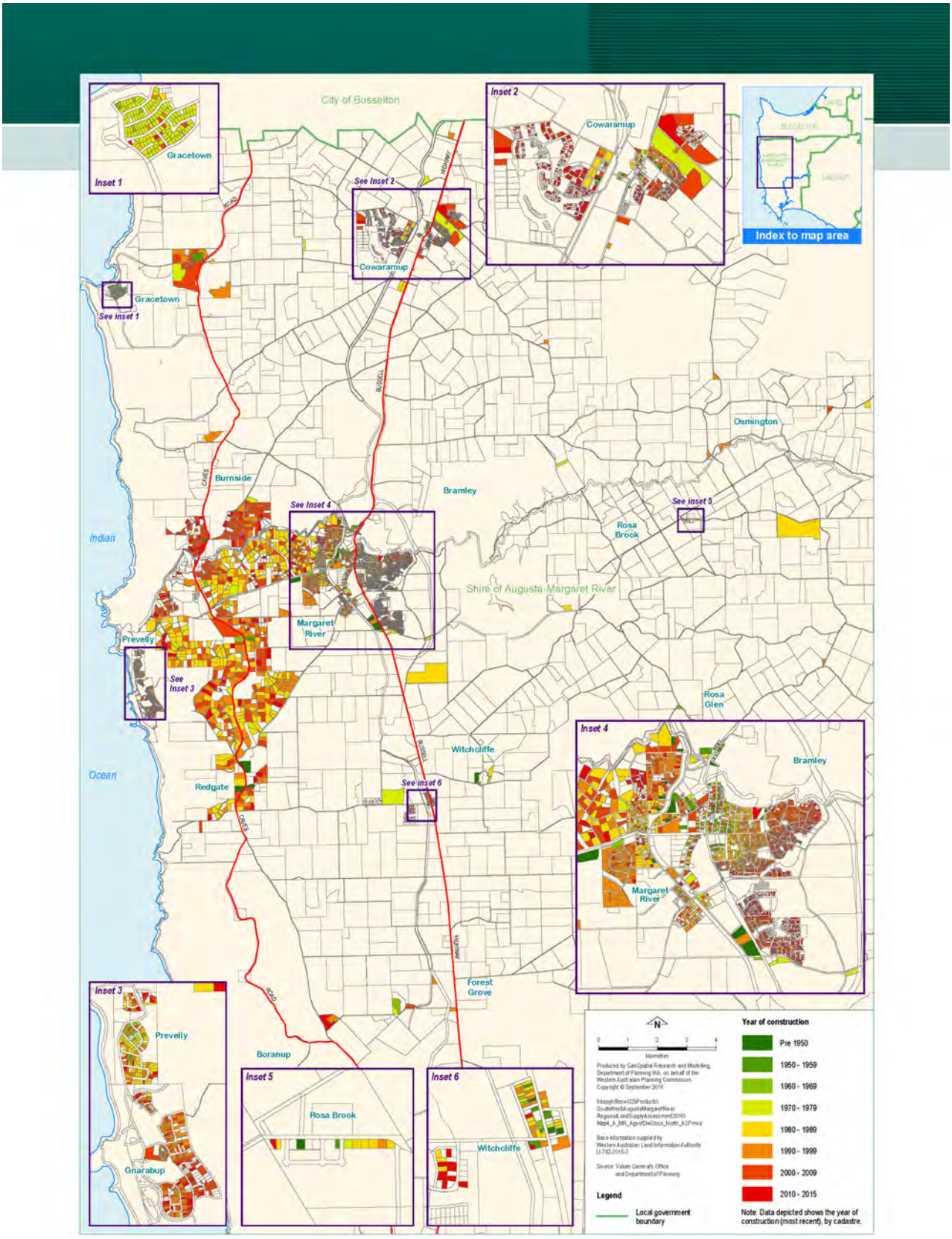


Figure 17b. Town Centre Land Planning and Period of Dwelling Construction

6.5.3 ROADS & TRANSPORT

In Australia, resilience in transportation is a critical indicator for a community to anticipate, prepare for and adapt to changing conditions, and withstand, respond or recover from disruption, particularly given the regional or rural nature of many communities across the country (Infrastructure Australia 2024).

The Scott River Catchment is remote and serviced primarily via Sues Road and Brockman Highway. The development of the BHP titanium mineral sands mine resulted in the reconstruction of parts of Brockman Highway, Black Point Road and Scott River Road, and the construction of Sues Road to the north.

Apart from a short section of Milyeanup Coast Road, all other roads in the study area are either graded earth roads or dirt tracks. One of the major constraints to road construction and upgrading in this area is the lack of road base materials within a reasonable haulage distance, as most of the materials reserves are located within the Department of Biodiversity, Conservation and Attractions and are generally not available for road purposes (Scott River Action Plan 2020).

A recent report by Monaghan, as cited in the referenced DPIRD Report shows that historically agricultural property movements in Scott River for supplies coming in, or stock/produce going out can generate up to 680 trucks per annum for the dairy farmers, 592 per annum for horticulture, and 2,083 per annum for farm forestry.

Consideration of these traffic movements, seasonal tourism visitation movements and natural constraints on access road construction will need to be incorporated into SynergyRED's decision making around traffic and transport in and out of the study area.



Figure 18. Indicative Primary Transport and Connection Arteries, as identified by respondents in the geospatial survey,

"The famers will lose feed or ability to get milk trucks in and out if they don't manage transport and roads use effectively." (IDI 2024)

6.5.4 POWER & TELECOMMUNICATIONS

""This region has always struggled with access to power, phone and basic utilities. Anything Synergy can do to help this would be well regarded." (IDI 2024)

Like transport corridors, power and telecommunications are essential infrastructure to maintain and generate future proofed resilient and prosperous communities.

Agricultural properties in the region are currently limited to single phase (240 volts) power supplies, which is sufficient to operate an irrigator, but a bore pump requires three phase (415 volts). There is a considerable cost saving in using appropriate electricity supplies, rather than diesel fuel, to power the plant associated with irrigated horticultural production (Monaghan 1999, as cited in the referenced DPIRD Report).

The landowners interviewed from in the study area have expressed a strong desire to connect to three phase power supplies. The Scott River Action Plan notes a preliminary estimate by Western Power to extend a suitable transmission line from the Beenup sub-station to the eastern sector of the study area. This is illustrated in Figure 19, page 37.

Currently, most of the properties in the central and western sections of the study area are connected to the Telstra cable phone system, but those in the east mostly rely on radio or satellite connections. Mobile telephone coverage is very limited. Those interviewed from Scott River and Augusta expressed a strong desire for an improved telecommunications service.

There may be an expectation on SynergyRED to work with Western Power or other utilities to improve power and telecommunications provisioning during construction, and operational stages of the proposed project.

6.5.5 COMMUNITY SERVICES

Remote settlements of less than 1,000 people in Western Australia are diverse in nature and present different challenges for government authorities, service providers, residents, commercial operators and funding agencies. Local service provision in remote settlements is governed by DPLH's Remote Services Level Guidelines, which looks at supply systems, networks, difficulties in access, size and technical knowledge/capacity.

In the Scott River region, local landowners and residents of these towns use the social infrastructure (schools, health and community facilities, commercial and civic facilities) in the larger surrounding towns such as Augusta, Witchcliffe and Margaret River. These are generally accessible and the communities at a scale that enables more appropriate provisioning of these services.

The Scott River Action Plan defines provision of community services from a common point at the Scott River township via the junction of Milyeannup Coast Road, Fouracres Road and Governor Broome Road, noting it is 70km to regional centre of Nannup, 60km to the township of Augusta, 68km to Margaret River, 81km to Pemberton and 84km to Manjimup. A small roadside shop, the Nillup General Store, exists on the north side of Brockman Highway, near the junction of Scott River Road.

The nearest regional hospital is at Augusta. The hospital includes a 24/5 Emergency Department, allied and general health services including mental health and telehealth services (WA Country Health 2024). All other regional community services are located within Augusta or Margaret River.

With increased population during construction and potential visitation to the proposed wind farm in Scott River as a tourist attraction, there is an implied implication amongst local stakeholders that this will see an increasing local population and in turn create the catalysts to improve local service provision.

However given the small scale of predicted impact in terms of population impact and flow on demand, this is unlikely to be a noticeable net benefit, nor a negative impact in terms of pressure on these services.

"There is so much pressure on facilities and infrastructure with growing population increases, slowing of subdivision development times and lag in services catch up to be ready." (IDI 2024)

6.5.6 WAY OF LIFE

"Windfarms are obviously not without landscape and visual impacts, however the Scott River location is able to accommodate impacts without adversely compromising way of life, or significant landscape values, as opposed, for example, to wind turbines on the coastal fringe or Leeuwin Naturaliste Ridge." (IDI 2024)

Part of the definition of a resilient and prosperous community is a strong, healthy and active community that has a clear purpose and a collective spirit. There is no established townsite in the immediate study area. In most instances, the Scott River 'community' is defined, by those interviewed for this assessment, as their own intergenerational family members residing on a family property, rather than a traditional definition of a community of different families and social structures residing within a common location.

This differs outside the Scott River Region, for example the Molloy Island Community, who note their strong sense of community spirit, and connection to their broader social structures of adjacent neighbours and residents. While in Augusta, 'community' is described, in both the qualitative and quantitative fieldwork as the wider township, its residents and its visitors.

The way of life within the Scott River area is described, as work and agriculturally focused, related to activity as part of 'farm life,' with a strong sense of ongoing learning and volunteering. For those in East Augusta and Molloy Island, the way of life is connected to activities on the water, nature and "peace and quiet."

In the township of Augusta, as noted in Section 6.2, community cohesion, sports and recreation and volunteering within the community drive this way of life.

In terms of the proposed wind farm in Scott River, and any potential impacts on the way of life in the region, the visual amenity, lights, noise and activity were cited as the main concerns with any changes introduced. Over sixty percent (60%) respondents to the online survey noted "preserving what is unique about this area" as an extremely important attribute of the region, and over fifty percent (50%) also rated "peace and quiet" as extremely important.

The proposed wind farm in Scott River does have the potential to drive some division in attitudes within the local community. This relates to the current high-profile nature of the project locally and the divided and public positions on the net benefit or negative impacts of the project.

This is evident in the overall support results for the project that are currently polarised at either edge of the perception spectrum in both the online survey and reflected in the analysis of the in-depth interviews. This will require careful management by the SynergyRED project engagement team.



Figure 19. Map of Proposed Transmission Line, provided by SynergyRED

6.6. THRIVING, DIVERSE & EQUITABLE ECONOMY/WORKFORCE

"The DPIRD report has highlighted the importance of agriculture in the region with advantages of water, high water table, soil health, the future for income generation in the area has to be agriculture and a diversity of agriculture." (IDI 2024)

Socio-economic considerations for productive human settlements relate to having an ability to derive an income, access to a thriving, diverse and equitable economy and workforce, and to have an active supply chain providing necessary goods and services. Delivery of this requires energy, appropriate infrastructure and a compatible range of industries/occupations/activities to provide livelihood and work for those currently employed in the energy industry or those currently outside the sector who may need additional skills, training or pathways if to benefit..

The proposed wind farm for Scott River will bring some employment opportunities, local procurement and the provision of improved regional infrastructure. The challenge will be ensuring the proposal is compatible with the existing agricultural productivity and tourism visitation, that the human settlements within the region are not only heavily reliant upon, but from which they also derive their sense of identity, history and community cohesion.

6.6.1 INDUSTRY SECTORS

The Shire of Augusta-Margaret River note its core industry sectors as tourism, agriculture, construction and manufacturing, noting "*tourism has just taken over agriculture in the region, followed by construction and manufacturing which primarily relates to wine making.*" (IDI 2024)

The total gross value of agriculture in the Scott River region is approximately $19.2 million, with a total value add $28 million (DPIRD Scott Coastal Plain – A Strategy for a Sustainable Future).

In addition to the agricultural activity described earlier, there are several other emerging and growth industry sectors around the Scott River Region. These include Abalone fishing and tourism. In the tourism sector, growth is being seen in boutique accommodation, remote camping and forestry, water-based activities and whale watching.

Wherever possible demonstrated compatibility between wind farms and agricultural activity, as well as nature-based tourism will need to be shown, and the evidence shared with local stakeholders and the broader community by the SynergyRED's engagement and access negotiation teams.

6.6.2 EMPLOYMENT

Employment opportunities are relatively low within the study area and are predominately related to agricultural management and trade/ farm hand roles. The proposed wind farm in Scott River introduces the opportunity to increase access to specialised and technical staff that may have some complimentary skills in terms of equipment or infrastructure maintenance on the rural properties.

Providing local employment opportunities is seen as the strongest area in which SynergyRED could deliver to this value to the community's benefit, with around a third (38.2%) rating it as 5 extremely well (to our benefit).

A full economic profile in terms of qualifications, industry of employment and employment numbers for each of the communities assessed is provided in Appendix 2.

Current Activity in Scott River Region	Employment per 100 ha	Area (ha)	Total Employment
Dairying (year-round workforce)	2	1,750	35
Horticulture (largely seasonal March to May)	50	450	225
Other (including Plantations)		5,000	30
Accommodation Provision			
Permanent Workforce			37
Seasonal Workforce			90
Total Beds			127

Table 2: Summary of Activity, Employment and Local Accommodation Provision in Scott River

"Employ local and look to local involvement in maintenance and blade restoration." (IDI 2024)

"It is a good thing for jobs, expenditure, and the local economy." (IDI 2024)

6.6.3 ABILITY TO DERIVE AN INCOME

"Compensate all local property owners in Scott River for their losses." (Survey Respondent 2024)

The ability to derive an income refers to one's earning capacity and the source from which that earning is drawn.

The impact on the agricultural landowners and the ability to derive an income is discussed in Section 6.5.2, 6.5.3 and Section 6.6.1 around land tenure and economic diversity. This risk is relatively low with respect to any negative impacts on the ability of the local community to derive an income, unless there are construction or operational impacts that have a flow-on impact to water quality, soil degradation, or fire. These will need to be managed carefully through appropriate management plans as noted in Section 6.3.1 to Section 6.3.3.

Several respondents in the qualitative fieldwork discussed the positive flow on that regular income for hosting a wind farm on a property has in terms of improved borrowing capacity for further capital investment.

A few respondents noted a potential negative impact for those wishing to capitalise through sub-division of their property. These are discussed above under land tenure, and as per the Western Australian State Planning Report for the region, sub-division and property price speculation are being restricted and controlled through efforts within the planning system, rather than being impacted by this proposed project.

6.6.4 SUPPLY CHAIN

As noted in Section 6.5.3 to Section 6.5.5, this proposed project can improve local supply chains through improved energy access, road and transportation link uplifts, procurement of local contractors and enabling passive income to local dairy farmers to invest in secondary processing and other value add propositions.

Synergy's obligations with regards to Western Australian industry participation and other government local procurement supply policies, the extent to which expenditure may be allocated, the types of supply chain opportunities and the availability of such goods and services in the region are outlined in Section 4.1 Summary of Synergy's Social Performance Approach.

Care will need to be taken during construction to ensure increased traffic does not interfere with agricultural transport to local properties, to avoid impacting their access to efficient supply chains.

"The ability to get equipment and feed in and milk/cattle trucks out, plus cattle movements is critical, and the roads aren't good." (IDI 2024)

7. PROJECT IMPACT CONSIDERATIONS

SynergyRED is aiming to determine the feasibility of a proposed wind farm in Scott River. Section 6 of this report detailed the social values held in high importance to the local communities, and areas of concern in SynergyRED's ability to manage any impacts on these values to the communities' detriment or benefit.

The following project description outlines the current project model being considered under this feasibility stage. It provides the baseline for the recommendations made in Section 8. Already several project decisions have considered the findings of this study and SynergyRED's ongoing engagement with local stakeholders and community members.

7.1. Project Description

The proposed 100MW onshore wind farm in Scott River is approximately 15 km north-east of the Augusta townsite in the south-west region of Western Australia (Figure 3). It is proposed to consist of up to 20 wind turbines and associated infrastructure and will connect into the South-West Interconnected System (SWIS) via the existing 132kV transmission line between Beenup and Manjimup. The proposed onshore wind farm is located on predominantly cleared freehold land used for farming and adjacent road reserves.

The design and layout has not yet been finalised. The indicative development footprint, shown in Figure 3 and 4, has been informed by discussions with landowners as well as in consideration of advice and any constraints identified from the various technical studies conducted in support of the proposed wind farm in Scott River.

The final layout will be determined through a comprehensive tender process. The turbine manufacturer will be selected by SynergyRED, who will then confirm the specifications of the wind turbines (including make, model, etc.) and the resulting final development footprint. This will be based on further detailed technical studies (e.g., geotechnical investigations) to ensure compliance with relevant international and national standards, guidelines, and site-specific constraints related to environment, heritage, and planning requirements. It is recommended that this tender process includes demonstration of how the final proposed layout will address the barriers and constraints raised in this social values assessment.

7.2. Project Scale and Size

The proposed wind farm in Scott River currently includes a maximum of 20 wind turbines, with a total maximum capacity of up to 100MW. The indicative turbine locations have been selected to maximise energy production whilst minimising impacts on the surrounding environment.

The overall height of the turbines (combination of hub height and blade length) shall not exceed 250m, as per the turbine design parameters being considered:

- Max blade length 90m.
- Tower/hub height between 80 to 164m.
- Turbine tip height between 150 to 250m.

The final turbine design and layout will be dependent on several factors including market conditions, cost of construction, availability of wind turbine infrastructure and the capacity of the existing 132kV power line. The cabling between the wind turbines will be underground and follow the roads as much as possible to minimise clearing and impacts on landowners.

Visual amenity, noise, impacts on the environmental values of biodiversity, flora and fauna, and the way of life in this remote region should be factored into decision-making around project size and scale.

7.3. Other Associated Infrastructure

Other associated infrastructure will include the substation, operations, and maintenance buildings, 4km transmission line, roads, and cabling. Foundations for each turbine will vary depending on the imposing load, ground conditions, construction methodology, and drainage requirements of the site. The depth of the foundation depends on a range of factors including turbine type, ground conditions and the unique Scott River geology. Traditional turbine foundation depth is generally around 4-5m. .

During construction up to six wind monitoring towers (meteorological masts or 'met masts') will be installed to obtain accurate wind speed measurements from the prevailing wind directions. Following commissioning up to three of these met masts will remain throughout operations (Figure 2). The met masts are required to be located a certain distance from nearby turbines and their locations will be confirmed at the detailed design phase to ensure that accurate measurements can be obtained throughout the life of the project in accordance with international standards. Met masts will be installed to the height of the turbine hub height (maximum height of 164m).

A microwave communication tower, with a height of 100m, would also be installed to enable the wind farm substation to communicate with Western Power operations remotely.

If the project is deemed feasible and environmental and regulatory approvals achieved, construction is anticipated to take up to 24 months. Project schedule and commencement time will be impacted by approvals timing and a conservative outlook on scheduling is being considered.

The physical construction of associated infrastructure, any clearing activities, gravel and concrete sourcing and production, operational use and construction activity (timing, location, access, visibility and noise) and accommodation of the construction workforce will have impact on the social values outlined in this report. Consideration should be given to clarifying these impacts as project decisions are made.

7.4. Project Water Requirements

Two 200kL water tanks and four 45kL water tanks will be installed to support construction and operational water requirements, including Emergency Services in the event of a bushfire either onsite or externally. This would likely be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, maybe able to also be used during construction.

Water sourcing, provisioning, use, de-watering, treatment, and storage are of prime interest to all stakeholders and members of the broader community. It is an attribute with a high social value and the value placed should be factored into decision making, and engagement strategy development.

7.5. Clearing Requirements

The proposed project would involve little vegetation clearing as project infrastructue and associated activities will be located in previously cleared areas. Clearing of any previously disturbed or undisturbed areas will need to factor in the high social value placed on the ironstone flora communities, bird life and other fauna and visual amenity. Again, this should be factored into decision making, and engagement strategy development.

7.6. Land Access and Buffer

A cleared area of approximately 40-70m around each turbine will be required to maintain vehicle access. This area would not be usable for farming. A buffer zone of up to 100m would be in place around each turbine that would limit built construction within this area, with farming activities still permissible on this land.

There would be two main site access points into the wind farm to achieve safe access and minimise community disruption during the construction stage, as well as reducing the extent of local roads required for delivery of turbine components. The site would also include three additional emergency services access points to allow easy access to and movement around the site.

On-site access roads will be designed to utilise existing roads or disturbance as much as practicable to limit impacts on the environment and existing agricultural activities once the wind farm is fully operational. The internal site access roads will be private roads only accessible to the landowners, and Synergy and its contractors.

It is anticipated that up to 30 km of gravel capped roads will be required, with the following design criteria and mitigation measures applied to mitigate potential impacts:

- Access road widths will typically be approximately 5-6m wide, with some portions proposed to be wider to accommodate turning circles for cranes, trucks, and other construction/delivery and emergency vehicle requirements.
- Turning areas and passing bays will be constructed where necessary.
- Roads are not proposed to be sealed and will be constructed from locally sourced aggregate/gravel.
- Drainage channels will be located on either side of the road as necessary.
- Culverts will be installed to maintain flows across the site.

These access roads will remain permeable and unsealed to allow for improved water penetration and minimised impact.

Minor works will be undertaken at these entrance points to facilitate the entry of large vehicles, including blade transport trucks and emergency services. This would typically involve widening of the road surface area and gates. Intersection works will be defined through the detailed design phase following turbine procurement and confirmation of blade length, and in consultation with the Shire.

Again, any access point or road construction, whether on previously disturbed or undisturbed areas, will need to factor in the high social value placed on the ironstone flora communities, bird life and other fauna and visual amenity. That said, improved access does have flow on benefits for the agriculture and wherever possible a net benefit to loss ratio should be applied.

Clearing, water management, and location of turbines and access decisions should be discussed openly with stakeholders and factored into project team and contractor inductions, as well as the engagement strategy.

7.7. Workforce and Employment

The Proposal is expected to require a workforce of up to 150 personnel at peak construction periods. The construction period is expected to take 18 to 24 months. It is anticipated that construction workforce will be accommodated at existing facilities in surrounding towns and localities, with no construction camp or temporary onsite accommodation currently proposed as part of this Proposal.

Once operational, it is anticipated that approximately five full time wind farm technicians who reside locally will be required throughout the life of the project, working day shift only and will be on call during weekends. These on-site personnel will be responsible for reporting, monitoring, and some maintenance of the wind turbines. Where required, an additional expert maintenance technicians would be engaged.

There will be several additional offsite personnel and contractors who will perform Australian Energy Market Operator (AEMO) coordination, turbine performance monitoring and licensing compliance, wind farm reporting and remote resetting and controlling.

There may be local supply chain opportunities for maintenance and refurbishment work during the project's operational lifetime. These would be sourced in line with SynergyRED's procurement processes and policies.

Again, as noted in Section 6.6 any local employment or procurement opportunities will have a positive net flow of improved access to workforce participation, skill development and income. A few respondents in the quantitative survey provided feedback that opportunities for technical, environmental, health and safety training could also be provided by SynergyRED to the broader community to increase this opportunity and benefit. Other participation requests around environmental surveying, rehabilitation and monitoring were also made.

Care will need to be taken in decisions relating to accommodation of the construction workforce during peak times to ensure any negative impacts on the community's perception of safety, cohesion, and pressure on supply or pricing is managed.

7.8. Tourism Opportunity

A wind farm viewing area that can accommodate up to six vehicles will be developed off Scott River Road to ensure a safe pull over area where tourists can stop and observe the turbines and learn about renewable wind energy.

This would be a positive net benefit to the local community, and one that offers an opportunity for active community participation in decision-making and engagement.

7.9. Project Lifecycle Considerations

The proposed wind farm in Scott River would have an operational life of approximately 30 years. Once the operational life of the wind farm comes to an end, the wind farm can be repowered by replacing the wind turbines, or wind turbine components to extend its life, or decommissioned with land returned to its previous state, or as agreed by the landowner.

Leaving a minimal footprint in this remote and natural environment is a core value expressed by local stakeholders and community members. Active engagement and involvement in project lifecycle planning, monitoring and rehabilitation should be factored in early in the project feasibility process.

Clarification on the lifecycle implications of wind farms compared with other energy sources has been requested by participants in this study.

8. SUMMARY OF RECOMMENDATIONS

8.1. ENERGY TRANSITION

This proposed project has a significant net positive actual impact in terms of the transition to renewable energy for Western Australia's future, generating up to 100MW of power which would be contributed to the grid.

Electricity from the proposed wind farm would feed into the Beenup substation in Scott River, which connects to homes and businesses in Augusta, Scott River, Molloy Island, Alexandra Bridge, Karridale, Hamelin Bay, East Augusta and Forest Grove. The remaining electricity from the proposed wind farm would flow along the transmission line to Manjimup, Collie and the rest of the energy grid.

Recommendations for Mitigation/Benefit Realisation

1. Providing neutral, accurate and timely information that sets out a relative comparison of the proposed project against different future renewable options in terms of lifecycle renewal, power consistency, carbon footprint, supply and cost may help moderate any polarisation of the debate within the community.

2. Consider financial support, or donation of technical expertise, to flagged projects around biomass, a micro-grid project or technological uplifts to elevate power supply or support through passive investment diversification, as recommended by DPIRD and the Dairy Industry Association, to show direct benefit flowing into the community.

8.2. POPULATION & DEMOGRAPHICS

The provision of appropriate accommodation, infrastructure and community services to support this growing population is somewhat limited, and pressure is evident in increasing rental and housing prices, government agency feedback and current investment into these areas within the community (Infrastructure WA 2022, Shire of Augusta Margaret River Annual Report 2024).

As such any population shift, or demographic change, is often shown to be more significantly felt in a smaller community, than comparatively within a larger regional centre where adequate services and infrastructure are already in place to service a larger population (Cheshire, Lynda, et al 2014).

In addition, any impact on the perceived values of "isolation," "peace" and "close-knit" nature of this community will be felt. This potential impact was raised by community members in both the qualitative and quantitative stages of the study.

That said, given the small operational workforce, this project would not have a noticeable impact on the demographic profile of the community, except during construction. The addition of up to 150 construction workers during peak construction, whose industry profile tends to show a greater proportion of young males within it (Master Builders Australia 2024), will sit differently within the ageing demographic of Molloy Island and Augusta, and other small population clusters distributed through the area.

The size of construction workforce may put pressure on social cohesion, accommodation, rental prices, utilities and services within the region, although it is noted that this is a short-term impact (Carrington, et al 2016, Scott and Hogg 2015, Lockie, Stewart, et al 2009, Bush and Lipari 2015, Chapman, Janine, et al, 2020, Pidd, K, et al, 2019, Shire of Augusta Margaret River Annual Report 23/24). This potential impact was considered a concern by several community members in both the qualitative and quantitative stages of the study.

Positive flow-on social benefit could be achieved through income contribution to accommodation providers, advice or suggestions on appropriate training or pathways to access employment within Synergy or the energy sector for the local workforce, local procurement and increased participation in social, sporting and recreation clubs.

Recommendations for Mitigation/Benefit Realisation

3. Any project decisions relating to accommodation of the construction workforce should consider:
   - Potential impacts on the region's smaller, tourism-based communities,
   - Potential impacts on communities such as Augusta whose demographic profile differs significantly from that of the profile of the construction workforce, as referenced in Section 8.2,
   - Potential impacts on rental housing, or holiday accommodation, that is already under pressure and where additional pressure may negatively impact residents, and visitors, in terms of rising prices, or reduced supply.
   - A commitment to achieve a greater diversity in the profile of the construction, and operational, workforce would reduce social impacts historically associated with construction workforces in regional areas.
   - The potential of a construction camp was raised by the local government, and some landowners, as an opportunity to address this pressure. Early investigations suggest that an accommodation camp may not be financially and commercially viable. Synergy should explore and continue to test the market should the project progress to the next stage. Other mitigation strategies could include recommended accommodation zones, behavioural management, policies and communication strategies.

8.3. ENVIRONMENTAL VALUES

The primary impact on environmental values and stewardship for this project are around water, visual amenity, flora and fauna. A full assessment of impacts on social and environmental values for these indicators will require project location, transport routes and construction decisions to be finalised.

However, the baseline provides a snapshot in time to help guide project feasibility decision making and design of mitigation strategies to minimise any potential negative social impacts.

Recommendations for Mitigation/Benefit Realisation

4. Recognise the importance of water, soils, ironstone floral communities, and conservation significant flora and fauna unique to this area, and, wherever possible, avoid the areas noted as high value through the quantitative survey results, and through SynergyRED's commissioned environmental and visual impact studies and assessments.

5. Support local volunteer and care groups to ensure that ongoing protection and restoration of the natural assets continues.

6. Ensure induction protocols include recognition of important flora and fauna values, expected behaviours are articulated in response to these, and weed mitigation control for vehicles entering the site is in place to assist in protection of local flora.

8.4. WATER

Changes in surface water flows from placement of infrastructure and any impact on already degraded water supplies was raised as a concern by several participants in both the qualitative and quantitative stages of the study.

Recommendations for Mitigation/Benefit Realisation

7. Develop a project management plan to manage any potential impacts to groundwater and acid sulfate soils.

8. Support local volunteer and care groups to ensure that ongoing protection and restoration of the natural waterways will continue.

9. Consider social values around water in any project decisions relating to dewatering requirements, clearing, access road or footing installation.

10. Ensure induction protocols include recognition of values, expected behaviours, and control for spills/discharges.

8.5. FLORA

The Scott River Region's sensitive flora communities, and the role they play in regional biodiversity is an important consideration for the proposed windfarm in Scott River. The following recommendations were provided by technical experts of the Wildflower Society and local conservation groups.

Recommendations for Mitigation/Benefit Realisation

11. A management plan be developed to manage any potential impacts on ironstone communities, waterlogged soils, and surface water flows to address community concerns around these values.

12. Support local volunteer and care groups to ensure that ongoing protection and restoration of the natural flora and fauna is seen as valued.

13. Ensure induction protocols include recognition of flora values through visual guides, controls for clearing and vehicle and transport protocols.

14. Priority actions include appropriate management and monitoring for weed control and spread of dieback disease, in line with standard industry practice in flora and biodiversity protection.

8.6. SOILS

SynergyRED has completed preliminary geotechnical investigations and is progressing detailed geotechnical investigations to adequately characterise the site, including the location of potentially acid sulfate soils. SynergyRED would submit an acid sulfate soils management plan to the Department of Water and Environment Regulation for approval prior to construction.

Recommendations for Mitigation/Benefit Realisation

15. Develop management plans outlining the proposed management strategies, and a comprehensive monitoring program, to ensure impacts on the downstream environment are appropriately managed.

16. Investigate as part of the feasibility study alternative foundation types, construction timing, and dewatering methodologies.

17. Consideration of corrosion in choice of foundation materials and associated steel infrastructure.

8.7. FAUNA

The following recommendations are based on the information and secondary research provided by Bird Life Australia in relation to minimising potential impacts on identified priority species of birds and bats. They should be considered against SynergyRED's Environmental Impact Assessment conclusions and appropriate messages provided to stakeholders and community as project decisions are finalised.

Recommendations for Mitigation/Benefit Realisation

18. Effort be made to avoid areas between forest or waterways (as birds will cross the turbine areas to move between fragments), and along forested ridge or waterways (as these are often used as navigational aids by birds and bats, abutting forest or remnants (as increased foraging activity along edges).

19. Reduce the attractiveness of turbine areas for birds and bats by minimising perching opportunities (e.g. guy lines) and lighting.

20. Provision of "passive" visual cues may enhance the visibility of the rotor blades enabling birds to take evasive action in due time. (May et al 2020).

21. Once built, ongoing management to reduce bird deaths during periods of high risk may be necessary, such as during peak foraging activity times and poor weather conditions (rainy, foggy, poor visibility).

22. Understand appropriate flight patterns through the environment studies and where possible establish fauna buffer zones to minimise collision hazards. This can be determined based on high habitat value features (e.g. hollow bearing trees or raptor nests) and biological and species specific information.

23. Lighting at operation and maintenance facilities should be on sensors, hooded and directed to minimise skyward illumination.

24. Funding scientific research to address information gaps and areas of uncertainty, i.e. barotrauma, low and high-speed rates of movement for bats, modeling work based on microbat activity periods/weather conditions. Information should be passed into the public arena to assist in future assessments.

25. Appropriate timing of construction activities to minimise impacts to birds and microbats, i.e. outside of known nesting periods.

8.8. FIRE

Fire in this region would have potentially catastrophic consequences to human life, property and emergency services. Studies conducted by SynergyRED to date demonstrates a low fire risk resulting from this proposed project, and note fire suppression and other risk management procedures will be in place.

Improved private access roads will allow better access for emergency services in case of fire, and provide additional fire breaks. Dedicated water tanks at the proposed wind farm can also be used in the event of a fire (SynergyRED).

Aerial firefighting is generally not impacted by a wind farm, with aircraft generally able to avoid the wind turbines in a similar manner to other obstacles such as power lines and communications towers. However, within the volunteer fire fighting community, interference with aerial firefighting activities is seen to be a perceived impact that is seen to potentially result in increased destruction of native vegetation and habitat during fire events. This may need to be worked through with DFES and as part of a local fire management plan.

Recommendations for Mitigation/Benefit Realisation

26. Ensure appropriate fire monitoring and prevention protocols around ignition sources are in place during construction and operations.

27. Install wind turbines with fire detection and fire suppression systems to prevent significant fires.

28. Employ a robust fire management plan for the proposed project to mitigate risks, in consultation with Department of Fire and Emergency Services.

29. Work with local volunteer fire brigades to ensure local protocols are employed, and all staff onsite are inducted to local nuances relating to fire risk.

30. Maintain appropriate levels of water for emergency response events as highlighted in the current project planning detailed in Section 7.4.

8.9. SENSE OF PLACE

The vast openness, peace, quiet, agricultural activities, forest, natural waterways and flora and fauna in the Scott River area are all contributing social values to maintaining a sense of place in the region. The scale of turbines, their layout and visibility/noise can be seen as a hinderance to this sense of place, or as in the case of Albany and many other European communities can be a value add contributing to a sense of place and pride over time.

Van Der Horst and Vermeylen in their LA Journal Article "Beautiful Eyesores" comment on this new way of seeing the aesthetics of wind energy turbines in remote areas in terms of functional and iconic landscapes. This balance will need to be sought, and communicated, as the proposed wind farm for Scott River moves forward in planning.

Recommendations for Mitigation/Benefit Realisation

31. Monitoring and finding appropriate controls for light emissions/shadow flicker and noise that may impact on the sense of remoteness, quiet and night sky.

32. Explore creative solutions around the aesthetic of the wind turbines – suggestions made by interview respondents include impressive artist murals and design. Wayfinding signage that described the art or the future of energy may assist to promote the infrastructure as a tourism asset and minimise negative perceptions. This may assist to create a greater net positive benefit. This would need to be done in a collaborative way with the community and professional artists to realise the benefit.

8.10. INDIGENOUS HERITAGE

SynergyRED, via consultants, have completed Aboriginal Heritage Surveys of the area in January 2024. The survey was conducted in accordance with the Noongar Standard Heritage Agreement under the South West ILUA to determine whether Aboriginal sites existed, and if any such sites would be impacted by the proposal. The survey was completed with local Elders nominated by the Karri Karrak Aboriginal Corporation.

A draft of the report provided to Synergy by the Heritage Consultant from the completed survey indicates no previously unrecorded Aboriginal sites were identified. The draft report also advises that SynergyRED can proceed with the proposed activities within the survey area with no regulatory approval required under the Aboriginal Heritage Act, excepting the portion of the survey area that remains unsurveyed and the ID20434 Blackwood River and ID22928 Scott River Aboriginal heritage sites. See Figure 14.

There was a request to avoid the identified specific tree at the intersection of Sues Road, Chester Road, and Brockman Highway, as well as the cultural protection of raptors, ospreys, and the wetlands and waterways.

Further discussions with Karri Karrak Aboriginal Corporation brought forward the following recommendations.

Recommendations for Mitigation/Benefit Realisation

33. Engage with Karri Karrak Aboriginal Corporation as the project moves from feasibility into planning to actively involve the local Indigenous community via an established set of consultation protocols for the life of the project.

34. If the project moves from feasibility to planning, to engage with Karri Karrak and the cultural representatives regarding opportunities for culturally appropriate interpretative material, employment and contracting opportunities.

35. Ensure all inductions and engagement protocols are in place prior to any commencement of works, potential clearing or accommodation/infrastructure activity.

8.11. COLONIAL HERITAGE

The local history and heritage of this region demonstrates social values of persistence, perseverance and an attachment to commercialising natural assets for greater community good, such as food supply, recreation and tourism-based activities.

There is an opportunity for the proposed wind farm in Scott River to demonstrate these core values in terms of provision of clean energy for the future, respecting and caring for the natural environment and persevering to deliver a win-win project for the local community and state.

Recommendations for Mitigation/Benefit Realisation

36. Ensure the proposed wind farm in Scott River adds another level of demonstratable economic activity to the region in terms of energy provision, as well as potential for investment in the historic dairy industry to sure up its future.

8.12. RESILIENT AND PROSPEROUS COMMUNITIES

The Federal Government defines community resilience and prosperity as the long-term wellbeing of a community and its ability to recover from, adapt and thrive in the face of change (Marinucci 2024). These changes are generally considered to be natural, economic or human made influences, pressures and disasters. This is generally the product of appropriate decision-making systems, land and housing security, connections and access and infrastructure provision, all of which are described in Section 6.5.1 to Section 6.5.6.

SynergyRED's proposed wind farm in Scott River adds resilience to the wider community through power generation and energy transition. However, at a local level the direct and tangible visibility of this contribution is not recognised locally.

Given the low operational workforce numbers and minimal impact on adequate provision of health and community service infrastructure, these are not discussed within this social values assessment. Further consideration of health and community service impacts should be considered if additional projects in the region were added into the future and contributed to cumulative impacts.

8.13. DECISION-MAKING SYSTEMS

The qualitative and quantitative fieldwork results have highlighted a strong expectation by local stakeholders and community members to be informed of, and actively involved in, decision making related to the proposed wind farm in Scott River. The suggestions to minimise negative impacts of the proposed wind farm in Scott River included demonstrating values around flexibility, transparency, humility and listening, educating and engagement, explaining energy generation and future technologies, being actively involved in clearing, monitoring and rehabilitation work associated with the project and involvement in decision making. See Figure 20a and b.

Recommendations for Mitigation/Benefit Realisation

37. Work to increase the community's faith in engagement and positive benefit decision making to help create a resilient and prosperous community through efforts and consistency to educate, inform and proactively demonstrate benefit across each stage of the project lifecycle.

38. If the project moves through the feasibility stage to a planning stage, ongoing consultation and application of any of the recommended/suggested mitigation strategies will need to be provided to those affected stakeholders. This will be the basis in which the community and stakeholders will feel they have had a say in the decisions that affect them.

8.14. LAND TENURE

Decisions relating to final locations for the proposed wind farm in Scott River turbines and associated infrastructure would have an impact on local landholdings and potential compensation income flow-ons. These will need to be managed not only from a commercial perspective, but also through recognising the social value attachment to land and its use and the financial gains for some landowners over others in region.

Recommendations for Mitigation/Benefit Realisation

39. Positive benefit can be realised through landowner rental agreements relating to the placement of the proposed wind farm in Scott River Turbines on private land, and there is an opportunity to demonstrate good faith and fairness through these negotiations.

40. Clarify the terms of the buffer restrictions and the definition of dwelling within the broader landowner community, particularly where it relates to sheds, workshops, proposed accommodation and other infrastructure on an adjacent property.

41. Consider power offsets, or additional benefits, for adjacent or affected landowners, not just those hosting a wind turbine as part of the landowner's agreement.

8.15. ROAD & TRANSPORT NETWORKS

Construction and operational activities will have implications for the road network and will need to be considered in mitigation management. Timing, and planning to reduce impacts on existing traffic on these remote roads will need to be factored into planning given the impact any congestion will have on access to local rural properties and essential transport for the agricultural industry and local supply chains.

Increased truck movements may increase the risk of collision on remote roads which would be classified as a project safety risk and should be managed as such.

Recommendations for Mitigation/Benefit Realisation

42. Access road planning should include considerations around drainage, permeability, protection of the ironstone roadside flora communities, tourism and agricultural traffic movements on the remote roads around the site, and safety.

43. A Traffic Planning and Management System is recommended to be developed to avoid key supply chain routes for dairy and feed trucks in and out of Scott River Region, particularly during construction.

44. Where possible, construction and turbine movements to be managed outside peak regional tourism seasons and key agricultural seasons.

8.16. POWER & TELECOMMUNICATIONS

SynergyRED are undertaking an Electromagnetic Interference study to identify issues and potential mitigation strategies if required. Liaison with other utility providers in the region will continue during subsequent project phases.

Recommendations for Mitigation/Benefit Realisation

45. Consider an advocacy approach on behalf of the local community with partnering utilities and service providers to improve power and communications into the Scott River Catchment.

8.17. COMMUNITY SERVICES

Recommendations for Mitigation/Benefit Realisation

46. SynergyRED could encourage local procurement of goods and use of local community services, as well as employee volunteering, to both direct employees and contractors, under Synergy's Social Values Framework to improve economic return to the local community and encourage investment in these core services.

8.18. WAY OF LIFE

Recommendations for Mitigation/Benefit Realisation

47. Care should be taken in the engagement strategy to ensure the community is not publicly pushed into a position of support or against the project, which may contribute to polarisation within this close-knit community. Rather discussion should focus on discussing the potential impacts and benefits, and how these can best be managed with community input.

48. Consideration of the way of life and demographics of the differing local settlements should be considered in decisions relating to accommodation of construction and operational workforces.

49. Contribution with respect to Synergy's benefit funding and social performance commitments should be made in line with existing community values and way of life.

8.19. INDUSTRY SECTORS

The economic footprint for the operational project area is small based on workforce size, and predicted local economic impact, as such, careful consideration of compatibility and ways to reduce impact on existing economic industries such as agriculture and tourism, should be at the forefront of the feasibility assessment for this project.

Recommendations for Mitigation/Benefit Realisation

50. Considerations to minimise negative impacts such as potential congestion on transport routes during construction, competition for seasonal workers, access and amenity issues and impacts on agricultural productivity in final positioning of the turbines will require ongoing engagement and transparent project decision making in subsequent stages of the project.

51. Provision of the tourism viewing point and managing any restricted access to camping areas, forest or waterways will also ensure a positive legacy is left for the local tourism industry.

8.20. EMPLOYMENT

The impact of the introduced employment for the proposed wind farm in Scott River is relatively low with respect to the operational workforce. The construction workforce may have an impact on either local draw, or an introduced workforce from out of the region. This impact will be dependent on SynergyRED's final procurement strategy for the project once it moves into the planning phase.

Recommendations for Mitigation/Benefit Realisation

52. Efforts to employ locally will be defined by SynergyRED's Buy Local, Aboriginal Procurement Policy and WA Industry Participation Plans (WAIPS) is encouraged.

8.21. SUPPLY CHAINS

Care will need to be taken during construction to ensure increased traffic does not interfere with agricultural transport to local properties, to avoid impacting their access to efficient supply chains.

Recommendations for Mitigation/Benefit Realisation

53. Local procurement ensures incomes derived provide a direct local economic benefit that is multiplied through the region to a greater extent than if it is taken outside the region. This can be quantified once the proposed wind farm in Scott River procurement strategy is in place.

54. Implement appropriate management plans to manage risk to water, soils or land clearing that may impact on agricultural enterprises.

55. Introduce positive procurement strategies for local construction, maintenance, operations and technical teams.

Figure 20a. Summary of Survey Respondents Suggestions for Social Benefit Realisation

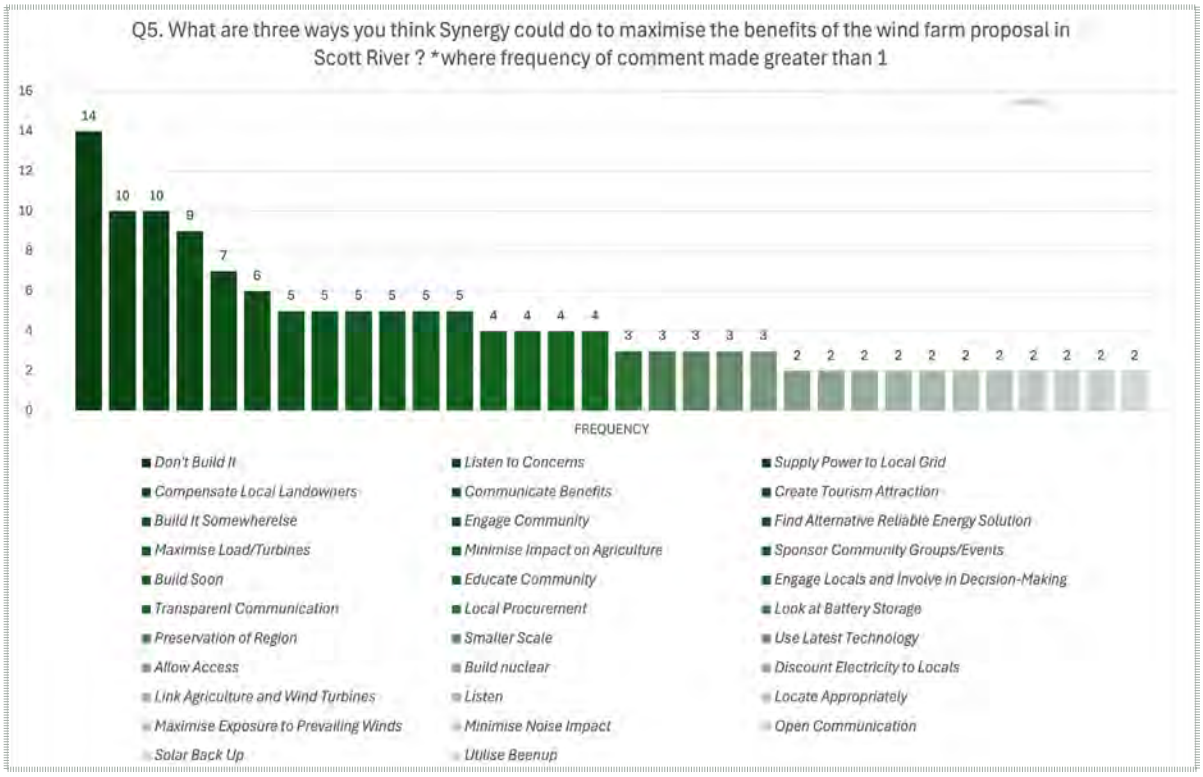
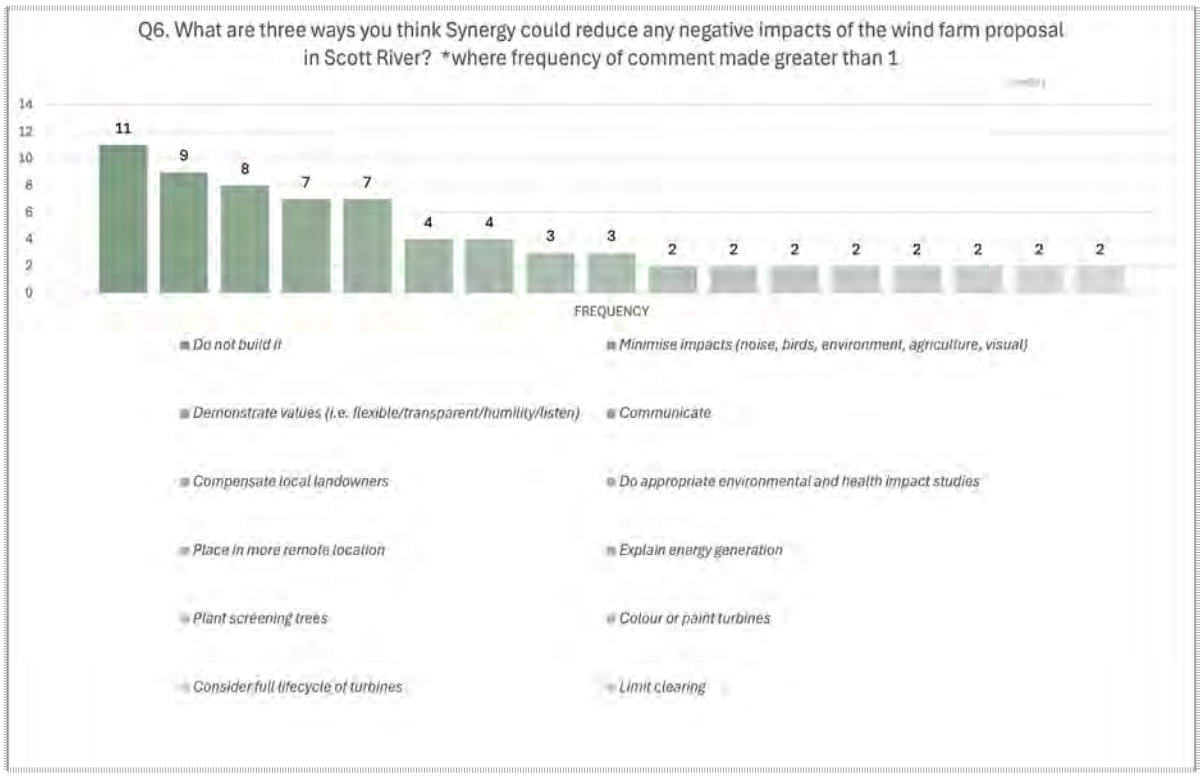


Figure 20b: Summary of Survey Respondents Suggestions for Social Impact Reduction or Mitigation



8.22. ADDITIONAL LIFECYCLE CONSIDERATIONS

Understanding the full project lifecycle and long-term carbon footprint of the proposed wind farm in Scott River was raised, by stakeholders and the local community, in relation to understanding the full picture of the proposed projects impacts.

As per the Section 7 project description, the proposed wind turbines have a typical life span of around 30 years. It is understood that parts, including blades, may need to be replaced, if they are damaged, before end-of-life.

SynergyRED notes that approximately 85 percent of a wind turbine (by weight) is commonly recycled in Australia. This includes the steel tower and valuable metals in the generator. While wind turbines blades are not yet commonly recycled, a variety of reuse products have been trialed including bridges, poles, sound barriers, bus stops, roofs and farming equipment. The industry is working to make turbine blades more easily recyclable.

Several residents and stakeholders questioned the estimation on the SynergyRED Fact Sheet that a wind turbine takes only six to nine months to pay back the carbon footprint required for its production, transport, construction, maintenance, dismantling and disposal. This estimation is referenced to Vesta Energy 2024, and should be clarified further, along with full lifecycle information, in future consultation and engagement work undertaken by SynergyRED.

Recommendations for Mitigation/Benefit Realisation

56. A full lifecycle assessment should be completed for the wind turbines and associated infrastructure as the project potentially moves from feasibility to planning. This could include the considerations summarised in Table 3.

Table 3: A Summary of Recommendations Provided by Project Lifecycle Stage



Planning & Feasibility

- Invest in pre-construction phase surveys and monitoring for birds, bats and habitat to improve knowledge of breeding populations in area.
- Continue engagement with local landowners, Traditional Owners, transport and infrastructure agencies, local environmental groups, community representatives and accommodation providers.
- Establish ongoing performance management indicators, monitoring and reporting frameworks across the project lifecycle.
- Consider demonstration of this proposal against other future energy solutions.



Construction

- Implementation of mitigation and benefit realisation measures identified during construction and operations phases.
- Detailed and considered engagement with local landowners and community on proposed transport and access routes.
- Plans to minimise clearing and ensure construction workforce is appropriately inducted and aware of obligations to minimise impacts in high-risk areas identified in this report.
- Considered and effective water management strategies in place – particularly in relation to dewatering and acid sulphate soil risks.
- Assess and manage traffic congestion, truck collision risks and interference with local supply chains.
- Consider recommended accommodation zones, behavioural management strategies and local employment to reduce potential risks and impacts.
- Confirm latest technology to minimise bird or bat impacts in turbine procurement.



Operations

- Consider energy consistency in low wind scenarios.
- Fire mitigation and management plans in place.
- Local procurement and maintenance contracts with local benefits quantified.
- Water management plans are in place and monitored.
- Bird and bat sensors and or management strategies in place.
- Weed control and vehicle access procedures are in place.



Replacement & Lifecycle Renewal

- Maintain focus on recycling and life cycle renewal for the turbines and associated infrastructure.
- Focus on supporting new and emerging technologies to find appropriate re-use and re-cycle opportunities for the turbine blades.

9. CONCLUSION

This report intends to provide a baseline understanding of the social value drivers for the proposed wind farm in Scott River in the context of the remote, rural and agriculturally based community in Scott River, and human settlements in the immediate surrounds.

The Scott River and associated communities of the Augusta region embody a rich tapestry of social, cultural, and environmental values that resonate with local community members and visitors alike. These areas are celebrated for their unique natural landscapes, including pristine waterways, biodiversity, and agricultural heritage, which contribute to both individual well-being and community identity.

The connection between people and place is evident through the region's recreational opportunities, agricultural activity, and strong sense of community stewardship. However, these values face challenges from increasing development, environmental pressures, and shifting demographics. Balancing sustainable development with the preservation of these social values is essential to ensure that future generations continue to experience and cherish the unique character of Scott River and Augusta.

Through collaborative planning, inclusive decision-making, and proactive management, stakeholders can safeguard the region's cultural and environmental integrity, enhancing its role as a vibrant and meaningful place and one that may play an important role in the state's transition to a new energy future. This assessment underscores the importance of aligning social values with long-term regional strategies to foster resilience, equity, and sustainability in these treasured parts of Western Australia.

If the proposal for the wind farm in Scott River progresses to subsequent stages in the approvals and project planning processes, impacts on these social values can be quantified and a monitoring/reporting base established for the project's lifecycle.

APPENDICES

1. LIST OF STAKEHOLDER ORGANISATION WHO PARTICIPATED IN AN INDEPTH INTERVIEW

1. **Augusta Hotel & First National Real Estate**
2. **Augusta Historical Society/Museum**
3. **Augusta Library**
4. **Augusta Margaret River Clean Community Energy (Partner)**
5. **BirdLife Australia**
6. **BHP Billiton**
7. **Cape to Cape Bird Group (linked to Birdlife Australia)**
8. **Kudardup Bush Fire Brigade**
9. **Karri Karrak Aboriginal Corporation**
10. **Karridale Agencies**
11. **Lower Black Land Conservation District Committee**
12. **Scott River local farmer 1**
13. **Scott River local farmer 2**
14. **Scott River local farmer 3**
15. **Scott River local farmer 4**
16. **Molloy Island Reserves Friends Group**
17. **Molloy Island Homeowners Association**
18. **Shire of Augusta- Margaret River - President**
19. **Wildflower Society of Western Australia - SW Division**
20. **Pelican Post**

2. AUSTRALIAN BUREAU OF STATISTICS COMMUNITY PROFILE GRAPHS

SCOTT RIVER WIND FARM FEASIBILITY SOCIAL VALUES ASSESSMENT

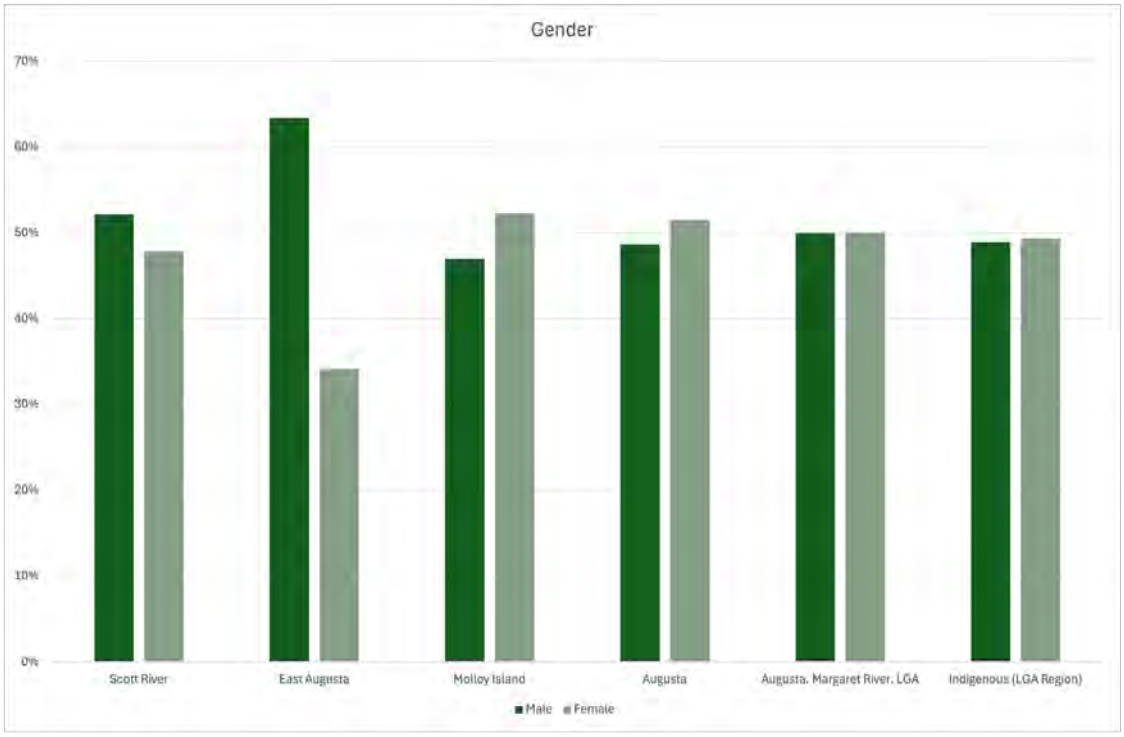
APPENDIX A: COMMUNITY PROFILES

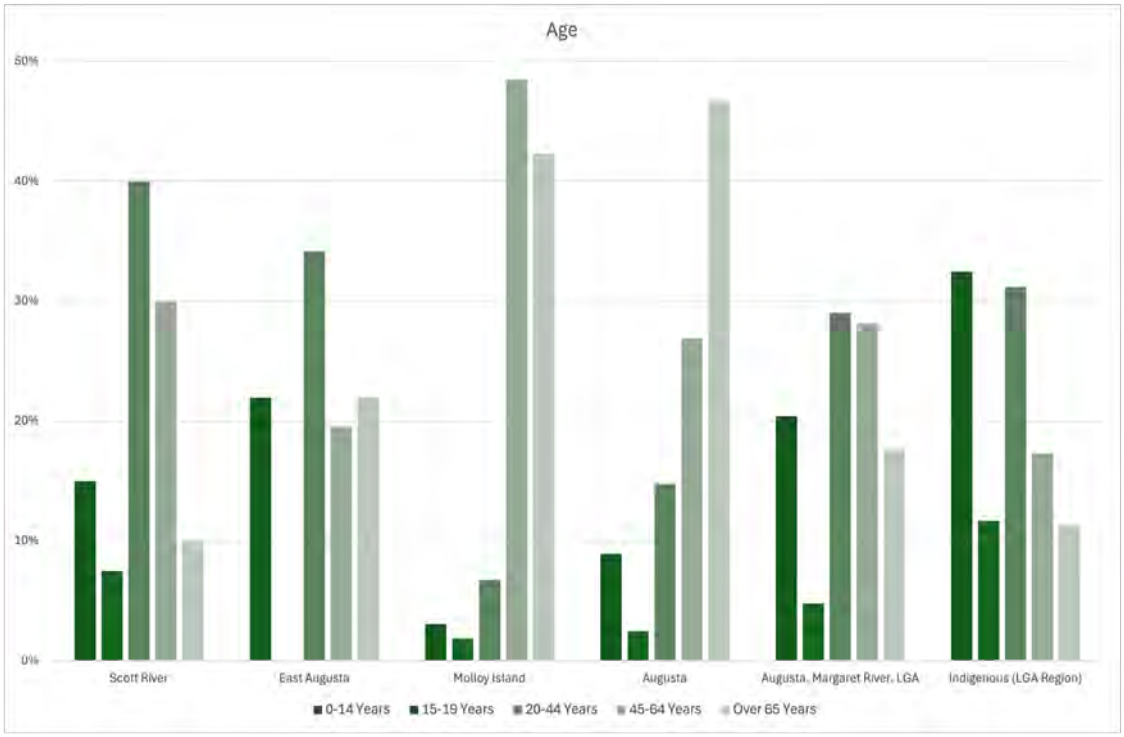
Source: ABS 2021 Community Census Data

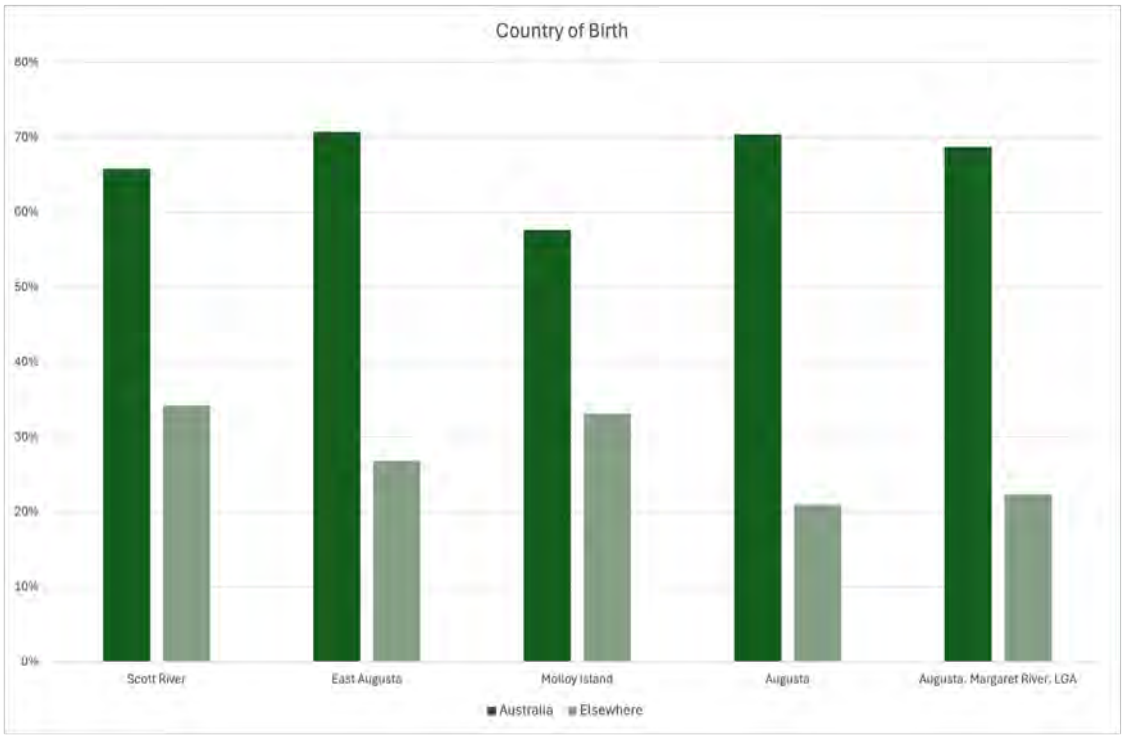
	Scott River	East Augusta	Molloy Island	Augusta	Augusta. Margaret River. LGA	Indigenous (LGA Region)
Total Population	**46**	**41**	**163**	**1,211**	**16,791**	**231**
Median Age	34	52	63	63	42	26
Median Personal Income (weekly)	843	474	486	541	785	599
Median Family Income (weekly)	1,874	1,125	1,075	1,145	1,871	1,609
Median Rent (weekly)	$200	$150	$275	$280	$350	$350
% Unemployed	9.4%	12.5%	4.0%	1.3%	2.8%	7.8%
Permanency - Lived at same address 5 years ago	46%	41%	90%	59%	58%	40%
Average Household Size	1.9	2.1	1.7	1.9	2.5	2.9
Indigenous %	0	0	0	1.0%	1.3%	

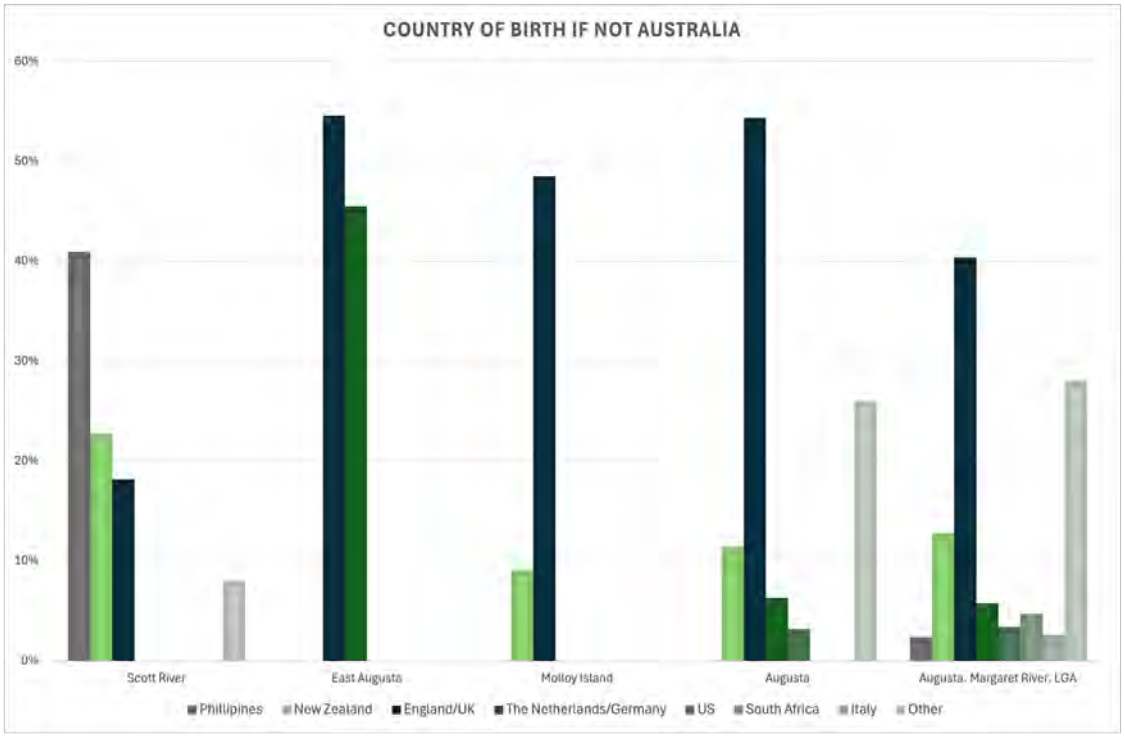
SOCIAL PROFILE

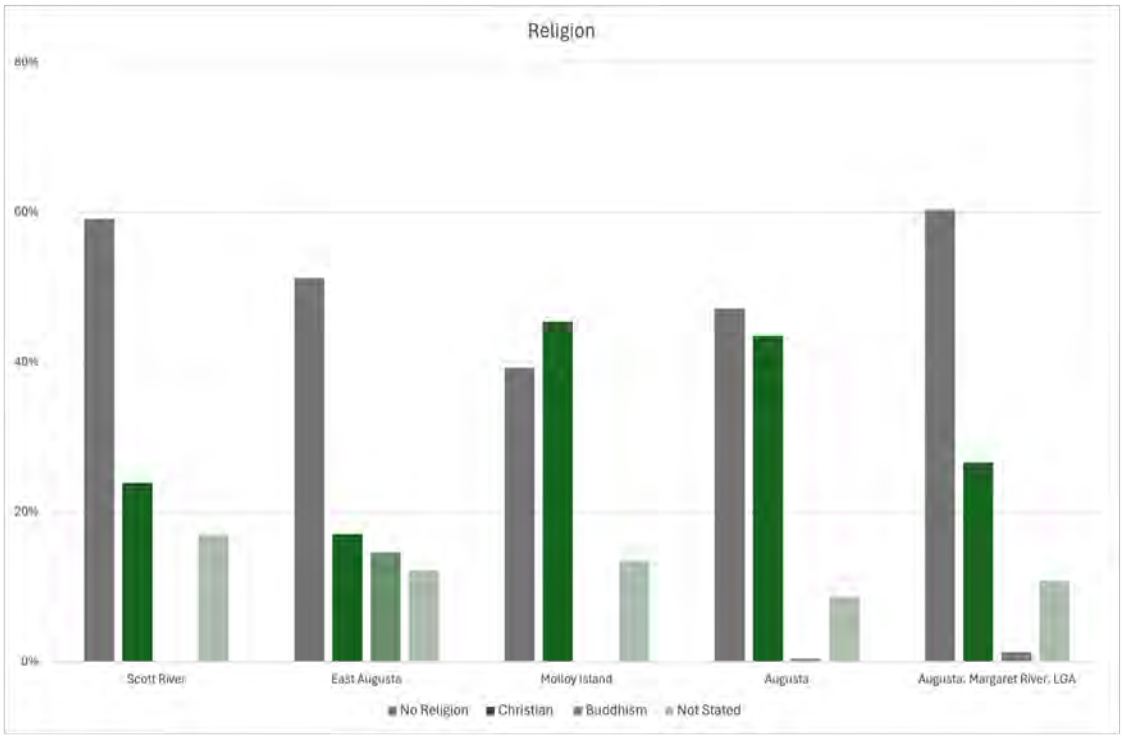
(source: ABS 2021 Community Census Data)

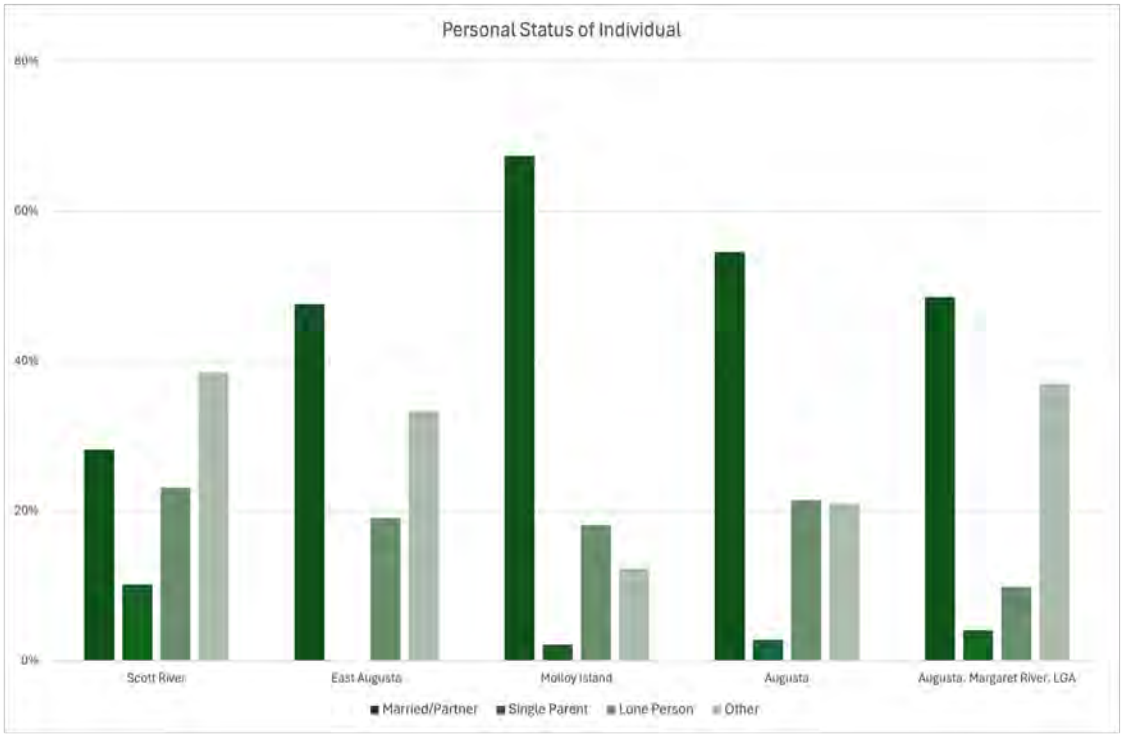


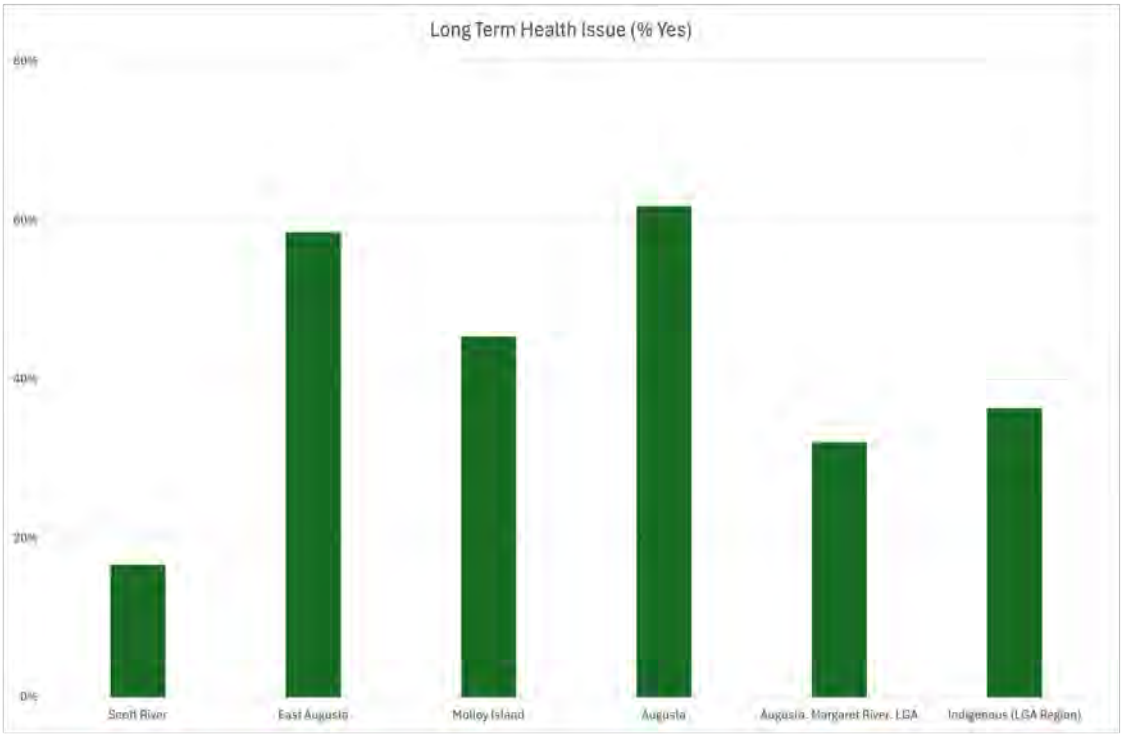


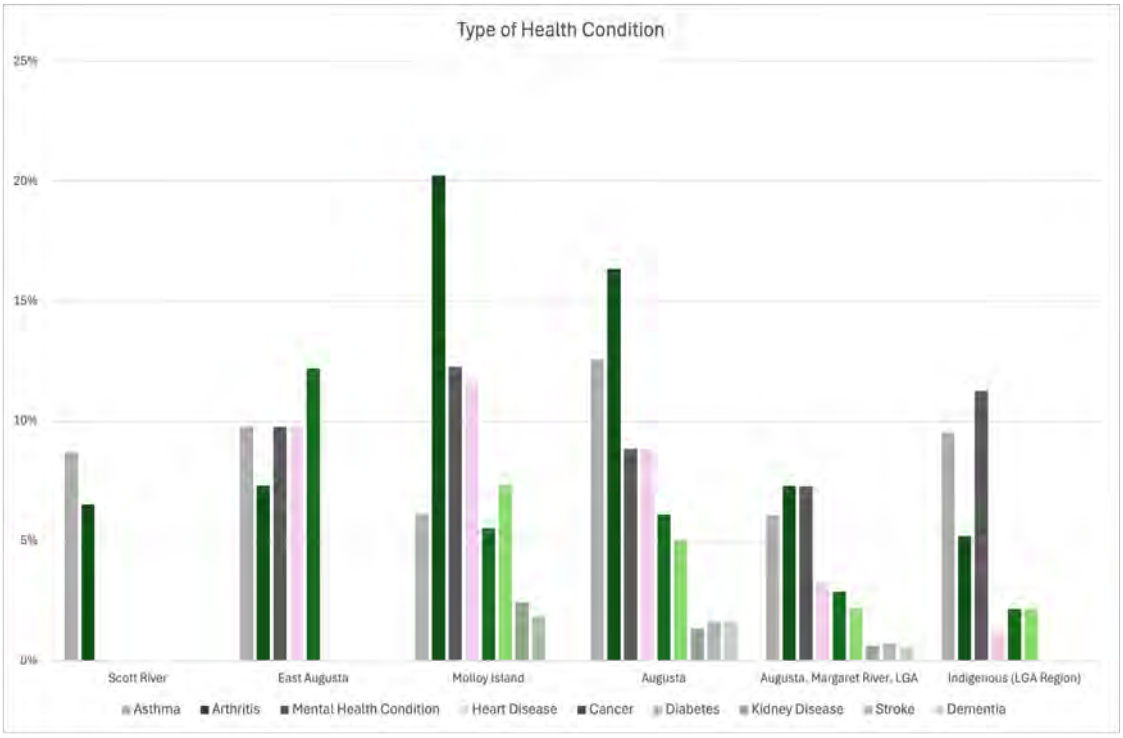

Country of Birth
80%
70%
60%
50%
40%
30%
20%
10%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Australia
Elsewhere

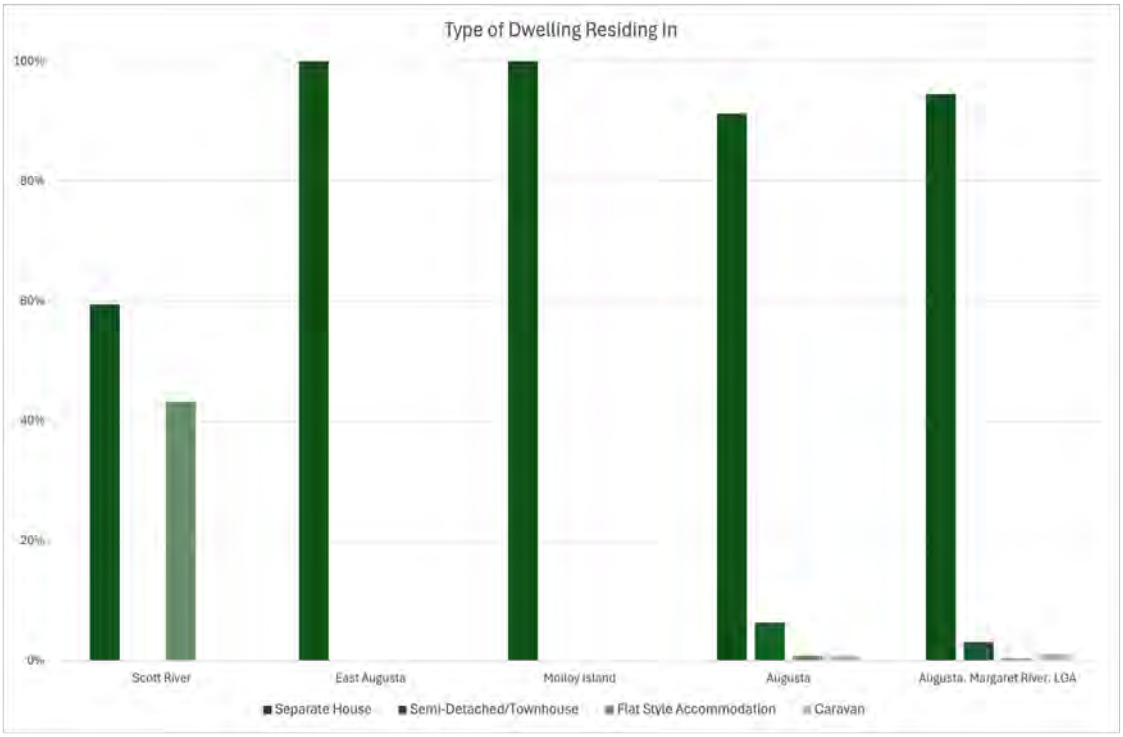

COUNTRY OF BIRTH IF NOT AUSTRALIA
60%
50%
40%
30%
20%
10%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Phillipines
New Zealand
England/UK
The Netherlands/Germany
US
South Africa
Italy
Other


Religion
80%
60%
40%
20%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
No Religion
Christian
Buddhism
Not Stated


Personal Status of Individual
80%
60%
40%
20%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Married/Partner
Single Parent
Lone Person
Other

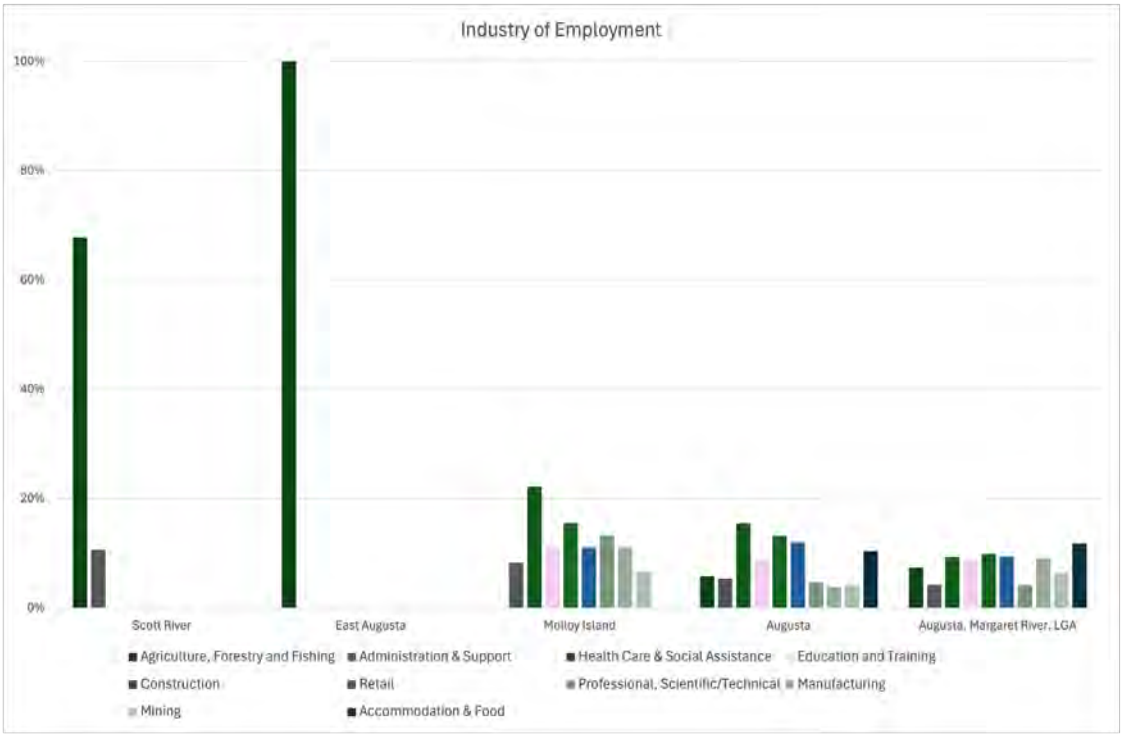

Long Term Health Issue (% Yes)
60%
40%
20%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Indigenous (LGA Region)

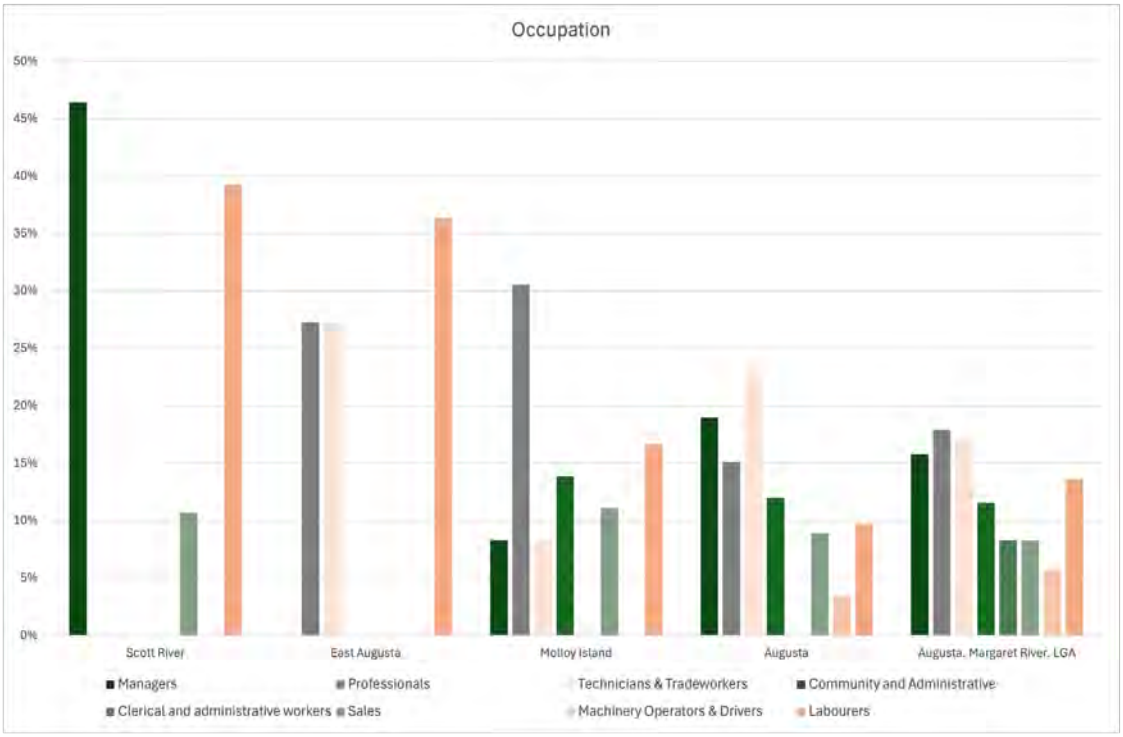

Type of Health Condition
25%
20%
15%
10%
5%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Indigenous (LGA Region)
Asthma
Arthritis
Mental Health Condition
Heart Disease
Cancer
Diabetes
Kidney Disease
Stroke
Dementia

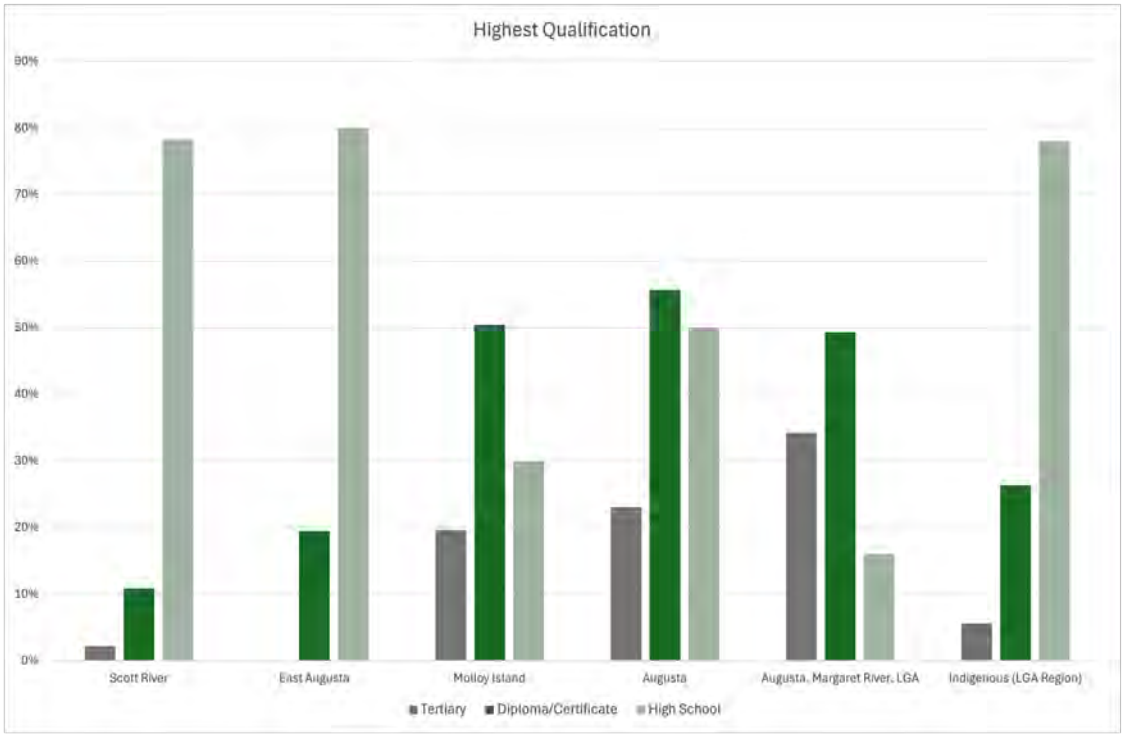

Type of Dwelling Residing In
100%
80%
60%
40%
20%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Separate House
Semi-Detached/Townhouse
Flat Style Accommodation
Caravan

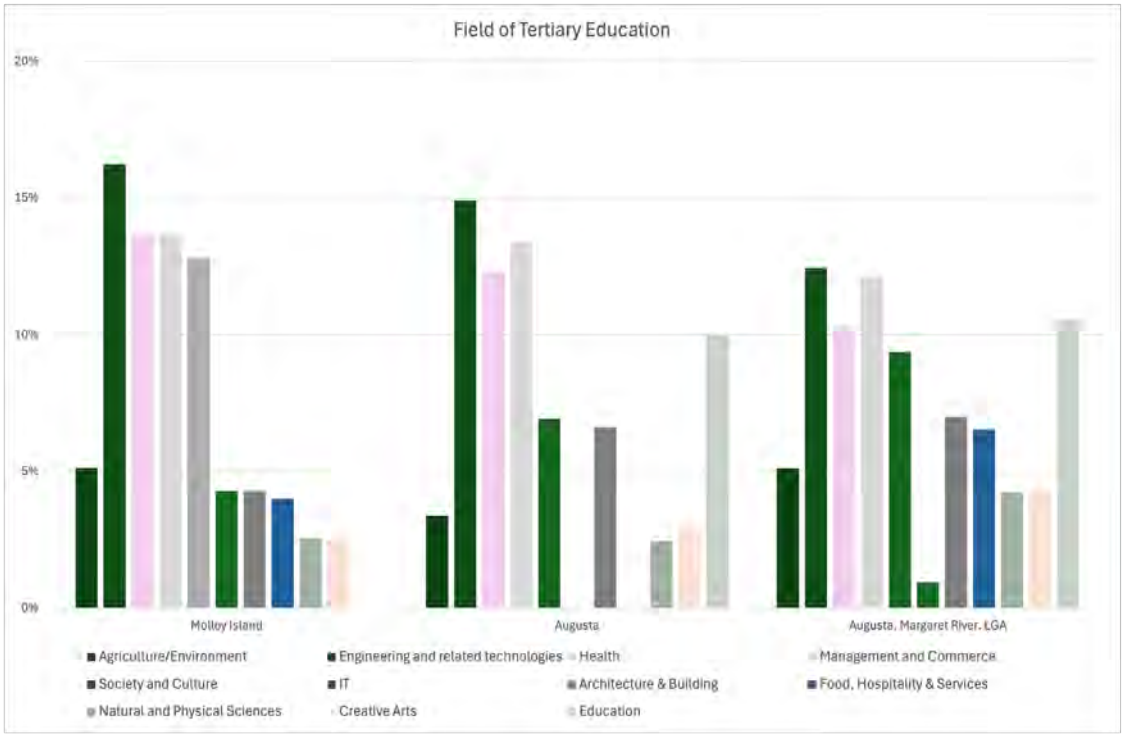
ECONOMIC PROFILE

(source: ABS 2021 Community Census Data)






Highest Qualification
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Scott River
East Augusta
Molloy Island
Augusta
Augusta, Margaret River, LGA
Indigenous (LGA Region)
Tertiary
Diploma/Certificate
High School


Field of Tertiary Education
20%
15%
10%
5%
0%
Molloy Island
Augusta
Augusta, Margaret River, LGA
Agriculture/Environment
Engineering and related technologies
Health
Management and Commerce
Society and Culture
IT
Architecture & Building
Food, Hospitality & Services
Natural and Physical Sciences
Creative Arts
Education

3. IN-DEPTH INTERVIEW GUIDE

Synergy Wind Farm Feasibility

INDEPTH INTERVIEW GUIDE

YOUR VIEWS & PERSPECTIVES

WIND FARM FEASIBILITY SOCIAL IMPACT QUESTIONNAIRE

Your views will form part of an independent social impact assessment that will directly assist with the project feasibility and future decision making. There are no right or wrong answers, we are simply interested in your perspectives.

Q1. Firstly, I'd like to understand more about your connection to the region? How long have you lived here? Why did you choose to live here? Do you volunteer for any organisations in the region?

Q2. How do you derive your income? What is this reliant on e.g. people, land, environment, transport?

Q3. How many people do you employ? And where do you draw them from?

Q4. What do you think are the most significant issues facing this region into the future?

Q5. What do you think are the most important attributes of this area to you?

Q6. Please share any other thoughts you might have on the most important attributes to keep or protect in the Scott River area.

Q7. Are you aware of the Synergy Wind Farm Feasibility Study for Scott River?

Q8. Do you have any initial thoughts around the proposal – either concerns or positive benefits?

IDEAS TO CONSIDER

Q9. Based on your understanding to date, are there any things you think Synergy could do to maximise the benefits of the wind farm proposal in Scott River?

1.

2.

3.

Q10. Based your understanding to date, what are three ways you think Synergy could reduce any negative impacts of the wind farm proposal in Scott River?

1.

2.

3.

Q11. On a scale of 0-5, how much do you support a transition to a NetZero emission future? (0=not supportive at all and 5 = highly supportive)

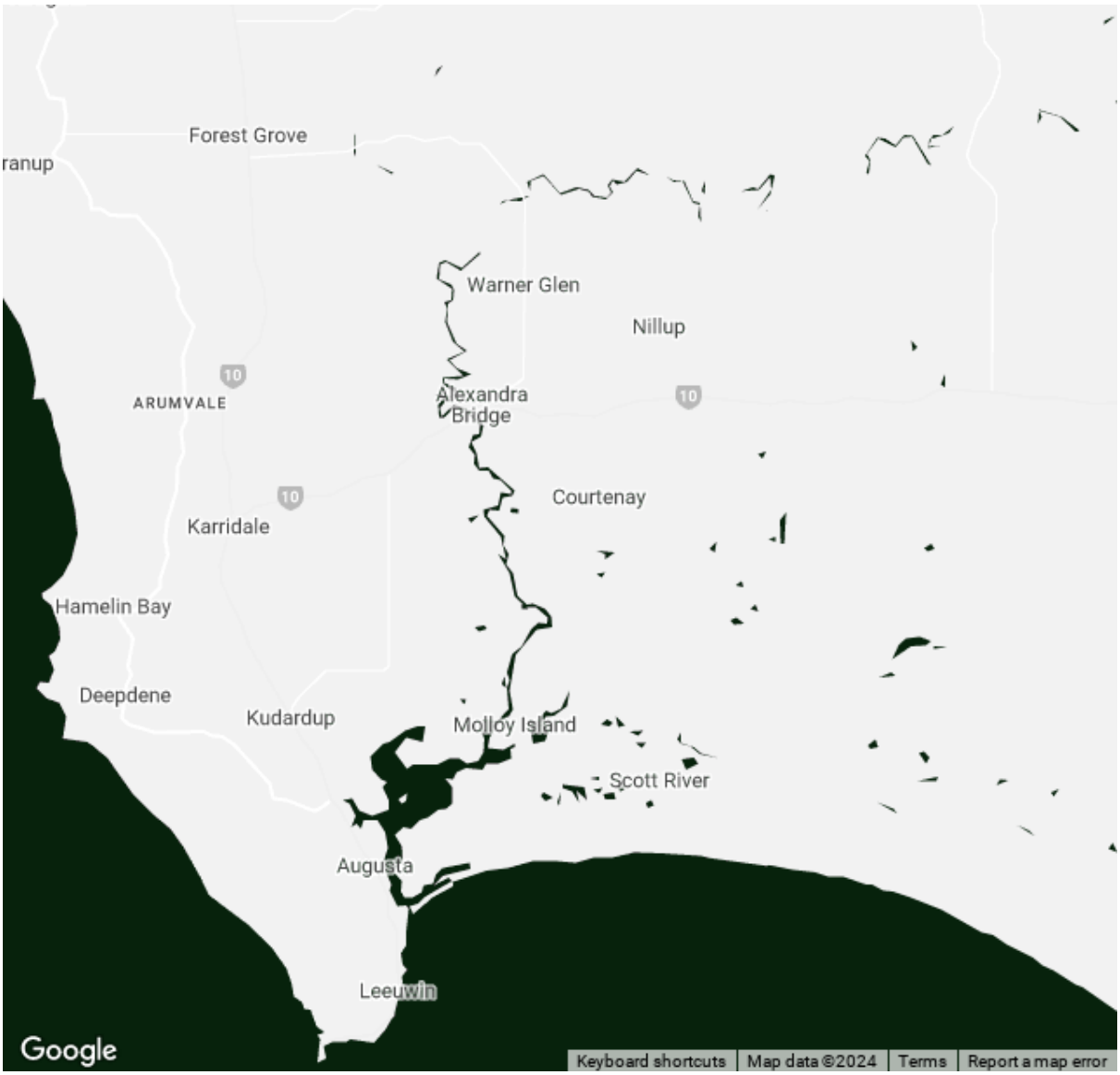
Enter a value between 0 (Not at all Supportive) and 5 (Highly Supportive)

Q12 What is your energy generation preference, and why?

PLACES OF IMPORTANCE

Q10a. Please indicate on the map any places that have an important value to you.

Q.10b. Briefly describe why you have chosen these points and what makes them important to you.


Forest Grove
ranup
Warner Glen
Nillup
ARUMVALE
10
Alexandra Bridge
10
Courtenay
10
Karridale
Hamelin Bay
Deepdene
Kudardup
Molloy Island
Scott River
Augusta
Leeuwin
Google
Keyboard shortcuts
Map data ©2024
Terms
Report a map error

ROUTES & ACCESS

Q11.Please draw on the map the main routes you would travel for across this region for work or recreation.



Q.12 In conclusion, is there anything else that we haven't discussed that you think is important in understanding the social and economic drivers of the region?

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4. ONLINE QUESTIONNAIRE FRAME



YOUR VIEWS & PERSPECTIVES

WIND FARM FEASIBILITY SOCIAL IMPACT QUESTIONNAIRE

Your views will form part of an independent social impact assessment that will directly assist with the project feasibility and future decision making.

There are no right or wrong answers, we are simply interested in your perspectives.

Q.1 On a scale of 1-10, how supportive would you be of a renewable energy wind farm in the Scott River area?

Not at all supportive — Highly supportive

5

Q2a. In thinking about the Scott River area, how important are the following attributes to you ? (1 = not at all important and 5 = extremely important)

Agricultural production and history

Local biodiversity of native flora and fauna

Peace and quiet

Being able to visit the forests and national parks

Preserving what is unique about this area

Local employment opportunities

Unique bird life

Being close to community and our networks

Environmental conservation and restoration of cleared land

Tourists and visitors enjoying the region

Using the regions natural assets to help provide for my family (e.g through farming or tourism)

Water values such as rivers, wetlands and swamps

Aboriginal history and culture

Being able to see the clouds, horizon and sky

Being able to drive and access remote areas around us

Other (please specify below)

Q2b. Please share any other thoughts on the most important attributes to keep or protect in the Scott River area

Q3a. Thinking about a proposed wind farm consisting of up to 30 wind turbines in Scott River, how would you rate the likely impacts on the following identified attributes? (1= not manageable at all (to our detriment) and 5 = manage extremely well (to our benefit)

Being able to see the clouds, horizon and sky

Tourists and visitors enjoying the region

Being close to community and our networks

Environmental conservation and restoration of cleared land

Water values such as rivers, wetlands and swamps

Being able to visit the forests and national parks

Being able to drive and access remote areas around us

Peace and quiet

Biodiversity of native flora and fauna

Local employment opportunities

Other (please specify below)

Preserving what is unique about this area

Unique bird life

Using the regions natural assets to help provide for my family (e.g through farming or tourism)

IDEAS TO CONSIDER

Q5. What are three ways you think Synergy could do to maximise the benefits of the wind farm proposal in Scott River?

Q6. What are three ways you think Synergy could reduce any negative impacts of the wind farm proposal in Scott River?

Q7. On a scale of 0-5, how much do you support a transition to a NetZero emission future? (0=not supportive at all and 5 = highly supportive)

Not at all Supportive — Highly Supportive

3

Q.8 What is your energy generation preference, and why?

Q9a. If you had $10 million dollars to invest in energy for the future, what proportion would you allocate to the following?

$0 / $10,000,000

0

Coal or traditional energy sources

$0

Natural Gas

$0

Solar Power

$0

Wind Power

$0

Hydro power

$0

Ocean Power

$0

Stand-alone power systems

$0

Nuclear power

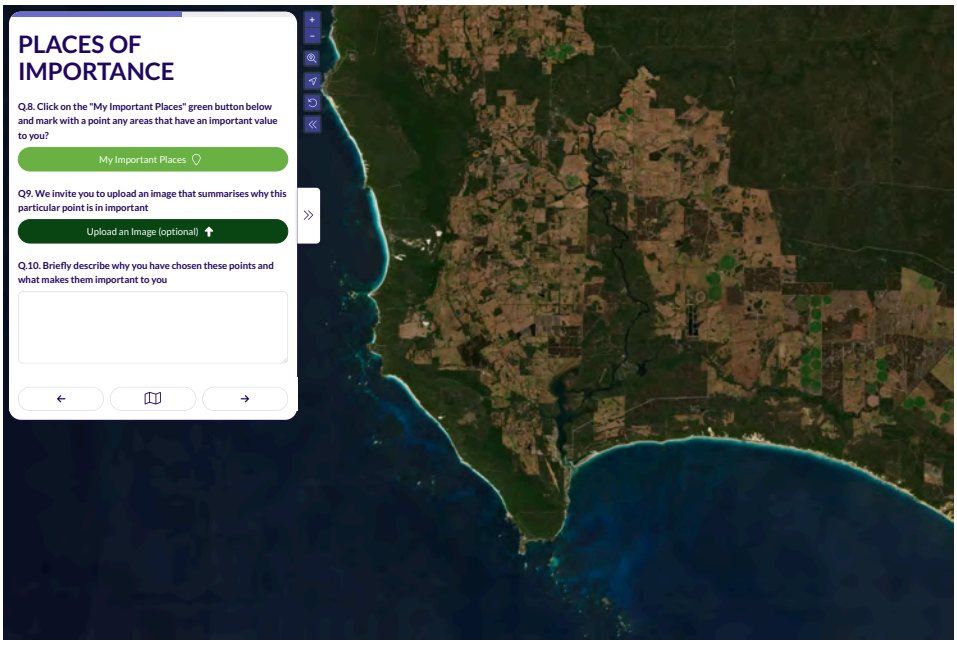
$0

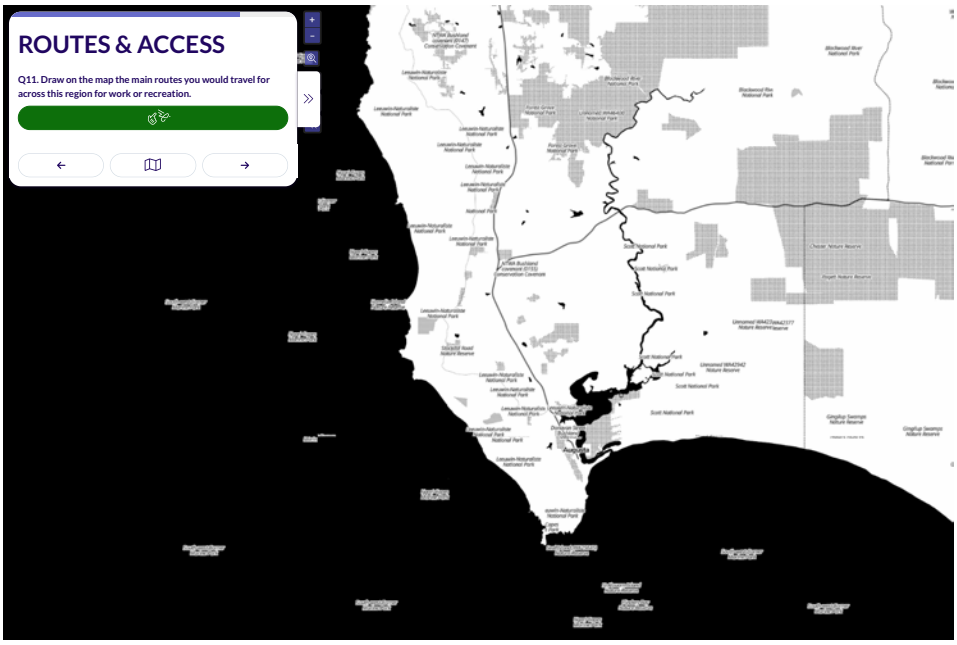
Other (please specify below)

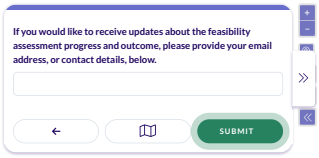
$0

Q9b. If you selected 'other' please write your response here

2 / 5

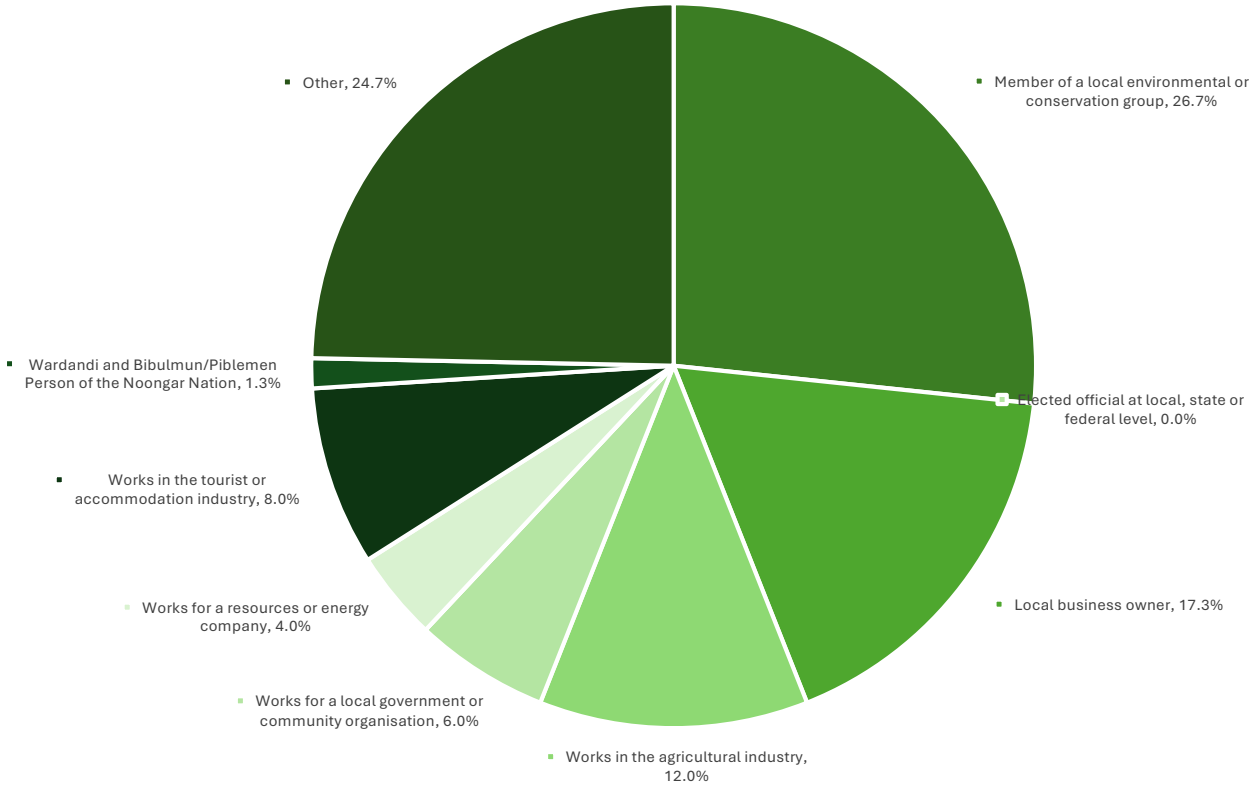

PLACES OF IMPORTANCE
Q.8. Click on the "My Important Places" green button below and mark with a point any areas that have an important value to you?
My Important Places
Q9. We invite you to upload an image that summarises why this particular point is important
Upload an Image (optional)
Q.10. Briefly describe why you have chosen these points and what makes them important to you


ROUTES & ACCESS
Q11. Draw on the map the main routes you would travel for across this region for work or recreation.

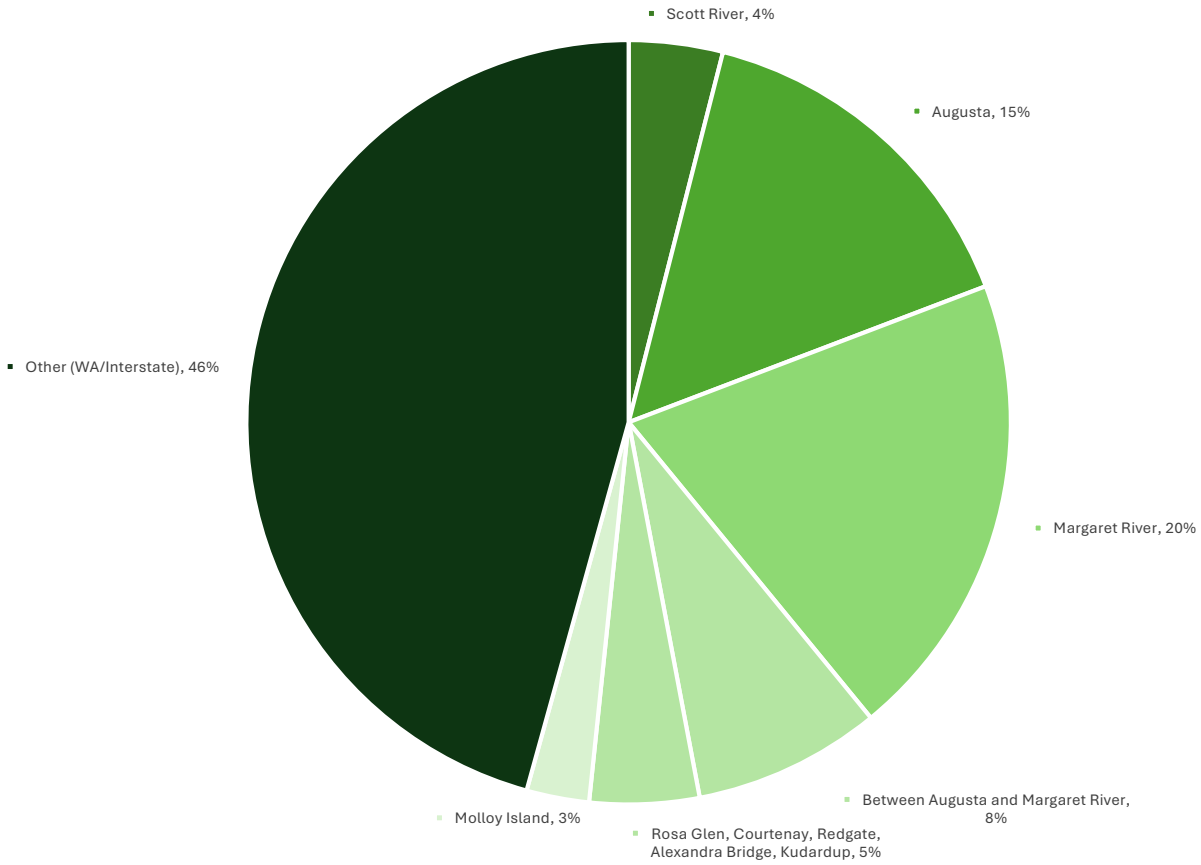

If you would like to receive updates about the feasibility assessment progress and outcome, please provide your email address, or contact details, below.
SUBMIT

6. ADDITIONAL ONLINE SURVEY RESULTS

Profile of Respondents



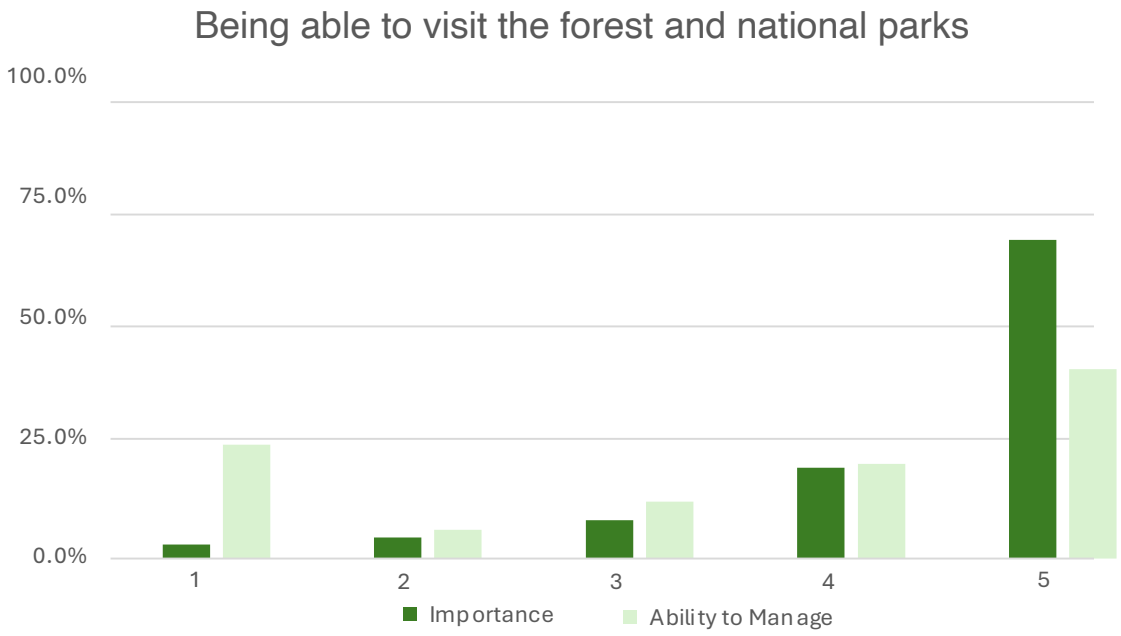
Area of Residence



Place.ID Social Values Matrix Frequencies

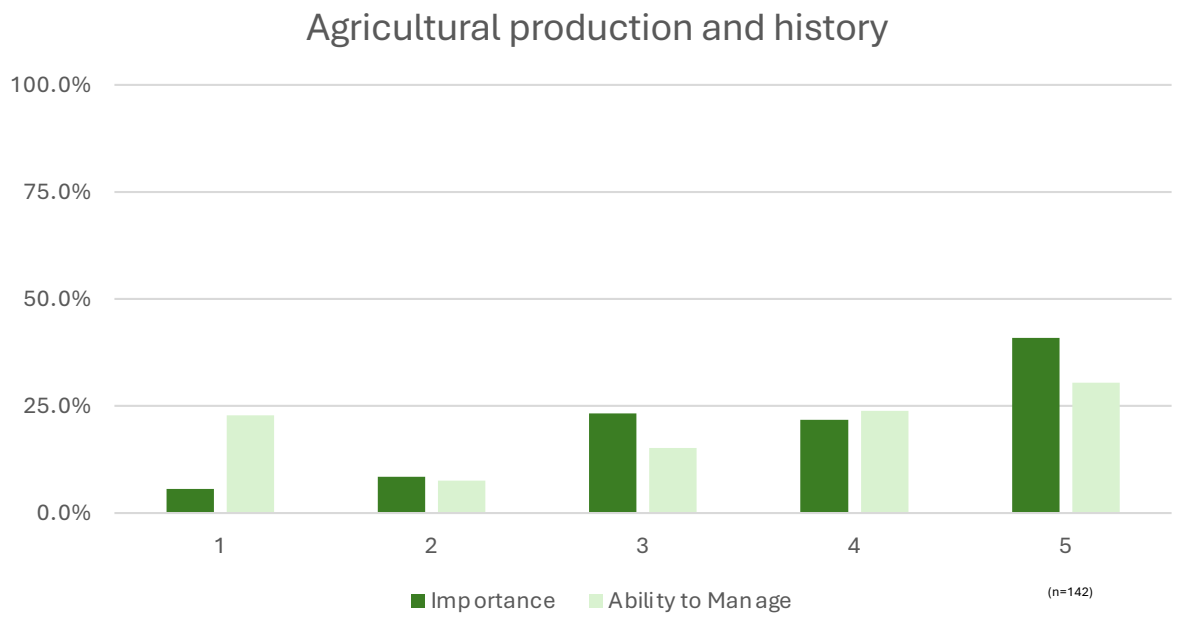
Q. In thinking about the Scott River area, how important are the following attributes to you ? (1 = not at all important and 5 = extremely important)?

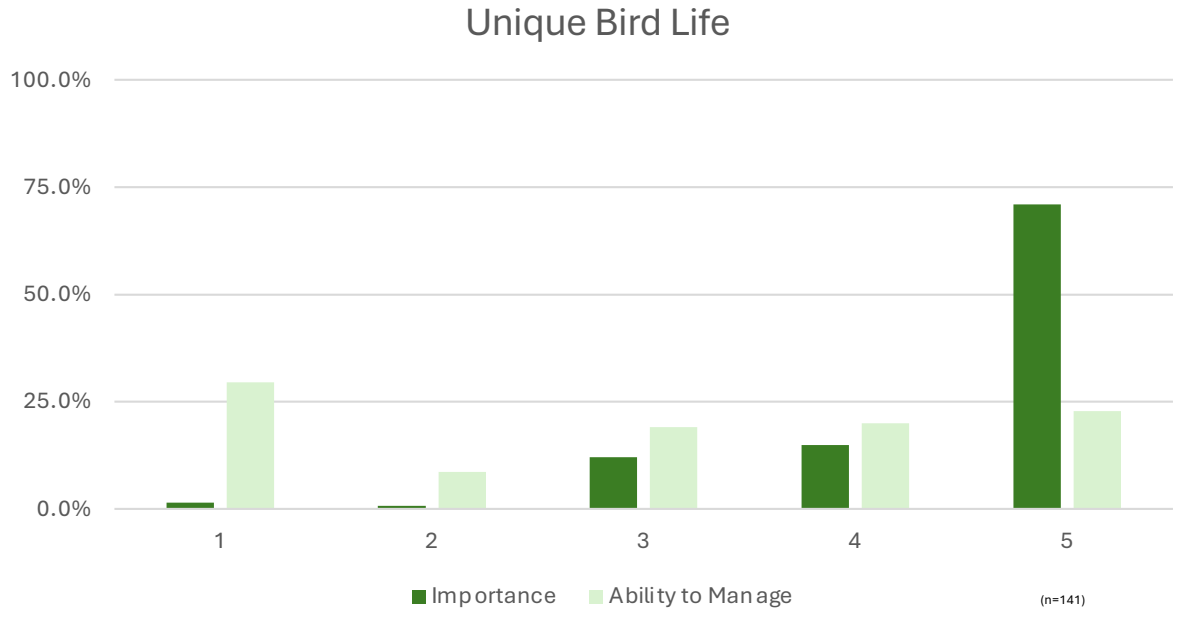
Q. Thinking about a proposed wind farm consisting of up to 30* wind turbines in Scott River, how would you rate the likely impacts on the following identified attributes? (1= not manageable at all (to our detriment) and 5 = manage extremely well (to our benefit)

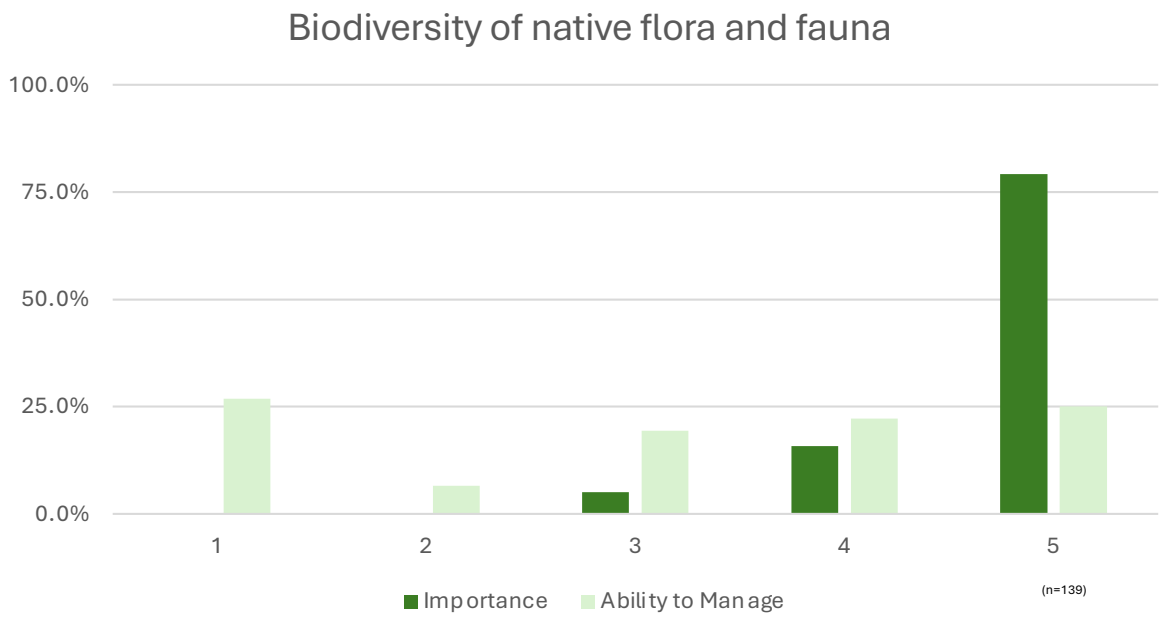


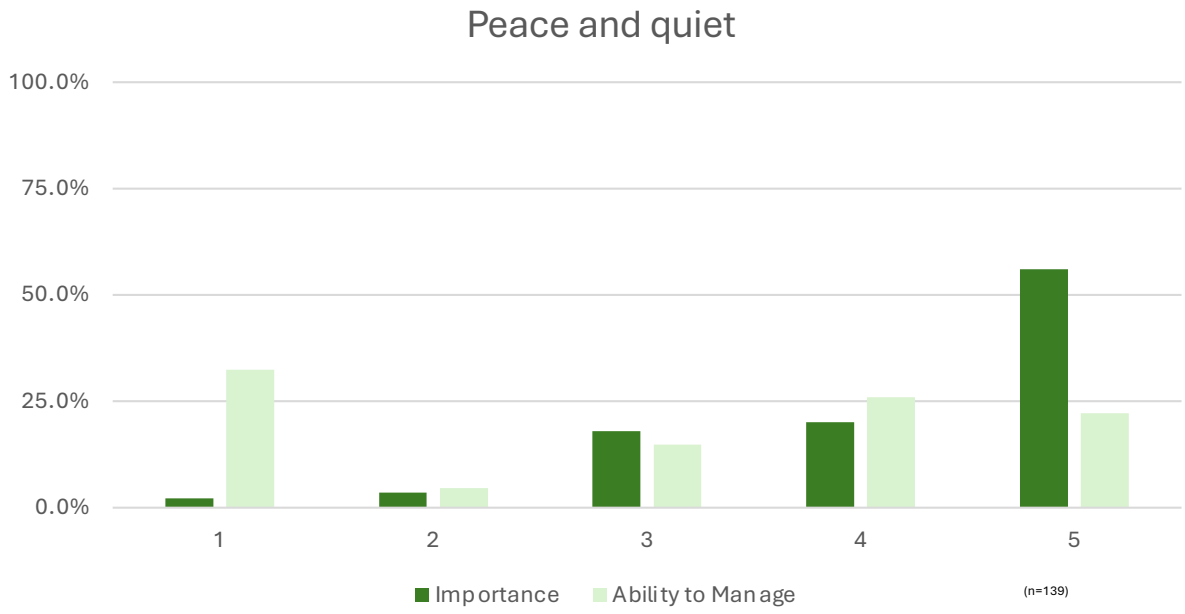


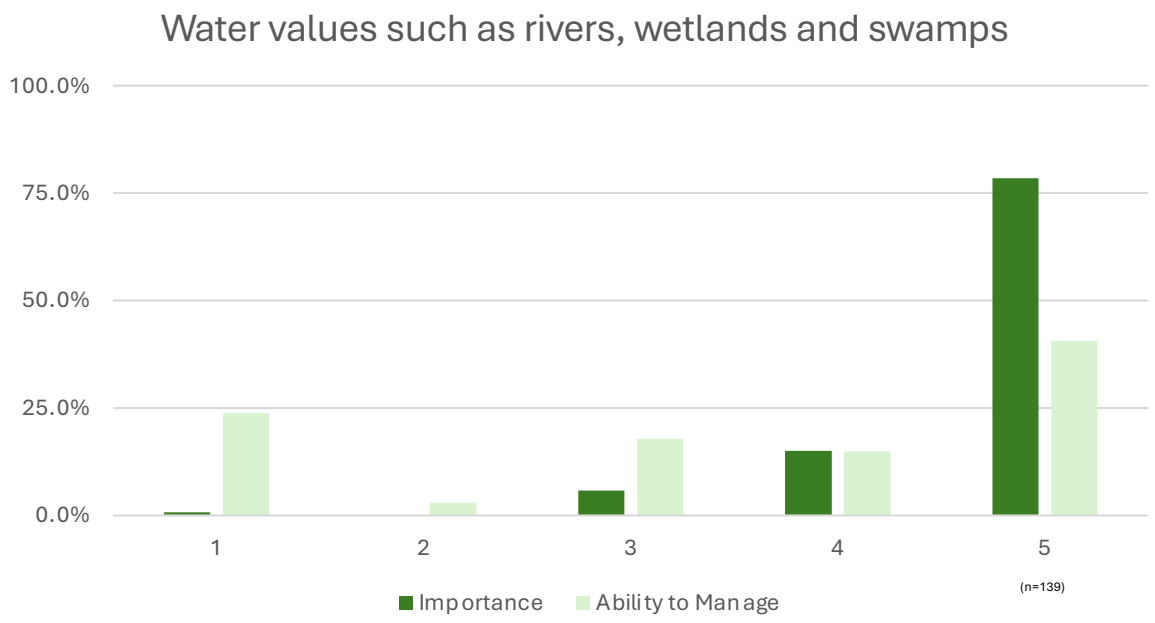
*Note: This question was asked as part of the community survey released in March 2024. This was prior to the scope of the proposed wind farm being reduced from a maximum of 30 turbines to 20 turbines to cater for transmission line capacity.

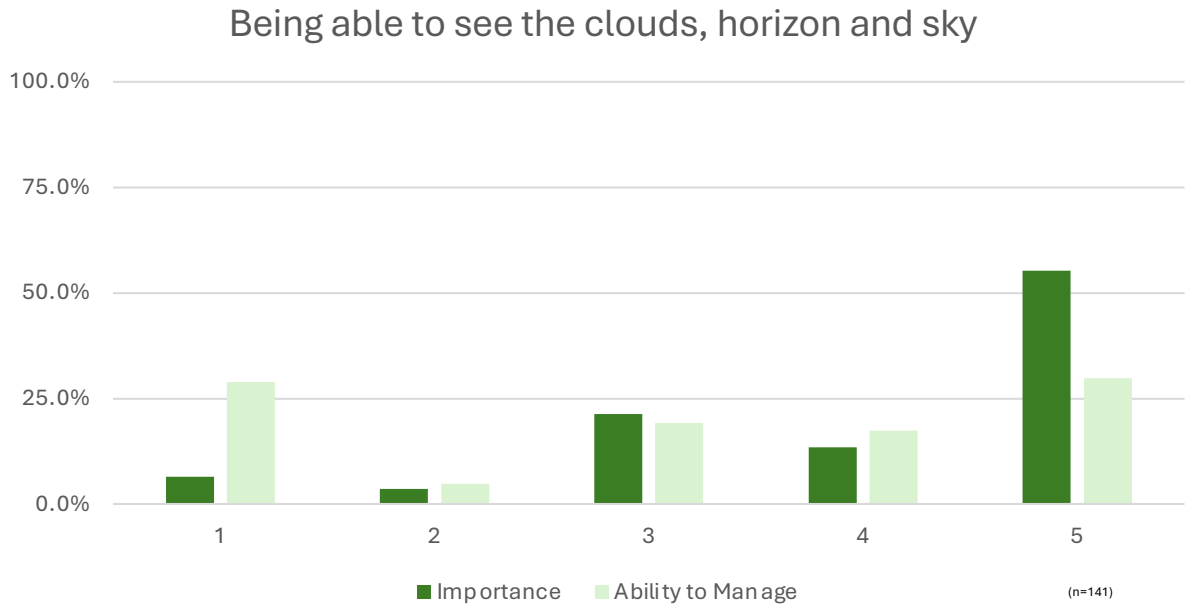

Agricultural production and history
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=142)

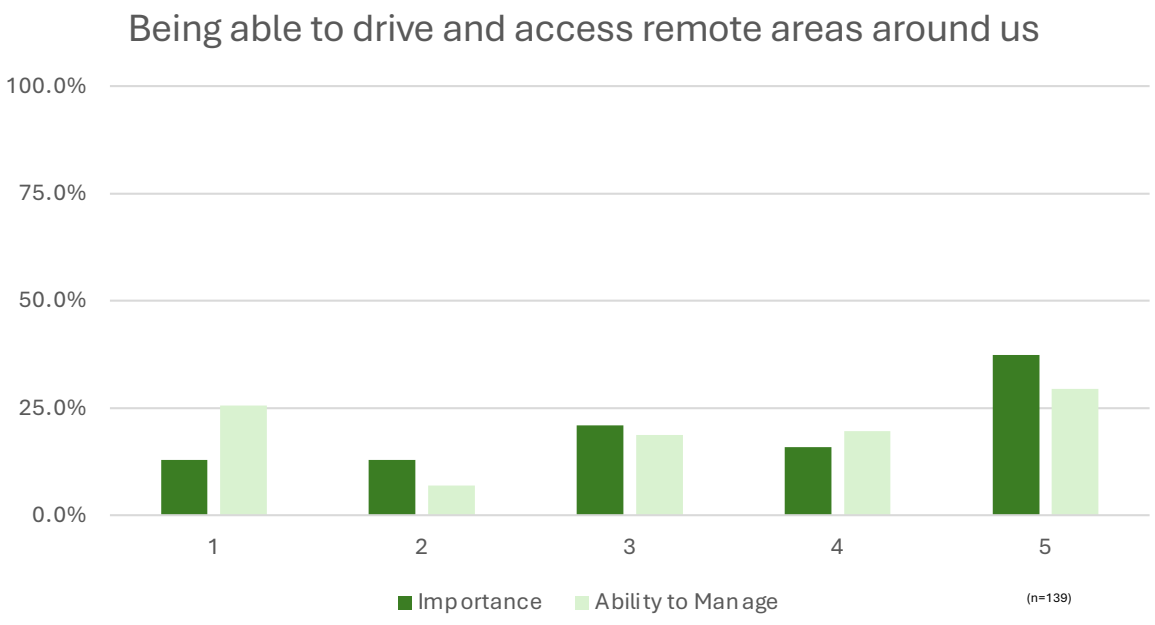

Unique Bird Life
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=141)

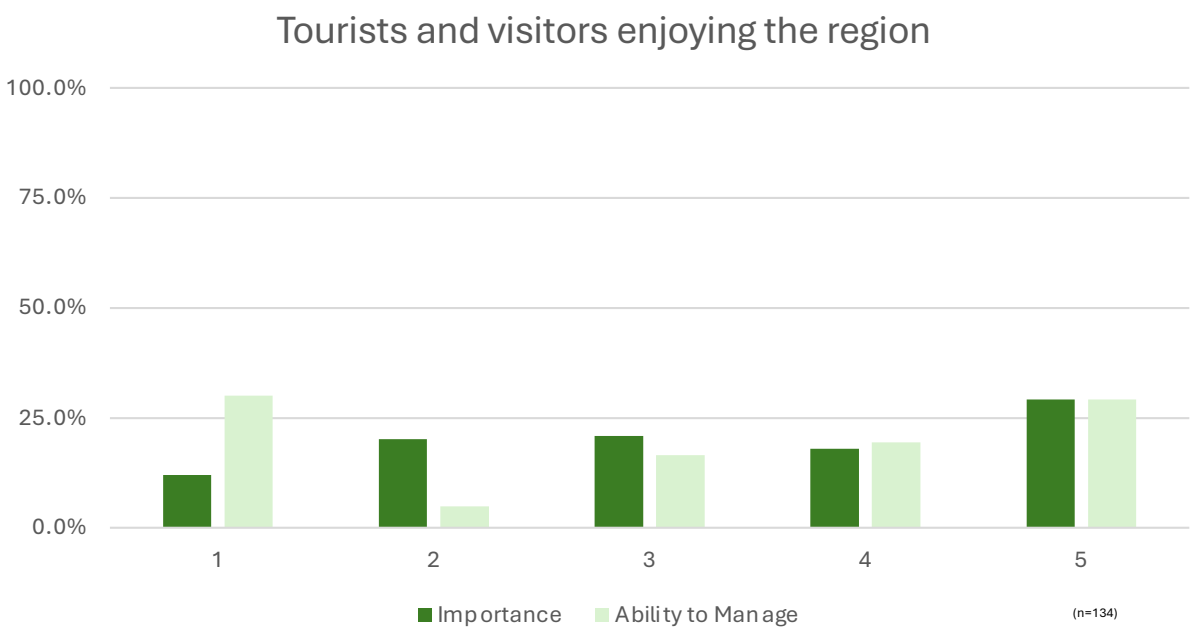

Biodiversity of native flora and fauna
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=139)

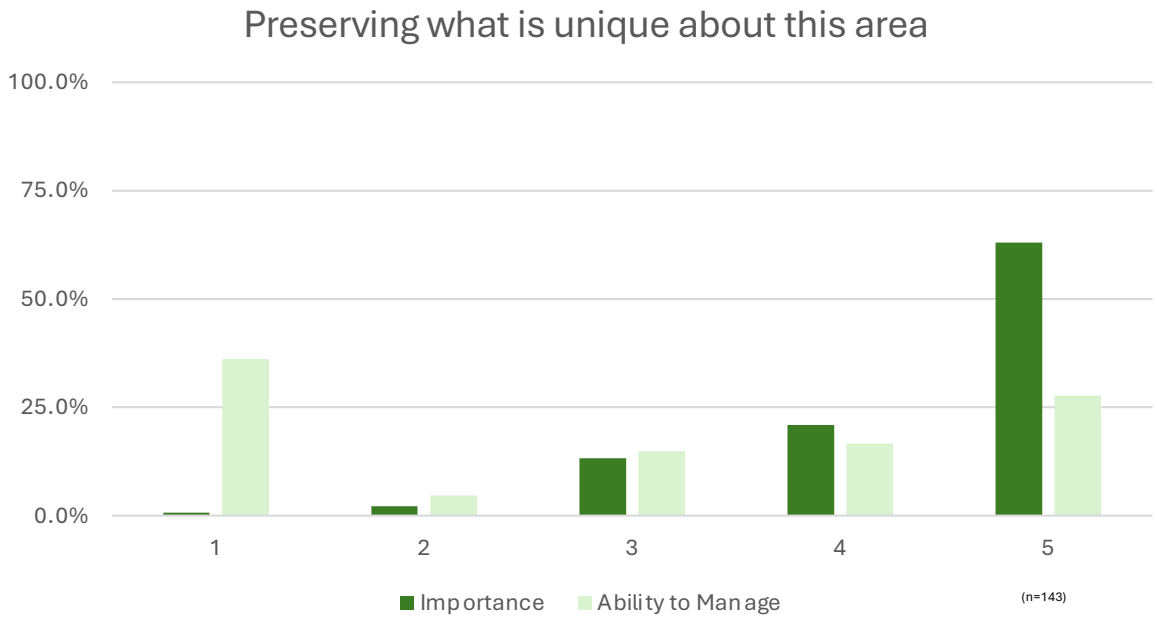

Peace and quiet
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=139)

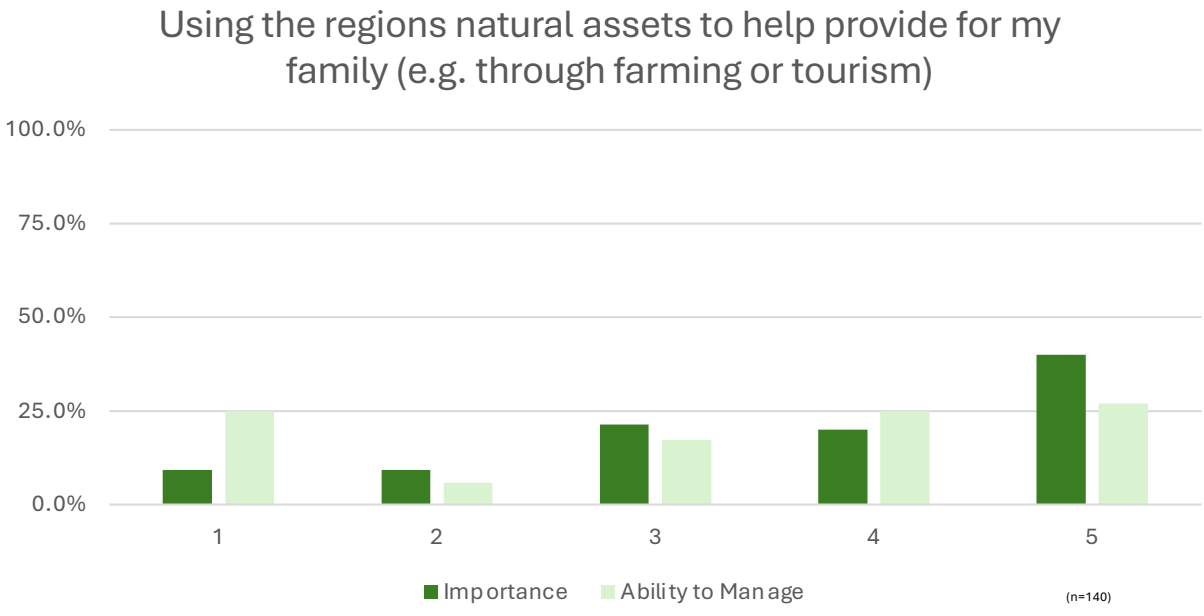

Water values such as rivers, wetlands and swamps
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
(n=139)
Importance
Ability to Manage

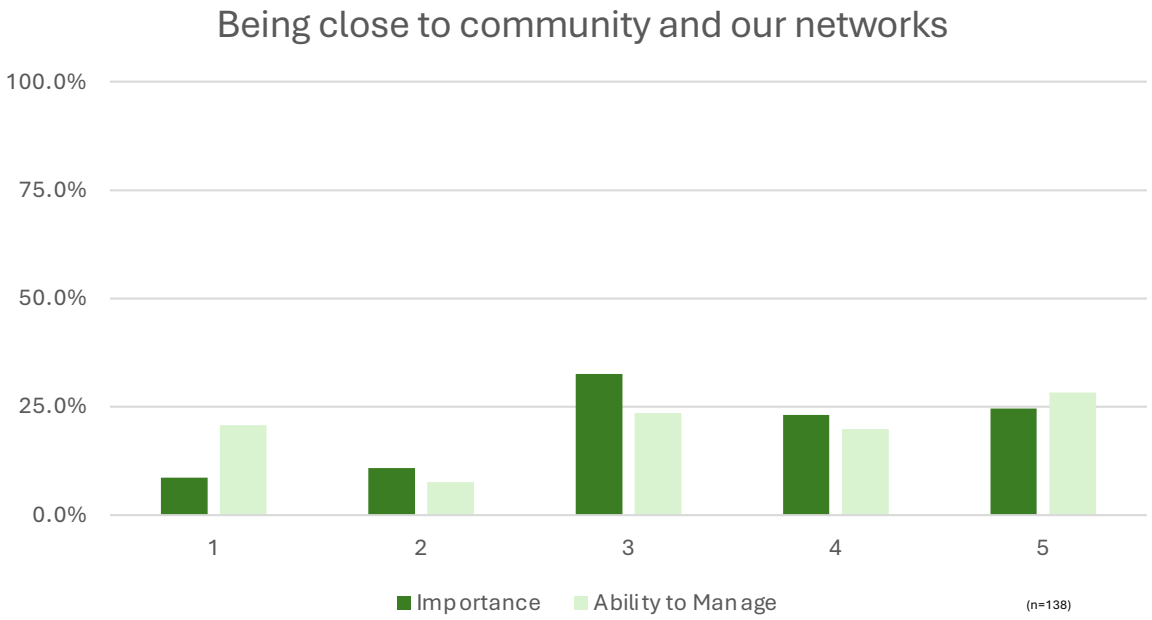

Being able to see the clouds, horizon and sky
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
(n=141)
Importance
Ability to Manage

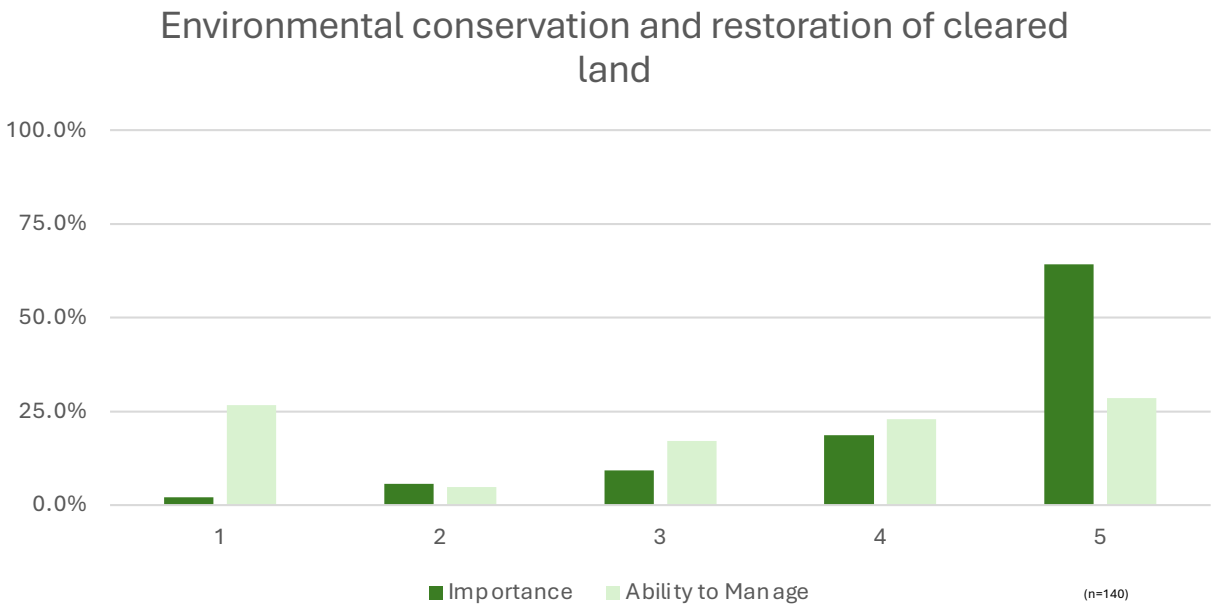

Being able to drive and access remote areas around us
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=139)

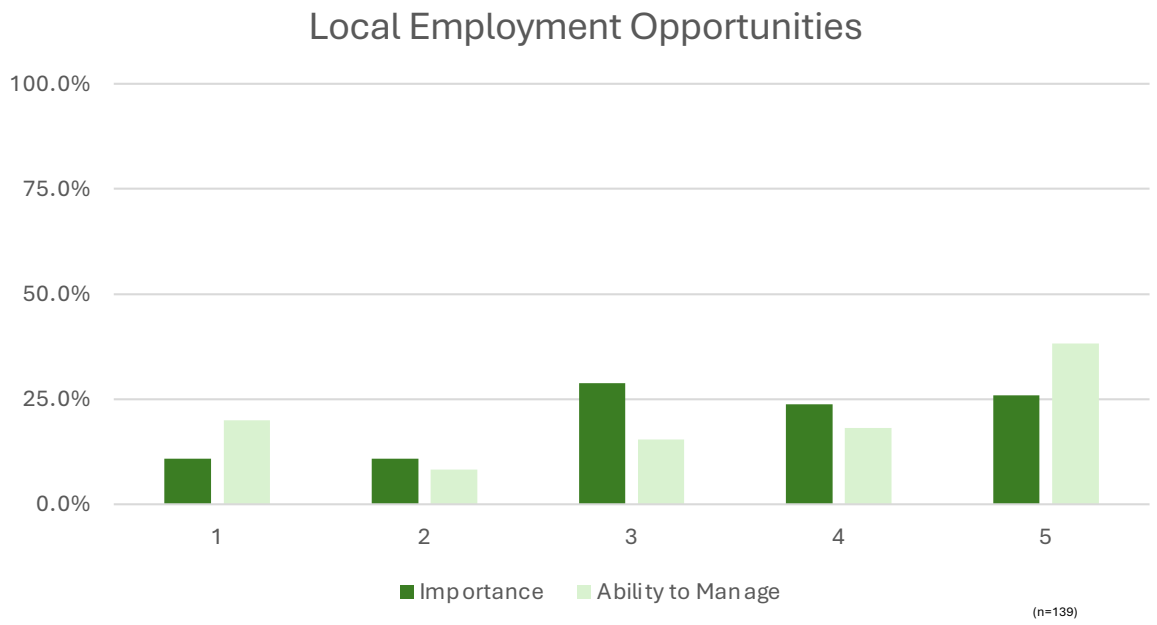

Tourists and visitors enjoying the region
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=134)

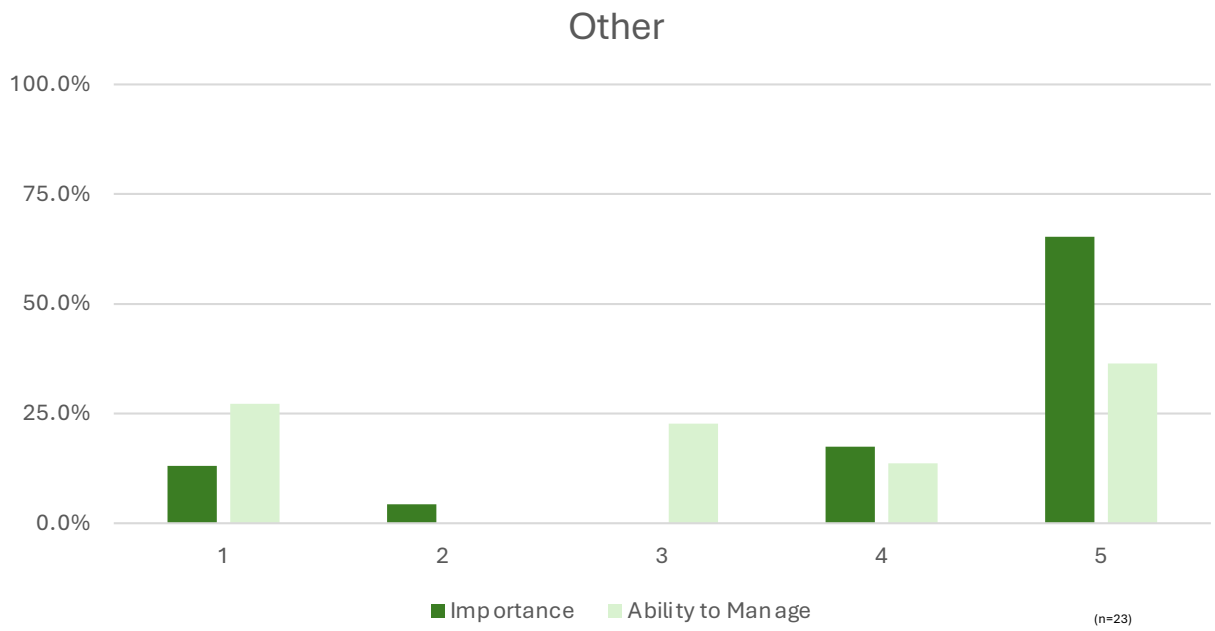

Preserving what is unique about this area
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=143)


Using the regions natural assets to help provide for my family (e.g. through farming or tourism)
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=140)

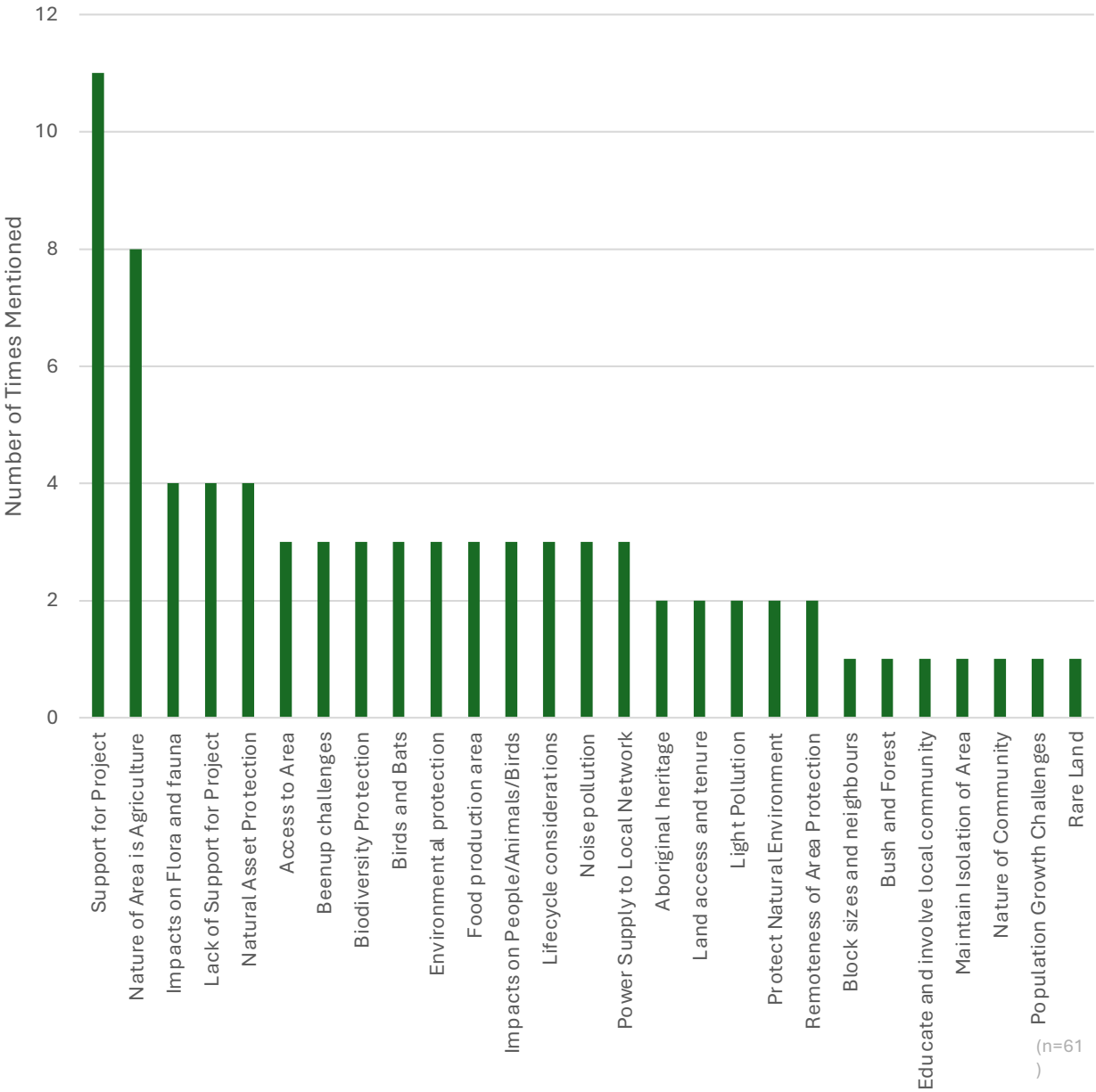

Being close to community and our networks
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=138)

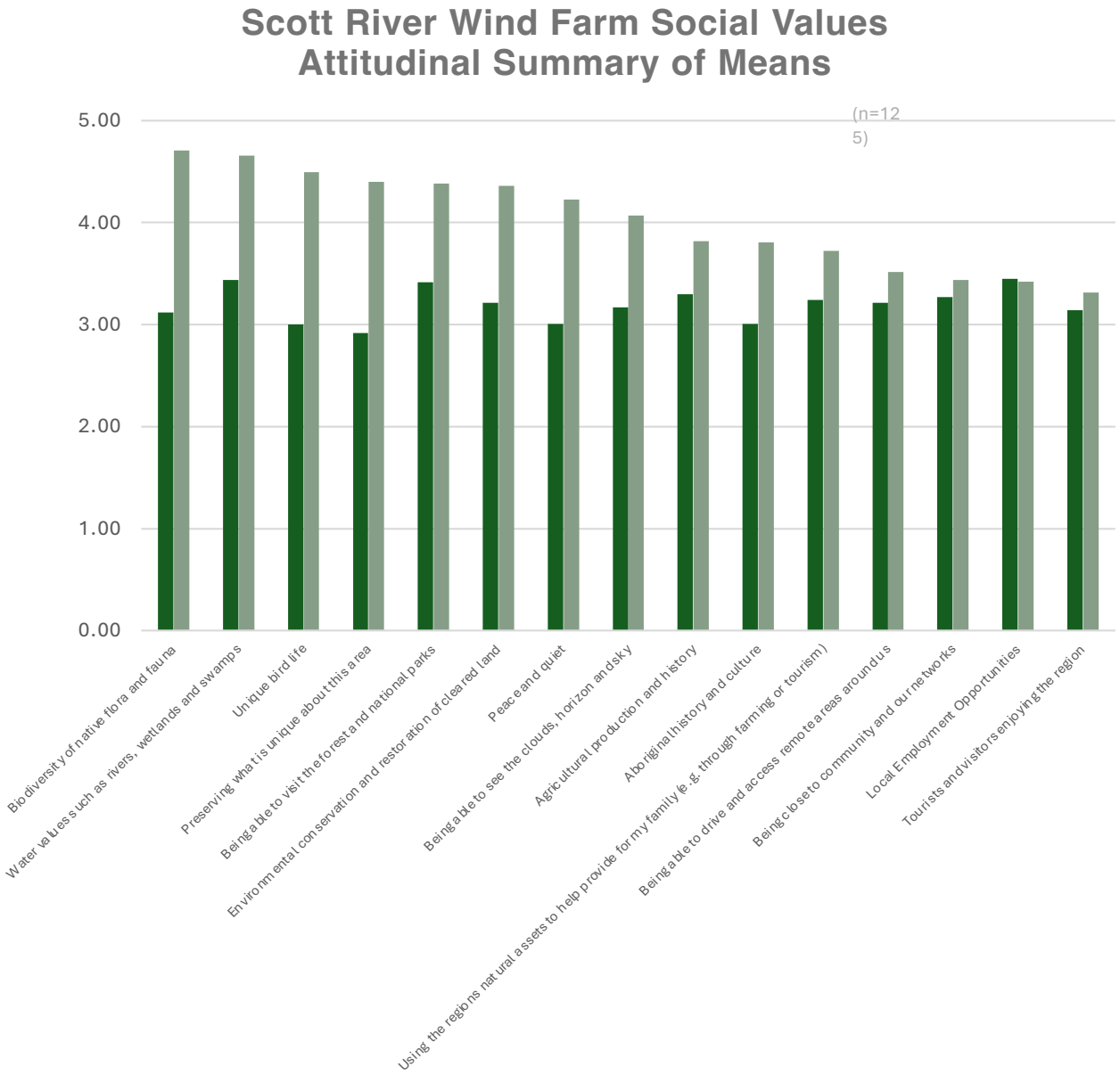

Environmental conservation and restoration of cleared land
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=140)


Local Employment Opportunities
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=139)

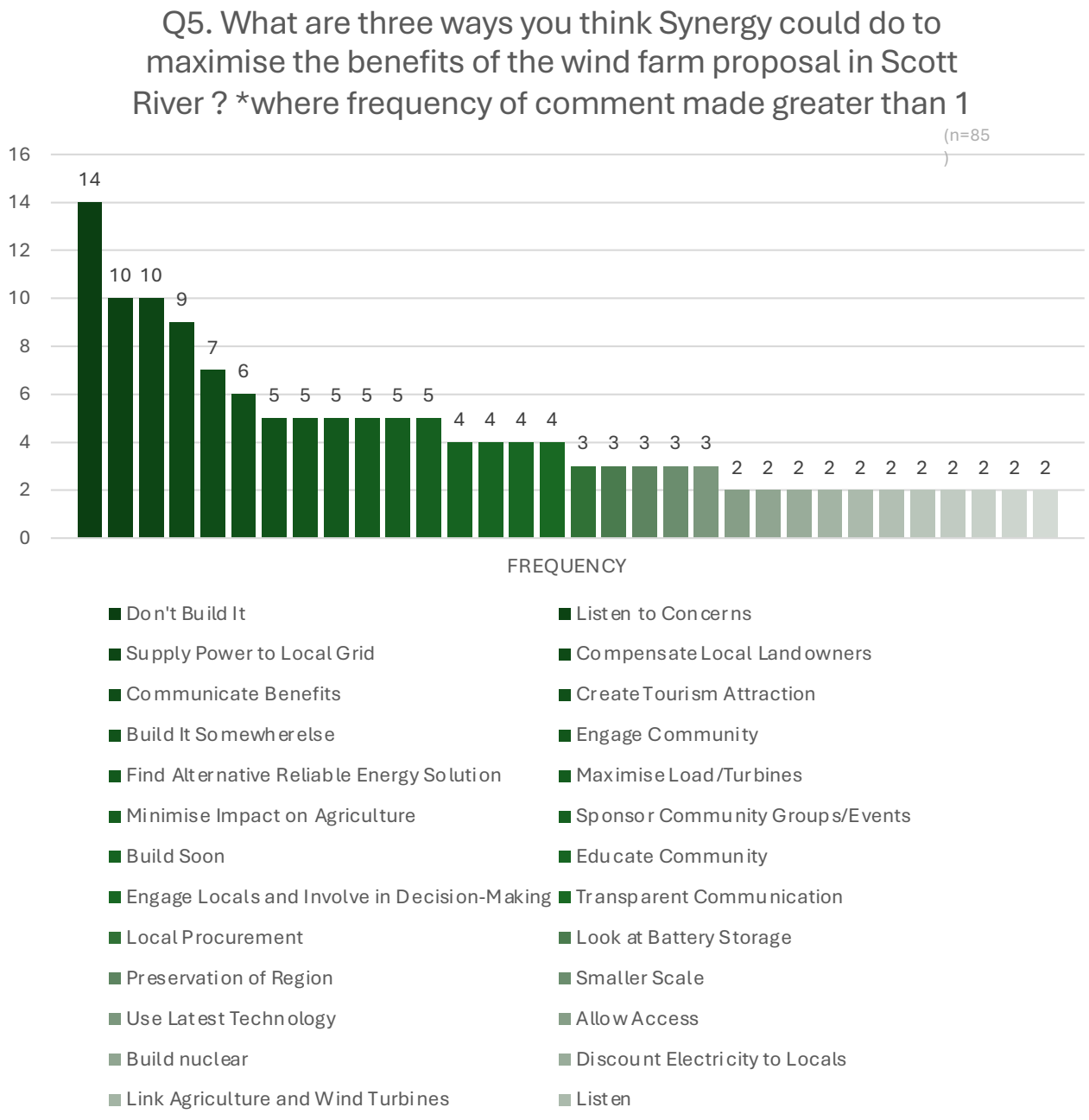

Other
100.0%
75.0%
50.0%
25.0%
0.0%
1
2
3
4
5
Importance
Ability to Manage
(n=23)

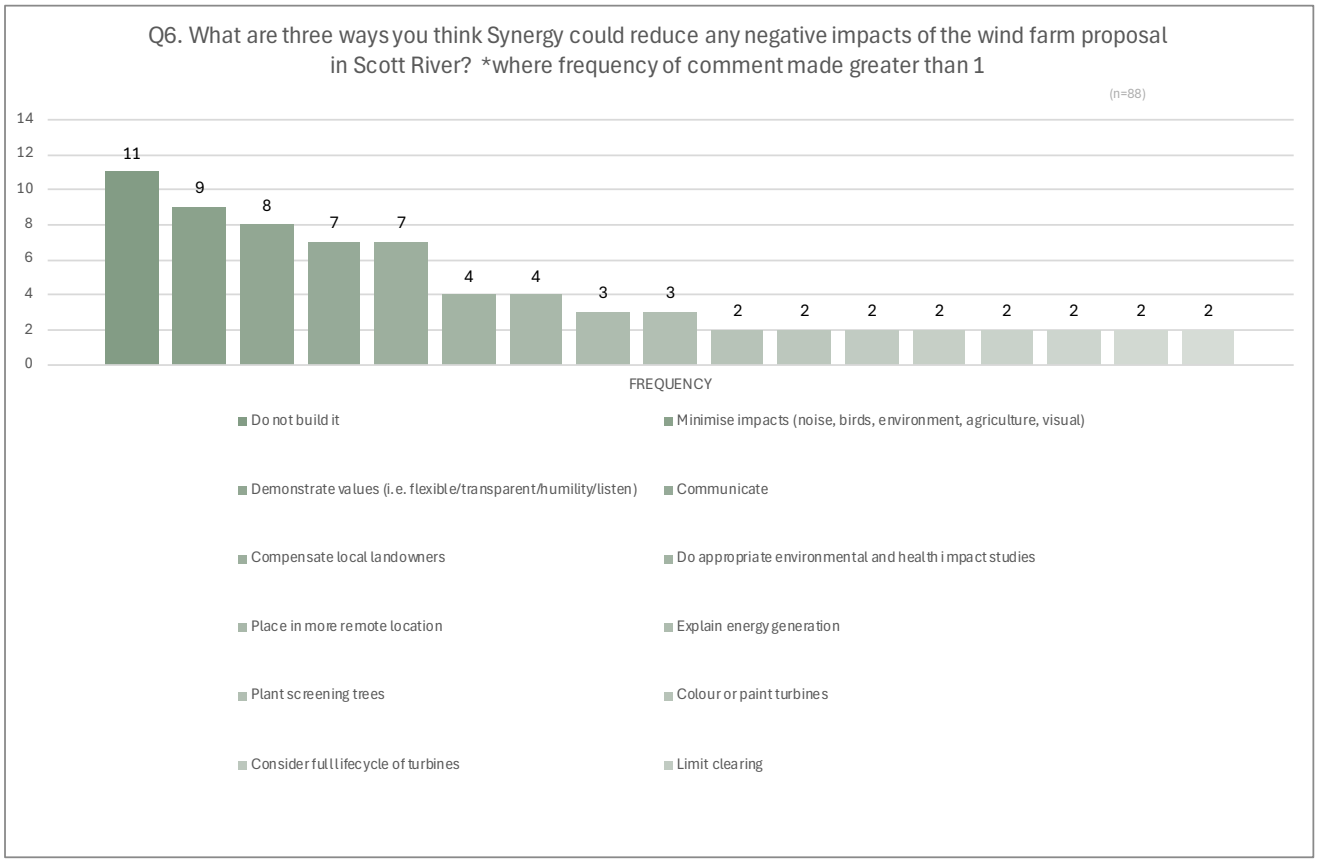
Frequency of Coded 'Other' Responses to Social Values and Project




Scott River Wind Farm Social Values
Attitudinal Summary of Means
(n=125)
5.00
4.00
3.00
2.00
1.00
0.00
Biodiversity of native flora and fauna
Water values such as rivers, wetlands and swamps
Unique bird life
Preserving what is unique about this area
Being able to visit the forest and national parks
Environmental conservation and restoration of cleared land
Peace and quiet
Being able to see the clouds, horizon and sky
Agricultural production and history
Aboriginal history and culture
Using the regions natural assets to help provide for my family (e.g. through farming or tourism)
Being able to drive and access remote areas around us
Being close to community and our networks
Local Employment Opportunities
Tourists and visitors enjoying the region
Perceived Ability To Manage (where 1=not manageable at all to our determinent and 5=extremely well to our benefit)
Importance (where 1=not at all important and 5 =extremely important)

SUGGESTIONS FOR MANAGING IMPACTS/BENEFITS




Q6. What are three ways you think Synergy could reduce any negative impacts of the wind farm proposal in Scott River? *where frequency of comment made greater than 1
(n=88)
14
12
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4
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4
3
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2
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2
FREQUENCY
Do not build it
Minimise impacts (noise, birds, environment, agriculture, visual)
Demonstrate values (i.e. flexible/transparent/humility/listen)
Communicate
Compensate local landowners
Do appropriate environmental and health impact studies
Place in more remote location
Explain energy generation
Plant screening trees
Colour or paint turbines
Consider full lifecycle of turbines
Limit clearing

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Attachment 4 (RSD) - Appendix S

Noise Impact Assessment

Proposed Wind Farm at Scott River

Noise Impact Assessment

Synergy Renewable Energy Developments Pty Ltd

12 May 2025

→ **The Power of Commitment**



Project name	Proposed Wind Farm at Scott River- Noise Impact Assessment					
Document title	Proposed Wind Farm at Scott River | Noise Impact Assessment					
Project number	12623449					
File name	12623449- Proposed Wind Farm at Scott River- Noise Impact Assessment					

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	H Satari	V Lenchine B Hillion		J Forrest		12/11/2024
S3	B	H Satari	V Lenchine B Hillion		J Forrest		19/12/2024
S4	0	H Satari	B Hillion		J Forrest		24/02/2025
S4	1	H Satari / R Febriyandi	B Hillion		J Forrest		12/05/2025

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Executive summary

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is proposing to develop a wind farm at Scott River in southwest WA (the Project). A noise impact assessment (NIA) for the operation of wind turbine generators (WTGs) has been conducted to support the relevant environmental and planning approvals for the Project.

A dual criteria approach was adopted for this NIA which involved deriving the criteria based on both the WA *Environmental Protection (Noise) Regulations* 1997 and SA *Wind Farm Environmental Noise Guidelines, 2021* using the background noise monitoring data collected at seven locations around the Development Envelope.

A 3D environmental noise model of the Project was created to predict noise levels at the adjacent noise sensitive receptors, using the ISO9613-2:2024 calculation algorithm implemented in SoundPLAN (v 8.2) software. A proposed 20 WTG layout with a hub height of 164 metres was considered in the 3D noise model. The turbine source noise input data was based on the overall sound power level and the 1/3 octave source spectra data provided by SynergyRED.

Noise modelling results show that predicted noise levels from turbine operation at adjacent noise sensitive receptors are expected to comply with the noise criteria in accordance with both WA Noise Regulations (1997) and the SA Guidelines (2021).

This report summarises the results of the NIA. This report is subject to and must be read in conjunction with the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout this report.

Glossary

Term	Description
Background noise level	The measured background noise level at a noise receptor location as per the SA Guidelines.
dB	Decibel, which is 20 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	A-weighted decibel measurement to represent the sound frequency sensitivity of the human ear.
Downwind direction	Wind direction for which a noise receptor location is downwind of the nearest WTG as per the SA Guidelines.
Downwind background noise level	Measured background noise level at a noise receptor location for winds within ±45° of the downwind direction as per the SA Guidelines.
Dwelling	Building used for a noise sensitive purpose,
DWER	WA Department of Water and Environmental Regulation
EPA	Environmental Protection Authority of Western Australia
Cut-in wind speed	Wind speed at which the turbine starts power production
GHD	GHD Pty Ltd
IEC 61400-11:2012	International Standard published by the International Electrotechnical Commission regarding wind turbines.
IF	Influencing Factor which is calculated to determine the noise criteria at a specific noise receptor location and depends on the ratio of commercial and industrial land zoning and the presence of major and secondary roads within 100 metres and 450 metres of the point under consideration.
ISO 9613-2: 2024	Recent version of international standard *ISO9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO9613-2), used for noise propagation modelling by considering the distance between source and noise sensitive receptor topography, ground attenuation, atmospheric absorption at different frequencies and meteorological conditions favourable to noise propagation.
L_{A1}	A-weighted sound pressure level that is exceeded for 1 percent of the measurement period.
L_{A10}	A-weighted sound pressure level that is exceeded for 10 percent of the measurement period.
L_{Amax}	Maximum A-weighted sound pressure level recorded during a specified time period.
$L_{Aeq,10\text{-}min}$	The predicted equivalent noise level adjusted for tonality over a 10-minute period.
$L_{A90,10\text{-}min}$	Measured ambient background noise in the absence of the noise under investigation that is equalled or exceeded for 90 percent of the measurement time interval.
$L_{Aeq\ (time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L_{Afast}	A-weighted sound level measured with a fast time constant of 125 milliseconds.
L_{Aslow}	A-weighted sound level measured with a slow time constant of 1 second

Term	Description
L_{Apeak}	A-weighted peak sound level. It represents the highest instantaneous sound pressure level measured.
Mitigation	Reduction in severity.
NIA	Noise impact assessment
NMP	Noise monitoring point
Premises	Residential, industrial or other premises of any kind whatsoever and includes land, water and equipment
Project	Proposed wind farm at Scott River in southwest WA
Rated power wind speed	Lowest hub height wind speed at which the WTG reaches its rated power
SA Guidelines	*SA Wind Farm Environmental Noise Guidelines, 2021*
Noise receptor	A noise modelling term used to describe a location/premises used for different purposes where the noise by a specific source is received, measured, predicted or mitigated. The noise receptor types vary depending on the usage of the premises e.g. sensitive, non-sensitive, involved, or not-involved.
Noise sensitive receptor	A noise modelling term used to describe a building or dwelling used for residential or accommodation purposes.
Non-sensitive noise receptor	A noise modelling term used to describe a building not used for residential or accommodation purposes e.g. a shed.
Involved noise sensitive receptor	A noise sensitive receptor in a parcel of land that accommodate part of a wind farm development.
Not-involved noise sensitive receptor	A noise sensitive receptor in a parcel of land that do not accommodate any part of a wind farm development.
Position statement	The Position Statement: Renewable Energy Facilities (WAPC, March 2020) outlines the Western Australian Planning Commission's guidelines for the development and assessment of renewable energy facilities.
pW	Picowatt, which is a unit of power equal to one trillionth of a watt
Sound pressure level (SPL)	The change in air pressure above and below the average atmospheric pressure caused by a passing pressure wave; this is then converted to decibels and can be abbreviated as SPL or L_p.
Sound power level (SWL)	Represents the total noise output of the plant or equipment. Also presented as L_{wA} or SPW.
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
The Regulations	*Environmental Protection (Noise) Regulations, 1997*
Tonal noise	Noise with perceptible and definite pitch or tone.
TF	Transport Factor
Wind speed bin	±0.5 m/s at each integer of wind speed from cut-in to cut-out.
WAPC	Western Australian Planning Commission
WHO	World Health Organization
WTG	Wind turbine generator

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Appendix A	Sound power levels for WTGs and substation transformers
Appendix B	Background noise monitoring
Appendix C	Noise contour maps
Appendix D	WTG coordinates

1. Introduction

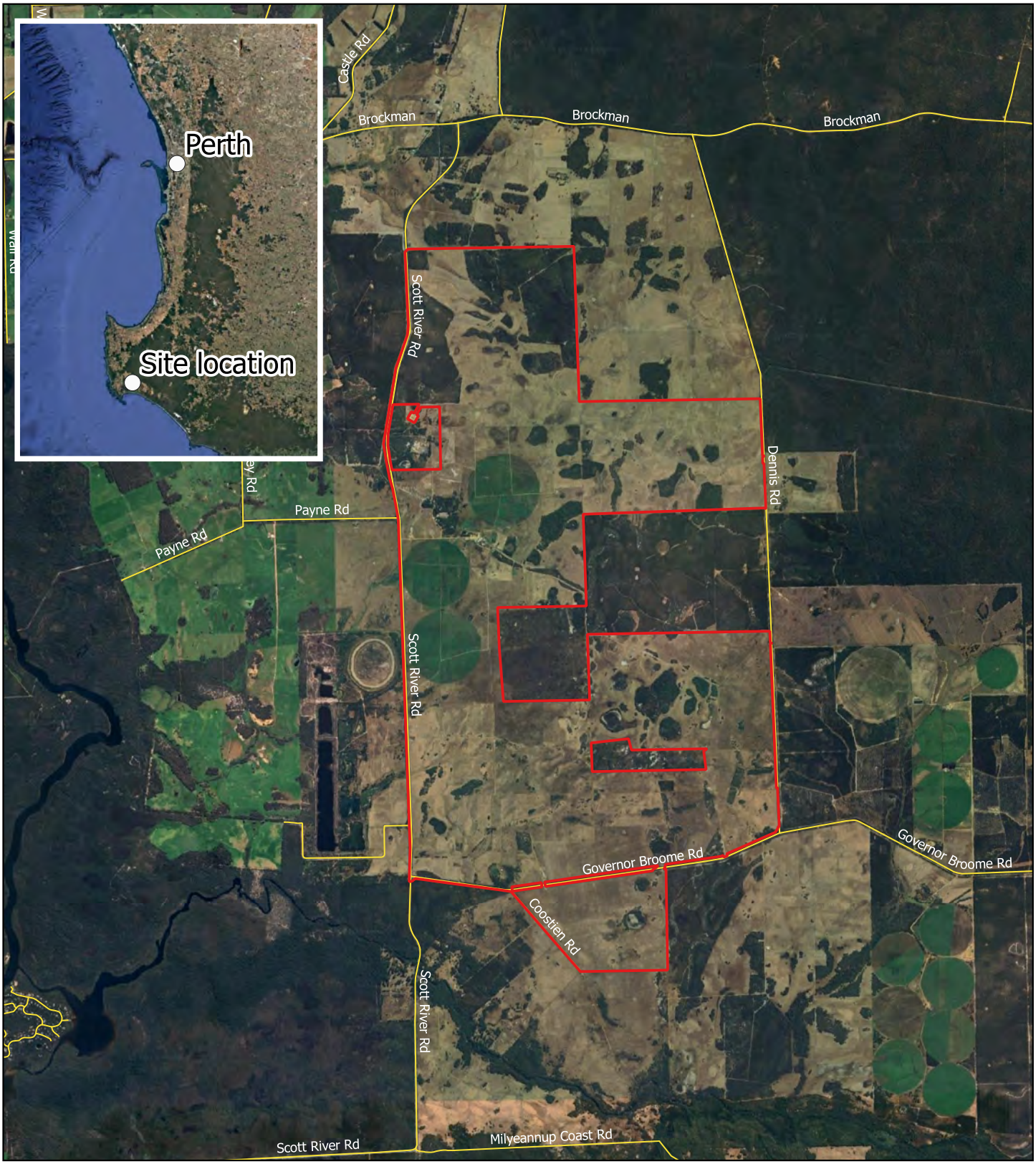
1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is currently investigating development of a new wind energy project at Scott River in southwest WA (the Project). The Project has the potential to connect to the Southwest Interconnected System.

The Project Development Envelope is located at Scott River in southwest WA, predominantly surrounded by rural lands developed for agricultural purposes with small areas of remnant and regenerated vegetation (Figure 1.1). The development Envelope is generally bound by the following roads:

– Brockman Highway
– Dennis Road
– Milyeannup Coast Road
– Scott River Road

SynergyRED engaged GHD Pty Ltd (GHD) to undertake an environmental noise impact assessment (NIA) for the Project.



Legend

Development Envelope

Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Project Development Envelope

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE 1.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
Created By: dfebriyandi

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1.2 Purpose of this report

This report summarises the results of an operational NIA for the Project, including background noise monitoring, noise modelling and impact assessment in accordance with applicable regulatory requirements.

1.3 Scope of works

The scope of works for this assessment is as follows:

– Background noise monitoring:
  - Review of adjacent noise receptor locations to identify representative noise receptor locations to conduct noise monitoring.
  - Five months of unattended background noise monitoring at seven representative noise receptor locations, with one local weather monitoring station (wind speed, wind direction and rainfall) deployed at one of the seven representative noise receptor locations.
  - NIA based on dual criteria. The criteria were derived primarily based on the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The baseline noise monitoring results were used to determine criteria in accordance with the SA Environment Protection Authority's (SA EPA) *Wind Farms Environmental Noise Guidelines* (SA Guidelines, 2021). The criteria derived based on the SA Guidelines were used as secondary noise criteria for NIA and details of the background noise data processing are provided in Appendix B.

– Noise modelling of the Project:
  - Development of 3D noise model of the Project and surrounding area, incorporating topographic data and all identified noise receptors.
  - Review noise emission data for the candidate turbines being considered for the Project.
  - Conduct noise impact modelling of the Project site according to the prediction procedures as specified in SA Guidelines using ISO9613-2:2024 modelling algorithm.
  - Assess the compliance margin for the proposed layout at noise receptors based on the modelling results. In the case that potential non-compliance is predicted at any noise sensitive receptor, liaise with Project team to discuss mitigation strategies (e.g. changes to turbine layout) to ensure compliance can be achieved. If non-compliance with relevant criteria is still predicted, explore further mitigation measures such as turbine noise curtailment, to achieve the noise criteria
  - Assess operational noise for the substations in accordance with the Regulations.

– Provide a NIA report, summarising the findings relevant to the agreed layout within the scope components above.

1.4 Limitations

This report has been prepared by GHD for SynergyRED and may only be used and relied on by SynergyRED for the purpose agreed between GHD and SynergyRED as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than SynergyRED arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.5 Assumptions

This report is subject to the following general assumptions at the time of writing this report:

– All information provided by SynergyRED, including relevant Project location and noise receptor information, wind turbine generator (WTG) layout and specification, wind data from the Project's meteorological mast, and relevant noise data are deemed correct.
– All parameters used in the assessment and other relevant data are based on best estimates using information provided by SynergyRED and other relevant sources.
– Operating hours for the wind farm would be 24 hours a day, seven days a week.
– It is assumed that noise emission from WTGs for the development do not exhibit tonal character that evokes noise level adjustment in accordance with SA Guidelines.
– Hub heights for the layouts of proposed WTGs used in the current assessment were assumed to be 164 metres above ground level.
– Due to the substantial separation distance to the nearest noise receptors (the nearest noise receptor to the substation is located more than 1700 metres away) it is not expected that vibration impacts would be relevant during the operation of the Project.

2. Assessment criteria

2.1 Operation of wind turbines

Specific noise guidelines are applicable to assessment of noise from wind farms due to their unique noise generating characteristics in conjunction with typically low ambient noise surroundings.

Following advice from the Department of Water and Environmental Regulation (DWER), the *Environmental Protection (Noise) Regulations 1997* (the Regulations) will be used as the primary noise criteria for the NIA.

In addition, the SA Guidelines will be also used to derive the secondary noise criteria based on the background noise monitoring data.

2.1.1 Environmental Protection (Noise) Regulations 1997

Noise emissions from the operation of WTG and associated substation will be assessed against criteria according to the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 8 sets out the maximum allowable noise levels (assigned noise levels) based on different time of day and land use (i.e. noise sensitive premises, commercial and industrial type premises), applicable at the premises receiving the noise. Various parameters of the assigned noise levels (L_{A10}, L_{A1} and L_{Amax}) also depend on influencing factor (IF) which are calculated in accordance with Schedule 3 of the Regulations, taking into account the area of industrial and commercial land and the presence of major and secondary roads within a 100 m and 450 m radius around the noise receptor.

A summary of the assigned noise levels from Regulation 8 is presented in Table 2.1.

Table 2.1 Assigned noise levels based on the Environmental Protection (Noise) Regulations 1997

Type of premises receiving noise	Time of day	Assigned noise level. dB(A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: Highly sensitive area (i.e. noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use)	7:00 am to 7:00 pm Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	9:00 am to 7:00 pm Sunday and public holidays	40 + IF	50 + IF	65 + IF
	7:00 pm to 10:00 pm all days (Evening)	40 + IF	50 + IF	55 + IF
	10:00 pm on any day to 7:00 am Monday to Saturday and 9:00 am Sunday and public holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: Any area other than highly sensitive area (i.e. Noise Sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use)	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

2.1.1.1 Influencing factor

Influencing factors (IFs) have been calculated and used to determine assigned noise level criteria as presented in Table 2.2 for nearest noise receptors (refer to Figure 3.5).

Schedule 3 of the Regulations details the process to determine the IF for noise sensitive premises, which can be summarised as the following steps:

1. Obtain a Council zoning map covering an area up to 500 m from the receiving location.
2. Draw two circles around the receiving point, of 100 m radius and 450 m radius.
3. Determine the percentage of each circle that is taken up with industrial and commercial zonings. Note that the industrial and commercial areas in the inner circle are also counted in the outer circle.
4. Add the percentages up as follows:
   - (Percent industrial in small circle + percent industrial in a large circle) x 1/10 = I
   - (Percent commercial in small circle + percent commercial in large circle) x 1/20 = C
5. Determine the transport factor (TF) as follows (Note – TF cannot be more than 6):
   - Major road (more than 15,000 vehicles/day) in small circle, TF = 6
   - A major road in a large circle, TF = 2
   - For each secondary road (6,000 - 15,000 vehicles/day) in small circle, TF = 2
6. Add I, C and TF from steps 4 and 5 above to obtain the IF (i.e., IF = I + C + TF), and
7. Fill in the table of assigned levels by adding in the IF to obtain the L_{A10}, L_{A1} and L_{Amax} assigned levels.

Table 2.2 summarises the list of noise receptors, their coordinates and calculated IFs surrounding the Development Envelope.

Table 2.2 Influencing factor (IF) calculated for noise receptors

ID	Noise Receptor Type	Coordinates, GDA2020 / MGA Zone 50		IF
		Easting, metres	Northing, metres	
R01	Not-involved noise sensitive receptor	339933	6218605	0
R02	Not-involved noise sensitive receptor	340681	6218532	0
R03	Not-involved noise sensitive receptor	340852	6218785	0
R04	Not-involved noise sensitive receptor	341008	6219011	0
R05	Not-involved noise sensitive receptor	341249	6219088	0
R06	Not-involved noise sensitive receptor	341069	6218419	0
R07	Not-involved noise sensitive receptor	341535	6217905	0
R08	Not-involved noise sensitive receptor	342043	6218890	0
R09	Not-involved noise sensitive receptor	342690	6218163	0
R10	Not-involved noise sensitive receptor	343549	6218312	0
R11[1]	Non-sensitive noise receptor	343548	6214495	NA
R12[1]	Non-sensitive noise receptor	340638	6214626	NA
R13	Not-involved noise sensitive receptor	338412	6215131	0
R14	Not-involved noise sensitive receptor	338464	6214395	0
R15	Not-involved noise sensitive receptor	338587	6213882	0
R16	Not-involved noise sensitive receptor	338768	6213383	0
R17 [2]	Involved noise sensitive receptor	340924	6213832	0
R18 [2]	Involved noise sensitive receptor	341392	6213419	0
R19	Not-involved noise sensitive receptor	338804	6211691	0

ID	Noise Receptor Type	Coordinates, GDA2020 / MGA Zone 50		IF
		Easting, metres	Northing, metres	
R20	Not-involved noise sensitive receptor	340492	6207596	0
R21	Not-involved noise sensitive receptor	340852	6207358	0
R22	Not-involved noise sensitive receptor	341310	6207260	0
R23	Not-involved noise sensitive receptor	341585	6206886	0
R24	Not-involved noise sensitive receptor	341494	6206613	0
R25[1]	Non-sensitive noise receptor	342437	6208749	NA
R26[1]	Non-sensitive noise receptor	344716	6209189	NA
R27[1]	Non-sensitive noise receptor	345036	6210136	NA
R28	Not-involved noise sensitive receptor	347575	6209225	0
R29	Not-involved noise sensitive receptor	347645	6208472	0
R30	Not-involved noise sensitive receptor	346773	6204588	0
R31	Not-involved noise sensitive receptor	347732	6203961	0
R32	Not-involved noise sensitive receptor	341223	6207695	0
R33	Not-involved noise sensitive receptor	341234	6207287	0
R34	Not-involved noise sensitive receptor	339819	6217839	0

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] R17 and R18 are involved noise sensitive receptors (participating landowners).

2.1.1.2 Annoying noise characteristics

Regulation 7 requires that the noise character received at noise sensitive receptors must be free from annoying characteristics of tonality, modulation, and impulsiveness. If these characteristics cannot reasonably and practicably be removed, then a series of adjustments to the measured or calculated received levels are set out, and the adjusted level must comply with the assigned level. The adjustments are set out in Table 2.3 and are further defined in Regulation 9(1). These adjustments are cumulative up to a maximum of 15 dB.

Table 2.3 Table of adjustments

Adjustment where noise emission is not music (Adjustments are cumulative to a maximum of 15 dB)		
Where tonality is present	**Where modulation is present**	**Where impulsiveness is present**
+5 dB	+5 dB	+10 dB

– Tonality is defined in Regulation 9(1) as being present where the difference between the A- weighted sound pressure level in any one third octave band and the arithmetic average of the A weighted sound pressure levels in the two adjacent one third octave bands is greater than 3 dB in terms of $L_{Aeq, T}$ where the time period T is greater than 10 percent of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A, Slow}$ levels.

– Modulation is defined as a variation in the emission of noise that:

- Is more than 3 dB $L_{A, Fast}$ or is more than 3 dB $L_{A, Fast}$ in any one third octave band

- Is present for at least 10 percent of the representative assessment period, and
- Is regular, cyclic and audible

– Impulsiveness is defined as present where the difference between $L_{A, peak}$ and $L_{Amax, S}$ is more than 15 dB when determined for a single representative event.

2.1.2 SA Guidelines

The *Position Statement: Renewable energy facilities (WAPC, March 2020) (Position Statement)* has been used by the Western Australian Planning Commission (WAPC) for wind farm development. For assessment purposes, the Position Statement endorses the use of the SA Guidelines. As a result, the criteria derived based on the SA Guidelines will be used as an additional criterion (secondary criterion) for the NIA presented in this study.

To prevent adverse impacts from the WTG noise, the SA Guidelines require that the received noise levels at the relevant noise sensitive receptors be compared to the corresponding background noise.

The predicted equivalent noise level ($L_{Aeq,10\text{-}min}$) adjusted for tonality in accordance with these guidelines, should not exceed:

– 35 dB(A) at relevant noise sensitive receptors in localities which are primarily intended for rural living (equivalent to noise sensitive receptors in accordance with the WA Regulations), or

– 40 dB(A) at relevant noise sensitive receptors in localities in other zones (equivalent to other types of premises apart from noise sensitive premises in accordance with the WA Regulations), or

– Background noise ($L_{A90,10\text{-}min}$) by more than 5 dB(A)

whichever is the greater, at all relevant noise sensitive receptors for wind speed from cut-in to rated power of the WTG and each integer wind speed in between. These criteria apply for both daytime and nighttime hours.

The proposed project site is located within a rural area. Therefore, the 35 dB(A) baseline criterion or the adjusted “background + 5” dB(A) criteria apply to all relevant noise sensitive receptors.

2.1.2.1 Participating landowners

It should be noted the criteria based on SA Guidelines have been developed to minimise the impact on the amenity of premises that do not have an agreement with wind farm developers (i.e. Not-involved noise sensitive receptors).

Wind farm developers commonly enter into agreements with the owners of private land suitable for a wind farm site (participating landowners). The agreement provides the developer with the appropriate siting and generally rewards the landowner with a level of compensation and diversity in their income stream. Notwithstanding this, the Environmental Protection Authority (EPA) cannot ignore noise impacts on the basis that an agreement has been made between the developer and the landowner. Developers cannot absolve themselves of their obligations under the *Environmental Protection Act 1986* (EP Act) by entering into an agreement with a landowner, i.e., the development should not have an adverse effect on the amenity of the area which unreasonably interferes with the enjoyment of the area. In terms of health impacts in particular, the likely exposure level should not result in sleep disturbance.

The World Health Organization (WHO) *Guidelines for Community Noise* (1999) recommend a 30 dB(A) indoor limit to prevent negative effects on sleep. *The Working Group on Noise from Wind Turbines* (Final Report, ETSU for DTI, 1996) recommends the outdoor noise limit of 45 dB(A) after any adjustment for tonality for landowners having financial involvement in the wind farm. As such, if the received noise level from a wind farm does not exceed 30 dB(A) indoor and 45 dB(A) outdoor at an involved noise sensitive receptor having financial involvement with the developers, then it is considered that the development is not having adverse effect on the amenity of the involved noise sensitive receptor.

2.1.2.2 Background noise monitoring

Long term (unattended) noise measurements were conducted at seven noise logger locations in the area within and adjacent to the Development Envelope. The details of the background noise monitoring and data processing are provided in Appendix B.

As can be seen on appended Figures B.2 to B.8 the measured noise levels generally:

– range approximately from 20 dB to 50 dB L_{A90} at NMP02 (at 4 m/s and 15 m/s wind speed respectively), with averaged values ranging from 30 to 45 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP03 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 30 to 44 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP04 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 30 to 39 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP05 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 28 to 38 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP06 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 28 to 42 dB L_{A90}.

Appended Figure B.2 to Figure B.6 show results of postprocessed data and relevant noise criteria calculated in accordance with SA Guidelines 2021. Data postprocessing is performed for arithmetic averages of measured noise levels in integer wind speed bins as per Section 3.4 of the SA Guidelines.

Relevant SA guidelines noise criteria are derived for each of the monitoring locations for wind speeds referenced to hub height of 164 m.

The resulting SA guidelines criteria are summarised in Table 2.4, along with other criteria.

2.1.3 Summary of wind farm noise criteria

Table 2.4 summarises the criteria derived from both the state Regulations and the SA Guidelines. The full list of noise receptors and their types are provided in Table 2.2.

For the NIA of the WTGs operation, the most stringent criteria i.e. 35 + IF, L_{A10} during nighttime will be adopted for the criteria based on the Regulations. Advice provided by DWER is that the assigned levels in the Regulations are unlikely to apply to involved noise sensitive receptors. DWER recommended that 40 dB L_{A10} be used as the criteria for the involved noise sensitive receptors.

The details of the noise monitoring including the representative monitoring locations and the calculations to derive the noise criteria according to the SA Guidelines are provided in Appendix B. It should be noted that R17 and R18 are involved noise sensitive receptors (section 2.1.2.1), the SA Guideline criteria of 45 dB(A) for an involved receptor has been used.

Table 2.4 Noise criteria for 164 m hub height – Dual criteria for wind farm NIA

Noise receptor [1]	Reference of noise criteria	Representative monitoring location [2]	Hub height wind speed, m/s							
			4	5	6	7	8	9	10	11
Involved, noise sensitive										
R17, R18	The Regulations [3]	-	40	40	40	40	40	40	40	40
	SA Guidelines [4]	-	45	45	45	45	45	45	45	45
Not-involved noise sensitive										
R01, R02, R03, R04, R05, R06, R07, R08, R09, R10, R34	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP02	35	36	38	39	40	40	39	41
R20, R21, R22, R23, R24, R32, R33	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP03	35	35	36	36	37	37	37	39
R28, R29, R30, R31	The Regulations	-	35	35	35	35	35	35	35	35

Noise receptor [1]	Reference of noise criteria	Representative monitoring location [2]	Hub height wind speed, m/s							
			4	5	6	7	8	9	10	11
	SA Guidelines	NMP04	35	36	37	37	37	37	37	38
R14, R15, R16, R19	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP05	35	35	35	35	35	35	35	36
R13	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP06	35	35	36	36	37	37	37	38

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] Background noise monitoring results and representative monitoring locations are not applicable to the criteria based on the Regulations.

[3] R17 and R18 are involved noise sensitive receptors (i.e. participating landowners) for which 40 dB(A) is used upon advice from DWER.

[4] R17 and R18 are involved noise sensitive receptors for which the SA Guideline criteria of 45 dB(A) for an involved receptor is used.

2.2 Operation of the substation

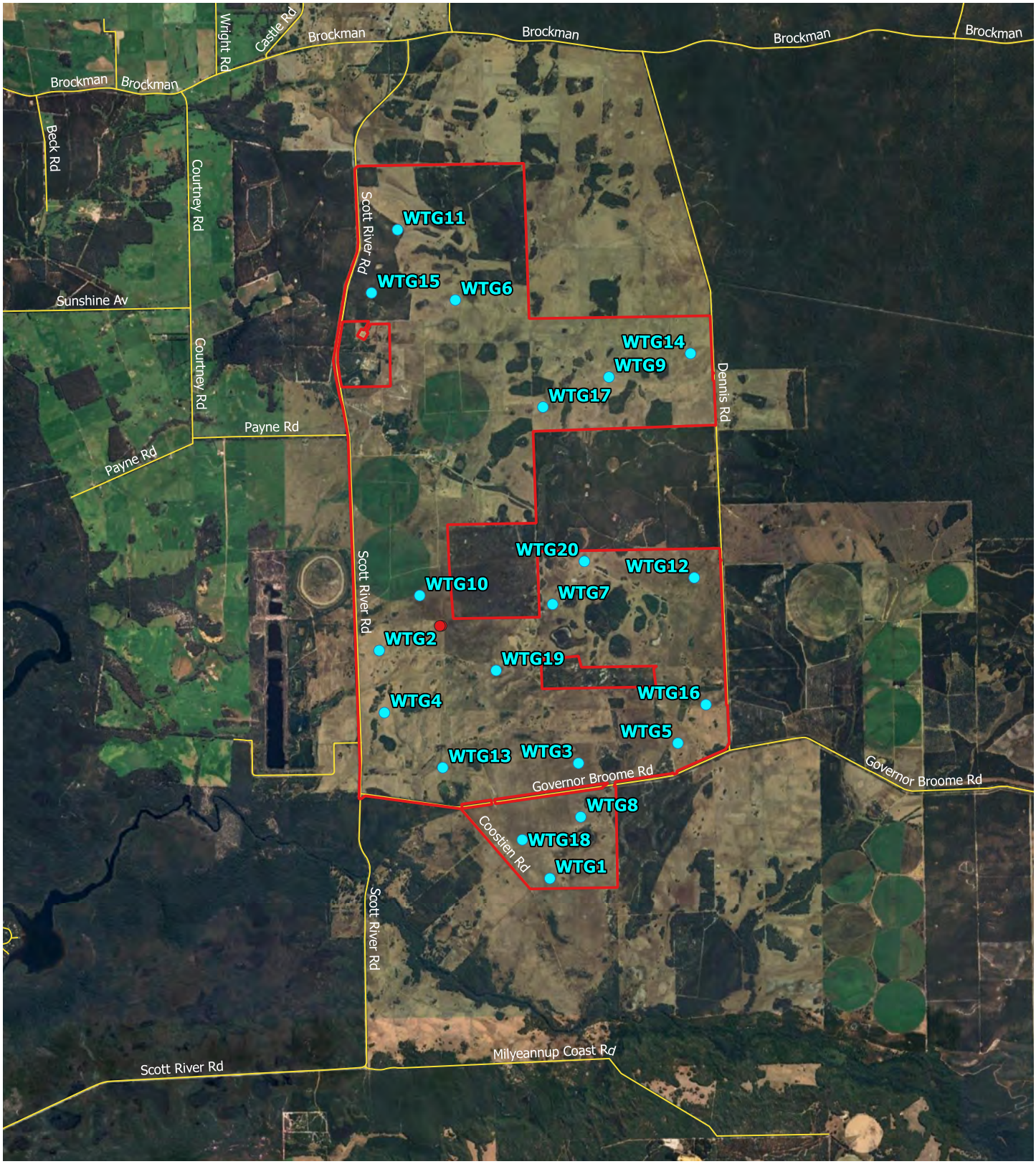
The noise emissions from the substation proposed for the Project are governed by the *Environmental Protection (Noise) Regulations 1997* (Refer to section 2.1.1 above).

3. Project overview

3.1 Wind turbines

3.1.1 Wind turbine locations

A 20-WTG layout has been used for the NIA as presented in Figure 3.1 along with the locations of the transformers. The WTG coordinates are provided in Appendix D.



Legend

Wind turbines | Substation transformer | Development Envelope | Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Wind turbines and transformers locations
20 WTG Layout

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE 3.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
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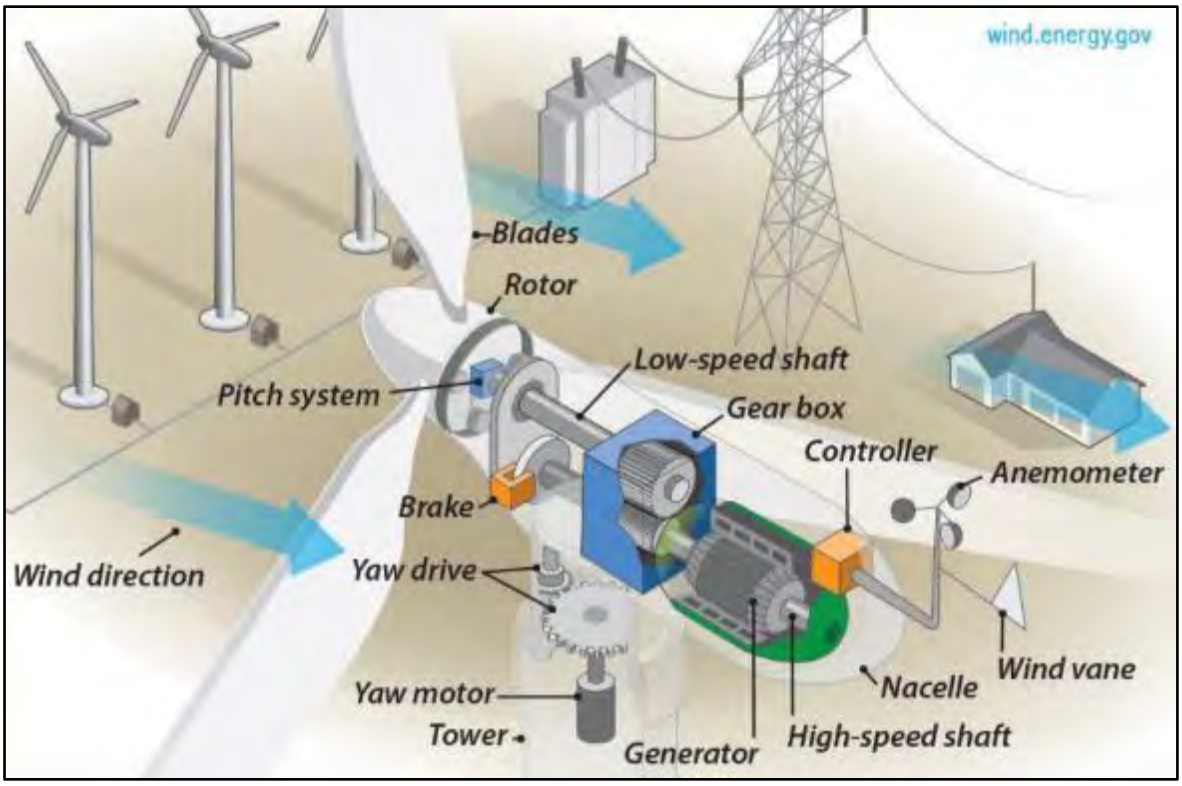
3.1.2 Sources of noise

There are two main groups of noise sources originating from a WTG: mechanical and aerodynamic noise. Sources of mechanical noise include the following (refer to Figure 3.2):

- Gearbox
- Generator
- Yaw drives
- Cooling fans
- Auxiliary equipment
- Brakes (when applied)

Sources of mechanical noise tend to be both tonal and broadband in nature since the emitted sound is associated with the rotation of mechanical and electrical equipment. However, in modern turbines, mechanical noise is not usually audible above aerodynamic noise at greater separation distances. Mechanical noise can be effectively reduced through standard noise control practices such as vibration isolation, damping and noise enclosures.

Aerodynamic noise is associated with the passage of air over the turbine blades and is considered the most dominant source of WTG noise emissions. Aerodynamic noise levels typically increase with rotor speed.



Source: US Office of Energy Efficiency & Renewable Energy

Figure 3.2 WTG components

3.1.3 Sound power levels

The proposed WTG make and model for the Project will be determined through a procurement process prior to commencement of construction. The turbine hub height is not yet finalised and is expected to be a maximum of 164 m.

Among the turbine options considered, the WTG make and model with worst-case noise emissions and their spectral data are used for the noise assessment study. The overall sound power levels (SWLs) are presented in Figure 3.3 with reference to the IEC 61400-11 standard. The SWLs presented are valid for the corresponding wind speeds referenced to the hub height. The prototype cut-in wind speed is 4 m/s and speed of rated power is 11 m/s.

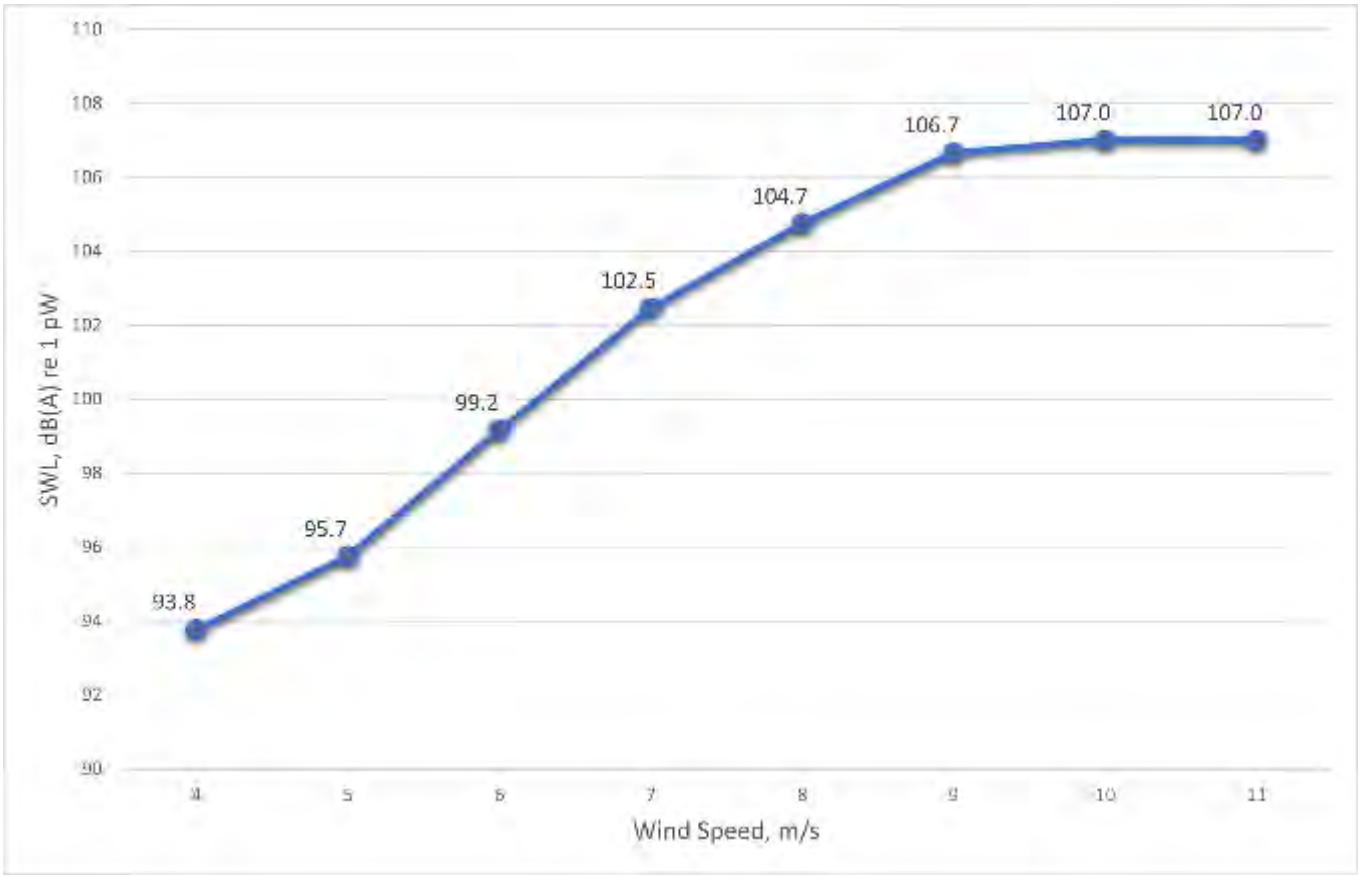


Figure 3.3 WTG SWL vs wind speed

The 1/3 octave source spectra in dB(A) re 1 pW for the corresponding centre frequencies are shown in Figure 3.4 for the wind speed of 8 m/s as an example, referred to the hub height as per IEC 61400-11. Appendix A provides the turbine source spectra for the full range of wind speeds.

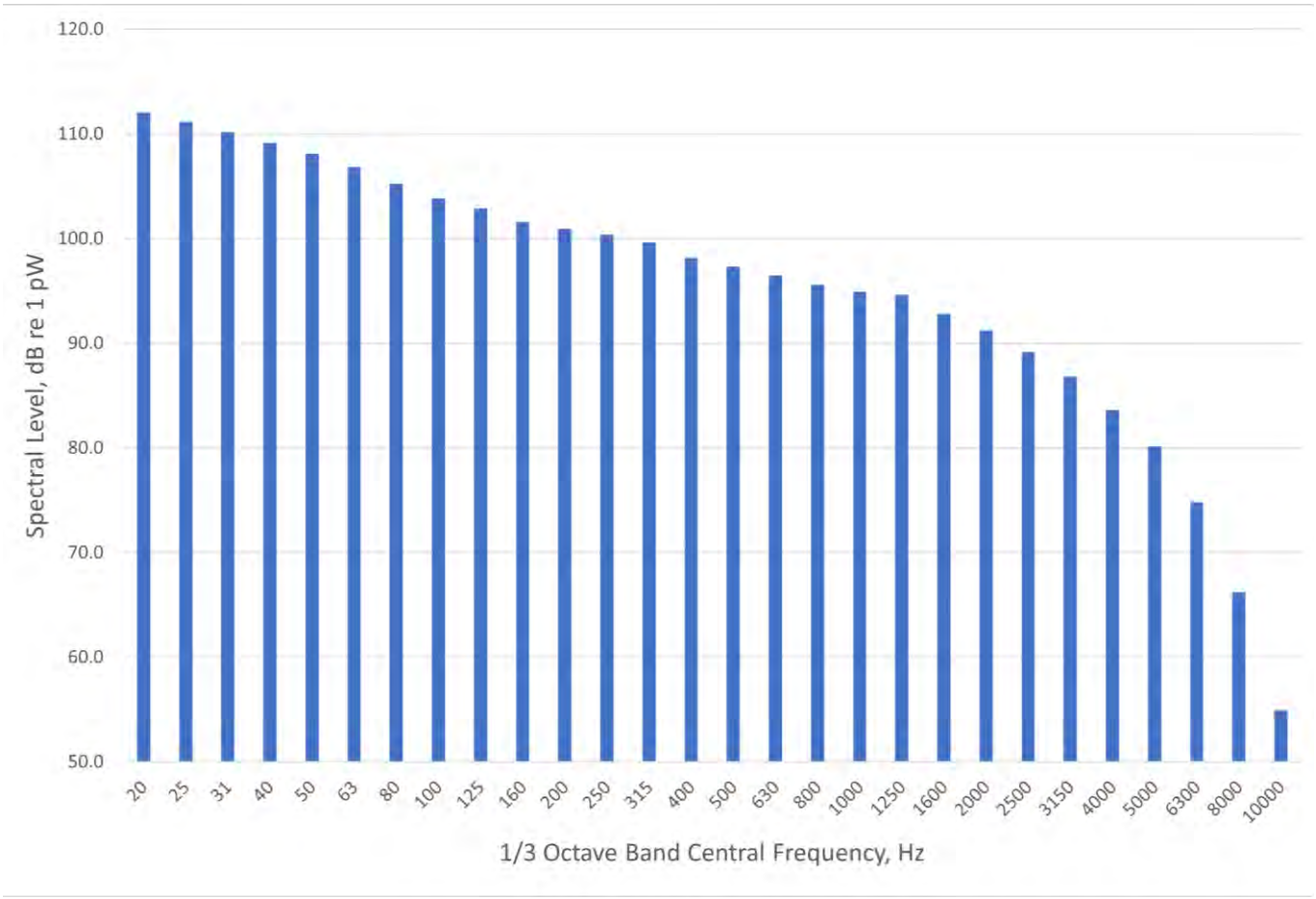


Figure 3.4 1/3 octave band spectral levels at hub height for wind speed 8 m/s

3.1.4 Tonality and infrasound

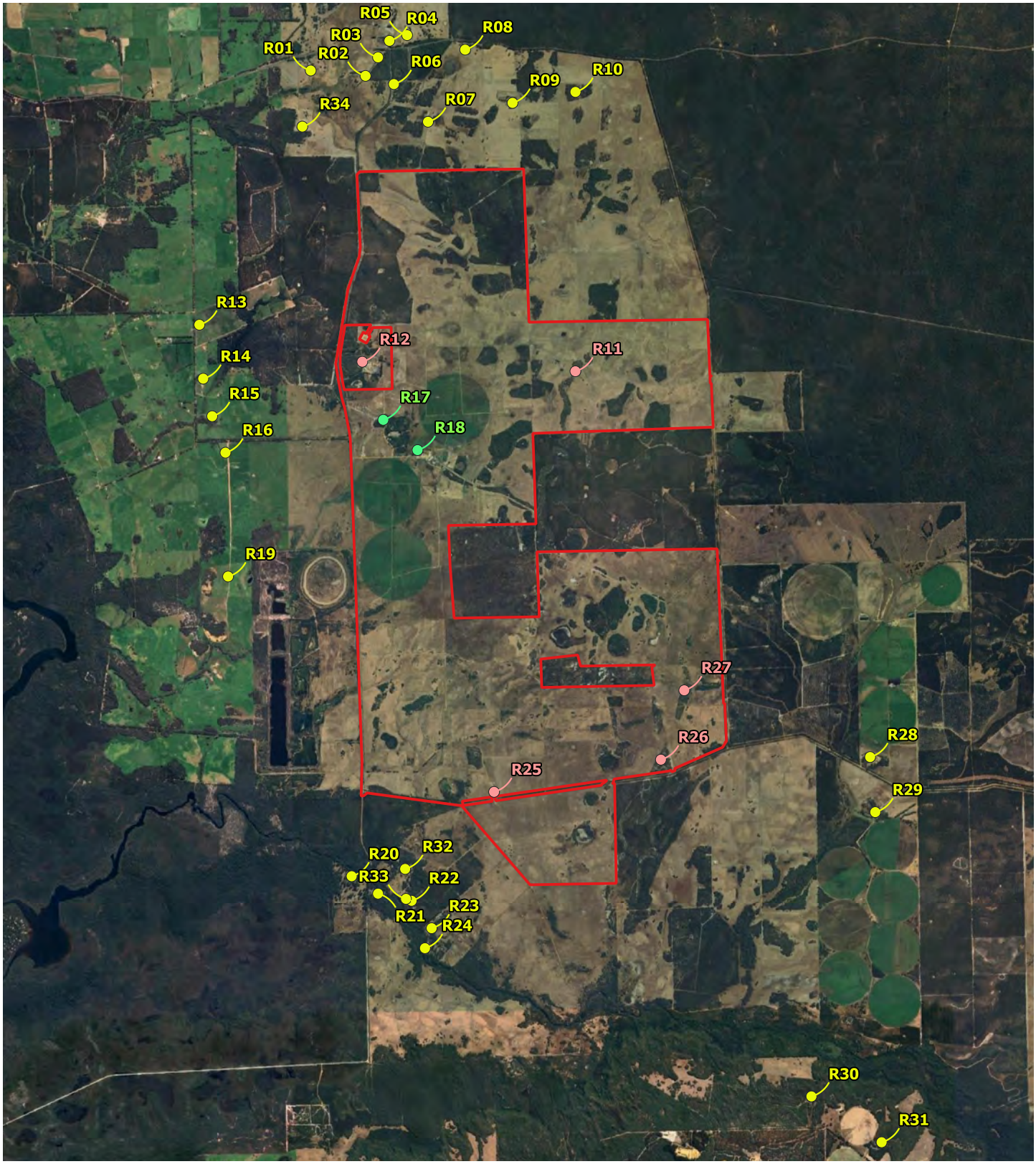
WTG manufacturers are expected to conduct independent acoustic tests in accordance with IEC 61400-11 to assess tonal audibility.

According to both the Regulations and the SA Guidelines, an additional 5 dB should be added to the measured noise level from a wind farm where tonality is shown to be a characteristic and is audible at the relevant noise sensitive receptor. GHD assumes no tonal characteristics associated with the WTG to be used and therefore tonality has been excluded from this assessment.

Infrasound (sound spectral component below 20 Hz) is not tested as an obligatory part of IEC61400-11 or the SA Guidelines. Infrasound was a characteristic attributable to earlier design of WTGs where turbine blades were downwind of the main tower. This generated an infrasound effect as the blades cut through the turbulence generated around the downwind side of the tower. Modern WTG designs typically have the blades upwind of the main tower and combined with improved blade design, infrasound is found not to be one of the major audible characteristics at modern wind farm sites (Wind-watch.org, 2014). SynergyRED is committed to using WTGs of modern design for the Project.

3.1.5 Noise receptors

The noise assessment methodology, as specified in both the Regulations and the SA Guidelines, require all noise receptors within the area surrounding the Development Envelope to be identified. Noise receptors identified within 5 km of the Development Envelope are presented in Figure 3.5.



Legend

- Development Envelope
- Local road
- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Receptor Locations

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE 3.5

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

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The coordinates and types of these noise receptors are detailed in Table 2.2. It should be noted that R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA. Also, receptors R17 and R18 are participating landowners (i.e. involved noise sensitive receptors).

4. Noise modelling and impact assessment

4.1 Noise modelling algorithm and inputs

4.1.1 Modelling algorithm

Both the Regulations and SA Guidelines state that a suitable model must be selected to predict worst-case noise levels at all relevant noise receptors and recommend the use of prediction methods in accordance with ISO9613-2 or CONCAWE.

Noise from the Project has been predicted using the most recent version of international standard *ISO9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO9613-2). The ISO9613-2 noise propagation algorithm is used around the world and is generally accepted as an appropriate model for assessment of wind farms. The model has the ability to take into account the distance between source and noise receptor topography, ground attenuation, atmospheric absorption at different frequencies and meteorological conditions favourable to noise propagation.

In general accordance with the SA Guidelines, noise levels at relevant noise receptor locations were predicted for each reportable wind speed. Appendix D.4 of ISO 9613-2:2024 states that:

When the source is a WTG, attenuation due to ground effect appears lower than considered in the "General method" and selection of the ground factor in a) – c) in 7.3.1 should be modified as follows:

– *Hard ground, which includes paving, water, solid ice, concrete, and all other ground surfaces having a low porosity. Tamped ground, for example, as often occurs around industrial sites, can be considered hard. For hard ground G = 0.*
– *Porous or mixed ground, which includes ground covered by grass, trees or other vegetation, and farming land should be modelled using a maximum of G = 0.5.*
– *When using G = 0.5, a minimum receiver height of 4 m is recommended for the purposes of the predictions, regardless of actual receiver height.*

Because the ground surrounding the Development Envelope comprises mostly of sand, soil and vegetation, ground absorption was set to G=0.5. In order to adhere to ISO 9613-2:2024 for WTG noise prediction as per advice from DWER, noise receptors were set at 4 metres above ground level (instead of typical 1.5 metres above ground level) as this leads to more consistent outcomes for noise prediction of WTGs.

4.1.2 Modelling of wind turbine generators

The noise model was developed based on the following data inputs:

– Topographic elevation contours (5 m resolution) for the Development Envelope and surrounding area, obtained from publicly available data.
– A single scenario for the proposed Project turbine layout (20 WTG layout) (refer to Appendix D for the coordinates) and the hub height (164 m above ground level).
– Noise receptor locations and types, received from SynergyRED.
– The following modelling parameters were used in the model:
  - Atmospheric conditions at 10°C temperature and 80 percent relative humidity.
  - 50 percent acoustically porous or mixed ground (G = 0.5 ground factor).
  - No barriers or intervening structures were included in the model.
  - 4 m noise receptor height.
– Turbine source noise emissions and the 1/3 octave source spectra data, received from SynergyRED.

For modelling purposes, representative WTG type and noise emission data have been used to assess noise compliance. The overall SWLs and 1/3 octave source spectra data (20 Hz to 10 kHz) under integer wind speeds between 4 m/s and 15 m/s are provided in Appendix A. No penalty for tonality was applied to the modelling prediction results.

It should be noted that the following conservative assumptions were implemented in the noise model:

1- Noisiest turbine available at the time was used (i.e. with no mitigation applied).

2- General wind roses available from the BOM website for the area suggest that winds are predominantly south-easterly. However, in the noise model wind has been stipulated to occur in all directions which makes for a conservative assessment (i.e. the noise predicted in the assessment assumes downwind noise conditions have been used for all receptors).

4.1.3 Modelling of substations

The Project proposes a substation comprising two 132 kVA transformers. The overall sound power level of the transformers is 85 dB(A), estimated in accordance with Australian Standard AS 60076 Part 10: 2009 *Power Transformers – Determination of Sound Levels (IEC 60076-10, Ed.1 (2001) MOD)* and the proposed transfer rating (in kVA). The 1/3 octave sound power spectral curve used for the model input, as presented in Appendix A, is based on a reference spectral curve measured for a typical transformer facility.

It should be noted that the equivalent continuous noise parameter L_{Aeq} is used to characterise the noise emissions from the substation transformers. Considering the noise emissions from the transformers are constant in nature, it is expected that the parameter L_{Aeq} will be consistent with the parameter L_{A10} based on which the noise assessment criteria have been specified as in Table 2.1. For this conversion, a 3 dB conversion factor has been used (i.e. $L_{A10} = L_{Aeq} + 3$ dB(A)).

4.2 Impact assessment

4.2.1 WTG noise

Received noise levels have been predicted at all identified noise sensitive receptors with all WTGs (20 WTGs) operating simultaneously, for all source noise emission inputs under relevant individual integer wind speeds as provided in Appendix A.

As explained in Section 1.3, a dual criteria approach has been used for the NIA by assessing the predicted noise levels against the criteria based on the Regulations (Section 2.1.1) and based on the background noise monitoring data processing as indicated by the SA Guidelines (Section 2.1.2). The predicted noise levels for the Project assessed against the criteria derived are provided in Table 4.1 and Table 4.2 based on the Regulations and the SA Guidelines, respectively. As explained in section 2.1.3, the nighttime L_{A10} assigned noise levels for the nighttime (35 + IF) has been used as the most stringent criteria for the NIA at the Not-involved noise sensitive receptors based on the Regulations. Also 40 dB L_{A10} has been used as a conservative criteria for the involved noise sensitive receptors based on DWER advice. All predicted results and criterion values are rounded to the nearest integer for compliance assessment. As can be seen from the tables, the predicted noise levels at all noise sensitive receptors comply with the criteria derived based on both the Regulations and the SA Guidelines.

It should be noted that the criteria derived based on the Regulations, are more stringent which results in smaller safety margines at wind speeds above 10 m/s. The smallest safety margin is less than 1 dB predicted for noise sensitive receptor R32 at wind speeds above 10 m/s (Table 4.1).

Noise contour maps are provided in Figures C1 to C4 in Appendix C for 4 m/s, 6 m/s, 8 m/s and 10-11 m/s which constitute four representative wind speeds from the cut-in to the rated power wind speeds. It should be noted that the turbine source spectra and thus the predicted noise levels are similar for 10 and 11 m/s for the proposed WTG type (Appendix A).

4.2.2 Substation noise

Due to the large distances from the proposed substation to the noise sensitive receptors assessed (i.e. more than 2 km), the predicted noise levels from the substation transformers at all noise sensitive receptors are below 5 dB(A), which is well below the expected ambient noise levels.

Considering the +5 dB adjustment on received levels due to the potential tonal characteristics for transformer noise emissions, the predicted noise levels from the proposed substation are still well below the worst-case 35 dB(A) nighttime assigned level applicable to the fixed equipment under the Regulations.

Table 4.1 Predicted noise levels (dB(A)) assessed against criteria based on the Regulations (Section 2.1.1)

Noise sensitive receptor [1]	Predicted noise level at each wind speed																Compliance
	4 m/s		5 m/s		6 m/s		7 m/s		8 m/s		9 m/s		10 m/s		11 m/s		
	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	
R01	16	35	18	35	21	35	24	35	26	35	27	35	28	35	28	35	Yes
R02	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	35	Yes
R03	15	35	17	35	20	35	23	35	25	35	27	35	27	35	27	35	Yes
R04	14	35	16	35	19	35	22	35	24	35	26	35	26	35	26	35	Yes
R05	15	35	17	35	20	35	23	35	25	35	27	35	27	35	27	35	Yes
R06	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	35	Yes
R07	19	35	21	35	25	35	28	35	30	35	31	35	32	35	32	35	Yes
R08	15	35	17	35	21	35	24	35	25	35	27	35	27	35	27	35	Yes
R09	17	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R10	15	35	17	35	21	35	23	35	25	35	27	35	27	35	27	35	Yes
R13	16	35	19	35	22	35	25	35	27	35	29	35	29	35	29	35	Yes
R14	16	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R15	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	35	Yes
R16	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	35	Yes
R17 [2]	21	40	24	40	27	40	30	40	32	40	34	40	34	40	34	40	Yes
R18 [2]	22	40	24	40	27	40	30	40	32	40	34	40	34	40	34	40	Yes
R19	18	35	21	35	24	35	27	35	29	35	30	35	31	35	30	35	Yes
R20	20	35	23	35	26	35	29	35	31	35	33	35	33	35	33	35	Yes
R21	21	35	23	35	27	35	30	35	31	35	33	35	33	35	33	35	Yes
R22	21	35	23	35	27	35	30	35	31	35	33	35	33	35	33	35	Yes
R23	21	35	23	35	27	35	29	35	31	35	33	35	33	35	33	35	Yes
R24	19	35	22	35	25	35	28	35	30	35	31	35	32	35	32	35	Yes
R28	18	35	20	35	23	35	26	35	28	35	29	35	30	35	30	35	Yes
R29	17	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R30	11	35	13	35	16	35	19	35	21	35	22	35	23	35	23	35	Yes
R31	9	35	12	35	14	35	17	35	19	35	20	35	21	35	21	35	Yes
R32	22	35	25	35	28	35	31	35	33	35	34	35	35	35	35	35	Yes
R33	21	35	23	35	26	35	29	35	31	35	33	35	33	35	33	35	Yes
R34	17	35	19	35	22	35	25	35	27	35	29	35	29	35	29	35	Yes

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA.*[2] R17 and R18 are involved noise sensitive receptors (i.e. participating landowners) for which 40 dB(A) is used upon advice from DWER (Section 2.1.3).*

Table 4.2 Predicted noise levels (dB(A)) assessed against the criteria based on SA Guidelines (Section 2.1.2)

Noise sensitive receptor [1]	Predicted noise level at each wind speed																Compliance
	4 m/s		5 m/s		6 m/s		7 m/s		8 m/s		9 m/s		10 m/s		11 m/s		
	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	
R01	16	35	18	36	21	38	24	39	26	40	27	40	28	39	28	41	Yes
R02	16	35	18	36	21	38	24	39	26	40	28	40	28	39	28	41	Yes
R03	15	35	17	36	20	38	23	39	25	40	27	40	27	39	27	41	Yes
R04	14	35	16	36	19	38	22	39	24	40	26	40	26	39	26	41	Yes
R05	15	35	17	36	20	38	23	39	25	40	27	40	27	39	27	41	Yes
R06	16	35	19	36	22	38	25	39	26	40	28	40	28	39	28	41	Yes
R07	19	35	21	36	25	38	28	39	30	40	31	40	32	39	32	41	Yes
R08	15	35	17	36	21	38	24	39	25	40	27	40	27	39	27	41	Yes
R09	17	35	19	36	22	38	25	39	27	40	28	40	29	39	29	41	Yes
R10	15	35	17	36	21	38	23	39	25	40	27	40	27	39	27	41	Yes
R13	16	35	19	35	22	36	25	36	27	37	29	37	29	37	29	38	Yes
R14	16	35	19	35	22	35	25	35	27	35	28	35	29	35	29	36	Yes
R15	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	36	Yes
R16	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	36	Yes
R17 [2]	21	45	24	45	27	45	30	45	32	45	34	45	34	45	34	45	Yes
R18 [2]	22	45	24	45	27	45	30	45	32	45	34	45	34	45	34	45	Yes
R19	18	35	21	35	24	35	27	35	29	35	30	35	31	35	30	36	Yes
R20	20	35	23	35	26	36	29	36	31	37	33	37	33	37	33	39	Yes
R21	21	35	23	35	27	36	30	36	31	37	33	37	33	37	33	39	Yes
R22	21	35	23	35	27	36	30	36	31	37	33	37	33	37	33	39	Yes
R23	21	35	23	35	27	36	29	36	31	37	33	37	33	37	33	39	Yes
R24	19	35	22	35	25	36	28	36	30	37	31	37	32	37	32	39	Yes
R28	18	35	20	36	23	37	26	37	28	37	29	37	30	37	30	38	Yes
R29	17	35	19	36	22	37	25	37	27	37	28	37	29	37	29	38	Yes
R30	11	35	13	36	16	37	19	37	21	37	22	37	23	37	23	38	Yes
R31	9	35	12	36	14	37	17	37	19	37	20	37	21	37	21	38	Yes
R32	22	35	25	35	28	36	31	36	33	37	34	37	35	37	35	39	Yes
R33	21	35	23	35	26	36	29	36	31	37	33	37	33	37	33	39	Yes
R34	17	35	19	36	22	38	25	39	27	40	29	40	29	39	29	41	Yes

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] R17 and R18 are involved noise sensitive receptors for which the SA Guideline criteria of 45 dB(A) for a not-involved receptor is used (Section 2.1.3).

4.2.3 Noise from substation vs noise from WTGs

Currently there are no known significant sources of noise in the area adjacent to the Development Envelope which is predominantly rural in nature. The noise modelling results for both WTG and substation demonstrate that the received noise levels at assessed noise sensitive receptors from the proposed substation are more than 20 dB lower than the noise levels received from the proposed WTGs. Therefore, the combined noise impact from the Project is dominated by the WTG noise emissions, and the proposed substation is unlikely to result in any noticeable increases in received noise levels at the assessed noise sensitive receptors.

5. Conclusion

A NIA has been conducted for the operation of the Project in general accordance with the requirements of the Regulations and the SA Guidelines (2021) for the operation of the WTGs.

A dual criteria approach was adopted for this NIA: 1- the criteria was derived based on the Regulations, and 2- baseline noise monitoring was conducted at seven monitoring locations around the Development Envelope, and the baseline noise criteria were derived in accordance with the SA Guidelines.

A 3D environmental noise model of the Development Envelope was created using the SoundPLAN software to predict noise levels at the adjacent noise sensitive receptors, using the ISO9613-2:2024 calculation algorithm. A 20 WTG layout with hub height of 164 metres was considered in the 3D noise model. The turbine source noise input data is based on the 1/3 octave source spectra data provided by SynergyRED.

The noise modelling results show that the predicted noise levels from the Project received at the adjacent noise sensitive receptors comply with the noise criteria in accordance with both the Regulations and the SA Guidelines. The smallest safety margin is less than 1 dB predicted for noise sensitive receptor R32 at wind speed 10 m/s and above when assessed against the criteria based on the Regulations which are more stringent especially at high wind speeds.

It should be noted that the following conservative assumptions were implemented in the noise model:

1- Noisiest turbine available at the time was used (i.e. with no mitigation applied).

2- General wind roses available from the BOM website for the area suggest that winds are predominantly south-easterly. However, in the noise model wind has been stipulated to occur in all directions which makes for a conservative assessment (i.e. the noise predicted in the assessment assumes downwind noise conditions have been used for all receptors).

It is recommended that the turbines are properly maintained to ensure the noise emissions of the turbines are not adversely affected by the turbine wear, which could potentially result in audible tonality.

Once the wind farm is operating, in accordance with the Regulations and SA Guidelines, it is recommended that compliance monitoring be undertaken at the noise sensitive receptors with the highest predicted noise levels (i.e. R32).

6. References

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Appendices

Appendix A

Sound power levels for WTGs and substation transformers

Table A.1 Sound power levels (dB) for the proposed WTG type

Unweighted 1/3 octave band centre frequency	Hub height wind speed – 164 m											
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s
20 Hz	103	104	107	110	112	114	114	114	114	114	114	114
25 Hz	102	103	106	109	111	113	113	113	113	113	113	113
31.5 Hz	101	102	105	108	110	112	112	112	112	112	112	112
40 Hz	100	101	104	107	109	111	111	111	111	111	111	111
50 Hz	99	100	103	106	108	110	110	110	110	110	110	110
63 Hz	97	99	102	104	107	109	109	109	109	109	109	109
80 Hz	96	98	100	103	105	107	108	108	108	108	108	108
100 Hz	95	97	99	102	104	106	106	106	106	106	106	106
125 Hz	94	97	99	101	103	105	105	105	105	105	105	105
160 Hz	93	96	98	100	102	103	103	103	103	103	103	103
200 Hz	92	95	98	100	101	102	103	103	103	103	103	103
250 Hz	91	94	97	99	100	102	102	102	102	102	102	102
315 Hz	89	92	96	98	100	101	101	101	101	101	101	101
400 Hz	87	90	94	97	98	100	100	100	100	100	100	100
500 Hz	86	88	92	95	97	99	99	99	99	99	99	99
630 Hz	84	86	90	94	96	98	98	98	98	98	98	98
800 Hz	83	85	89	93	96	97	98	98	98	98	98	98
1 kHz	83	84	88	92	95	97	97	97	97	97	97	97
1.25 kHz	83	83	87	92	95	97	97	97	97	97	97	97
1.6 kHz	81	82	86	90	93	95	96	96	96	96	96	96
2 kHz	81	81	84	88	91	94	94	94	94	94	94	94
2.5 kHz	79	81	83	86	89	92	92	92	92	92	92	92
3.15 kHz	77	79	82	84	87	89	89	89	89	89	89	89
4 kHz	75	77	79	82	84	86	86	86	86	86	86	86
5 kHz	71	73	76	78	80	82	82	82	82	82	82	82

Unweighted 1/3 octave band centre frequency	Hub height wind speed – 164 m											
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s
6.3 kHz	65	68	71	73	75	76	76	76	76	76	76	76
8 kHz	55	59	62	65	66	67	68	68	68	68	68	68
10 kHz	43	46	50	53	55	56	56	56	56	56	56	56
Overall A-Weighted dB(A)	94	96	99	102	105	107	107	107	107	107	107	107

Table A.2 Sound power overall and 1/3 octave spectral levels – Substation transformer

Overall, dB(A)	1/3 octave band central frequency (Hz) and noise level, in dB (linear)													
	20	25	31	40	50	63	80	100	125	160	200	250	315	400
85	71	73	75	73	68	71	71	91	71	67	87	72	83	85
	500	630	800	1 K	1.25 K	1.6 K	2 K	2.5 K	3.15 K	4 K	5 K	6.3 K	8 k	
	80	75	69	70	68	62	60	54	53	52	53	54	53	

Appendix B

Background noise monitoring

B. Background noise monitoring

Long term (unattended) noise measurements were conducted at seven monitoring locations in the area adjacent to the Development Envelope. Loggers at locations NMP01 and NMP05 were deployed on 8 December 2023 and loggers at locations NMP02, NMP03, NMP04, NMP06 and NMP07 on 7 December 2023. Loggers at locations NMP01, NMP02, NMP03 and NMP04 were retrieved on 14 May 2024 and loggers at locations NMP05, NMP06 and NMP07 on 13 May 2024.

For measurement of local ground level meteorology and rainfall, one ultrasonic automatic weather mast was co-located at the NMP01 logger location during the deployment period (from 8 December 2023 to 14 May 2024). Wind data at greater heights was taken from the existing meteorological mast near the Development Envelope provided by the client.

The data across all noise loggers, local weather masts, and existing site meteorological masts was date and time synchronised over 10-minute data intervals.

B-1 Instrumentation

Ambient noise levels were monitored using SVAN 977 environmental noise loggers. Details of the noise measurement instrumentation used are presented in Table B.1.

All noise monitoring instrumentation was in current National Association of Testing Authorities (NATA) calibration at the time of use. All instrumentation was field-checked and calibrated both before and after noise measurements using a Svantek SV-36 calibrator. No discrepancies equal to or greater than 1 dB were noted throughout the measurement exercise as is required under Section 5.6 of Australian Standard AS 1055:2018 *Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 2018).

Table B.1 Unattended noise monitor equipment details

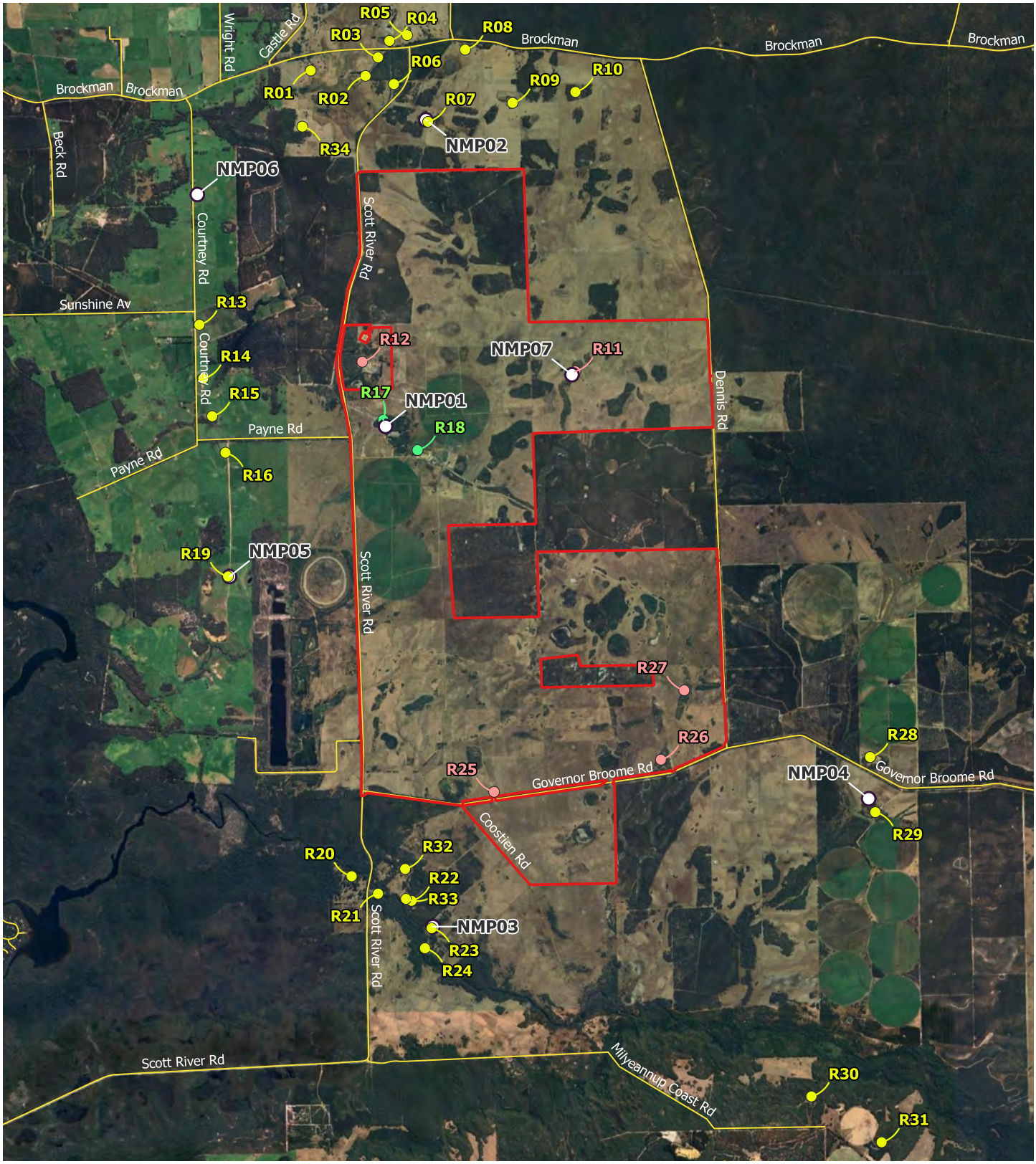
Instrumentation details	NMP01	NMP02	NMP03	NMP04	NMP05	NMP06	NMP07
Model and class	SVAN 977 Type A	SVAN 977 Type C	SVAN 977 Type D	SVAN 977 Type D	SVAN 977 Type C	SVAN 977 Type D	SVAN 977 Type D
Serial No.	69721	98077	99011	99009	92622	99010	99261
Deployment date	08 Dec 2023	07 Dec 2023	07 Dec 2023	07 Dec 2023	08 Dec 2023	07 Dec 2023	07 Dec 2023
Collection Date	14 May 2024	14 May 2024	14 May 2024	14 May 2024	13 May 2024	13 May 2024	13 May 2024

B-2 Noise measurement locations

Long term monitoring was performed at locations close to residences. Coordinates of the monitoring locations details are summarised in Table B.2. Figure B.1 shows the location of monitoring locations in relation to the noise receptors. As can be seen from Figure B.1, the monitoring locations were selected to cover a reasonable range of wind directions and to represent several NSRs by designating similar criteria to a number of noise receptors based on similarity of acoustic environment.

Table B.2 Noise logger coordinates

Logger location	Coordinates, GDA2020 / MGA Zone 50	
	Easting, metres	Northing, metres
NMP01	340955	6213742
NMP02	341506	6217931
NMP03	341602	6206907
NMP04	347555	6208654
NMP05	338823	6211690
NMP06	338384	6216910
NMP07	343502	6214448



Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Development Envelope
- Noise monitoring points
- Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

N

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise monitoring locations

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE B.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
Created By: dfebriyandi

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B-3 Meteorology

B-3-1 Hub height wind speed

Data from a meteorological mast provided by SynergyRED was used for collecting wind data at various hub heights (from 60 m to 150 m with 30 m steps). Wind speeds were calculated at the proposed 164 m hub height and then used to calculate the noise criteria (refer to Section B-4-1).

B-3-2 Rainfall and local wind speed

SA Guidelines state: As part of the development application, developers should confirm that the reported noise levels are not influenced by high wind speed across the microphone.

Hence, in the case of wind farm noise monitoring, it is a requirement to undertake measurements in a manner that allows collection of noise measurements in situations where the wind speed exceeds the 5 m/s at the microphone position normally provided as the upper limit for environmental noise monitoring. The limit is a guide to reduce air pressure fluctuations across the microphone artificially increasing the measured noise level. Standard 90 mm wind shield was used during noise monitoring.

According to the SA Guidelines, sound level measurements should be made during a representative range of wind speeds and directions generally expected at the wind farm, and include the normal operating range of the turbines, that is from cut-in to rated power. Extraneous sound levels caused by events, including precipitation, insects, fauna, and so on, as far as is practical for an unattended monitoring exercise, be identified and removed from the data set.

Rain data collected by the co-located weather station placed at the logger location NMP01 was utilised to confirm rain events during the monitoring period. This data has been used to exclude periods where rain events were recorded.

Average 10-minute noise measurements where rainfall, high local wind speeds or irrelevant noise occurred were defined as ‘extraneous events’ and were excluded from the background noise assessment. Data acquired during local wind speeds (microphone height) exceeding 5 m/s was excluded from further analysis.

B-4 Results of noise monitoring and derived noise criteria

Applicable noise criteria were calculated for the proposed 20 WTG layout with 164 m hub height.

Background noise was processed and analysed in accordance with procedures in the SA Guidelines. The number of valid monitoring points is summarised in Table B.3. The total number of valid data points is well above 2000 which gives sufficient basis to derive applicable noise criteria.

Table B.3 Number of valid background noise monitoring data

Monitoring location			Valid data points-Guidelines 2021
Logger location	**Start time**	**End time**	**Hub height 164 m**
NMP01	7/12/2023	14/05/2024	22699
NMP02	7/12/2023	14/05/2024	22853
NMP03	7/12/2023	14/05/2024	22862
NMP04	7/12/2023	14/05/2024	22858
NMP05	8/12/2023	13/05/2024	22632
NMP06	7/12/2023	13/05/2024	22753
NMP07	7/12/2023	13/05/2024	22748

The SA Guidelines also recommend that no less than 500 data points are to be collected for downwind conditions. Wind direction for downwind conditions is defined as ±45° from line connecting the noise receptor and the nearest turbine. If there are more than one turbine at similar distances from the noise receptor, SA Guidelines recommend identification of more than one downwind angle. The resulted downwind angles and the number of downwind data points for each monitoring location is presented are presented in Table B.4.

Table B.4 Background noise data points - Downwind direction

Monitoring location			Nearest turbine ID	Downwind direction, degree	Valid downwind data points at hub height 164 m
Logger location	Start time	End time			
NMP01	3/08/2023	27/09/2023	WTG 15	356	1269
NMP02	3/08/2023	27/09/2023	WTG 11	196	2068
NMP03	16/08/2023	27/09/2023	WTG 1	101	10993
NMP04	3/08/2023	27/09/2023	WTG 5	300	794
NMP05	3/08/2023	27/09/2023	WTG 2	113	10974
NMP06	17/10/2023	22/11/2023	WTG 11	103	11021
NMP07	17/10/2023	22/11/2023	WTG 9	99	8773

Table B.3 and Table B.4 show that the background noise monitoring program allowed to collect a suitable number of downwind data points in accordance with the requirements of the SA Guidelines.

It is understood that relevant noise sensitive receptors around the Development Envelope are situated in zones classified as rural living. As such, Project specific noise criteria based on the SA Guidelines are derived as:

– 35 dB(A) at affected noise sensitive receptors, or
– Background noise ($L_{A90,10\text{-}min}$) plus 5 dB(A)

whichever is greater for wind speed from cut-in to rated power of the WTG.

The Project Development Envelope is located within a rural area. It should be noted that R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA. Therefore, the 35 dB(A) baseline criterion or the adjusted “background + 5” dB(A) criterion apply to all Not-involved noise sensitive receptors identified in Table 2.2. R17 and R18 are involved noise sensitive receptors (section 2.1.2.1) for which the SA guidelines criteria of 45 dB(A) is used.

B-4-1 Background noise monitoring data and noise criteria for hub height 164m

Results of background noise monitoring were processed in accordance with SA Guidelines 2021 and relevant noise criteria are derived for each of the monitoring locations for wind speeds referenced to hub height of 164 m.

Figure B.2 to Figure B.6 show results of postprocessed data and relevant noise criteria calculated in accordance with SA Guidelines 2021. Data postprocessing is performed for arithmetic averages of measured noise levels in integer wind speed bins as per Section 3.4 of the SA Guidelines.

One can see that applicable noise criteria correspond to the baseline limit of 35 dB(A) where the background noise is equal or smaller than 30 dB and based on background plus 5 dB(A) where the background noise exceeds 30 dB (at higher wind speeds). The maximum applicable noise criterion used for the compliance assessment reaches approximately 41 dB(A) at monitoring location NMP02.

B-4-2 Summary of wind farm noise criteria based on SA guidelines

There are 35 noise receptors in the area within and adjacent to the Development Envelope. SA Guidelines recognise that it is not always practicable to perform background noise measurements at each of affected noise receptor. Noise monitoring has been undertaken at representative locations and used to derive the criteria at a number of adjacent noise receptors. Table 2.2 contains the list of noise receptors in the area surrounding the Development Envelope. Results of the background noise monitoring survey are used to assign criteria to relevant noise receptors with expected similar background. It should be noted that compliance with noise criteria at the nearest noise receptor typically ensures that noise from the wind farm will meet similar criteria at greater separation distances from a wind farm. Table B.5 presents noise limits for each integer wind speed from cut-in to the speed of the rated power as referenced to 164 m hub height. Results are presented for procedures included in the SA Guidelines.

Table B.5 Noise criteria for 164 m hub height - SA Guidelines

Noise receptor	Representative monitoring location	Hub height wind speed, m/s							
		4	5	6	7	8	9	10	11
R12[1]	NMP01	38	38	39	39	39	39	38	39
R17[2], R18[2]	-	45	45	45	45	45	45	45	45
R01, R02, R03, R04, R05, R06, R07, R08, R09, R10, R34	NMP02	35	36	38	39	40	40	39	41
R20, R21, R22, R23, R24, R25[1], R32, R33	NMP03	35	35	36	36	37	37	37	39
R26[1], R27[1], R28, R29, R30, R31	NMP04	35	36	37	37	37	37	37	38
R14, R15, R16, R19	NMP05	35	35	35	35	35	35	35	36
R13	NMP06	35	35	36	36	37	37	37	38
R11[1]	NMP07	35	35	35	35	35	35	35	36

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] R17 and R18 are involved noise sensitive receptors, the SA Guideline criteria of 45 dB(A) for a not-involved receptor will be used for the NIA.

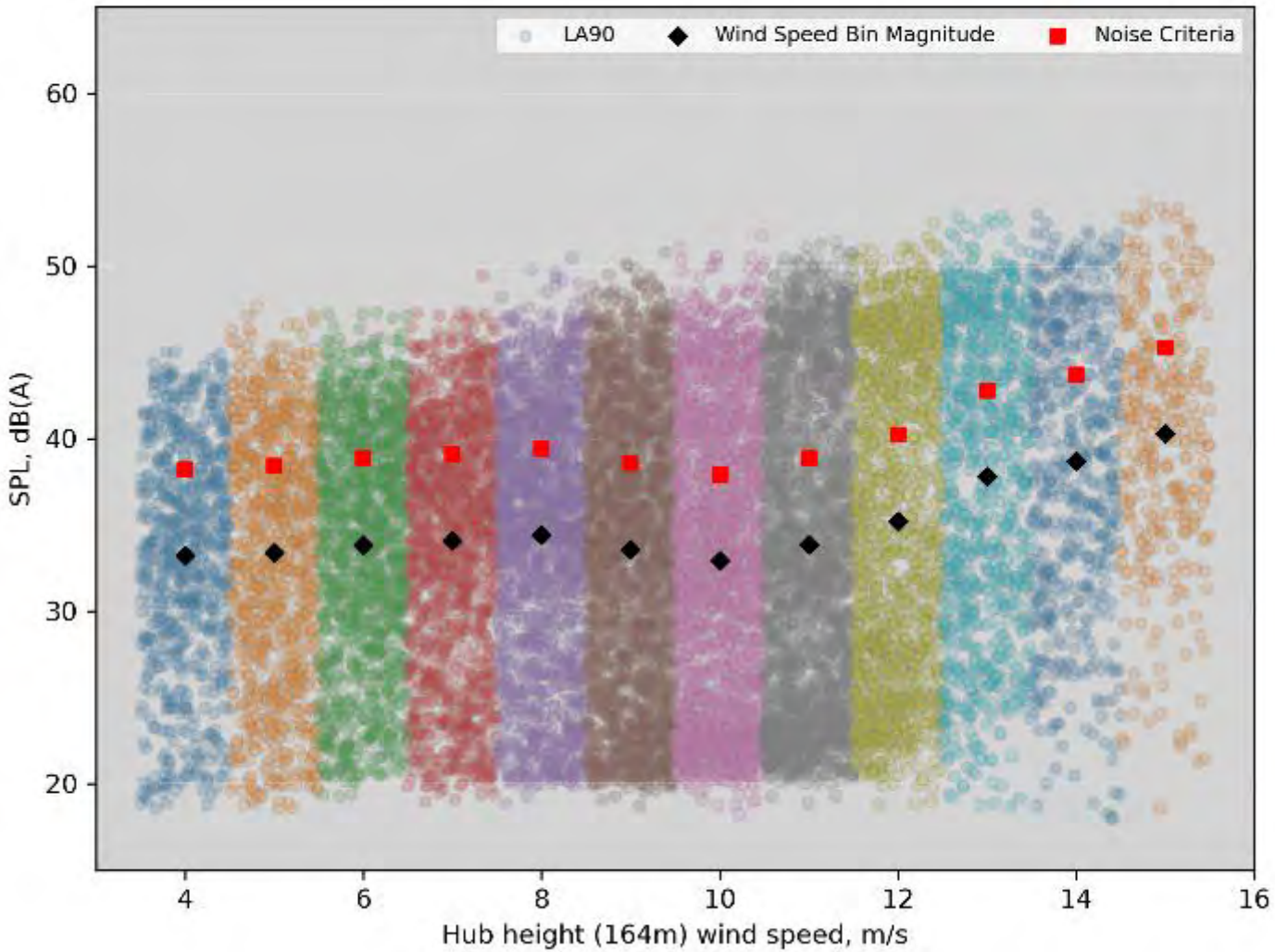


Figure B.2 Background noise monitoring data and applicable noise criteria at logger location NMP01, 164 m hub height - SA Guidelines, 2021

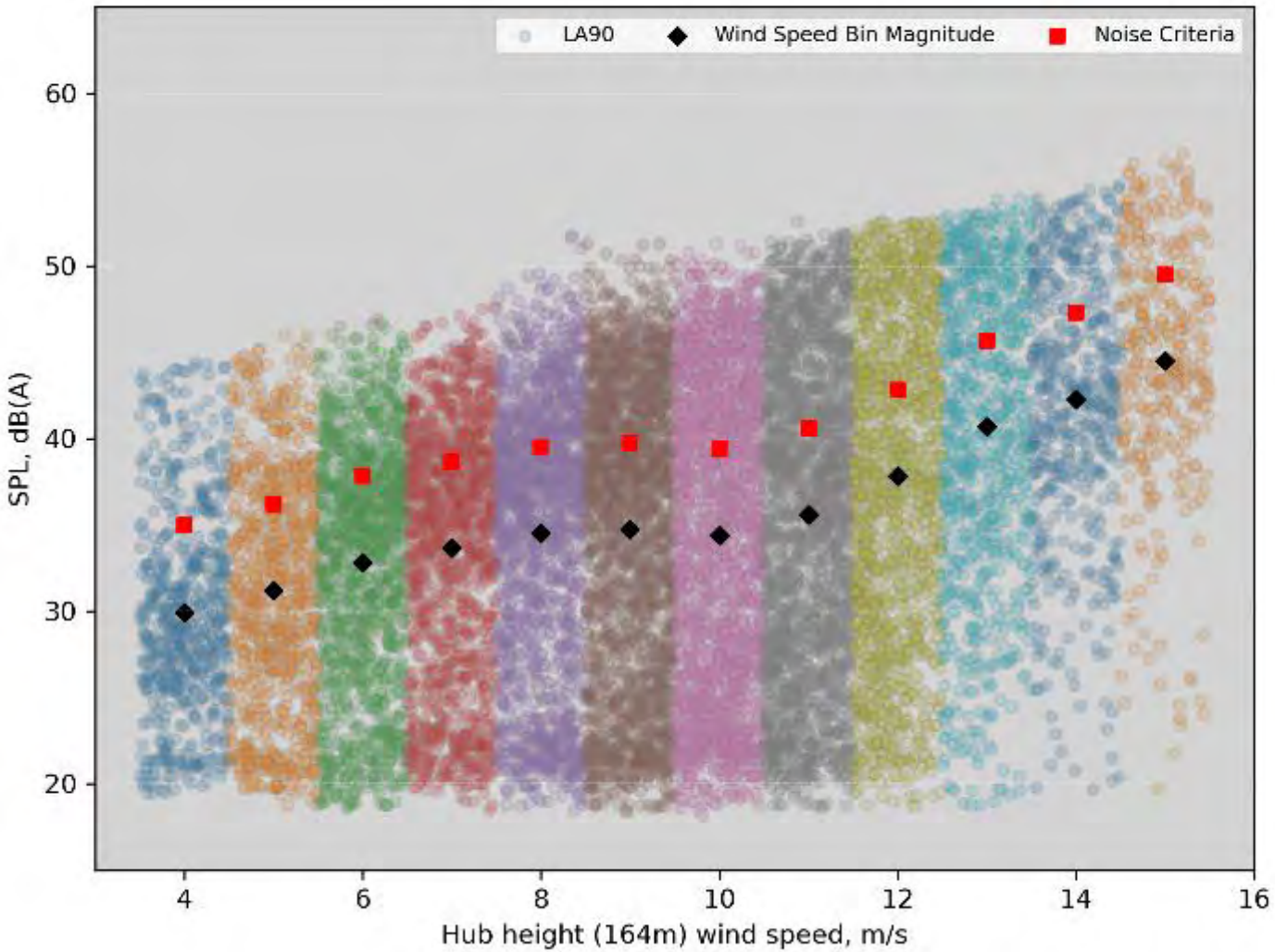


Figure B.3 Background noise monitoring data and applicable noise criteria at logger location NMP02, 164 m hub height - SA Guidelines, 2021

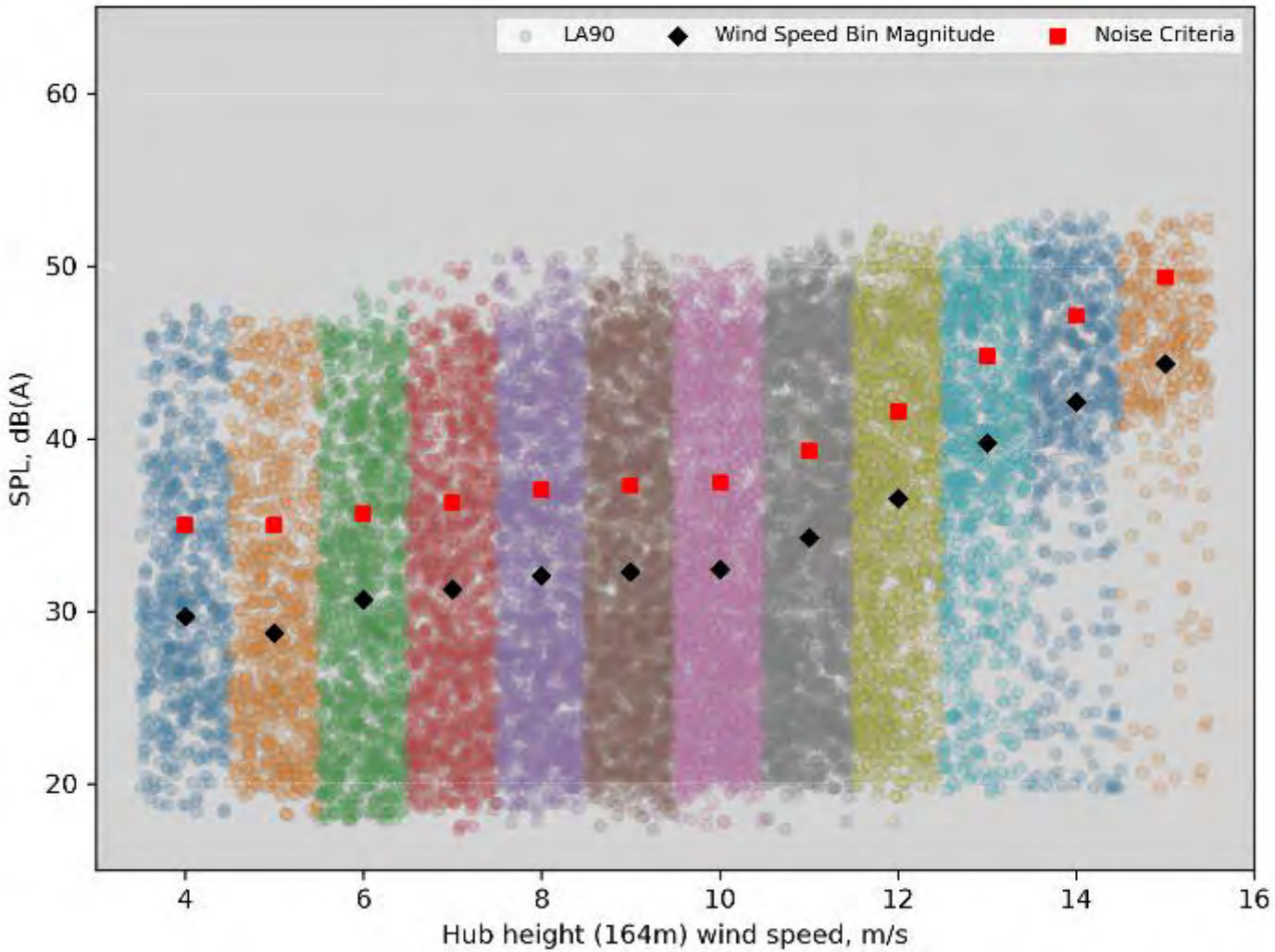


Figure B.4 Background noise monitoring data and applicable noise criteria at logger location NMP03, 164 m hub height - SA Guidelines, 2021

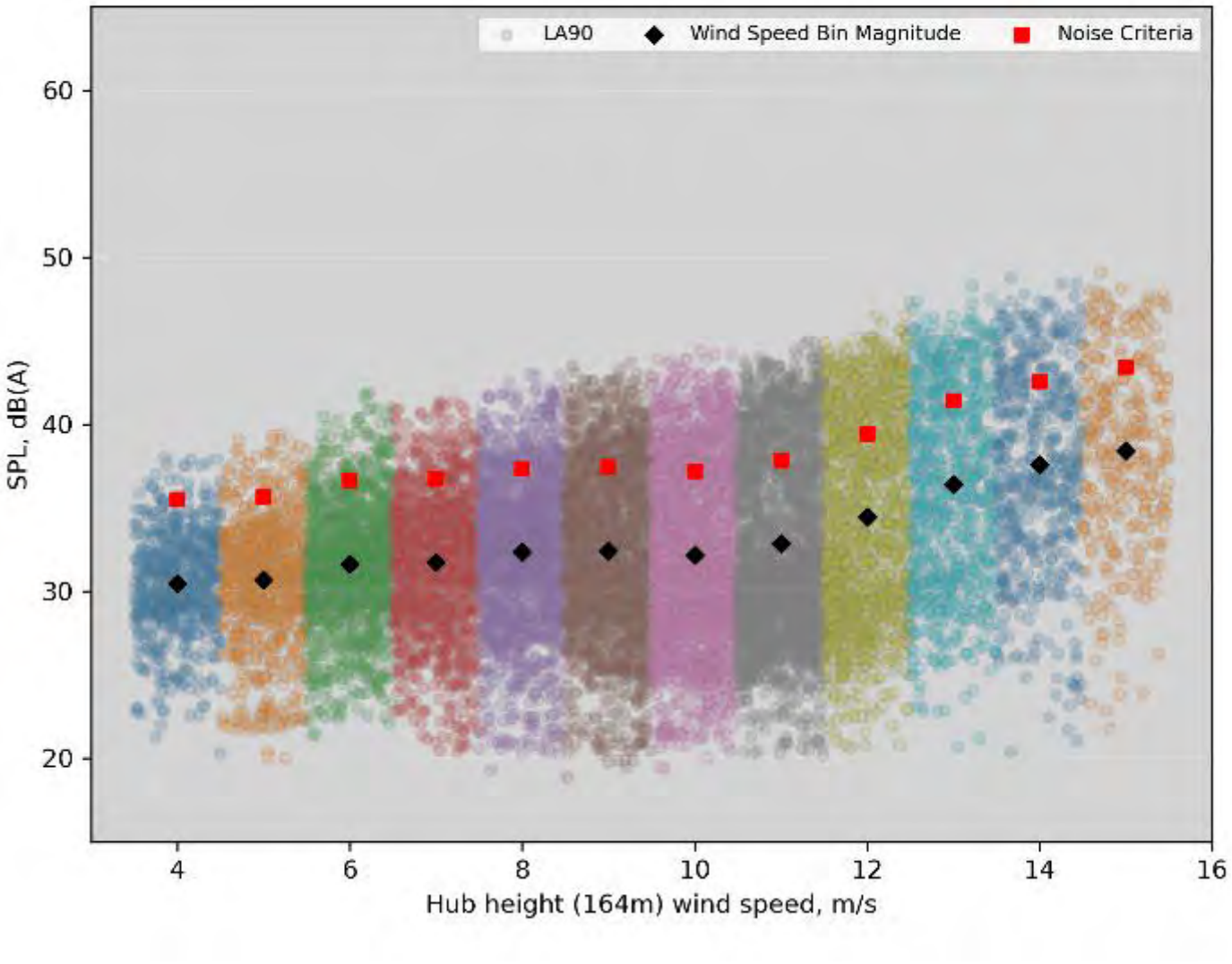


Figure B.5 Background noise monitoring data and applicable noise criteria at logger location NMP04, 164 m hub height - SA Guidelines, 2021

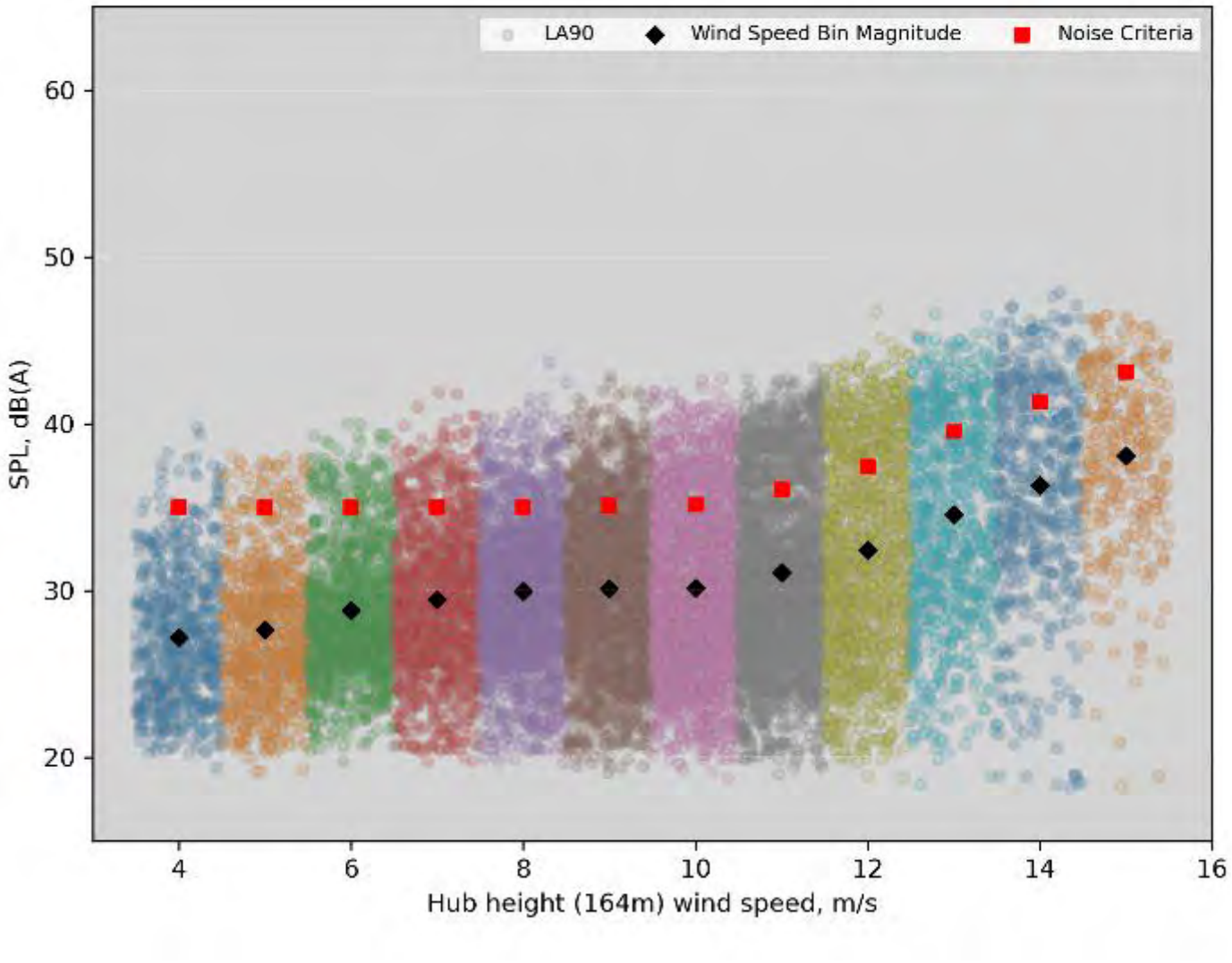


Figure B.6 Background noise monitoring data and applicable noise criteria at logger location NMP05, 164 m hub height - SA Guidelines, 2021

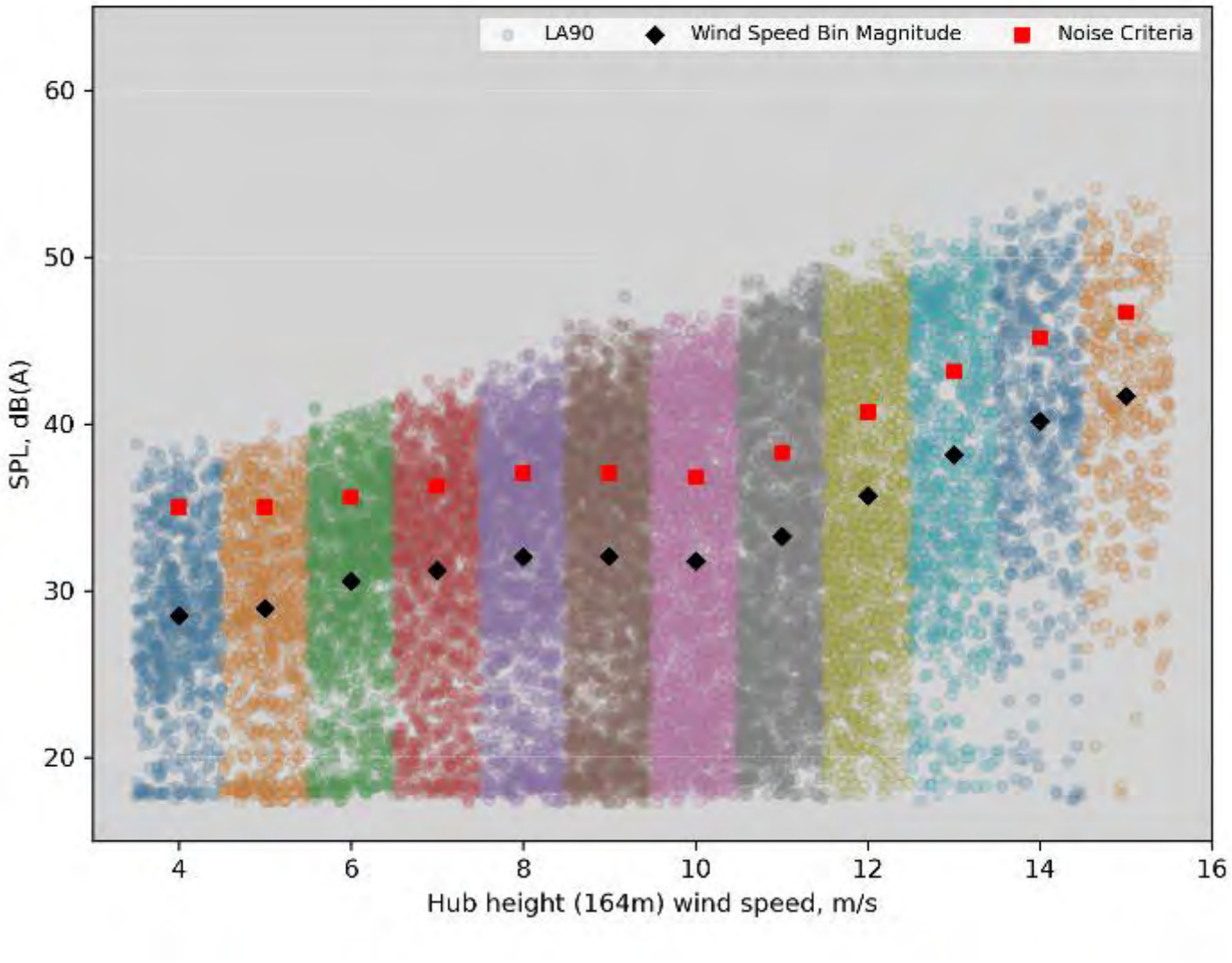


Figure B.7 Background noise monitoring data and applicable noise criteria at logger location NMP06, 164 m hub height - SA Guidelines, 2021

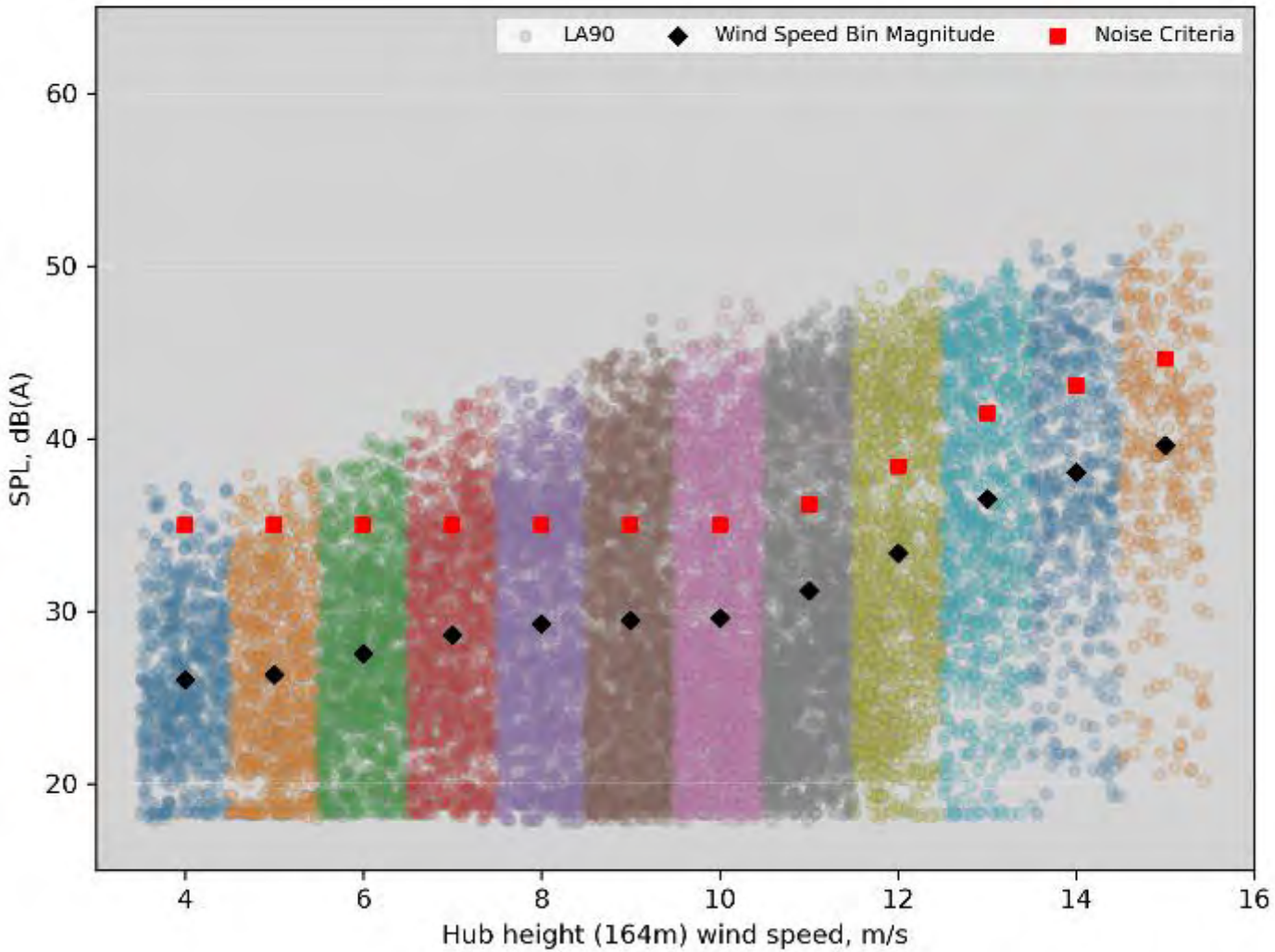


Figure B.8 ***Background noise monitoring data and applicable noise criteria at logger location NMP07, 164 m hub height - SA Guidelines, 2021***

Site photographs of the monitoring instrumentation are provided below.

Description	Site photo
Logger location NMP01 and local weather station	

Description	Site photo
Logger location NMP02	

Description	Site photo
Logger location NMP03	

Description	Site photo
Logger location NMP04	

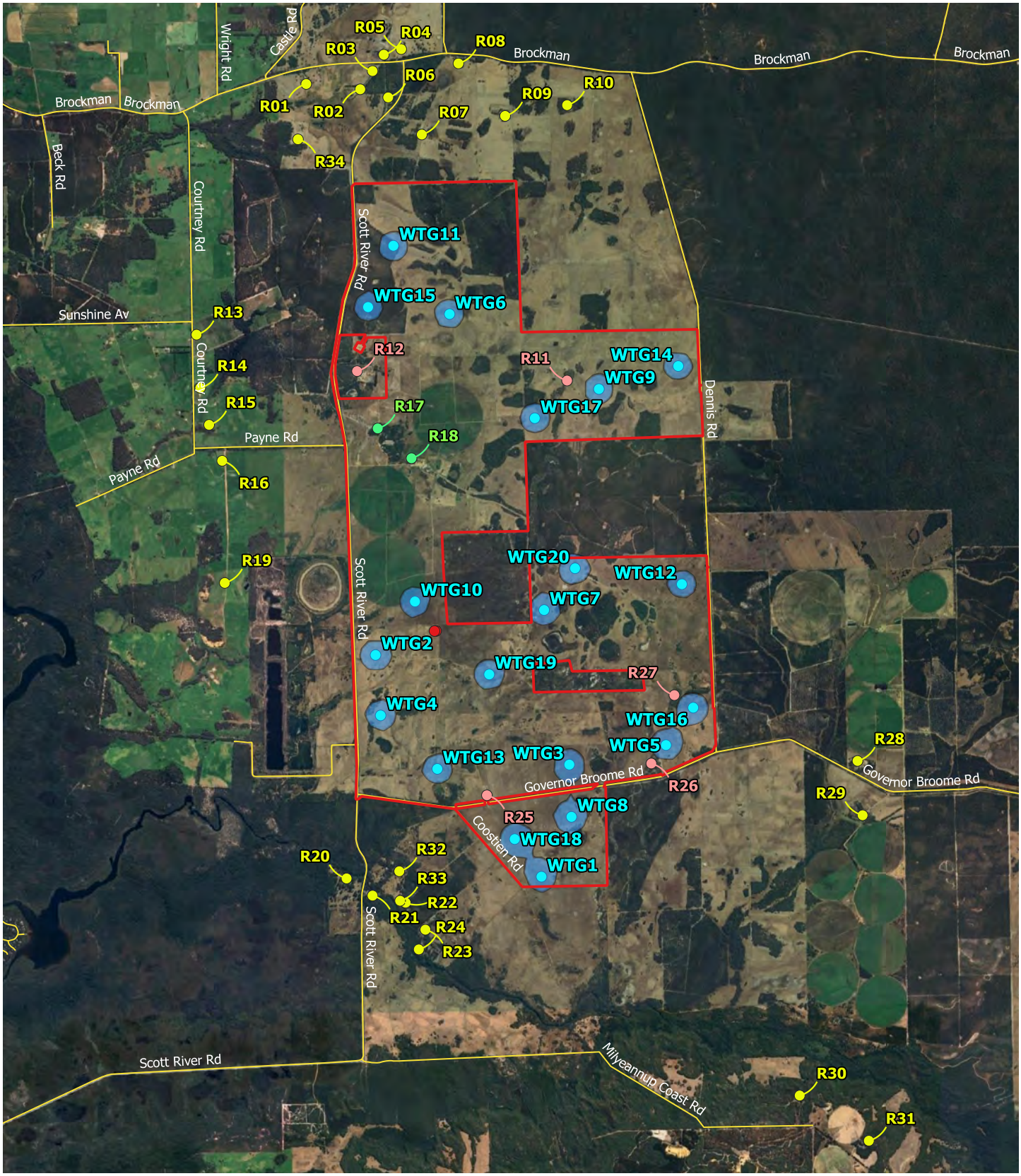
Description	Site photo
Logger location NM05	

Description	Site photo
Logger location NM06	

Description	Site photo
Logger location NM07	

Appendix C

Noise contour maps



Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope
- Noise Contours dB, LAeq, 10-min
  - 35 - 40
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 4 m/s

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE C.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
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Data Source:Google Earth Imagery 2025.
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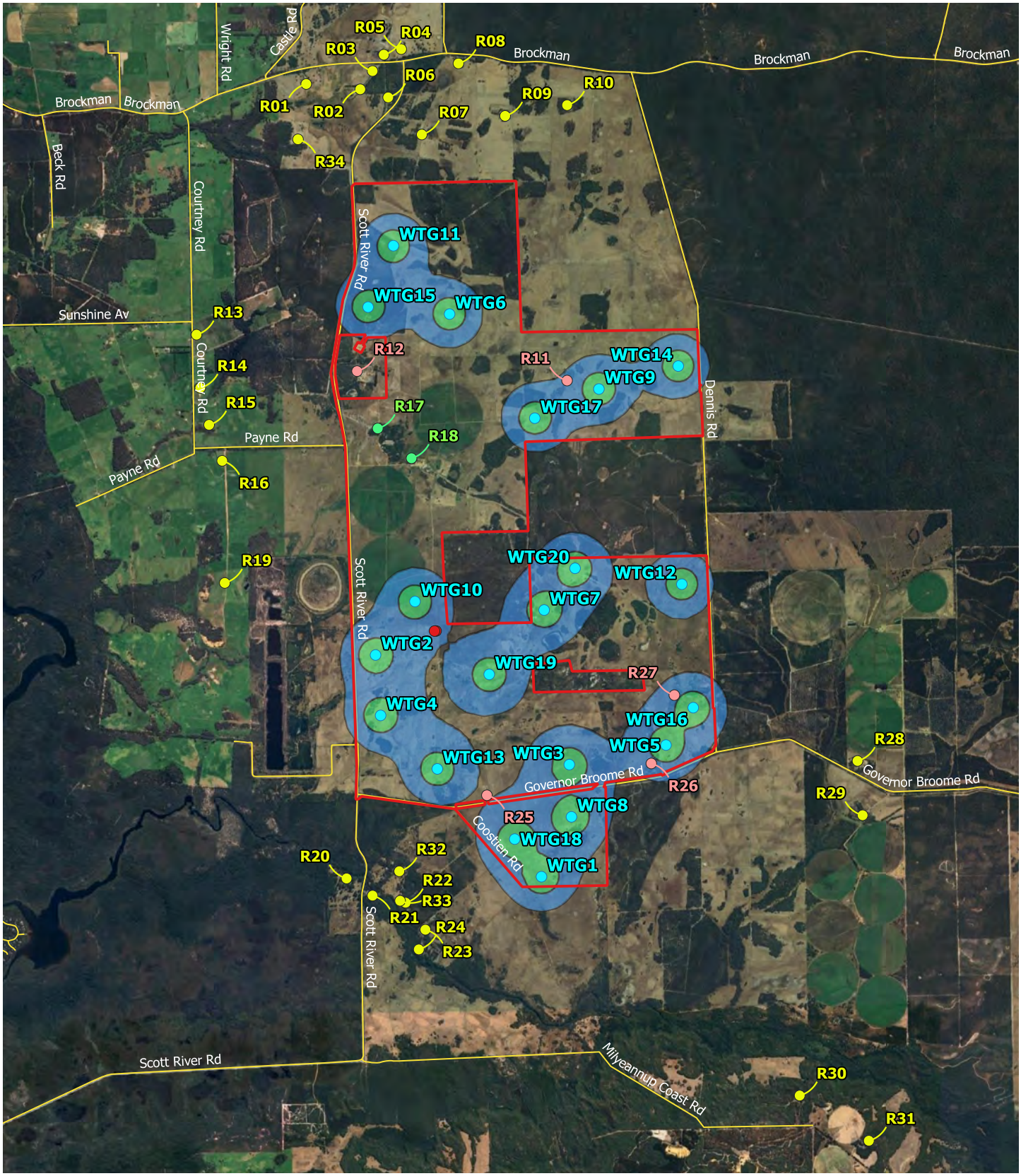

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope
- Noise Contours dB, LAeq, 10-min
  - 35 - 40
  - 40 - 45
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 6 m/s

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE C.2

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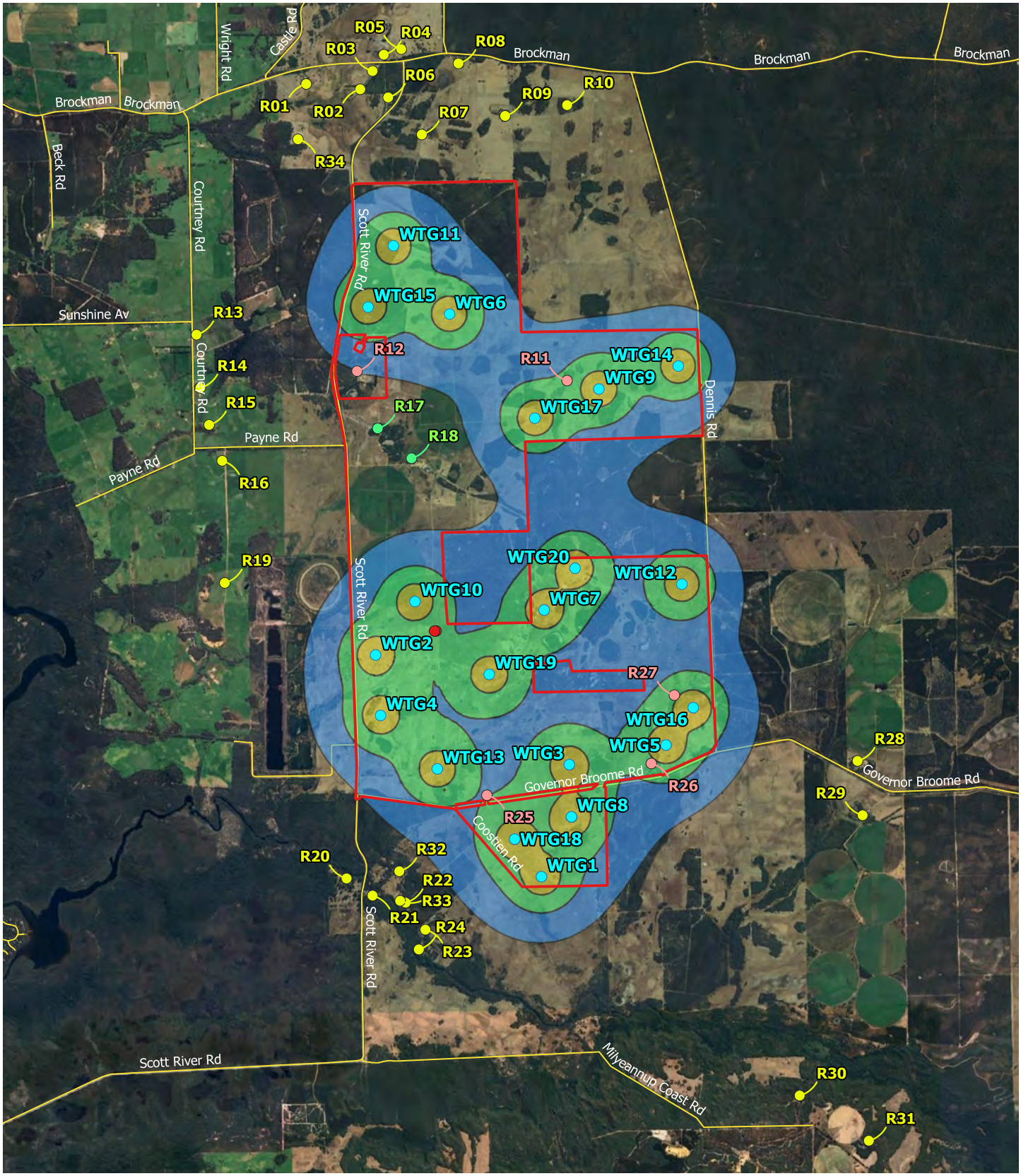

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope

Noise Contours dB, LAeq, 10-min

- 35 - 40
- 40 - 45
- 45 - 50
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 8 m/s

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE C.3

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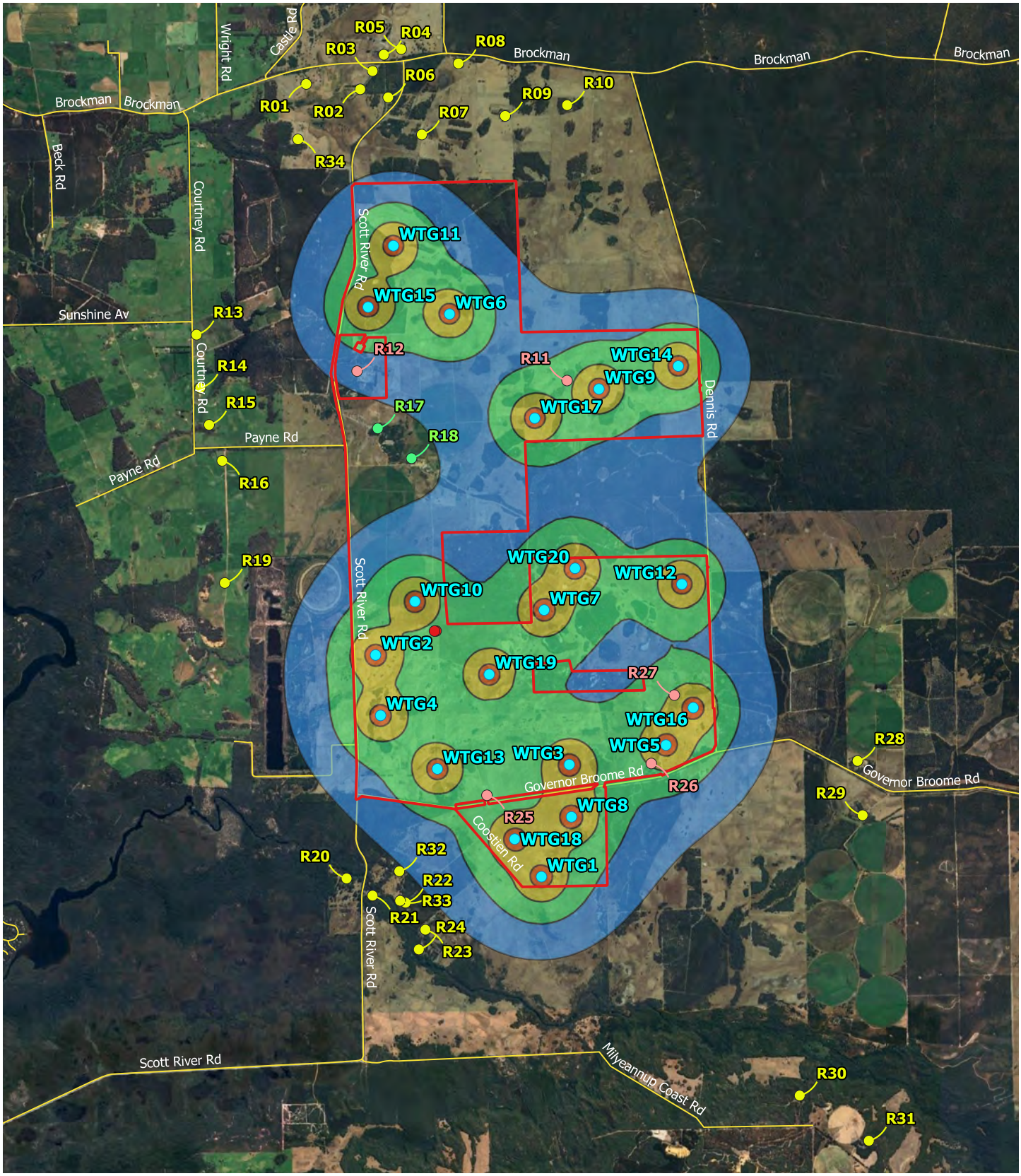

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope

Noise Contours dB, LAeq, 10-min
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 10 -11 m/s

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE C.4

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Appendix D

WTG coordinates

Table D.1 Wind turbine coordinates

Location	Coordinates, GDA2020 / MGA Zone 50	
	Easting, metres	Northing, metres
WTG 1	343194	6207620
WTG 2	340894	6210692
WTG 3	343580	6209174
WTG 4	340964	6209855
WTG 5	344919	6209444
WTG 6	341920	6215417
WTG 7	343230	6211316
WTG 8	343610	6208450
WTG 9	343990	6214378
WTG 10	341440	6211434
WTG 11	341141	6216364
WTG 12	345140	6211673
WTG 13	341750	6209114
WTG 14	345090	6214696
WTG 15	340790	6215514
WTG 16	345297	6209963
WTG 17	343101	6213974
WTG 18	342823	6208141
WTG 19	342469	6210424
WTG 20	343659	6211894



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→ The Power of Commitment

Attachment 4 (RSD) - Appendix T

Landscape and Visual Impact Assessment

Proposed Wind Farm – Scott River

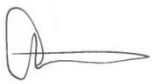
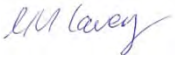
Landscape and Visual Impact Assessment

SynergyRED

10 January 2025

→ **The Power of Commitment**



Project name		Proposed Wind Farm – Scott River - LVIA					
Document title		Proposed Wind Farm – Scott River | Landscape and Visual Impact Assessment					
Project number		12632296					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	S Elton	E van der Velde	DRAFT	M Lavery	Record on file	17/04/2024
S4	B	S Elton	L Farrell	Record on file	H Shigeyoshi	Record on file	15/8/2024
S4	0	S Elton	L Farrell	Record on file	M Lavery	Record on file	26/11/2024
S4	1	S Elton	E van der Velde		M Lavery		10/01/2024

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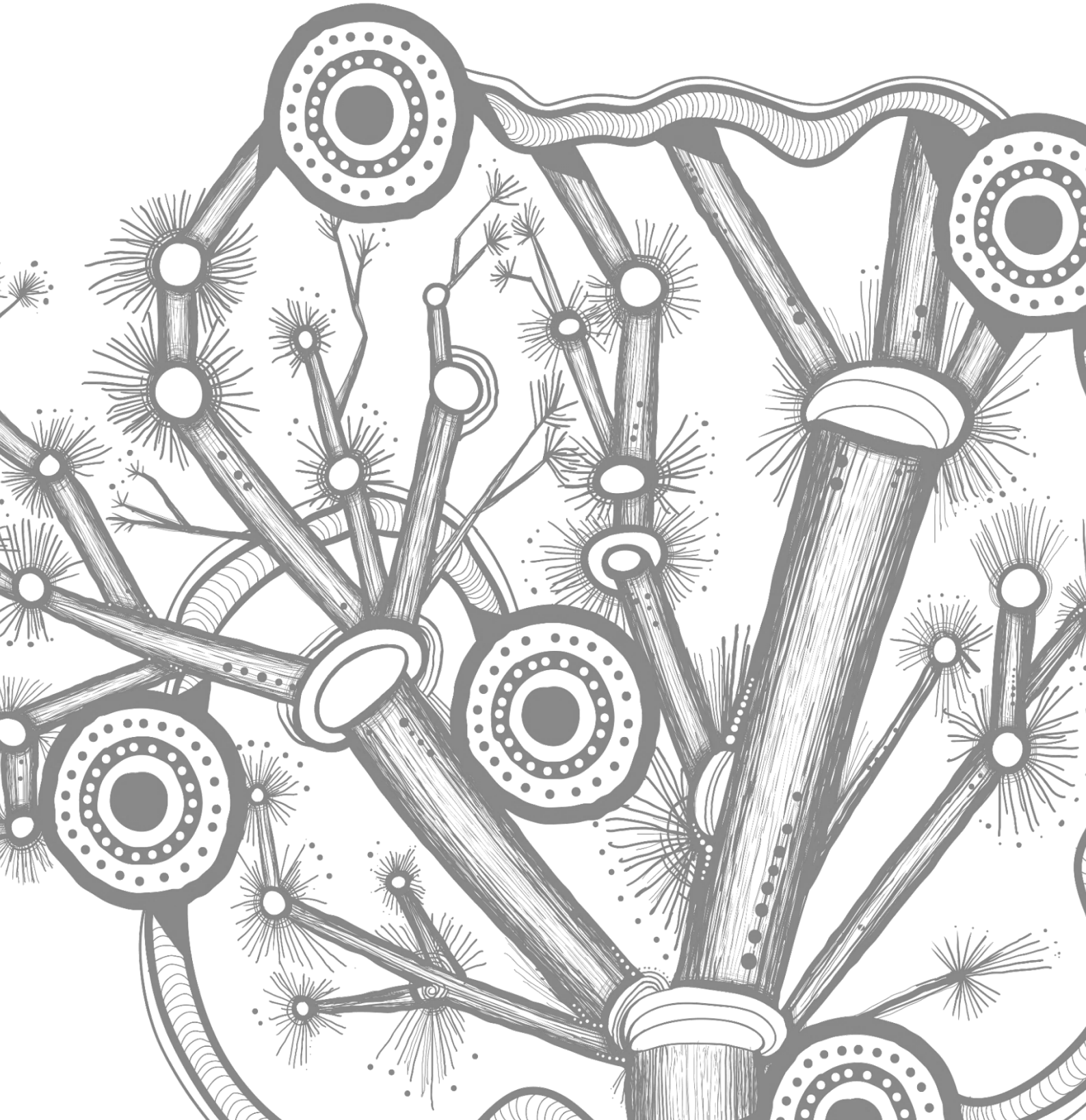
Acknowledgement of Country

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.



Executive summary

Introduction

SynergyRED engaged GHD Pty Ltd (GHD) to prepare a Landscape and Visual Impact Assessment (LVIA) for a Proposed Wind Farm in Scott River (The Proposal). The Study Area for this assessment is generally confined to the likely extent of visibility of the Proposal, within the surrounding context, being approximately 30 km in each direction of the Proposal site.

The purpose of the LVIA is to support the following:

– Environmental Protection Authority (EPA) referral under Part IV, Section 38 in accordance with *Environmental Factor Guideline –Social Surroundings* (EPA, 2023e) under the Environmental Protection Act 1986.
– Development approval application (Shire of Augusta Margaret River) to commence development of the Proposal described in Section 2.

Method

The LVIA assessment was informed by a desktop review, site inspection (March and August 2024), identified Landscape Character Units (LCU)'s and values, and a review of previous studies within a similar landscape context. It includes an assessment of potential landscape and visual impacts from twelve viewpoints (sensitive visual receptor locations) with four photomontages of the proposed works. Reflective of assessment findings the Report concludes with mitigation and management measures, to lessen the visual impacts of the Proposal, related to the LCU's and viewpoints.

Proposal summary

Primarily located within cleared farmland, the Proposal is envisioned to be built as a single stage project comprising nominally of 20 wind turbines, two meteorological masts, on-site substation, operational and maintenance facility, hard stand areas, transmission line and 33 kilovolt (kV) underground electrical transmission.

LVIA findings

Four LCU's were identified in the Study Area. The significance of impact on LCU1 is high-moderate, as the Proposal will likely affect the characteristics of LCU1, where the Leeuwin-Naturaliste Ridge is recognised as a key landscape feature. The significance of impact on LCU2 is also high-moderate, with contributing factors including scenic qualities and the inclusions of Scott National Park and Gingilup Swamps Nature Reserve, which host highly diverse flora and fauna species. The findings indicate a high-moderate significance of impact on LCU3 due to the high sensitivity and importance of notable drainage features that are registered Aboriginal heritage sites, as well as several national parks and nature reserves. The Proposal will likely result in notable changes to this landscape character. LCU4 would experience a moderate significance of impact, as the changes will be confined to specific locations within LCU4.

Twelve key and representative viewpoints were selected for this LVIA based on the desktop study and community feedback, Zone of Theoretical Visibility (ZTV) analysis and fieldwork conducted in March 2024. Consideration was also afforded to the duration of impact which was considered short term during construction and permanent during operation. This assessment identified the significance of impact for each viewpoint which ranged from negligible to high.

Mitigation and management measures

After conducting a contextual analysis, the visual management objectives for the Study Area were outlined. The focus of the visual management objectives included optimising the siting and design of the Proposal to protect and maintain the distinct landscape characters. The key recommendation, in support of this objective, and as practically possible with regards to flora and fauna is consideration of realignment of the wind turbines into a regular shape, such as a double line or grid, and a reduction in turbine height to reduce visual impact.

Other recommended mitigation and management measures include maintaining the rural landscape character by adopting measures such as retaining as much existing remnant vegetation as possible within the Proposal site and re-establishing any pastural land disturbed during construction. In addition, consideration of Aboriginal heritage

values and engagement with the Wardandi and Bibulmun/Piblemen people was recommended as a measure for protection and maintenance of cultural heritage values.

Concluding remarks

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the Report.

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Appendices

Appendix A	Photomontages

Terminology

Terminology	Definition
Landscape	All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.
Landscape character	The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.
Landscape character unit	Areas of homogenous (similar) patterns of visual characteristics such as landform, vegetation, water form and land use as well as individual features.
Landscape impacts	Changes in the character and quality of the landscape that occur because of change and development, while *visual impacts* relate to the appearance of these changes.
Magnitude	The measurement of the scale, form and character of a development proposal when compared to the existing condition. In the case of visual assessment this also relates to how far the proposal is from the viewer. Combines with sensitivity, magnitude provides a measurement of impact.
Receptor	An aspect of the landscape or view that could be impacted, such as physical resources or viewer groups.
Sensitivity	The sensitivity of the landscape character or view and its capacity to absorb change of the nature of the development proposal. In the case of visual impact this also relates to the type of viewer and number of viewers. Combined with magnitude, sensitivity provides a measurement of impact.
Susceptibility to change	The capacity of the landscape to accommodate a change of a particular type or scale, without adverse effects on the existing landscape character, requirement for baseline situation maintenance, and obtaining new landscape planning policies and approaches.
Study Area	Consists of land in the vicinity of, and including, the Proposal site. The study area is a wider area surrounding the Proposal site as defined in this assessment, including landscape that has the potential to be indirectly impacted by the Proposal.
The Proposal	A proposed wind farm in Scott River
View	Comprises a portion of a landscape seen by an observer.
Viewpoint	The point from which a view is observed.
Visual amenity	The overall quality of views that people enjoy of their surroundings.
Visual impact assessment	The analysis of changes in the appearance of the landscape as a result of development. Impacts may be negative or positive.
Visual receptor	Individuals and/or defined groups of people who have the potential to be affected by the proposal.
Zone of theoretical visibility	A map, usually digitally produced, showing areas of land within which, a development is theoretically visible.

Abbreviations

Abbreviations	Long form
3D	Three dimensional
AHD	Australian Height Datum
AMR Shire	Shire of Augusta Margaret River
DA	Development Approval
BOP	Balance of Plant
EPA	The Western Australian Environmental Protection Authority
GHD	GHD Pty Ltd
GIS	Geographic Information System
km	Kilometre
kV	Kilovolt
LCU	Landscape Character Unit
LGA	Local Government Area
LVIA	Landscape and Visual Impact Assessment
O&M facility	Operation and maintenance facility
m	Metre
SWIS	South West Interconnected System
VP	Viewpoint
WA	Western Australia
WAPC	Western Australian Planning Commission
ZTV	Zone of Theoretical Visibility



Introduction

1. Introduction

GHD Pty Ltd (GHD) engaged by Synergy Renewable Energy Development (Synergy RED) has prepared this report and the accompanying information in support of the proposed development of a Proposed Wind Farm in Scott River (The Proposal), situated within the Scott River region, next to Chester and Pagett Nature Reserves, South Blackwood State Forest and Scott National Park.

SynergyRED is a wholly-owned subsidiary of Synergy (electricity retail and generation corporation) located in Perth, Western Australia. SynergyRED is currently in the process of investigating future renewable energy assets with the potential to connect to the South West Interconnected System (SWIS). The Proposal is one such project being investigated.

1.1 Purpose and scope of this report

This report provides a Landscape and Visual Impact Assessment (LVIA) for the Proposal. The purpose of this report is to meet the requirements of:

– Environmental Protection Authority (EPA) Environmental Factor Guideline –Social Surroundings (EPA, 2023) under the Environmental Protection Act 1986.
– Development Approval (DA) application (Shire of Augusta Margaret River) to commence development of the Proposal described in Section 2.

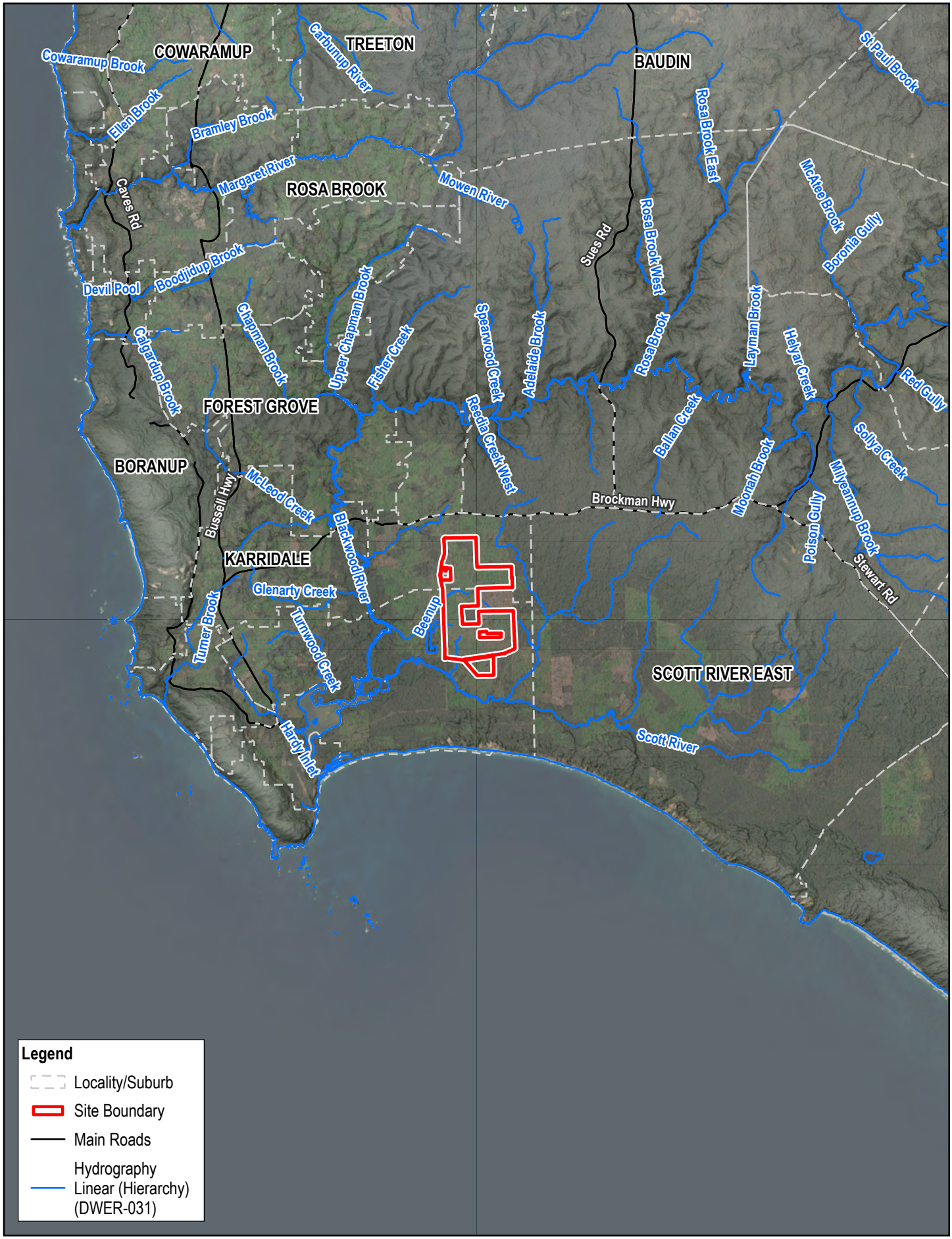
The Proposal has been considered against the relevant planning and environmental regulatory framework applicable to landscape and visual impact.

1.2 Overview of the Proposal

The Proposal is planned within the South West Boojarah, traditional lands of the Bibulmun/Piblemen Noongar language group, in the southwest region of Western Australia (WA). The Proposal site is located approximately 15 kilometres (km) northeast of Augusta, 5 km northeast of Molloy Island, 3 km southeast of Nillup Village General Store and less than 2 km from Brockman Highway, the nearest main road. The Proposal site covers an area of approximately 4,000 hectares located on freehold land owned by multiple landowners. Zoned ‘General Agriculture’ under the provisions of the Shire of Augusta Margaret River Local Planning Scheme No. 1 (LPS1), the majority of the Proposal site has been cleared and is currently used for agricultural purposes with some areas of remnant vegetation remaining.

Scott River, a tributary of the Blackwood River, lies close to the southern boundary of the Proposal and flows in an east-west direction to the Hardy Inlet.

The Proposal is proposed to be built as a single stage project comprising nominally of 20 wind turbines, two meteorological masts, on-site substation, operational and maintenance facility, hard stand areas, transmission line and 33 kV underground electrical transmission. For the Proposal location see Figure 1.



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

Project Location Plan

FIGURE 1

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Data source: World Imagery: Earthstar Geographics. Created by: rbrown3

1.3 Report structure

The report comprises sections itemised in Figure 2.

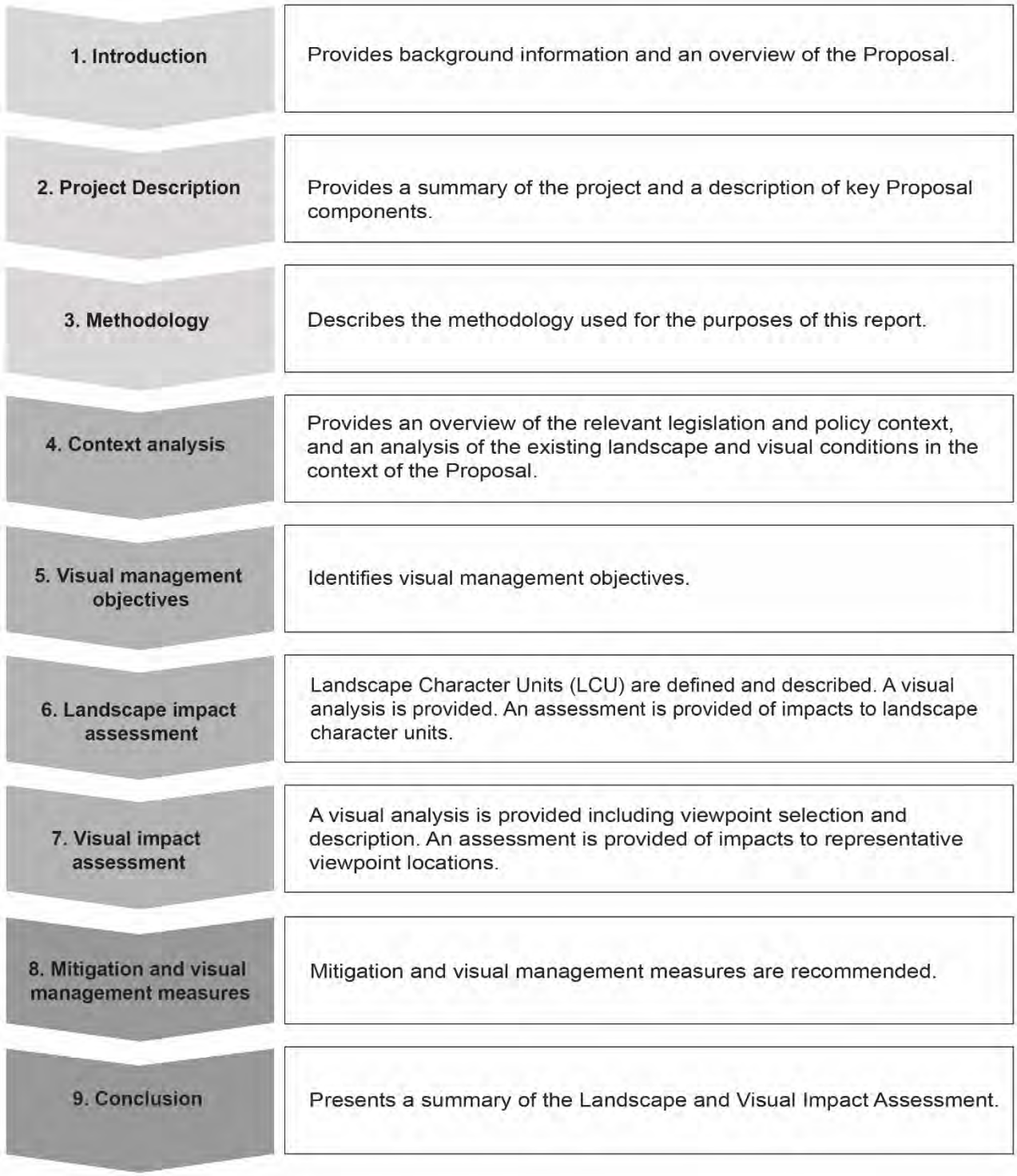


Figure 2 Report structure

1.4 Limitations

This report has been prepared by GHD for SynergyRED and may only be used and relied on by SynergyRED for the purpose agreed between GHD and SynergyRED as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than SynergyRED arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 8 and 9 of this Report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.5 Assumptions

There is no national guidance on the assessment of landscape and visual impacts specific to Australia. However, in WA, the industry typically refers to *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting, and design (*Western Australian Planning Commission, 2007). This assessment has also referred to:

- *Guidelines for Landscape and Visual Impact Assessment, Third Edition* (Landscape Institute, 2013)
- *Environmental Factor Guideline: Social Surroundings* (Environmental Protection Authority, 2016)
- *Position Statement: Renewable energy facilities* (Western Australian Planning Commission, 2020)

The assessment aims to be objective and describe any potential changes factually. While potential impacts resulting from the Proposal are defined, the significance of these changes requires qualitative (subjective) judgements. The conclusion of this assessment therefore combines objective measurement and professional interpretation. While this assessment aims to be objective, it is recognised that LVIA can be subjective, and individuals are likely to associate different visual experiences to the study area.

This assessment is based on the information provided to GHD at the time of writing. The scope of this assessment does not include consideration of landscape and visual impacts from lighting or during night time conditions, as these are not included or required in the design of the Proposal.

2. Project description

2.1 Site overview

The Proposal covers an area of approximately 4,000 hectares and is located on freehold land owned by multiple landowners. Zoned 'General Agriculture' under LPS1, the majority of the Proposal site has been cleared and is currently used for agricultural purposes with some areas of remnant vegetation remaining. It is possible that a minor level of remnant vegetation clearing, (as approved), may occur during the development of the Proposal. Access to the Proposal site is via Scott River Road.

2.2 Project overview

SynergyRED is currently in the process of investigating future renewable energy assets with the potential to connect to the South-West Interconnected System (SWIS). The Proposal is one such project being investigated.

The Proposal is proposed to be developed as a single stage project. Elements of the Proposal, shown in Figure 3 include nominally up to 20 wind turbines, two meteorological masts, on-site substation, Operational and Maintenance facility (O&M facility), hard stand areas, transmission line and 33 kilovolt (kV) underground electrical transmission. The wind turbines and ancillary infrastructure are described below.

2.2.1 Wind turbines

The final turbine model and design are yet to be confirmed. It is expected that a traditional turbine tower design would be utilised, and the turbines would be light grey to reduce their contrast with the background sky and minimise reflections (Photo 1).

The following maximum dimensions have been used for this assessment to allow selection of wind turbines withing the following criteria:

– Maximum tip height: 250 m
– Maximum hub height: 164 m



Photo 1 *Example 7.2 megawatt wind turbine*

2.2.2 Ancillary infrastructure

Ancillary infrastructure would include transmission poles, access tracks, underground 33 kV electrical reticulation wind turbine foundations and hard stand areas. Permanent access tracks are required to form a connection between turbines and existing public roads. An onsite substation is also proposed within the site area along with an operational and maintenance facility.

2.2.2.1 Electrical reticulation

Cable routes were selected to utilise similar routes as other collector groups and access roads to minimise trenching and ground disturbance. Further optimisation will need to be completed to verify this design.

2.2.2.2 Electrical transmission line

Transmission from the wind farm substation would tie into the existing MJP-BNP 81 line at the voltage of 132 kV. This tee connection occurs approximately 2 km from the Beenup Substation. The proposed transmission line corridor is approximately 4 km, running through the centre of the Proposal site.

2.2.2.3 Substation

An on-site substation is proposed within the Proposal site, at the centre of the site. The substation would measure approximately 200 m by 200 m and may contains workshops, transformers, and high voltage equipment. The final layout and dimensions are subject to further detailed design.

2.2.2.4 Operational and maintenance facility

An O&M facility is also proposed, at the centre of the site close to the substation. This would typically include areas such as an office, warehouse, car parking and storage facilities.

2.2.2.5 Meteorological masts

Two permanent meteorological mast are proposed within the Proposal site, with a maximum height of 164 m.

2.2.2.6 Batching plant

A temporary batching plant, with a facility footprint measuring 100 m by 100 m is also proposed to produce concrete on-site during the construction phase.

2.2.2.7 Construction and laydown area

A temporary construction and laydown area measuring 400 m by 100 m would also be required and typically consist of a site office, machinery, fuel storage, amenities, and car parking. They would also be suitable to receive and store machinery, wind farm components and materials. If required, to reduce the need for clearing of native vegetation, construction and laydown areas could be partially relocated to previously cleared land.

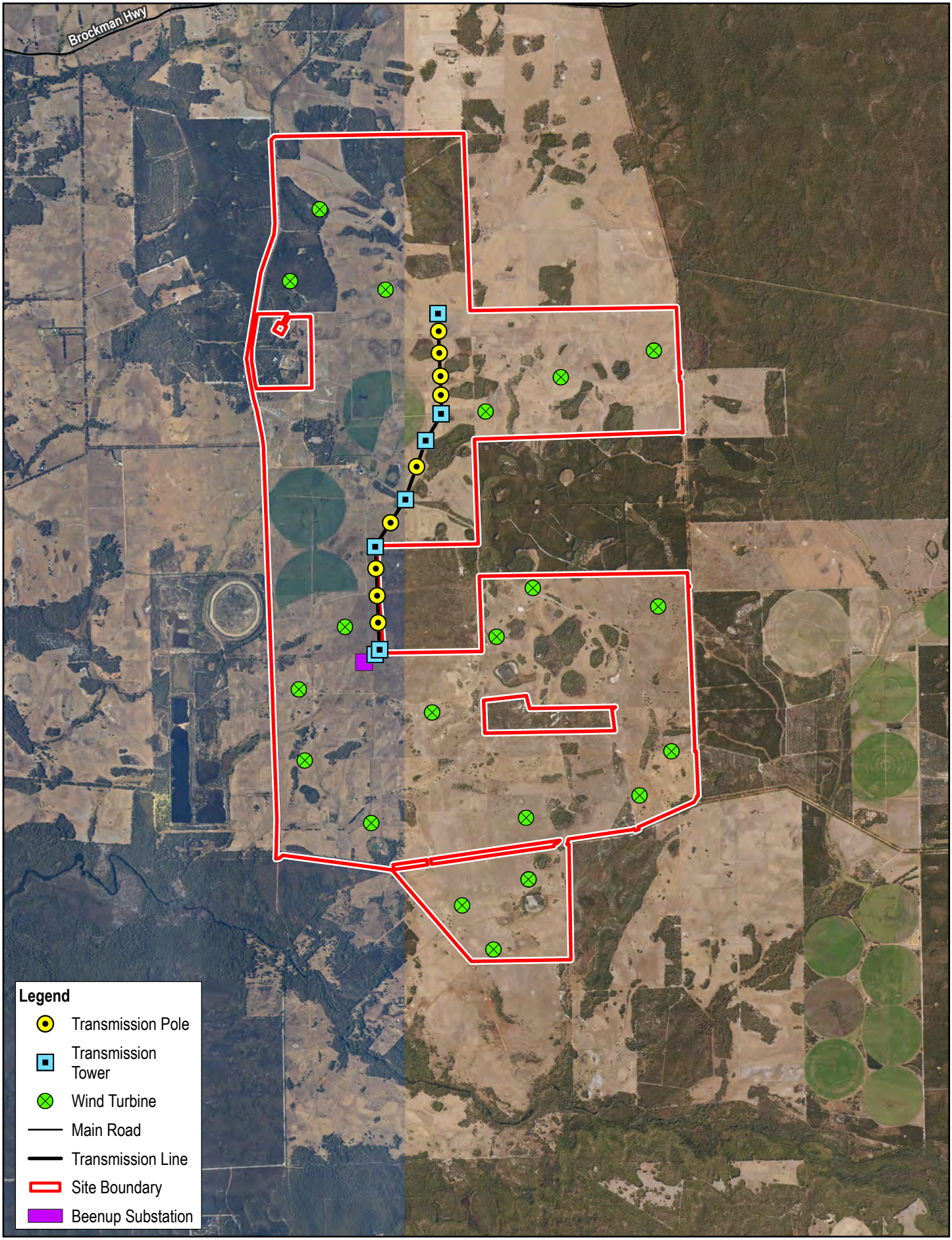
The construction duration is estimated to be approximately 24 months with a peak manning of up to 150 people at peak periods. It is assumed that project accommodation would be met by the utilisation of multiple facilities within an appropriate radius. As part of the feasibility, SynergyRED is considering off-site, mixed onsite and offsite and onsite accommodation options.

Some prior enabling works will be required prior to the commencement of construction. These may include:

– site investigations, such a geotechnical investigations or surveys
– establishing water supply options
– possible offsite road works
– installation of wind monitoring towers and establishment of roads and clearing for their installation.

The following activities are likely to occur during construction:

– potential construction of temporary compounds, works accommodation, laydown, and storage areas
– civil works, including construction of new site access tracks, associated earthworks, and vegetation clearance within the Proposal site and excavation for the foundations
– transportation of wind farm and transmission line components
– installation of wind turbine transformers, in parallel with electrical reticulation works
– construction of wind turbines, and ancillary infrastructure including meteorological masts, and electrical reticulation
– electrical balance of plant works including overhead transmission line, substations and switching stations
– rehabilitation of the site.



Paper Size ISO A4

0 0.5 1 1.5 2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

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Proposal Site and Components Plan

FIGURE 3

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3. Methodology

This section outlines the methodology used to assess the impacts of the Proposal on landscape character and visual amenity (Figure 4).

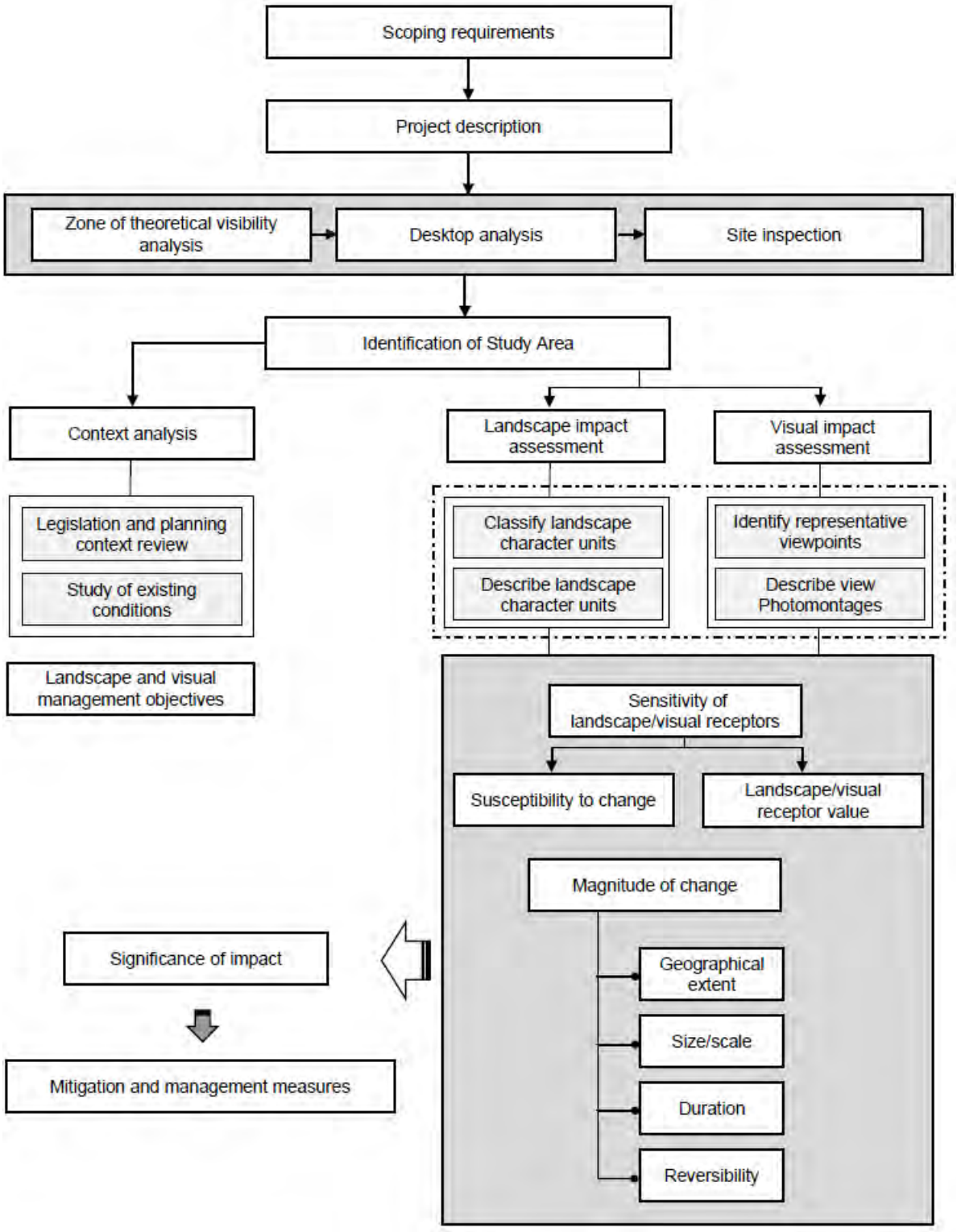


Figure 4 *Landscape and visual impact assessment process*

The methodology for the LVIA has been set out to respond to specific project requirements and constraints including the scale and nature of the Proposal.

There is no general and/or legislated guidance on the assessment of landscape and visual impacts produced by an independent body specific to Australia. Where practicable, the landscape and visual impacts associated with the Proposal have been assessed in accordance with the advice provided in international, national and state recognised resource documents and in accordance with all relevant legislation. These include but are not limited to the following:

– The Western Australian Planning Commission (2007) *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting and design.* This manual provides guidance for the practice of visual impact assessment in Western Australia; however, it is not a statutory procedure or prescriptive policy.
– The Landscape Institute and the Institute for Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment, Third Edition* (GLVIA3).
– Environmental Protection Authority (2023) *Environmental Factor Guideline: Social Surroundings*
– Natural England (2014) *An Approach to Landscape Character Assessment*

3.1 Zone of theoretical visibility

Zone of theoretical visibility mapping is a computer-generated analysis which identifies land from which it is theoretically possible to view the components of the Proposal. These have been used primarily to guide determination of the Study Area and representative viewpoint selection as well as to inform the site inspection.

ESRI ArcGIS was used to model the ZTV of the Proposal. A digital elevation model was produced using DEM data and a resolution of 30 m. The ZTV was mapped using the following parameters:

– A viewing height of 1.7 m, which is the average within the typical viewing level range of an adult.
– Maximum tip height of 250 m
– Maximum hub height of 164 m

The GIS software then digitally determines the likely extent over which the component would be visible or not visible. In interpreting the ZTV, the following considerations must be made:

– The ZTV only considers the landform and does not include land cover factors such as the presence of buildings and trees. It therefore represents the worst-case scenario of potential visual impacts.
– The ZTV does not consider the effect of distance. The greater the distance from the Proposal, the lower the impact, as the development will take up a smaller portion of the view, and atmospheric conditions may reduce the visual prominence of the Proposal.
– The ZTV is only accurate to the resolution of the elevation model.

3.2 Desktop analysis

As specified in Section 4, existing data focused on the proposed Study Area and the Proposal was gathered and reviewed, including:

– Proposal design information and site photographs
– Topography, land use, hydrology, and vegetation maps
– Available data on heritage sites
– Google Earth and Google Street View

Using this data, a preliminary assessment of the landscape and visual environment was undertaken to inform the site inspection and impact assessment process.

3.3 Site inspection

Numerous site inspections were undertaken by a Landscape Architect and Landscape Planner on 7, 8 and 27 March and the 28 August 2024 in varied weather conditions from clear, sunny, and high visibility to full cloud, light

rain, and low visibility. During the site inspections, the proposed Study Area was driven and walked to gain representative views of the Proposal from publicly accessible and private viewpoints. The purpose of the inspection was to:

– Inspect the proposed Study Area and appreciate views to and from the Proposal
– Inspect publicly accessible locations identified in the desktop analysis as likely to provide views of the Proposal
– Identify sensitive visual receptor locations (identified in Section 7.3)
– Assess the landscape character of the Study Area and identify landscape sensitivities
– Undertake site photography for the visual assessment and for the preparation of photomontages

3.4 Study Area

The Study Area for this report is generally confined to the likely extent of visibility of the Proposal within the surrounding context. This has resulted in an indicative study area of approximately 30 km from either side of the Proposal boundary, based on an understanding of the Proposal and informed by a comprehensive analysis. This includes a desktop review and site inspection of the existing landscape context, and previous studies of a similar type and/or within a similar landscape context. Refer to Figure 5 Study Area for the Study Area extent.

Located within South West Boojarah, the Study Area encapsulates the traditional lands of the Wardandi and Bibulmun/Piblemen Noongar language group with the Proposal site located within Bibulmun/Piblemen Country.

3.5 Legislation and planning context review

A review was conducted to assess essential planning designations, policies, and guidance concerning landscape and visual environment relevant to the Study Area. The focus of this review was to identify designations, protections, values, and objectives pertinent to the landscape and visual environment of the Study Area, including scenic amenity values (refer to Section 4).

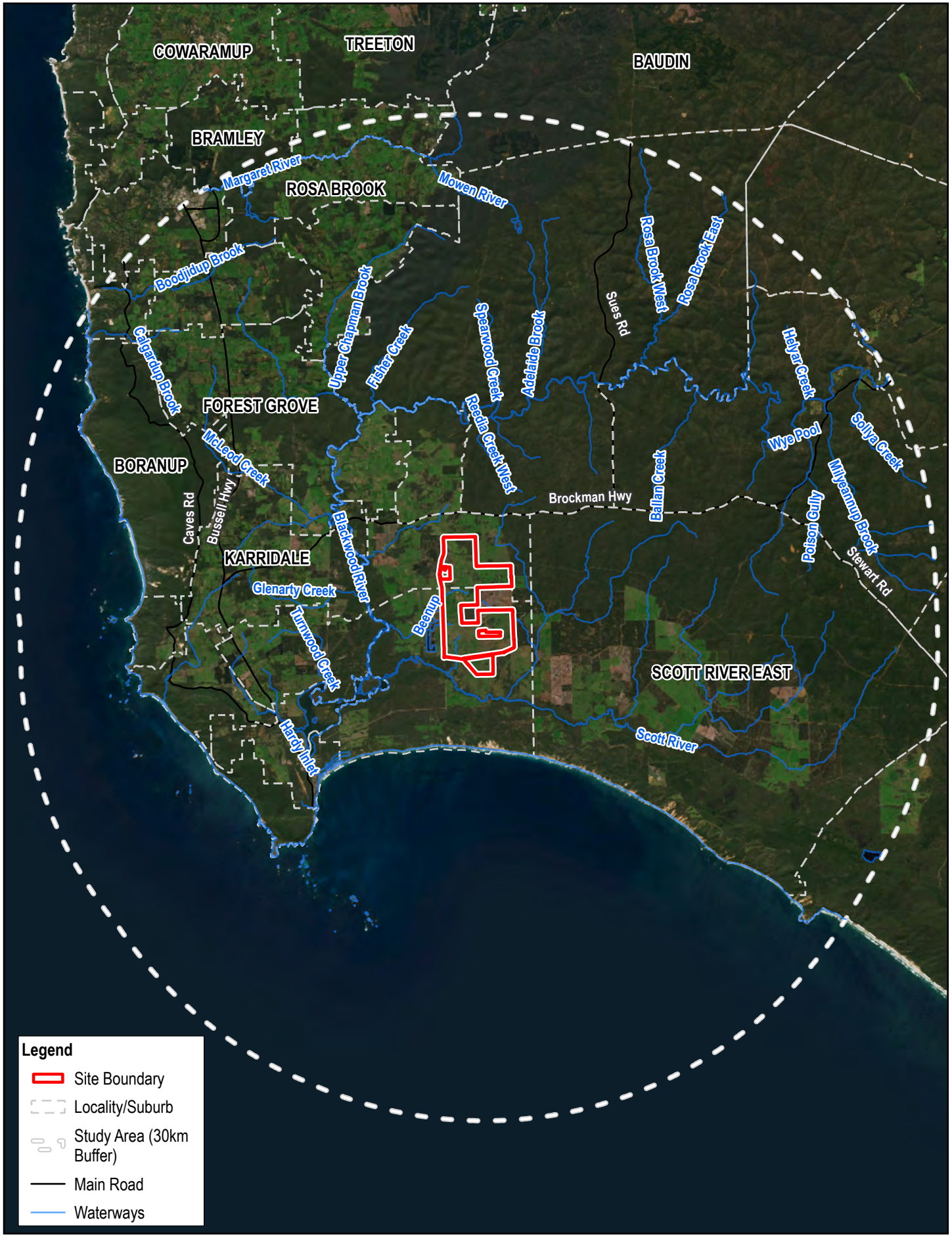
3.6 Existing landscape and visual conditions

An assessment of the landscape was undertaken to determine the existing natural, cultural, and visual features within the Study Area. This includes determination of key landscape and spatial elements, features, and values. Visual analysis of the existing conditions involves identifying viewing locations, identifying who the viewers are and how they experience the landscape, identifying key views, and determining visibility. This assists in understanding how the proposed changes may impact the viewing experience and values. Aspects considered include:

– Land use and built form
– Landform, topography, and hydrology
– Vegetation
– Heritage features
– Aboriginal cultural heritage

3.7 Landscape and visual management objectives

The purpose of landscape and visual management objectives is to manage the character of the landscape and visual amenity within the Study Area. The legislation and policy review and context analysis form the basis of development of appropriate management objectives and strategies. Refer to Section 5.



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

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Study Area

FIGURE 5

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3.8 Landscape impact assessment

The assessment of landscape impacts includes an identification of Landscape Character Units (LCU's) defined within the Study Area and an assessment of potential impacts from the Proposal provided for each LCU. Refer to Section 6.

3.8.1 Landscape character units

LCU's generally comprise of homogenous patterns of characteristics such as landform, vegetation, water features and land use as well as individual features, as identified during the context analysis and site inspection.

The blend of elements shown in Figure 6 contributes to shaping a landscape character which defines distinct landscapes with unique attributes and sense of place.

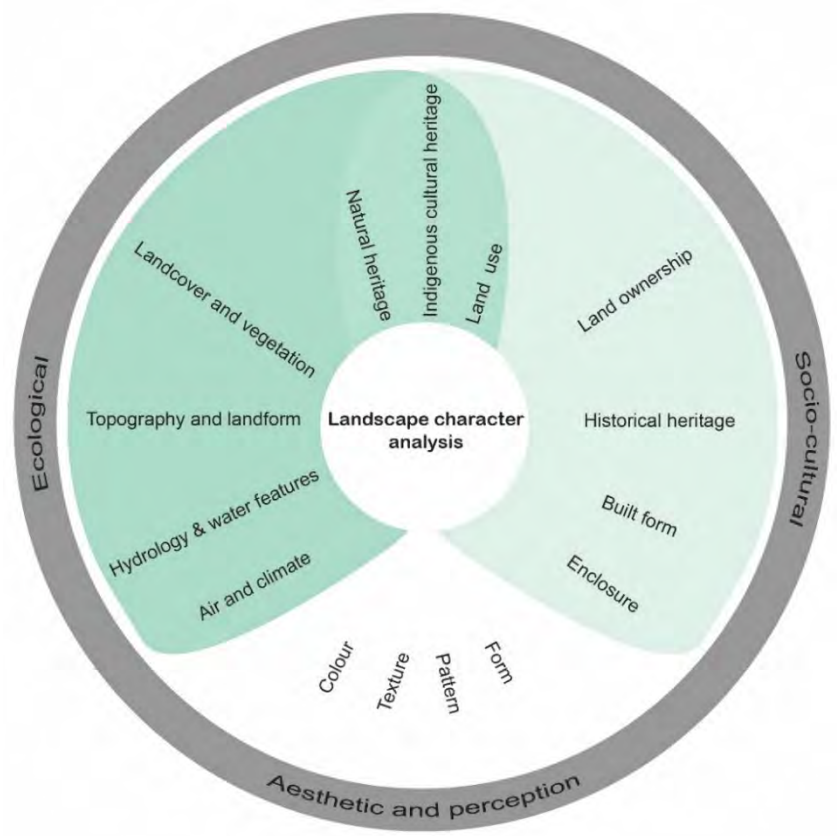


Figure 6 Landscape character elements

These elements have been considered to establish the existing landscape character of the Proposal and Study Area and serve to provide a framework for measuring the impact of the Proposal. This assists in:

– Identifying landscape elements that contribute to defining character
– Defining landscape character attributes
– Identifying landscape value

The assessment of the existing landscape also considers factors which have influenced landscape change in the past and those that are likely to do so in the future. The identified LCU's in the Study Area are defined in Section 6.1.

Values associated with the landscape have also been identified for each LCU. Landscape value considers designated and undesignated landscapes and all elements such as the environmental, cultural, historical, and visual elements that form the landscape. When defining landscape value considerations include landscape quality, scenic quality, rarity, representativeness, conservation value, recreation value, and associations. Refer to Table 1 for the criteria used to determine the landscape value.

3.8.2 Assessment of impacts to landscape character

Landscape impact assessment deals with the effects of change and development on landscape as a resource. The assessment focuses on how the Proposal could affect the elements that make up the landscape, including the aesthetic and perceptual aspects and its distinctive characteristics.

The consideration of potential impacts to landscape character is determined based on the sensitivity of the existing landscape to the proposed change, and the magnitude of change that is likely to occur.

The sensitivity of a landscape is determined on the capacity of the landscape to accommodate the change of a particular type and scale, without impacts on existing landscape character, and the value of the existing landscape. A judgement on the level of sensitivity is made and a rating of high, medium, low, and negligible applied.

The magnitude of change to landscape character depends on the nature, scale and duration of the change expected to occur. It also depends on the loss, change or addition of any feature to the existing landscape.

3.8.2.1 Sensitivity to landscape impacts

The sensitivity of landscape impacts addresses the following specific criteria:

– Sensitivity of landscape to proposed change, is based on the landscapes susceptibility to change, and the value of the landscape. Refer to Table 1 for landscape sensitivity, landscape value criteria and landscape susceptibility to change criteria. Professional judgement on the level of sensitivity is made and a rating of high, moderate, low, or negligible applied.

Table 1 Landscape sensitivity

Landscape sensitivity	Criteria	
	Landscape value	**Landscape susceptibility to change**
High	Landscapes located within, or contributes to the value of, landscapes designated and/or recognised at state, national and/or international level such as designated National Park, World Heritage Area, or State Heritage Place. May include nationally important features and landscapes that are valued by the community such as: – Conservation areas and designated landscapes. – Visually prominent landforms with elevated features such as ridges, hills and escarpments. – Waterways such as rivers, lakes and coastal areas. – Areas with a high degree of naturalness and/or areas subject to active rehabilitation or landscape treatments. – Cultural and heritage sites, features or designations including Aboriginal heritage sites of state, regional or local significance. – Residential areas and areas of recognised community value and amenity.	– Landscape of high quality and condition with consistent, intact, well-defined attributes – The landscape is well managed. – The proposed development would be incompatible with the existing characteristics of the area. – Mitigation measures are unlikely to reduce the impacts of the change.
Moderate	– Landscapes that are not explicitly recognised for a heritage significance or a value but are well-used by local communities. – Landscapes dominated by agricultural or other modified land uses, although with some degree of relative wilderness	– Landscapes of moderate quality and condition – Some of the key characteristics of the landscape relate well to the proposed development. – Any change caused by the type of development would be unlikely to have a significant adverse effect on the landscape character, condition or value that cannot be effectively mitigated.

Landscape sensitivity	Criteria	
	Landscape value	Landscape susceptibility to change
	– Landscape where there is evidence of some value associated with natural heritage, recreational activity, cultural associations, or other special interests.	
Low	– Landscapes with few specific natural features and cultural associations – Limited distinctive local features.	– Landscapes of low quality and poor condition – Attributes poorly managed and in poor state of repair – Landscape intrinsically able to accommodate the proposed change with many of the key characteristics relating well to the proposed development or unlikely to be diminished. – Mitigation measures would be effective in neutralising adverse effects.
Negligible	– Landscapes with no specific features of natural heritage, cultural associations, or other special interest. – No distinctive local features	– Degraded landscapes with poor quality and condition – Neglected landscapes without management and maintenance of natural features – None of the key characteristics are likely to be diminished by the proposed change. – Mitigation measures are not required.

3.8.2.2 Magnitude of landscape impacts

The magnitude of landscape impacts addresses the following specific criteria:

– The magnitude of change to landscape character is based on the size or scale of change, the geographical extent of effects, and the duration and reversibility of effects (Table 2). It also depends on the loss, change or addition of any feature to the existing landscape. It is based on the part of the LCU which is likely to be impacted to the greatest extent by the Proposal.
– An assessment is made on the overall level of significance of landscape impacts in relation to the existing conditions as per the significance of impact matrix defined in Section 3.9.4.

Table 2 Landscape magnitude of change criteria

Rating	Criteria
High	A substantial/obvious change to the landscape character due to total loss of, or change to, elements, features or characteristics of the landscape. Would cause a landscape to be permanently changed and its perceived quality diminished. Mitigation measures are unlikely to reduce the impacts of the change.
Moderate	Discernible changes in the landscape character due to partial loss of, or change to elements, features or characteristics of the landscape, however, has potential to be partly mitigated. The change would appear to have an adverse effect on the landscape character since it would be out of scale with the local pattern and landforms.
Low	Minor loss or alteration to one or more key landscape character elements, features or characteristics, or the introduction of components that may be new but may not be uncharacteristic within the existing landscape character. Mitigation measures would be effective in neutralising perceived adverse effects.
Negligible	Almost imperceptible or no change in the landscape character as there is little or no loss of/or change to the elements, features, or characteristics of the landscape. Mitigation measures would be effective in neutralising perceived adverse effects and/or improve the landscape character.

3.9 Visual impact assessment

Assessment of visual impacts deals with the effects of change and development on the views available to people and their visual amenity. It assesses how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views as a result of the change or loss of existing elements of the landscape and/or the introduction of new elements.

How a landscape is viewed is of critical importance in understanding changes in the landscape and how people perceive them. Visual landscapes are related to peoples' sense of place and quality of life. How people view, perceive, experience, and interact with landscape can be varied and diverse.

3.9.1 Viewpoint selection

A visual analysis of the Study Area was conducted. Via this process 12 sensitive visual receptors were identified, and their level of significance given, in line with guidance provided within the *Visual Landscape Planning in Western Australia* guidelines (WAPC, 2007) and *Guidelines for Landscape and Visual impact Assessment (IEMA, 2013).* Refer to Table 3 for visual sensitivity criteria and Section 7.2 for description of sensitive receptors

Level of significance generally increases with the importance of the view, the degree of sensitivity of the viewers, the degree to which experiencing the landscape is integral to the enjoyment of a travel route or site, and the length of duration of a view. These criteria were used to assist in determining which sensitive visual receptor locations to consider for assessment.

Sensitive visual receptors have been considered in terms of the views they are likely to obtain from within the Study Area including consideration of any key vantage points, such as lookouts, where there is particular interest in the view. Visual receptors are identified based on:

– Proximity of the sensitive visual receptors to the Proposal, as the most affected sensitive visual receptors are anticipated to be closest to the Proposal, unless located at an elevated vantage point.
– Type of sensitive visual receptor, as different viewer types would have different perceptions of the change.

Based on the analysis of the existing landscape and visual environment, viewpoint locations were selected for assessment as representative of sensitive visual receptor locations. To best illustrate the likely visual impacts of the Proposal, where appropriate, these viewpoint locations aim to represent a balance of:

– The most sensitive visual receptors.
– A range of sensitive visual receptor types.
– A range of distances from the Proposal.
– A range of view directions towards the Proposal within the Study Area.

3.9.2 Assessment of visual impacts

A series of 12 representative viewpoint locations were selected for assessment based on the visual analysis of the Study Area and understanding of the Proposal. Existing views were represented using a panorama technique (refer Section 3.9.5). An assessment of each viewpoint is provided which includes assessment of the sensitivity of the viewpoint to change, identification and description of the likely changes to the view, assessment of the magnitude of change that is likely to occur, and overall level of significance of impact on the visual environment or representative viewpoint.

The sensitivity of each viewpoint is considered to be dependent on the importance of the view, its existing scenic qualities, the presence of other existing built elements in the view, and the type of sensitive visual receptor and their likely interest in the view. The magnitude of change to views and visual amenity depends on the nature, scale and duration of the change that is expected to occur. This depends on the loss, change or addition of any feature in the field of view of the sensitive visual receptor including an assessment of the level to which the change contrasts with the existing view or expected view of the landscape.

The assessment considers the likely impacts of the Proposal, refer to Section 6. The level of impact on a view depends on factors such as the extent of visibility, degree of obstruction of existing features, degree of contrast with the existing view, angle and duration of the view, and the distance from the Proposal.

The sensitivity and magnitude of visual impacts address the following specific criteria:

– Sensitivity of the visual receptor to the proposed change, based on the susceptibility of visual receptors to change, and the value attached to the view (Table 3).
– Magnitude of change, based on the size or scale of the change, geographical extent of effects, and duration and reversibility of effect (Table 4).

Table 3 Visual sensitivity criteria

High	– Occupiers of residential properties, at home or going to or from, with long viewing periods, within close proximity to the proposed development – Communities that place value upon the urban landscape and enjoyment of views of their setting. – Users of designated tourist routes or scenic drives – Users of recreation, conservation, or scenic areas – Users of viewpoints and lookouts of state or national significance including their access routes – Viewers of scenic views, city views, rural views, elevated views, long or wide views, or views that include water bodies. – Viewers of views of national or state importance
Moderate	– Viewers at schools, or similar, when outdoor play and recreation areas are located within close proximity but viewing periods are limited – Occupiers of residential properties with long viewing periods, at a distance from or screened from the Proposal – State or main road users – Viewers who have intermittent views of the Proposal
Low	– Road users in motor vehicles, trains or on transport routes that are passing through or adjacent to the Study Area and therefore have short term views – Viewers indoor at their place of work, schools or similar – Local roads users
Negligible	– Viewers from locations where there is screening by vegetation or structures where only occasional screened views are available and viewing times are short – Road users in motor vehicles, trains or on transport routes that are passing through/adjacent to the Study Area and have partially screened views and short viewing times

Table 4 Visual magnitude of change criteria

High	A substantial/obvious change to the existing view due to total loss of, or change to, elements, features or characteristics of the view. Would cause a view to be permanently changed and its perceived quality diminished
Moderate	Discernible changes in the existing view due to partial loss of, or change to elements, features or characteristics of the view, however, has potential to be partly mitigated. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Low	Minor loss or alteration to one or more key view elements, features or characteristics, or the introduction of components that may be visible but may not be uncharacteristic within the existing view.
Negligible	Almost imperceptible or no change to the view as there is little or no loss of/or change to the elements, features, or characteristics of the view.

3.9.3 Duration of impact

Landscape and visual impacts can be temporary or permanent in nature. The duration of impact as used in this assessment is outlined in Table 5. This was used to assess the landscape and visual impacts associated with the construction and operation phase of the Proposal.

Table 5 Duration of impact

Temporary	Impacts lasting 1 year or less
Short term	Impacts lasting 1 to 5 years
Medium term	Impacts lasting 5 to 10 years
Long term	Impacts lasting 10 to 25 years
Permanent	Impacts lasting over 25 years

3.9.4 Significance of impacts

The combination of sensitivity and magnitude of change determines the significance of impact on the visual environment or representative viewpoint. Refer to Table 6 which illustrates the matrix used to determine the significance of impacts.

Table 6 Significance of impact matrix

		Magnitude of change			
		High	**Moderate**	**Low**	**Negligible**
Sensitivity	**High**	High	High-moderate	Moderate	Negligible
	Moderate	High-moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

3.9.5 Panorama and photomontage

All photographic images were captured using a 50 millimetre fixed focal length lens on a 35 millimetre full frame format camera at a camera height of 1.7 m. All photograph locations were recorded and mapped.

A series of 12 representative viewpoint locations were selected and existing views represented using a panorama technique. This technique involves the stitching together of a number of adjoining images using the Adobe Photoshop software program.

Photomontage images were prepared for all 12 viewpoints to represent proposed views following the completion of the Proposal. The software used to model and render the photomontages was Autodesk 3D Studio Max. In order to achieve an accurate photomontage of the Proposal and surrounding landscape, with a digital terrain model to a resolution of 10 m was used to model the surrounding landform.

Once the 3D model incorporating both the landscape and new Proposal elements was created, a virtual camera was placed in the software at the same location the photographs were taken. The film, focal lens and height of the virtual camera matches the real camera utilised to take the photographs. The photographs of the site were used in 3D Studio Max as a background to accurately match the 3D model with the Proposal elements to the perspective of the photographs. From the camera view, rendered images of the Proposal were produced to match the daylight exposure of the photographs. The rendered images were imported into Adobe Photoshop for post-production editing and collation of the photomontages.

The final result is the 3D model of the Proposal shown in the correct 3D location in the photographs (Appendix A). The final images were produced to a high resolution, suitable for printing.

3.10 Mitigation and management measures

GHD has proposed mitigation and management measures for SynergyRED's consideration, focusing on landscape character units and visual amenity. Determining these measures involves reviewing the achievability of visual management objectives and addressing impacts identified through the assessment. The feasibility of proposed measures has not been analysed.

Context analysis



4. Context analysis

4.1 Legislation and planning context

A detailed review of government legislation and policies relevant to the Proposal and adjoining Study Area are summarised below. This is not intended to be a thorough review of planning scheme, mechanisms and planning related triggers. The emphasis of the review is to identify designations, protections, values, and objectives relevant to the landscape and visual environment of the Study Area, including scenic amenity values.

Summary of findings

The assessment of relevant legislation, policies and guidelines has identified that the Study Area's existing landscape character and views are valued, and some areas are protected. A review of these key values informed the understanding of the existing landscape and the overall impact assessment.

A key reoccurring value was the protection of the natural character of Leeuwin-Naturaliste Ridge due to its unique social, ecological and landscape values and character and the Scott Coastal Plain which is known for its high and varied visual landscape values. In addition, the importance of the rural character, amenity, and landscape viewed from Brockman Highway was identified through the review.

4.1.1 State legislation and policy

State Planning Policy 2.0: Environment and Natural Resources Policy (WAPC, 2003)

This policy applies throughout the State of WA and includes specific objectives for the protection of landscapes.

Policy *5.9 Landscape* highlights WA's diversity of high value landscapes and scenic areas. It recognises that as the State grows, it will be increasingly important to ensure that landscapes valued by the community are protected. To do this, it is necessary to identify the landscape types and features requiring special attention and develop appropriate management and planning policies that can positively contribute to their maintenance and enhancement. To achieve this, planning strategies, schemes and decision-making should:

i. Identify and safeguard landscapes with high geological, geomorphological, or ecological values, as well as those of aesthetic, cultural or historical value to the community, and encourage the restoration of those that are degraded.

ii. In areas identified in 5.9 (i) above, consider the level or capacity of the landscape to absorb new activities and incorporate appropriate planning, building design and siting criteria to ensure that new development is consistent and sensitive to the character and quality of the landscape.

iii. Consider the need for a landscape, cultural or visual impact assessment for land use or development proposals that may have a significant impact on sensitive landscapes.

Position Statement: Renewable energy facilities (WAPC, 2020)

This document outlines the Western Australia Planning Commission (WAPC) requirements to '*support the consistent consideration and provision of renewable energy facilities within WA. The policy identifies assessment measures to facilitate appropriate development of renewable energy facilities' (WAPC, 2020).*

It states that landscape and visual impact assessments should address:

– *Landscape significance and sensitivity to change, earthworks, topography, extent of cut and fill, the extent and type of vegetation, clearing and rehabilitation areas, land use patterns, built form character, public amenity, and community values.*

– *Likely impact on views including visibility of the facility using view shed analysis and simulations of views from significant viewing locations including residential areas, major scenic drives, and lookouts.*

– *Layout of the facility including the number, height, and scale, spacing, colour, surface reflectivity and design of components, including any ancillary buildings, signage, access-roads, and incidental facilities.*

– *Measures proposed to minimise unwanted, unacceptable, or adverse visual impacts.*

Government of Western Australia, State Planning Strategy 2050 (WAPC, 2014)

The State Planning Strategy 2050 is WA's strategic planning response to the challenges WA is likely to face over the next 30 years. The strategy provides a guide for the future land-use planning and development of the State. The Study Area is part of the south-west sector. It is identified as the population centre for the State and a global biodiversity hotspot with endemic native flora and rare and threatened species.

State Planning Policy No 2.6 State Coastal Planning Policy (WAPC, 2013)

This policy recognises the importance of the WA coastal zone as a significant asset in terms of its environmental, economic, social, and cultural resources and recognises the varied pressure on the coastal zone for use by different groups in the community for a variety of purposes. Planning for coastal zone land is about balancing competing needs and desires in a manner that considers the value of the coastal zone which includes its scenic, aesthetic, and ecological qualities in addition to recreational opportunities and social, indigenous, culture and economic importance.

Development and settlement policy measure (v) identifies the importance of ensuring use and development, adjacent to the coast is designed and sited to complement and enhance the coastal environment in terms of its visual, amenity, social and ecological values.

4.1.2 Region and sub-region schemes and policies

Augusta-Walpole Coastal Strategy (WAPC, 2009)

A component of coastline between Augusta and Walpole is included in the Study Area. The Augusta-Walpole Coastal Strategy provides guidance on how various issues affecting the coastline in this vicinity can be managed. It addresses coastal tenure and management, settlement, tourism, coastal access, infrastructure, subdivision, development and the protection of the environment and biodiversity.

The strategy states that alternative power generation within the strategy area, such as solar or wind, may be applicable in isolated areas provided that infrastructure is consistent with the surrounding landscape and does not affect the visual amenity.

As affirmed in the strategy as the Study Area has low levels of development it has a very high level of natural landscape amenity.

Scott Coastal Plain – A Strategy for a Sustainable Future (DPIRD, 2001)

This document provides a broad strategy and vision for the future development and use of the Scott Coastal Plains recognising the importance of the region's potential, environmental values and receiving water bodies such as Hardy Inlet.

The strategy identifies the area south of Scott River be zoned as Rural Landscape and Conservation to protect significant landscapes and environmental features and provide for development which is compatible with and will enhance the landscape and environmental qualities of this location. As stated, this zone has high and varied visual landscape values and as such development or use should be designed and located as to be compatible with and complimentary to the visual landscape and in particular not be placed on exposed dunes or in visually conspicuous positions.

State Planning Policy 6.1 Leeuwin-Naturaliste Ridge Policy (WAPC, 2019)

Utilising a regional planning approach the purpose of this policy is to protect the unique ecological, social and landscape values and character of the Leeuwin-Naturaliste Ridge. This policy applies to all land use and development within the policy area which stretches from Cape Naturaliste to Cape Leeuwin, inland to Bussell Highway and the eastern extent of townsites along the highway.

The policy states that this is an extraordinary landscape and development needs to have due regard for the landscape integrity and value of the Ridge backdrops when viewed from the coastline, bays, or travel route corridors. In areas of natural landscape significance, the significant natural characteristics will be protected and provide adequate development setbacks. In areas of Rural Landscape Significance and General Character development should protect the rural character of the land.

4.1.3 Local planning framework

Shire of Augusta Margaret River Local Planning Strategy (DPLH, 2022)

The Shire of Augusta Margaret River (AMR Shire) Local Planning Strategy (LPS) specifies the inherent landscape values and visual character of agricultural land and the visual management controls relevant to travel route corridors such as Brockman Highway, located within close proximity to the Proposal. In these areas large visually obtrusive developments on sites that are prominently located along travel route corridors and contribute to the natural and rural landscape amenity of the Shire are discouraged (DPLH, 2022).

The strategy also stipulated that all development within the Shire should preserve and celebrate those elements of the built and natural environment that are of cultural heritage significance to the local Wardandi and Bibulmun/Piblemen people and are representative of the special character and heritage of the Shire and that the Shire will guide against inappropriate development of visually sensitive sites (DPLH, 2022).

This document also specifies the importance of the Leeuwin Naturaliste Ridge as one of the key landscape features within this area. Development within and surrounding this landform is required to be appropriate and visually sensitive (DPLH, 2022).

Shire of Augusta Margaret River Local Planning Scheme No 1 (DPLH, 2024)

Of relevance to this assessment AMR Shire Local Planning Scheme No 1 (LPS1) recognises the importance of the area included in the Leeuwin Naturaliste Ridge Landscape Amenity Zone as being of high landscape value and vital to the preservation of the visual and landscape amenity of the Ridge. In the Southern Ocean Foreshore Protection zone development shall be designed and sited to minimise impact on the rural character, amenity, and landscape elements of the locality. Within varying agricultural zones LPS1 identifies that established rural character and amenity within these zones is preserved and is consistent with the ongoing use and development of that land for agricultural purposes **(**DPLH, 2024).

In addition, development adjacent to a travel route corridor shall be designed and sited to minimise any adverse impacts on rural character, amenity, and landscape values **(**DPLH, 2024).

Draft Shire of Augusta Margaret River Local Planning Scheme No 2 (AMR Shire, 2024)

Currently under review AMR Shire draft Local Planning Scheme No 2 (LPS2) seeks to implement an environment first approach to development whilst also ensuring that development is sensitively located and constructed in a manner that maintains the natural and rural landscape and visual qualities of the scheme area.

LPS2 specifies that within visual management areas development is required to be located on lower contours to avoid sky lining. Vegetation backdrops may be required to be planted where they will lessen visual impact.

In Environmental Conservation Zones (previously the Southern Ocean Foreshore Protection Zone) development shall be designed and sited to minimise impact on the rural amenity, character, and landscape elements of the locality.

At the time of writing, LPS2 remains draft in its status having concluded its public consultation phase earlier in the year (28 February 2024).

Shire of Nannup Local Planning Strategy (DLPH, 2018)

One objective of the Shire of Nannup (Nannup Shire) Local Planning Strategy is of relevance to this LVIA being create sustainable communities and sustainable development which aims to retain the unique sense of place that values its culture and heritage.

Specific actions related to landscape protection include maintaining the outstanding visual amenity within the region inclusive of key landscape and vistas through ensuring that development is designed and located in a manner that does not detrimentally impact on the landscape values of the area and ensure the landscape and scenic quality is protected through the use of appropriate development criteria and development controls. Specific strategies aligned to these actions include:

– *Ensure development reflects and enhances the natural, cultural, visual and built character of the regions landscape.*

– *Protect and enhance landscapes and associated visual amenity and character 'viewsheds' associated with tourist routes and major roads.*
– *Do not support development that will unacceptably impact the views from tourist routes and major roads.*
– *Within rural and priority agriculture areas rural character, environmental and vista qualities of the area are to be protected.*

Shire of Nannup Local Planning Scheme No 4 (DPLH 2022)

Nannup Shire Local Planning Scheme No 4 (LPS4) outlines aims relevant to this LVIA including:

– *Manage development by means of development controls and zoning to achieve compatibility between land use and the preservation, and where possible enhancement of visual amenity of rural environs.*
– *Promote sustainable use of rural land for agricultural purposes whilst accommodating other rural activities.*
– *Safeguard and enhance the amenity and character of the built and natural environment of the scheme area.*

4.1.4 Other guiding documents

Landscape character types for WA (CALM, 1994)

The landscapes of WA have been classified into landscape character types as part of the Reading the Remote - Landscape Characters of Western Australia study (CALM, 1994). This study classifies the landscapes of WA into broad landscape character types in terms of common distinguishing visual landform, vegetation, water form and land-use characteristics.

The following landscape character types are relevant to the Study Area and will help inform the LCU's:

– Leeuwin Naturaliste Coast
– Scott Coastal Plains
– Darling Plateau | Darling Uplands subtype

4.2 Landscape and visual existing conditions

4.2.1 Land use and built form

The Proposal is located in the Warren Bioregion (Figure 7) within the locality of Scott River in the AMR Shire Local Government Area (LGA) which is situated approximately 294 km south-east of Perth. The AMR Shire includes the townsites of Margaret River, Augusta and Cowaramup and the settlements of Gracetown, Karridale, Kudardup and Witchcliffe. In addition to Scott River the region also includes the rural localities of Alexandra Bridge, Baudin, Boranup, Bramley, Burnside, Courtenay, Deepdene, East Augusta, Forest Grove, Gnarabup, Hamelin Bay, Leeuwin, Molloy Island, Nillup, Osmington, Prevelly, Redgate, Rosa Brook, Rosa Glen, Schroeder, Treeton and Warner Glen.

AMR Shire LGA has a population of approximately 16,791 (Australian Bureau of Statistics, 2021) which is expected to grow to approximately 25,000 people by 2036 (DPLH, 2022). The townsites include a variety of land uses and infrastructure such as parks, hospital, schools, light industry and town centre with cafés and shops with the settlements incorporating small town centres, residential areas, and parks.

The Proposal site is situated next to Chester and Pagett Nature Reserve and Scott National Park approximately 15 km northeast of Augusta, 5 km northeast of Molloy Island, 3 km of south-east of Nillup Village General Store and less than 2 km from Brockman Highway, the nearest main road.

The land use within the Study Area, which covers a 30 km area (in each direction) from the Proposal site, contains the townsites of Augusta and a proportion of Margaret River in addition to the settlements of Karridale, Kudardup and Witchcliffe. It also contains national parks, nature reserves, state forests, agricultural land, and tourism land uses (Figure 8).

Brockman Highway and Bussell Highway are important arterial roads traversing through the Study Area with Caves Road being another important road.

4.2.2 Landform, topography, and hydrology

As indicated in Figure 9 the Study Area terrain is diverse ranging from ridges, rugged cliffs and capes, exposed slopes, rounded hills, and valleys to an almost flat to gently undulating plains. The high points of the topography are located on the Leeuwin Naturaliste Ridge and have a peak elevation of 220m Australian Height Datum. One is situated to the south-west, towards Cape Leeuwin, approximately 18 km from the Proposal and the other further north, within Boranup, adjacent to Boranup Lookout approximately 28 km from the Proposal.

The Study Area encompasses a variety of watercourses, such as the Blackwood River (Goorbilyup Buerle) located to the west and north of the Proposal, Scott River located directly south and the Margaret River (Wooditjup Bilya) and Mowen River, both of which are located to the north of the Proposal. Blackwood River and Scott River connect to Hardy Inlet near Augusta and have tributaries within the Proposal site.

4.2.3 Vegetation

Vegetation cover within the Study Area consists of coastal heathland and rushes, low forest, woodland, and open forest interspersed with areas of cleared pastureland (irrigated and unirrigated) and farming lands, including areas of tree plantations.

The native vegetation within the Study Area includes the pre-European vegetation complexes, as identified in the Leeuwin Naturaliste Coast, Scott Coastal Plains and Darling Plateau | Darling Uplands Vegetation Complexes (Department of Parks and Wildlife, 2016). The region comprises a combination of uplands, valleys, depressions and swamps on uplands, estuaries and valley floors and swamps. Vegetation complexes are itemised in Table 7 and included in Figure 10. The Proposal is located within the Scott vegetation complex definition but is comprised predominantly of cleared farmland.

Table 7 Vegetation complexes located within the Study Area

Vegetation complex	Description
Bidella	Low woodland of *Melaleuca preissiana-Banksia littoralis-Hakea lasianthoides* on valley floors and open forest to woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Eucalyptus* patens on slopes in per humid and humid zones.
Blackwood 1	Woodland to open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Xylomelum occidentale-Agonis flexuosa* on raised river terrace in the per humid zone.
Blackwood 2	Low open woodland of *Banksia attenuata-Nuytsia floribunda-Eucalyptus marginata subsp. marginata* on low dunes in the per humid zone.
Blackwood 3	Tall open forest of *Eucalyptus diversicolor-Corymbia calophylla* with some *Eucalyptus marginata subsp. marginata* on undulating uplands in the per humid zone.
Blackwood 4	Open forest of *Corymbia calophylla-Eucalyptus marginata subsp. marginata* on the variable slopes in per humid and humid zones.
Blackwood 5	Woodland to low forest of *Melaleuca rhaphiophylla, tall shrubland of Melaleuca incana* and closed heath of *Agonis spp.* on depressions in the per humid zone.
Blackwood 6	Woodland of *Melaleuca cuticularis* and sedgelands of *Cyperaceae-Restionaceae spp*. on estuarine flats in the per humid zone.
Coate	Low open woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Allocasuarina fraseriana-Banksia ilicifolia* and low open woodland of *Melaleuca preissiana-Banksia littoralis* on broad depressions in upper gullies in per humid and humid zones.
Cowaramup 1	Open to tall open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Banksia grandis* on lateritic uplands in the hyper humid zone.
Cowaramup 2	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Banksia grandis* on lateritic uplands in perhumid and humid zones.
Cowaramup 3	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Banksia ilicifolia* on sandy rises and low woodland of *Melaleuca preissiana* on lower slopes in the hyperhumid to humid zones.
Cowaramup 4	Woodland of *Corymbia calophylla-Eucalyptus marginata subsp. marginata-Agonis flexuosa*, woodland of *Banksia littoralis* and closed heath on rocky slopes in hyperhumid and perhumid zone.
Cowaramup 5	Mixture of open forest to woodland of *Eucalyptus diversicolor-Corymbia calophylla* and woodland of *Eucalyptus marginata subsp. marginata -Corymbia calophylla* on slopes and low woodland of *Melaleuca preissiana-Banksia littoralis* on depressions in the hyperhumid zone.
Cowaramup 6	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on slopes and low woodland of *Melaleuca preissiana-Banksia littoralis* on depressions in perhumid and humid zones.
D'Entrecasteaux 1	Tall shrubland and woodland of *Agonis flexuosa-Acacia saligna* on flats between dunes in the perhumid zone.

Vegetation complex	Description
D'Entrecasteaux 2	Mosaic of low woodland of *Agonis flexuosa* and closed heath of *Olearia axillaris-Spyridium globulosum-Acacia littorea* on steep dunes on calcareous deep sands in the perhumid zone.
D'Entrecasteaux 3	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla- Agonis flexuosa-Banskia grandis* with some *Eucalyptus megacarpa* on recent low dunes with dense shrub understorey in hyperhumid and perhumid zones.
D'Entrecasteaux 4	Woodland to low forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla- Agonis flexuosa-Banskia grandis* with some *Eucalyptus megacarpa* on stabilised higher dunes in hyperhumid and perhumid zones.
D'Entrecasteaux 5	Coastal complex and closed heath of *Olearia axillaris* and *Senecio spp.* on recently stabilised dunes in hyperhumid and perhumid zones.
D'Entrecasteaux 6	Tall shrubland of *Agonis flexuosa* and closed heath of *Olearia axillaris-Spyridium globulosum* on coastal low dunes in the perhumid zone.
D'Entrecasteaux 7	Woodland of *Agonis flexuosa* and closed heath of *Olearia axillaris-Spyridium globulosum* on coastal low dunes in the perhumid zone.
D'Entrecasteaux 8	Coastal complex and closed heath of *Phyllanthus calycinus-Olearia axillaris-Spyridium globulosum-Pimelea ferruginea -Rhagodia baccata* with some emergents of *Agonis flexuosa* and sedgeland of *Lepidosperma spp.* on steeper exposed dunes in the hyperhumid zone.
Darradup	Open forest to woodland of *Corymbia calophylla* with some *Eucalyptus marginata subsp. marginata* on slopes, woodland of *Eucalyptus rudis-Banksia seminuda-Melaleuca preissiana-Agonis flexuosa* and tall shrubland of *Agonis linearifolia-Callistachys lanceolata* on fringes of streams in perhumid and humid ones.
Glenarty Hills 1	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Banksia grandis* with some *Eucalyptus diversicolor* on upland and slopes in hyperhumid and perhumid zones.
Glenarty Hills 2	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on undulating uplands in hyperhumid and perhumid zones.
Glenarty Hills 3	Mixture of open forest of Eucalyptus diversicolor-Callistachys lanceolata, woodland of *Eucalyptus patens-Corymbia calophylla* and woodland of *Eucalyptus rudis-Melaleuca rhaphiophylla* on depressions in hyperhumid and perhumid zones.
Gracetown 1	Tall open forest of *Eucalyptus diversicolor-Corymbia calophylla-Agonis flexuosa* on mild slopes in the hyperhumid zone.
Gracetown 2	Mixture of low woodland of *Agonis flexuosa,* open forest of *Corymbia calophylla-Eucalyptus marginata subsp. marginata* and tall open forest of *Eucalyptus diversicolor* with some *Corymbia calophylla* and *Eucalyptus cornuta* on eastward facing slopes in the hyperhumid zone.
Gracetown 3	Closed heath of *Olearia axillaris-Rhagodia baccata-Agonis flexuosa* on seaward slopes in hyperhumid to humid zones.
Gracetown 4	Low woodland of *Agonis flexuosa* with some *Corymbia calophylla* on crests of calcareous dunes in hyperhumid to humid zones.
Gracetown 5	Tall open forest and open forest of *Corymbia calophylla-Eucalyptus marginata subsp. marginata-Eucalyptus megacarpa* and tall open forest of *Eucalyptus diversicolor-Agonis flexuosa* on valley floors in the hyperhumid zone.
Gracetown Karst	Tall open forest of *Eucalyptus diversicolor-Corymbia calophylla -Agonis flexuosa* on karst areas with sink holes in the hyperhumid zone.
Jalbaragup	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Eucalyptus patens* on slopes with some *Eucalyptus rudis* on broad terraces in perhumid and humid zones.
Jangardup	Open woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on rises and low open woodland of *Melaleuca preissiana-Banksia littoralis* on depressions in hyperhumid and perhumid zones.
Kilcarnup 1	Mosaic of coastal complex on exposed dunes on seaward slopes in hyperhumid to humid zones.
Kilcarnup 2	Mosaic of coastal complex and closed heath of *Olearia axillaris-Pimelea ferruginea-Melaleuca huegelii* on exposed calcareous dunes on seaward slopes in hyperhumid to humid zones.
Kilcarnup 3	Tall shrubland to closed heath of *Agonis flexuosa-Spyridium globulosum* on exposed slopes of calcareous dunes in hyperhumid to humid zones.
Kilcarnup 4	Tall shrubland of *Agonis flexuosa* on windward slopes, woodland of **Eucalyptus cornuta** on leeside in the hyperhumid zone.
Kilcarnup 5	Tall shrubland to low woodland of *Agonis flexuosa* on leeside of dunes in the hyperhumid zone.
Kilcarnup 6	Tall shrubland of *Agonis flexuosa-Acacia saligna* on leeside of calcareous dunes in hyperhumid to humid zones.
Kingia	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Allocasuarina fraseriana-Banksia grandis-Xylomelum occidentale* on lateritic uplands in perhumid and humid zones.
Layman	Woodland to open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Eucalyptus patens* on slopes and woodland of *Melaleuca preissiana-Banksia littoralis* on valley floors in perhumid and humid zones.

Vegetation complex	Description
Milyeanup	Open forest to tall open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Allocasuarina fraseriana* with some *Agonis flexuosa* on less undulating slopes in perhumid and humid zones.
Nillup 1	Open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla –Banksia grandis-Xylomelum occidentale-Agonis flexuosa* on low undulating plains in the perhumid zone.
Nillup 2	Woodland to open forest of *Eucalyptus marginata subsp. marginata –Corymbia calophylla - Banksia attenuata-Xylomelum occidentale-Nuytsia floribunda* on low sandy rises above plain in the perhumid zone.
Nillup 3	Mixture of open woodland of *Corymbia calophylla with some Eucalyptus patens and Eucalyptus megacarpa* and tall shrubland of *Agonis spp.* with some emergent *Eucalyptus marginata subsp. marginata, Corymbia calophylla* and *Banksia littoralis* on broad depressions in the perhumid zone.
Preston	*Woodland of Eucalyptus rudis-Agonis flexuosa-Banksia seminuda* along streams, open forest of *Corymbia calophylla-Eucalyptus* patens on slopes in the humid zone.
Scott 1	Low open forest and low woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Agonis flexuosa* with some *Eucalyptus patens* and *Banksia spp.* on low dunes to low woodland of *Melaleuca preissiana-Banksia littoralis* on inter-dune depressions in hyperhumid and perhumid zones.
Scott 2	Low woodland of *Banksia attenuata-Banksia ilicifolia-Nuytsia floribunda-Eucalyptus marginata subsp. marginata* with occasional *Corymbia calophylla* on dunes rising above the plain in hyperhumid and perhumid zones.
Scott 3	Mosaic of sedgeland of *Restionaceae-Cyperaceae spp.* and closed heath of *Myrtaceae-Proteaceae spp*. with occasional *Banksia occidentalis, Melaleuca preissiana* and *Banksia littoralis* on swampy depressions in the perhumid zone.
Scott 4	Mosaic of sedgeland of *Restionaceae-Cyperaceae spp.* and closed heath of *Myrtaceae-Proteaceae spp*. with occasional *Banksia ilicifolia* on swampy depressions and stunted *Eucalyptus marginata subsp. marginata-Banksia attenuata-Xylomelum occidentale* on low sandy rises in hyperhumid and perhumid zones.
Scott 5	Closed heath of *Myrtaceae-Proteaceae spp.* and tall shrubland *of Viminaria juncea* on flats and depressions in the perhumid zone.
Scott Scarp	Open forest of *Eucalyptus megacarpa-Eucalyptus patens* on the lower slopes of escarpment and open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on slopes in the perhumid zone.
Telerah	Low open woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla-Allocasuarina fraseriana-Xylomelum occidentale-Banksia ilicifolia* on slopes in perhumid and humid zones.
Treeton 1	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* with *some Allocasuarina fraseriana* on mild slopes in the per humid zone.
Treeton 2	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on undulating sandy slopes in the perhumid zone.
Treeton 3	Open forest of *Eucalyptus patens-Corymbia calophylla-Eucalyptus marginata subsp. marginata* on lower slopes and on floors of minor valleys in the perhumid zone.
Wilyabrup 1	Tall open forest of *Eucalyptus diversicolor-Corymbia calophylla-Allocasuarina decussata-Agonis flexuosa* on deeply incised valleys in the hyperhumid zone.
Wilyabrup 2	Open forest of *Corymbia calophylla-Allocasuarina decussata-Agonis flexuosa* on deeply incised valleys in perhumid and humid zones.
Wilyabrup 3	Woodland of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on slight rises on lower slopes in perhumid and humid zones.
Wilyabrup 4	Low woodland and woodland of *Corymbia calophylla-Eucalyptus marginata subsp. marginata* with some *Banksia spp.* on exposed slopes in hyperhumid to humid zones.
Wilyabrup 5	Mosaic of coastal heath and low woodland to woodland of *Corymbia calophylla-Eucalyptus marginata subsp. marginata-Banksia spp.* on westward slope in hyperhumid to humid zones.
Wilyabrup 6	Sedgeland of *Cyperaceae-Restionaceae spp.* on depressions by coast in the hyperhumid zone.
Wilyabrup 7	Woodland of *Corymbia calophylla-Eucalyptus marginata subsp. marginata* with closed heath of *Myrtaceae-Proteaceae-Papilionaceae spp.* on steep rocky slopes in the hyperhumid zone.
Wilyabrup 8	Tall open forest of *Eucalyptus diversicolor-Agonis flexuosa-Callistachys lanceolata* with some *Corymbia calophylla on* flats and valleys in the hyperhumid zone.
Wilyabrup 9	Tall open forest of *Corymbia calophylla-Agonis flexuosa* on flats and valleys in perhumid and humid ones.

4.2.4 Heritage features

Aboriginal cultural heritage

The Proposal and Study Area are located within the South West Boojarah within the traditional lands of the Noongar People - Wardandi and Bibulmun/Piblemen language groups.

Noongar people have lived in the southwest of WA since time immemorial, at least 45,000 years. Noongar connection to country connects everything across the vast landscape with meaning and purpose with the belief that everything is connected, the past, the present, the people, the land, the sea and all of its plants and animals (Integrate Sustainability, 2024).

Approximately 30 Aboriginal cultural heritage sites are identified in the Study Area which are protected under the Aboriginal Heritage Act 1972. Tributaries of the Blackwood River (site 20434) and lodged ACH site (22926) are located within the Proposal site as illustrated in Figure 11.

European heritage

AMR Shire LGA is one of the first areas settled by Europeans in Western Australia, over 180 years ago. There are many archaeological and historical places of cultural heritage significance in the region. An overview of the European heritage of the Shire is included in Figure 11. There are 11 properties located within the AMR Shire LGA that are on the State Heritage Register, with 74 places on the Shire's Heritage List. The Heritage Inventory was adopted in July 2012, updated in 2021.

State registered heritage places within the Study Area include Cape Leeuwin Water Wheel, Cape Leeuwin Lighthouse and Quarters, Memorial HMAS Nizam, Cape Leeuwin Lighthouse, Davies Park and Foundry Chimney and Darnell's General Store, Witchcliffe.

4.2.5 Key visual features and experiences

Caves Road

Caves Road is a tourist attraction in its own right located within the western extent of the Study Area. Stretching between Cape Naturaliste and Cape Leeuwin, running parallel to the coast, Caves Road provides views of undulating pastureland and vineyards, olive groves and areas of undisturbed natural vegetation. Towards the south Caves Road has impressive views of the karri trees within Boranup Forest (Tourism Western Australia, 2024).

Cape Leeuwin Lighthouse

Constructed in 1895 from local limestone the Cape Leeuwin Lighthouse is situated at the most south-westerly point of Australia and is still a vital working lighthouse for vessels navigating this cape. Located within the southwest of the Study Area, the lighthouse provides uninterrupted views of the Southern Ocean joining the Indian Ocean. Frequented by approximately 120,000 visitors annually Cape Leeuwin Lighthouse is a key tourist attraction (Sealite, 2024).

Cape-to-Cape Track

The Cape-to-Cape Track is a long-distance trail along the Leeuwin-Naturaliste Ridge between the lighthouses of Cape Naturaliste and Cape Leeuwin, within the western extent of the Study Area. Spanning 123 km the Cape-to-Cape Track provides long ranging elevated views across the Indian Ocean and the windswept heath and the surrounding ever-changing display of vegetation and wildflowers in addition to sheltered woodlands and the towering karri forest at Boranup (Trails WA, 2024).

Leeuwin Naturaliste Ridge

Leeuwin Naturaliste Ridge includes a number of caves, formed approximately 1 million years ago, open to the public such as Jewel Cave, Lake Cave and Mammoth Cave. The ridge also includes the towering karri trees of Boranup Forest and bright white sands and turquoise waters of Hamelin Bay Beach, known for spotting stingrays are typical of the visual features and experiences available within Leeuwin Naturaliste Ridge.

Ellis Street – Dead Finish Walk Trail

The Dead Finish Walk Trail is located between Ellis Street Jetty, within the town centre of Augusta, alongside the Blackwood Rivermouth / Hardy Inlet and the Southern Ocean. The walk includes the scenic locations of Seine Bay, the Landing Place memorial, Flinders Bay, Granny's Pool, Augusta Boat Harbour concluding at Dead Finish, providing long ranging views of the Southern Ocean. Whale watching is a popular activity on the trail between May to August due to Humpback migration patterns and the arrival of the Southern Right Whales who use Flinders Bay as their nursery ground (Whale Watch Western Australia, 2024),

Farmland and agriculture

Farming and agricultural is a prevalent land use type within the Study Area with the agricultural industry prominent in the region. Agricultural land is typically cleared for dairy, beef, sheep, horticulture, grapes, nuts, avocados, and olives (AMR Shire, 2021). Agricultural land is intersected with swathes of remnant vegetation, continuous roadside vegetation corridors, timber reserves, state forests and drainage channels whereby clearings open views into the surrounding farmland framed by remnant vegetation, creating a visual backdrop which establishes a distinct rural setting.

Flinders Bay settlement and beach

Flinders Bay was previously a settlement of coastal shacks used by holiday makers and permanent residents in the interwar years. Located in the southwest of the Study Area, it has retained its informal settlement layout and narrow winding residential streets (Heritage Council of WA, 2021) that lead to Flinders Bay. Flinders Bay is a protected bay, with a grass bank shaded by pine trees, that is popular for swimming with local residents and tourists alike. Wide views of the open Southern Ocean and towards the coastal extent of the Scott Coastal Plain are afforded from Flinders Bay.

Blackwood River

Kayaking, boating, camping, and bushwalking alongside the Blackwood River (Goorbilyup Buerle) are popular recreational pursuits. Spanning the southwest to northeast of the Study Area recreational users avail enclosed views of the river valley, framed by naturally occurring vegetation.

Hardy Inlet

Situated within the southwest of the Study Area Hardy Inlet is a key visual feature of Augusta. As a recreational and tourism location, Hardy Inlet is utilised for a range of recreational pursuits including fishing, swimming, wind foiling, boating, kayaking and houseboat cruising. Bird watching, picnicking and walking are also regular activities associated with the inlet. Long ranging views towards the seemingly undeveloped area of East Augusta, Blackwood River, the Southern Ocean, or Augusta townsite are afforded from the banks of Hardy Inlet.

Scott River

Scott River is a tributary of the Blackwood River (Goorbilyup Buerle). Utilised for recreational purposes, such as kayaking, a component of Scott River is located directly adjacent to the southern extent of the Proposal site.

Augusta town centre

Located in an elevated position above Hardy Inlet Augusta town centre, including large swaths of the residential areas, are positions to take advantage of the step valley that affords views across the riparian vegetation towards Hardy Inlet.

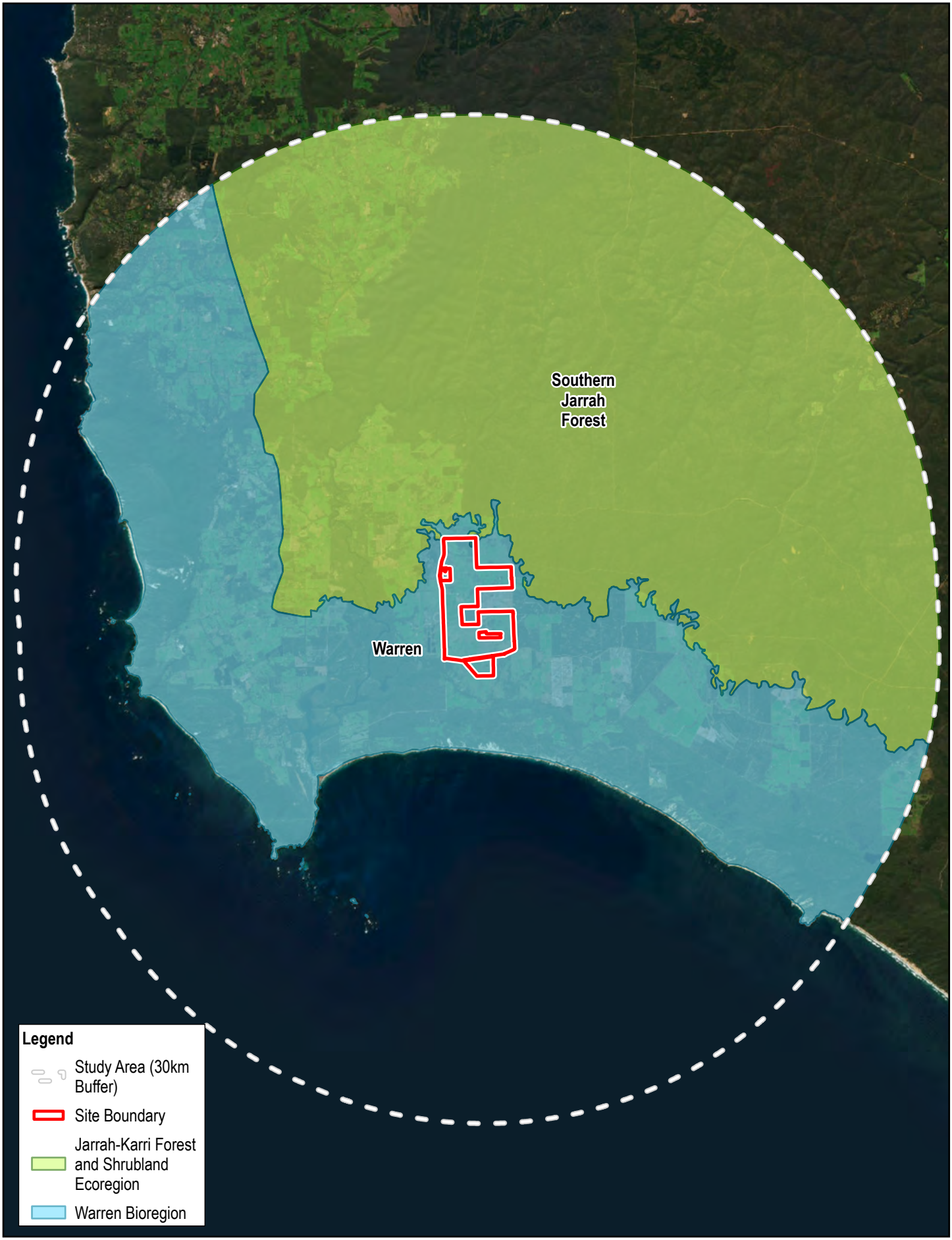
4.3 Community and stakeholder engagement

SynergyRED has engaged the community and stakeholders using best practice methods aligned with IAP2 (International Association of Public Participation) and Clean Energy Council Community Engagement Guideline. The objectives included outlining the proposed wind farm scope and sharing initial findings from the feasibility assessment allowing SynergyRED to gather feedback to inform the remainder of the assessment. This provides SynergyRED with the opportunity to gain feedback from the community and stakeholders to inform the remainder of the feasibility assessment.

The team held four community consultation sessions in Augusta, Scott River, East Augusta, and Margaret River between March 11 and 13, 2024, with 72 community members attending. Feedback was mostly positive or neutral, with some opposition. Some community members were awaiting the feasibility study results before forming an opinion. Prior to these sessions, SynergyRED engaged directly with landowners near the proposed wind farm boundary and continued consultations with community members, groups, and key stakeholders throughout the feasibility phase. An interactive website allows local stakeholders to register their interest and ask questions as the project progresses.

Five additional community consultation sessions were held between December 7 and 12 to share initial findings from the feasibility assessment, including 14 photomontages from the report. These sessions were attended by 152 community members. Feedback was mixed, with visual impact being a significant concern, especially for those living closer to the proposed wind farm and those owning or managing holiday homes.

Engagement with the community continues, including meetings with various community groups and conducting a social impact values assessment. The remaining feasibility assessment outcomes, including visual impact, will be shared with the community and other key stakeholders once finalised.



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Kilometers

Map Projection: Transverse Mercator
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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Bioregions

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

FIGURE 7

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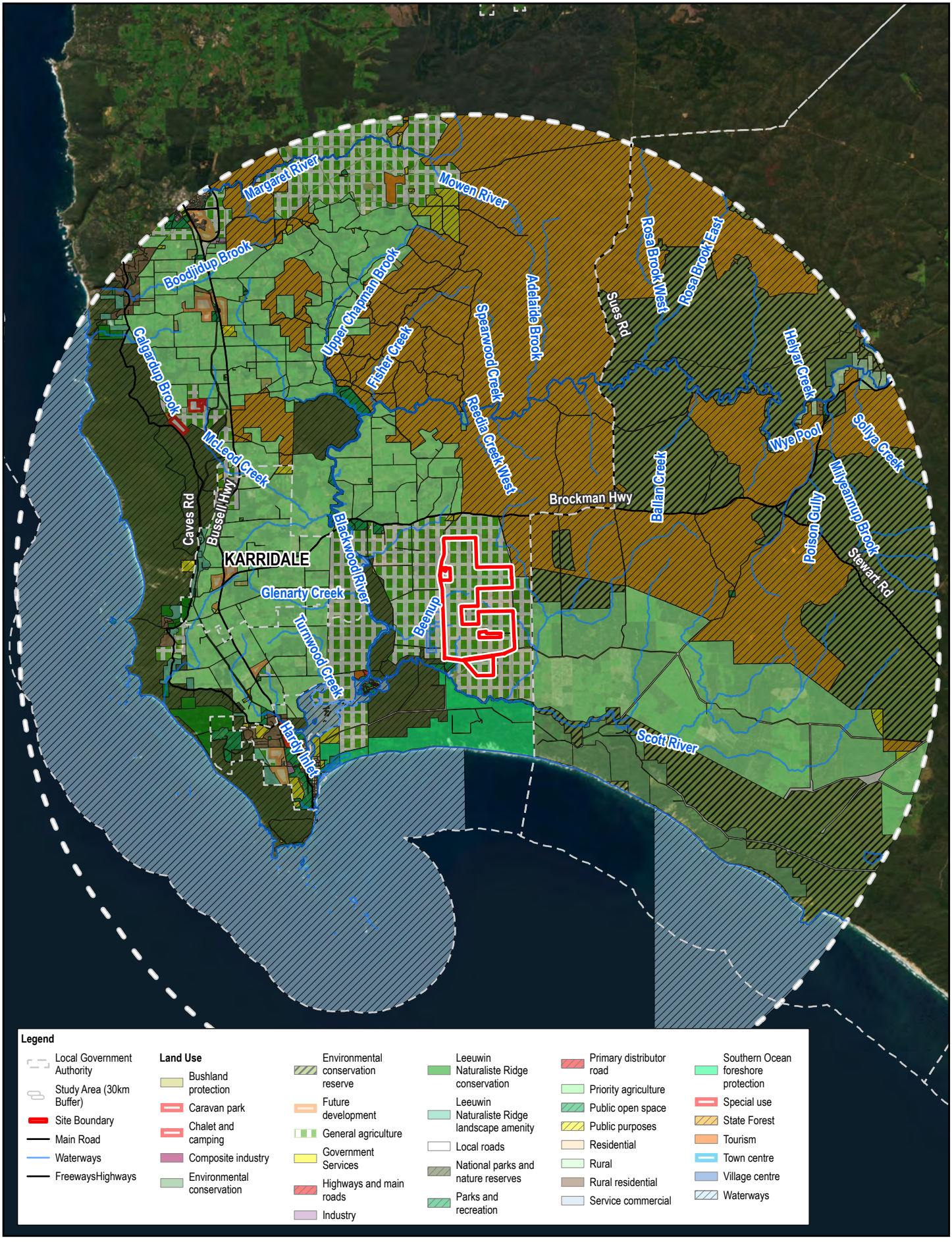

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Proposal Location Plan

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

Planning Zones

FIGURE 8

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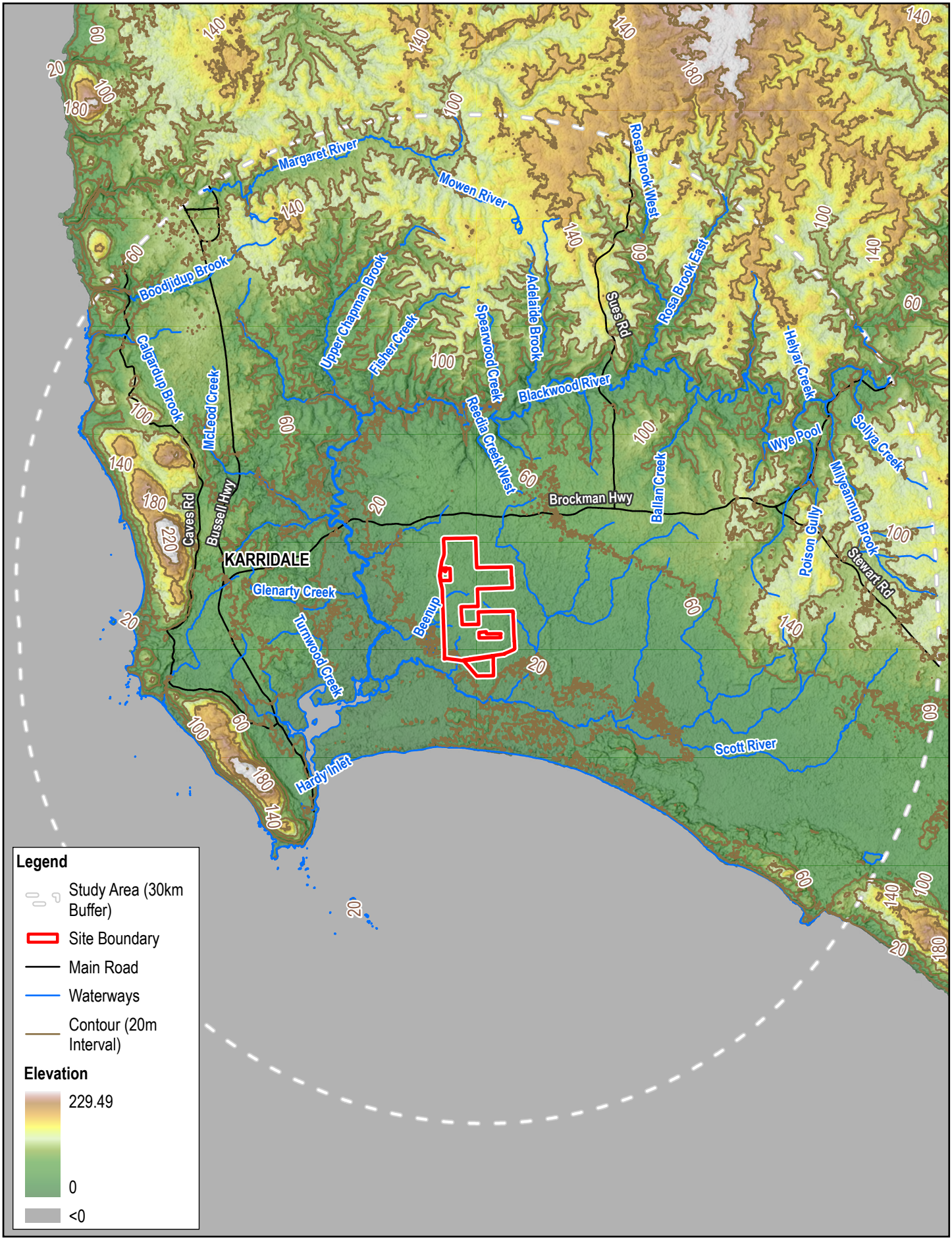

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Landform, Topography, and Hydrology

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

FIGURE 9

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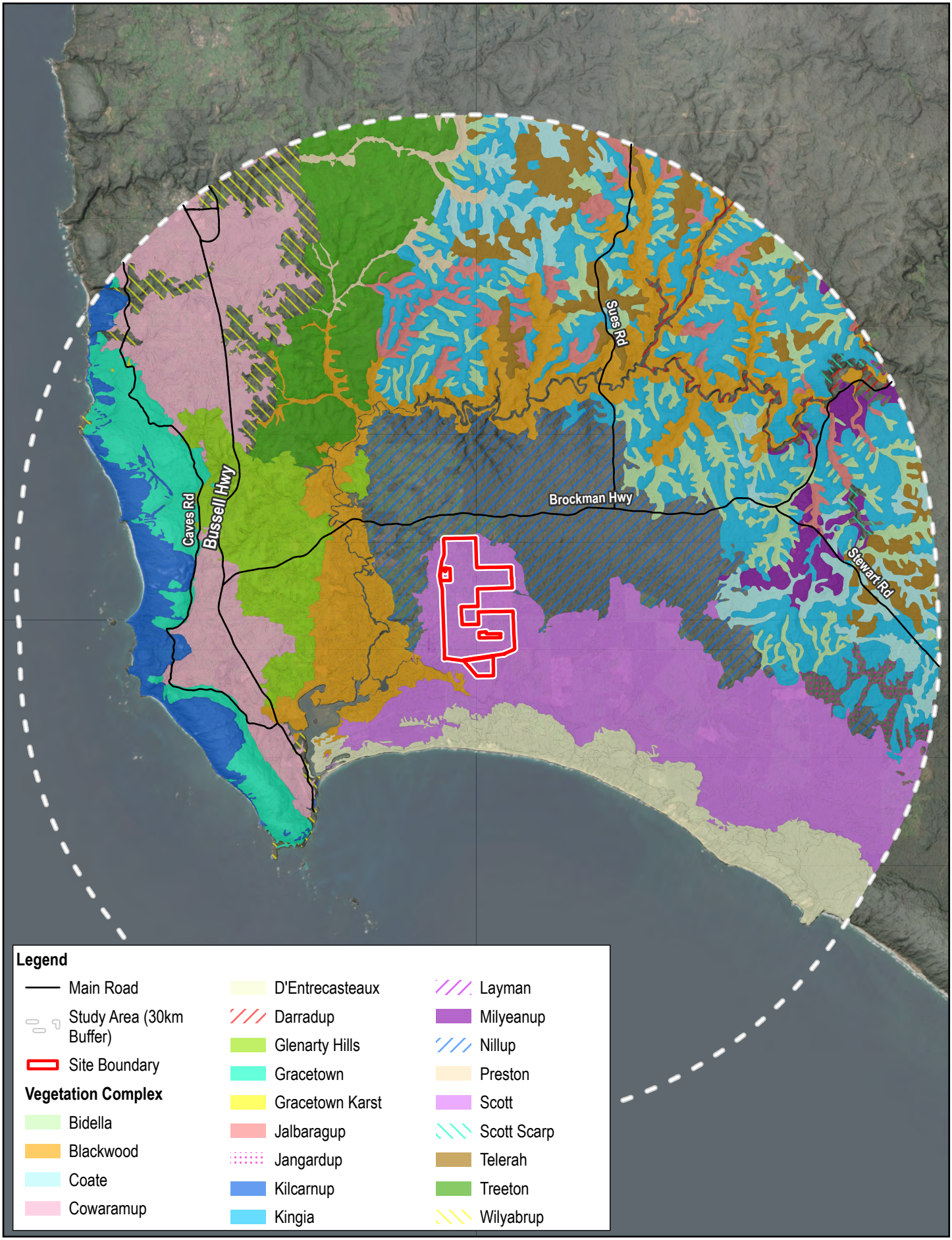

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Vegetation Complexes

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

FIGURE 10

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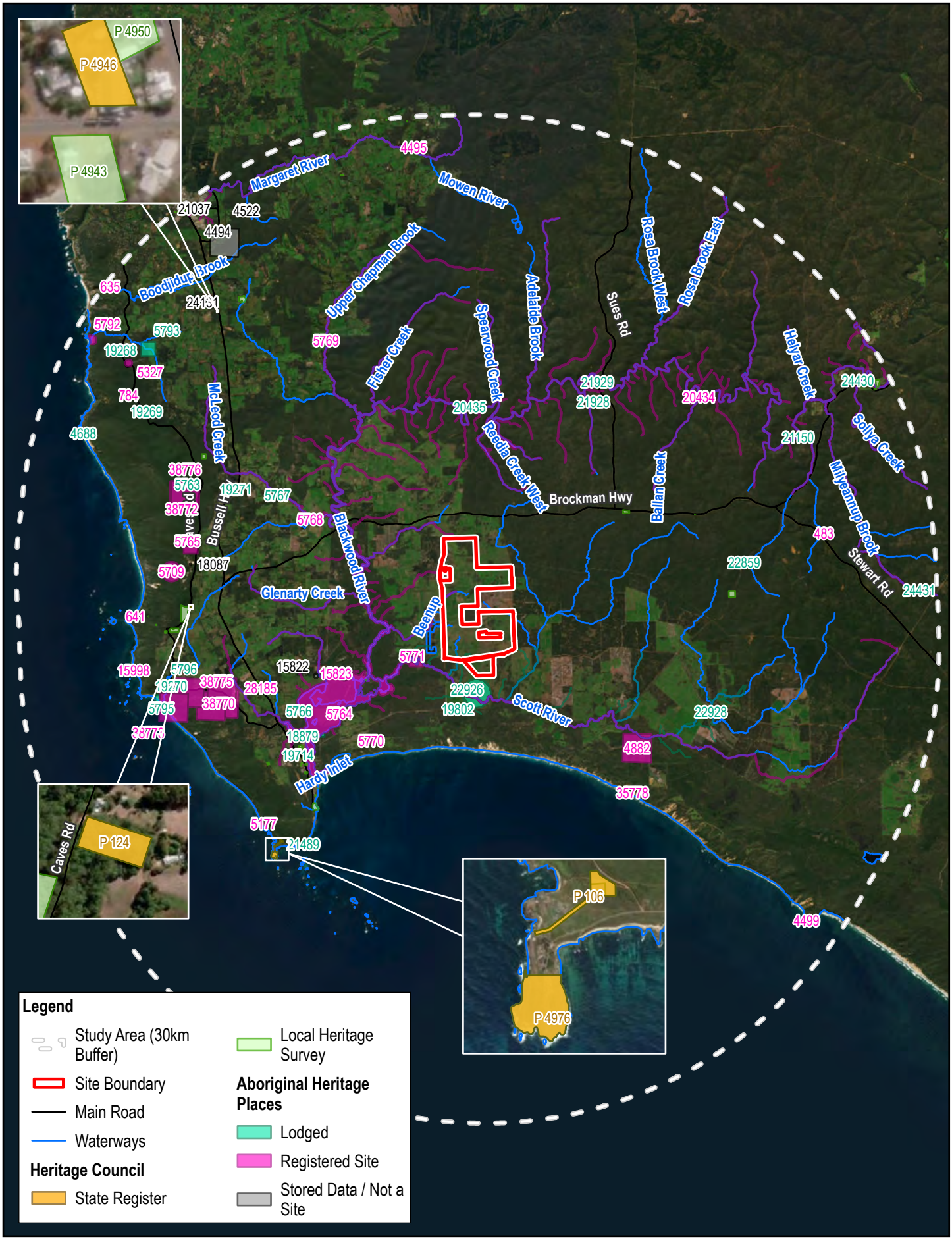

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

Heritage Places

FIGURE 11

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5. Landscape and visual management objectives

Landscape and visual management objectives have been defined to manage the character of the landscape and visual amenity within the Study Area. The legislation and planning review and context analysis have formed the development of appropriate management objectives. The developed landscape and visual management objectives are generally categorised as follows:

– Best practice siting and design
– Protection and maintenance of landscape character
– Engagement

5.1 Best practice siting and design

– To protect the existing landscape character, the proposed infrastructure should be sited within the natural topographic context of the landscape.
– Vegetation clearance should be kept to a minimum and turbines and associated infrastructure should be carefully sited to minimise impact to areas of remnant native vegetation.
– The design of built form, including finishes and materials selection should respond to the surrounding landscape setting and minimise the facility's visual prominence.
– The layout (e.g. grid pattern or clustered) of the wind farm should consider the existing landscape character (vegetation, waterform, landform and land use) and any variation in the topography of the site.
– Siting should also consider Aboriginal cultural heritage sensitivities that exist within the Proposal site and surrounding landscape.

5.2 Protection and maintenance of landscape character

The valued elements that define the existing landscape character are recommended to be protected. This includes Leeuwin Naturaliste Ridge, wind pruned coastal heath, extensive areas of distinct Jarrah, Marri and Karri forest, agricultural lands, wetland corridors, V shaped river valleys, the coastal landscape of Leeuwin Naturaliste Coast (adjacent to the Indian Ocean), Scott Coastal Plain (adjacent to the Southern Ocean) and the rural amenity of Brockman Highway travel route corridor.

5.3 Engagement

– The significance of the landscape within the Study Area specifically the Blackwood River (Goorbilyup Buerle) and Margaret River (Wooditjup Bilya) and their tributaries to the Wardandi and Bibulmun/Piblemen people should be considered in the design of the Proposal. Where possible engagement with Traditional Custodians to discuss the visual elements of the design should be considered.
– Engagement with the community and stakeholders throughout the design process provides beneficial project outcomes and can improve the perception of additional infrastructure within views and the wider landscape.



Landscape and visual impact assessment

6. Landscape impact assessment

6.1 Landscape character units

Based on the review of the existing landscape context, the site visit and the Department of Conservation and Land Management (1994) *Landscape Character Types of Western Australia*, the LCU's were defined for the Study Area (see Figure 12 below). The locations of the LCUs can be found in Figure 13.

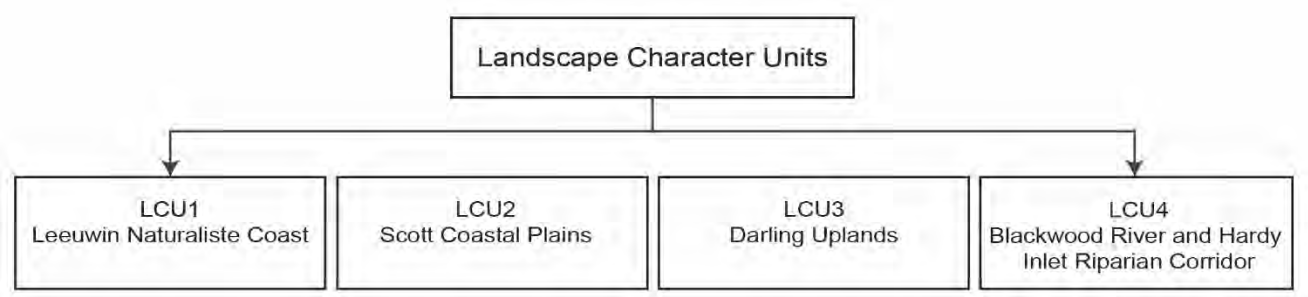
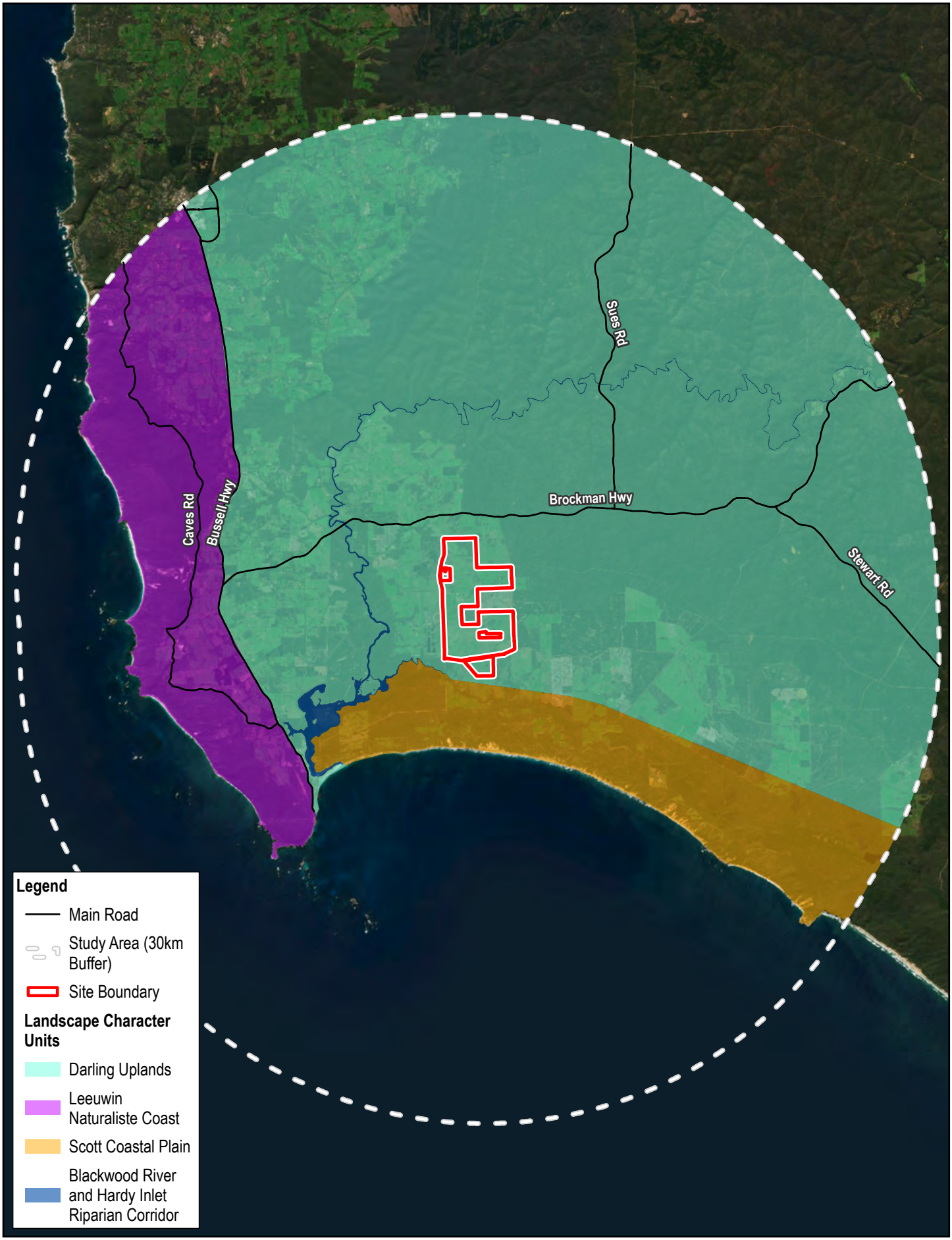


Figure 12 Identified LCU's



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Kilometers

Map Projection: Transverse Mercator
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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Landscape Character Units

Project No. **12632296**
Revision No. **0**
Date **09/01/2025**

FIGURE 13

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6.2 Landscape impact assessment

The following section includes a description of each LCU and an assessment of impacts to the landscape character within each LCU.

6.2.1 LCU1 Leeuwin Naturaliste Coast

Distinguishing features

– Topography consists of a central ridgeline, uneven beaches, towering sea cliffs and valleys and beyond the ridge an almost flat to gently undulating plain.

– Much of LCU1 encompasses Leeuwin Naturalise National Park and state forest. Vegetation includes wind pruned coastal heathland, stunted Jarrah Marri forest and the towering Karri (*E. divericolor*).

– Set out in a typical grid pattern Augusta town centre lies adjacent to Hardy Inlet and is orientated to take advantage of the views across the inlet from the typical building type of one or two storey commercial and residential properties.

– The local community has strong links to the marine and inlet environment, which are important natural assets that support the local fishing and tourism sectors.



Photo 2 ***Enclosed canopied rural road surrounded by stunted forest.***



Photo 3 ***Uniform wind pruned coastal heath within the open setting of Cape Leeuwin Ridge.***



Photo 4 ***Vast open coastline of the Indian Ocean with rounded undulating hillslopes and wind pruned coastal heath.***



Photo 5 ***Cape Leeuwin Lighthouse, open water of the Southern Ocean with rugged wind pruned coastal heath.***



Photo 6 *Intimate and uniform single storey shops typical of Augusta Main Street.*



Photo 7 *Enclosed bay at Flinders Bay with historical jetty sloping rocky shore and distinctive pine trees.*

6.2.1.1 Key characteristics

The key characteristics of LCU1 are listed in Table 8.

Table 8 *Key characteristics of LCU1*

Criteria	Description
Landform	The topography of LCU1 consists of conical dunes, rocky shorelines, towering sea cliffs, rounded undulating hillslopes punctuated by a discontinuous limestone ridge, known as Leeuwin Naturaliste Ridge. The eastern margin of the Leeuwin Naturaliste Coast, beyond the ridge, is characterised by an almost flat to gently undulating plain, with occasional granitic outcropping and slight gravelly rises or knolls (CALM 1994).
Vegetation	The western slopes of Leeuwin Naturaliste Coast consist of wind pruned coastal heathland vegetation the height and density of which is determined by the prevailing winds and salt spray (CALM 1994). The central ridge includes a stunted Jarrah Marri forest, which grows to its typical size to the east with more sheltered zones consisting of a variety of forests (CALM 1994). Rough barked Banksia and weeping peppermint dominate a range of structural remnant vegetation types, including low forest, woodlands, and open forest (CALM 1994). The vegetation pattern on the gentler eastern slopes is largely dictated by land use where largescale clearing for agriculture and timber has occurred. This, in some areas, has resulted in a colourful pattern of exotic crops, grasses and regrowth forest (CALM 1994). A key landscape feature of the Leeuwin Naturaliste Ridge is the towering Karri (*E. divericolor*), found within the protected depressions and gullies of the southwest proportion of this LCU (CALM 1994).
Waterways / reserves	LCU1 includes Leeuwin Naturaliste National Park, State Forest 45 and Cliff Spackman Nature Reserve. The main drainage feature of the Leeuwin Naturaliste Coast is the Margaret River (Wooditjup Bilya) located in the northern extent of LCU1. Wooditjup Bilya is approximately 60 km in length and comprises a 190 km network of tributaries (Shire of Augusta Margaret River, 2024). The ridge is also cut by a series of westerly flowing brooks with freshwater available on the coast at springs such as Contos and Cape Leeuwin where early settlers integrated the use of a waterwheel. Seasonal swamps and soaks scattered throughout the eastern portion are also evident (CALM 1994).
Land use	Land use within this area includes the expansive coastal landscape located within Leeuwin Naturalise National Park, state forest, agricultural lands (including grazing and vineyards), timber production, residential, town centre and transportation.
Infrastructure	Existing infrastructure within this LCU includes the dominant transport links of Caves Road and Bussell Highway, Augusta Boat Harbour, Cape Leeuwin Lighthouse, Augusta Airport and Augusta townsite.
Cultural and characteristics	LCU1 is located within the land of the Wardandi people. The Wardandi name for the Augusta area is Taalinup. Evidence of human occupation within this area extends beyond 9000 years before the present. Taalinup contains important cultural ecological values that form part of the heritage and identity of Wardandi custodians (Applied Archaeology International in Shire of Augusta Margaret River, 2022). Europeans first explored this area in 1801 and a settlement was set up in Augusta in 1830. European heritage places within LCU1 include Hamelin Bay jetty (DLPH, 2019).

Criteria	Description
	A dominant feature of this landscape is Cape Leeuwin Lighthouse. Cape Leeuwin Lighthouse is the tallest lighthouse on mainland Australia located at the most south-westerly point of Australia at the meeting point of the Southern and Indian Oceans (Margaret River Busselton Tourism Association, 2024). Constructed in 1895 the lighthouse receives approximately 120 thousand visitors annually. The most well-known and high use trail within LCU1 is the Cape to Cape Track. This trail extends 123 km from the Lighthouse at Cape Naturaliste to the Lighthouse at Cape Leeuwin providing a user experience of coastal and forest scenery (Trails WA, 2024). The marine environment of the Leeuwin Naturaliste Coast is a significant natural asset which the local fishing industries and tourism are dependent, and the local communities strongly connected to (DLPH, 2019). This includes Flinders Bay, a very popular swimming beach for community members as well as tourists.
Spatial qualities	The spatial qualities of the Leeuwin Naturaliste Coast include a central ridgeline with varying slopes, uneven beaches, towering sea cliffs and valleys, offshore reefs and wave-cut platforms, narrow sandbars, and U-shaped valleys (CALM, 1994).

6.2.1.2 Landscape impact assessment

Refer to Table 9 for assessment.

Table 9 LCU1 Leeuwin Naturaliste Coast landscape impact assessment

Criteria	Assessment
Anticipated change to landscape character	The Proposal will occur outside of LCU1. The Proposal will be visible from LCU1 and will therefore have the capacity to impact the setting of LCU1. The anticipated change would include views of: – Up to 20 wind turbines with a maximum tip height of 250 m – Two meteorological masts with a maximum height of 164 m
Landscape value	LCU1 has a landscape value of **high**. Values associated with LCU1 include the designated areas within Leeuwin Naturaliste National Park. As recognised in state planning policy 6.1 Leeuwin Naturaliste Ridge is recognised as one of the key landscape features of this area. In addition, LCU1 includes cultural heritage and Aboriginal heritage areas of recognised community value and amenity.
Susceptibility to change	Susceptibility to accommodate the proposed change is **high** as the landscape is of high quality with consistent, intact, well-defined attributes. The proposed development would be incompatible with the existing characteristics of the area and mitigation measures are unlikely to reduce the impacts of the change.
Sensitivity to change	The sensitivity to change is **high** as the susceptibility to accommodate the proposed change is considered high and the landscape value is high.
Magnitude of change	Magnitude of change is **moderate** as the Proposal will result is discernible changes in the landscape character due to partial loss of, or change to elements, features or characteristics of the landscape. The change would appear to have an adverse effect on the landscape character since it would be out of scale with the local pattern and the landforms.
Duration of impact	Permanent
Significance of impact	**High-moderate**

6.2.2 LCU2 Scott Coastal Plains

Distinguishing features

– The topography of LCU2 consists of the Southern Ocean coastline. This includes vertical cliffs, horizontal sandy plains and gently curving beaches. This secluded coastal dune system fronts a low-lying wetland corridor and low rounded hills.

– The wetland corridor includes seasonal swamps, wetlands and the Scott River (a tributary of the Blackwood River) in addition to Swan Lakes and Lake Gingilup.

– LCU2 includes the residential settlement of East Augusta. A small settlement of one to two storey dwellings. The Hardy Inlet has numerous jetties housing small boats used by residents to access Augusta town centre.

– Flora, fauna and landscape conservation is a significant land use of LCU2 as encompasses in Scott National Park and Gingilup Swamps Nature Reserve with privately owned land primarily cleared for farming.



Photo 8 ***Open sandy plain featuring low stunted heath***



Photo 9 ***Limestone rural road through flat plain lined by expanse of uniform vegetation cover.***



Photo 10 ***Intermittent remnant vegetation abutting and within cleared agricultural land.***



Photo 11 ***Cleared flat pastoral land with remnant vegetation.***



Photo 12 ***Lower area of the plain features a flat topography with wild heath and sedge including the bright red swamp bottlebrush.***



Photo 13 ***Sheltered expanse of uniform vegetation cover with variation in colour, texture, and pattern.***

6.2.2.1 Key characteristics

The key characteristics of LCU2 are listed in Table 10.

Table 10 Key characteristics of LCU2

Criteria	Description
Landform	LCU2 lies between the hills delineating the southern extent of the Darling Plateau and the ocean and to the west the Hardy Inlet. Landform characteristics associated with LCU2 include windswept dunes, sandy shoreline deposits fronting a low-lying wetland corridor with low rounded hills and scattered ridges to the north that gradually slope towards the sandy plains below (CALM, 1994).
Vegetation	Vegetation within LCU2 is diverse in structure and composition ranging from sedges to low heath, woodlands, and forests. The taller forest includes Jarrah (*Eucalyptus marginata*), Marri (*E. calophylla*) and Karri (*E. diversicolor*) with the Karri occurring in varies areas of the landscape such as shallow gullies, hill slopes and low plains. The understorey includes a variety of Wattles, Hazels (*Chorilaena spp*.), Water Bush (*Bossiaea aquifolia),* Bull Banksia (*B. grandis*), Snottygobble (*Persoonia longifolia*) and Peppermints (*Agonis flexuosa.)* with the lower areas of the plain influenced by the variability of the water table which effects the vegetation cover surrounding the swamps and lakes. Vegetation in these areas is often heath and sedge (CALM, 1994).
Waterways / reserves	LCU2 includes Scott National Park and Gingilup Swamps Nature Reserve. Terminating at Hardy Inlet the key water feature is Scott River (a tributary of the Blackwood River), with additional rivers, streams and springs also occurring, including Swan Lakes and Lake Gingilup (CALM, 1994).
Land use	Land use within LCU2 is primarily farmland. The remaining areas consist of reserves, national park, and unallocated crown land (Shire of Augusta Margaret River, 2022).
Infrastructure	Infrastructure includes the settlement of East Augusta, East Augusta Jetty, local unsealed roads and 4WD tracks.
Cultural and characteristics	An area of significant environmental and biodiversity value this LCU, incorporating Scott National Park and Gingilup Swamps Nature Reserve, includes highly diverse flora and fauna species. The environmental values are an essential component of both the heritage and wilderness value of this area with previous community engagement outcomes indicating a strong desire to protect the integrity of the environment (WAPC, 2009). Recreational pursuits at Swan Lakes, including fishing and boating and East Augusta residents daily transport needs met by boat are unique to LCU2 (Margaret River Busselton Tourism Association, 2024).
Spatial qualities	The scale of this LCU2, as defined by CALM (1994) includes vertical cliffs, horizontal sandy plains, shoreline, parallel series of dune ridges, horizontal reefs and wave cut platforms, gently curving beaches, swampy corridors and U-shaped valleys and a wetland corridor. Extensive views are provided from high points with long ranging views over the landscape offered by the swampy low-lying plain. Views to the foreground and midground restricted by the coastal dune system (CALM, 1994).

6.2.2.2 Landscape impact assessment

Refer to Table 11 for assessment.

Table 11 LCU2 Scott Coastal Plains landscape impact assessment

Criteria	Assessment
Anticipated change to landscape character	The Proposal will occur outside of LCU2. The Proposal will be visible from LCU2 and will therefore have the capacity to impact the setting of LCU2. The anticipated change would include views of: – Up to 20 wind turbines with a maximum tip height of 250 m – Two meteorological masts with a maximum height of 164 m
Landscape value	LCU2 is an area of significant environmental and biodiversity value with a landscape value of **high**. Scenic qualities include long stretches of coastline free of disturbance and designated areas incorporating Scott National Park and Gingilup Swamps Nature Reserve which includes highly diverse flora and fauna species. These values are recognised in the Augusta Margaret River LPS1.

Criteria	Assessment
Susceptibility to change	Susceptibility to accommodate the proposed change is **high** as the landscape is of high quality with consistent, intact, well-defined attributes. The proposed development would be incompatible with some of the existing characteristics of the area and mitigation measures are unlikely to reduce the impacts of the change.
Sensitivity to change	The sensitivity to change is **high** as the susceptibility to accommodate the proposed change is considered high and the landscape value is high.
Magnitude of change	Magnitude of change is **moderate** as the Proposal will result in discernible changes in the landscape character due to partial loss of, or change to elements, features, or characteristics of the landscape. The change would appear to have an adverse effect on the landscape character since it would be out of scale with the local pattern and the landforms.
Duration of impact	Permanent
Significance of impact	**High-moderate**

6.2.3 LCU3 – Darling Uplands

Distinguishing features

– A deeply dissected landscape featuring rolling hills, V shaped river valleys and extensive areas of Jarrah, Marri and Karri forest.

– LCU3 consists of the Margaret River (Wooditjup Bilya) and tributaries of the Blackwood River (Goorbilyup Buerle). The Margare River (Wooditjup Bilya) and tributaries of the Blackwood River, (Goorbilyup Buerle) and their foreshores are registered Aboriginal heritage sites.

– Farming and agriculture (including viticulture) and the timber industry are prevalent throughout LCU3 with family farms being quintessential to the way of life within LCU3.



Photo 14 *Gently rolling hills with uniform rows of grape vines backed by undisturbed forest.*



Photo 15 *Remnant vegetation alongside a semi-enclosed canopied rural road.*



Photo 16 *Cleared pasture land across gently rolling hills with ageing farm buildings, isolated trees backed by undisturbed forest.*



Photo 17 *Flat agricultural land with uniform windbreak planting and stand of remnant vegetation.*



Photo 18 Fenced Group Settlement farm residence



Photo 19 Karridale newly developed residential area

6.2.3.1 Key characteristics

The key characteristics of LCU3 are listed in Table 12.

Table 12 Key characteristics of LCU3

Criteria	Description
Landform	Located within the Darling Uplands this LCU includes rolling low hills, areas of granite outcrops and boulders and deep sided valleys influenced by the tributaries of the Blackwood River (Goorbilyup Buerle) and other watercourses.
Vegetation	Native vegetation includes dense areas of Jarrah forest (*Eucalyptus margrinata)* with an understorey including Sheok (*Allocasuarina fraseriana),* Bull Banksia (*B. grandis),* Snottygobble (Persoonia longifolia) and Woody Pear (*Xylomelum occidentale).* Other plant species include Grass Tree (*Xathorroea preissii*), Zamia Palm (*Macrozamia reidlii*), Prickly Bitter-Pea (*Daviesia decurrens*), Parrot Bush (*Dryandra sessilis*), Couch Honeypot (*D.nivea*), Snail Hakea (*H. cristata*) and the Two-leaf Hakea (*H. trifurcata*). This vegetation is interspersed with areas of cleared pastoral and farming lands, including areas of tree plantation.
Waterways/reserves	Reserves within LCU3 are plentiful and include, in no particular order, Milyeannup State Forest, Milyeannup National Park, Barlee Brook State Forest, Blackwood State Forest, Blackwood River National Park, South Blackwood State Forest, Hilliger National Park, Forest Grove National Park, Pagett Nature Reserve, Chester Nature Reserve and Wiltshire Butler National Park. Prominent drainage features of LCU 3 include the Margaret River (Wooditjup Bilya) located in the northern extent of LCU3 and the tributaries of the Blackwood River (Goorbilyup Buerle). Both the Margaret River (Wooditjup Bilya) and tributaries of the Blackwood River (Goorbilyup Buerle) are registered Aboriginal heritage sites.
Land use	Land use within LCU3 primarily includes farming / agriculture and state forest / national parks and nature reserves. Within this LCU also sits residential areas of Augusta, Kudardup, Karridale, Witchcliffe, and south-east Margaret River in addition to rural residential areas.
Infrastructure	LCU3 is bordered by Bussell Highway (the main arterial road north to south) and Brockman Highway (the main arterial road east to west). Infrastructure associated with rural localities and residential areas is also included in LCU3 as is Alexandra Bridge.
Cultural and characteristics	LCU3 includes the rural localities of Karridale, Kudardup, Alexandra Bridge and Witchcliffe. Farming and agriculture (including viticulture) and the timber industry are prevalent throughout LCU3 with family farms being quintessential to the way of life within LCU3.
Spatial qualities	Subdued topography with a gently undulating plateau featuring rolling hills and V shaped river valleys, tall forests and cleared agricultural land.

6.2.3.2 Landscape impact assessment

Refer to Table 13 for assessment.

Table 13 LCU3 Darling Uplands landscape impact assessment

Criteria	Assessment
Anticipated change to landscape character	The Proposal will occur within LCU2. The anticipated change may include: – Up to 20 wind turbines with a maximum tip height of 250m – Two meteorological masts with a maximum height of 164 m – Transmission poles – Access tracks – Substation – Operation and maintenance facility – Temporary batching plant – Temporary construction and laydown area
Landscape value	LCU3 has a landscape value of **high**. The two main drainage features within LCU3 are registered Aboriginal heritage sites. LCU3 also includes a number of designated national parks, including but not limited to Blackwood River National Park and Milyeannup National Park in addition to residential areas such as new subdivisions located east of Bussell Highway in Karridale and Witchcliffe.
Susceptibility to change	Susceptibility to accommodate the proposed change is **moderate** as LCU3 is a dissected landscape consisting of native vegetation interspersed with areas of cleared pastoral and farming lands, as such classified as being of moderate quality and condition. In addition, changes caused by the Proposal would be unlikely to have a significant adverse effect on the landscape character, as a whole, that cannot be effectively mitigated.
Sensitivity to change	The sensitivity to change is **high** as the landscape value is high and the susceptibility to accommodate the proposed change is considered moderate.
Magnitude of change	The magnitude of change is **moderate** as the Proposal will likely result in discernible changes to the landscape character due to partial loss of, or change to, elements, features or characteristics of the landscape that would be out of scale with the local pattern and landforms.
Duration of impact	Permanent
Significance of impact	**High-moderate**

6.2.4 LCU4 – Blackwood River and Hardy Inlet Riparian Corridor

Distinguishing features

– LCU4 consists of the Blackwood River and Hardy Inlet (Goorbilyup Buerle). Hardy Inlet and the Blackwood River, (Goorbilyup Buerle) and their foreshores are registered Aboriginal heritage sites.

– Hardy Inlet is open to the Southern Ocean, via Flinders Bay. The Blackwood River (Goorbilyup Buerle) discharges into the north eastern end of the inlet.

– 70% of lower Blackwood land use consists of State Forest or conservation estate.

– Fringing vegetation is largely in excellent condition.

– Recreational pursuits such as kayaking, boating, and camping alongside the Blackwood River (Goorbilyup Buerle) are popular pastimes for local residents, tourists, and visitors.

– Ellis Street Jetty primarily serves as the boat access from East Augusta (a regular form of transport)



Photo 20 *Open basin of Hardy Inlet*



Photo 21 *A unique gated private jetty at East Augusta*



Photo 22 *An enclosed view of the dark waters of the river fringed by riparian vegetation*



Photo 23 *Gently rippling water fringed by riparian vegetation gives a sense of enclosure*



Photo 24 *A framed view of the river at Alexandra Bridge*



Photo 25 *Reflected undisturbed natural vegetation on the banks of the river*

6.2.4.1 Key characteristics

The key characteristics of LCU4 are listed in Table 14.

Table 14 Key characteristics of LCU4

Criteria	Description
Waterform	Edged by irregular slopes, LCU4 consists of Hardy Inlet and the lower / coastal catchment of the Blackwood River (Goorbilyup Buerle). The river mouth is at its narrowest at the entrance channel, which expands out at Senge Bay and further still just north of East Augusta settlement before opening out into the Hardy Inlet basin that has an area of 9 km. Molloy Island is located within the northeast component of the inlet with Blackwood River (Goorbilyup Buerle) to the northwest of the Island. The long sinuous lower Blackwood gently ripples and snakes through the landscape in an irregular pattern, becoming wider or narrower throughout the extent of the catchment. The depth of the inlet and river vary from shallow areas with sandy beaches and sand bars closer to the entrance channel and deeper water towards the centre. The depth variances are reflected in surface colour from light blue – deep dark brown and blue.
Vegetation	Fringing vegetation throughout the extent of LCU4 is largely intact and in excellent condition. There are various zones of riparian with rushes present towards the coast giving way to salt and then freshwater melaleucas with medium height jarrah-marri forest. A small area of medium height woodland comprising flooded gum ((*Eucalyptus rudis*) and blackbutt with some bullich, jarrah and marri fringes the river whilst another small area is covered by low paperbark woodlands (*Melaleuca sp*.) (Department of Water, 2015).
Reserves	National parks adjacent to LCU4 include Scott National Park and Blackwood River National Park. There are also numerous unnamed reserves located alongside the river banks.
Land use	Land use within LCU4 mostly consists of vegetation and conservation estates with almost 70% of the lower catchment being State Forest or conservation estate with other land use consisting of timber milling, intensive horticulture, viticulture, dairy and beef farming (DWER, 2024).
Infrastructure	Infrastructure within LCU4 includes boat ramps, jetties of various size, styles and types, Molloy Island vehicle and pedestrian chain ferry and two vehicle bridges being Warner Glen and Alexandra Bridge.
Cultural and characteristics	Blackwood River (Goorbilyup Buerle) is a registered Aboriginal heritage site. It is believed that the Blackwood River (Goorbilyup Buerle) was created by and is home to the Waugal, rendering the entire river and its tributaries as a sacred site. It is also important to Aboriginal people as it forms the cultural boundary between the Bibulmun/Piblemen and Wardandi language groups (Brad Goode & Associates, 2018). Kayaking, boating, fishing, camping, and bushwalking alongside the Blackwood River (Goorbilyup Buerle) are popular recreational pursuits.
Spatial qualities	A narrow entrance channel at the river mouth that opening out into a wide basin at Hardy Inlet that transitions into a narrower winding river, edged by irregular slopes framed by varying zones of riparian vegetation.

6.2.4.2 Landscape impact assessment

Refer to Table 15 for assessment.

Table 15 LCU4 Blackwood River and Hardy Inlet Riparian Corridor landscape impact assessment

Criteria	Assessment
Anticipated change to landscape character	The Proposal will occur outside of LCU4. Elements of the Proposal will be visible from LCU4 and will therefore have the capacity to impact the setting of LCU4. The anticipated change may include views of: – Up to 20 wind turbines with a maximum tip height of 250 m.
Landscape value	Landscape values associated with LCU4 include designated landscapes such as Scott National Park and Blackwood River National Park and the nationally important features of the river corridor in addition to Aboriginal Cultural Heritage sensitivities. LCU4 therefore has a **high** landscape value.

Criteria	Assessment
Susceptibility to change	The landscape susceptibility to change is **moderate** as any change caused by the Proposal would be unlikely to have a significant adverse effect on the landscape character, condition or value that could not be mitigated.
Sensitivity to change	Sensitivity to change is **high** as the community place high value upon the landscape of LCU4 and enjoyment of views of their setting.
Magnitude of change	The magnitude of change is **low**, as the proposal will alter one or more key view elements, features, or characteristics by introducing components likely to be visible from specific confined locations within LCU4. Although limited, the change would appear to have an adverse effect on the view at these specific locations, as it would be out of scale with the existing view.
Duration of impact	Permanent
Significance of impact	**Moderate**

6.3 Summary of landscape character impacts

Landscape character units within the Study Area include LCU1 – Leeuwin Naturaliste Coast, LCU2 Scott Coastal Plains, LCU3 Darling Uplands and LCU 4 Blackwood River and Hardy Inlet Riparian Corridor. The detailed review undertaken provided a thorough understanding of the key characteristics of each LCU which, in turn, provided the baseline data required to carry out the landscape impact assessment (Table 16).

The landscape impact assessment found that LCU 1 – Leeuwin Naturaliste Coast, LCU2 – Scott Coastal Plain and LCU3 - Darling Uplands would be most significantly impacted by the Proposal, with a rating of high-moderate, for the following reasons:

– LCU1 Leeuwin Naturaliste Ridge has a high sensitivity relating to Leeuwin Naturaliste Ridge, a landscape of high quality and a magnitude of change of moderate as the Proposal will result in discernible changes in the landscape.
– LCU2 Scott Coastal Plain has a high sensitivity relating to the Southern Ocean coastline, an area of high scenic values, and numerous designated areas which include highly diverse flora and fauna species. The magnitude of change is moderate as the Proposal will result in discernible changes in the landscape that would be out of scale with the landscape character and at odds with the local pattern of the landform.
– LCU3 Darling Uplands received a high-moderate significance of impact rating due to the importance of the drainage features and inclusion of designated areas within a dissected landscape whereby the Proposal would result in discernible changes to the landscape that would leave an adverse impact on the landscape character.
– LCU4 Blackwood River and Hardy Inlet Riparian Corridor received a significance of impact rating of moderate as it likely that this LCU will experience landscape character impacts confined to specific locations.

Table 16 Summary of landscape character impacts

LCU	Name	Sensitivity to change	Magnitude of change	Significance of impact
LCU1	Leeuwin Naturaliste Coast	High	Moderate	High-moderate
LCU2	Scott Coastal Plains	High	Moderate	High-moderate
LCU3	Darling Uplands	High	Moderate	High-moderate
LCU4	Blackwood River and Hardy Inlet Riparian Corridor	High	Low	Moderate

7. Visual impact assessment

7.1 Zone of theoretical visibility analysis

A ZTV analyses were undertaken for the Proposal, focusing on the theoretical visibility of the Proposal. Refer to Section 3.1 for the methodology and heights used and below for an analysis of the ZTV.

Figure 14 and Figure 15 show the Proposal ZTV. The areas showing colour gradient from purple to white indicate land where the Proposal is theoretically visible.

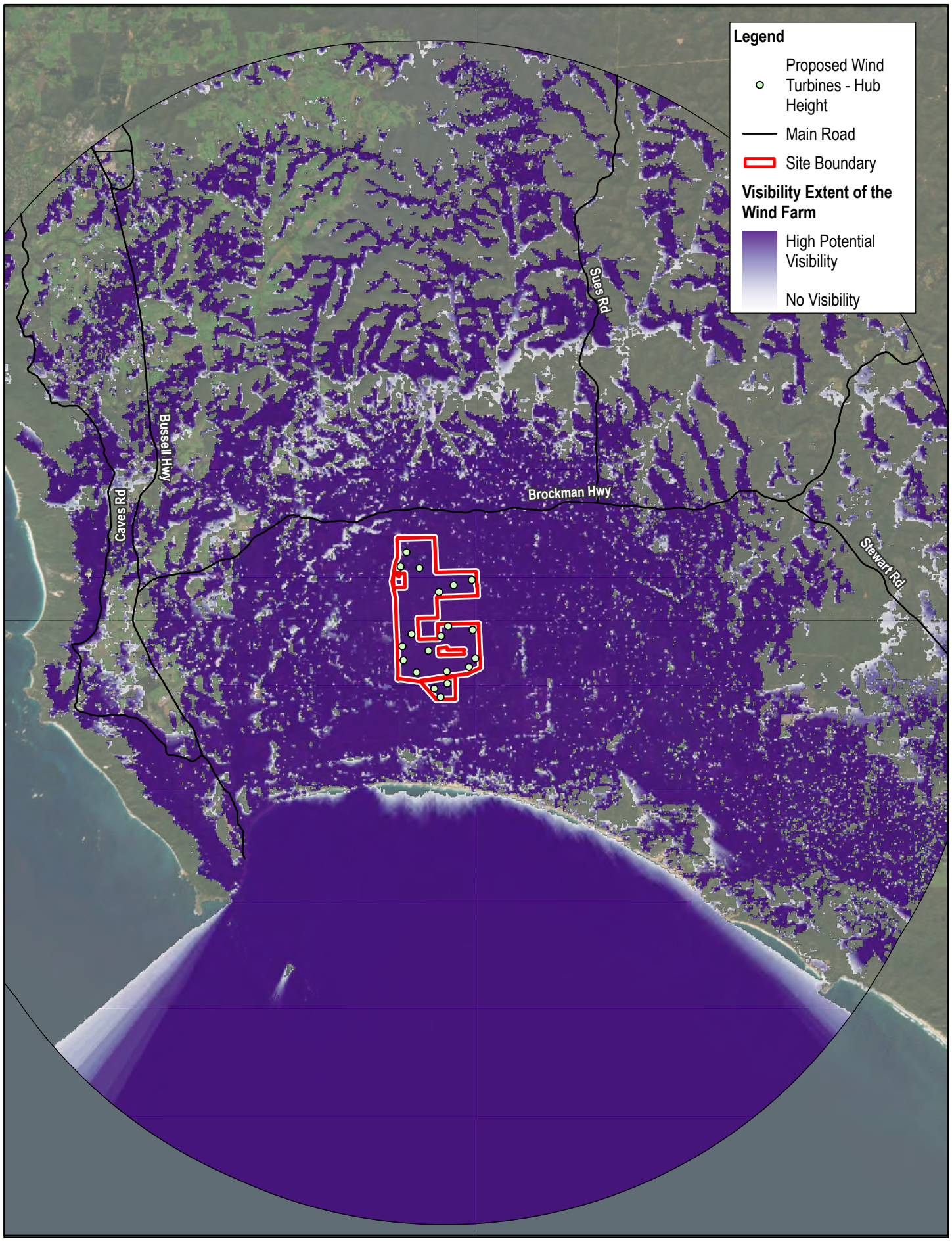
7.2 Site inspection and sensitive visual receptors

The ZTVs show that the siting of the Proposal has resulted in a high visibility of the Proposal throughout the Study Area. During the site inspection the existing Telstra radio tower was used as a reference guide to locate the Proposal site. It was observed that some areas shown as being theoretically visible on the ZTV mapping did not have views of the Proposal site due to intervening vegetation and / or distance. As a result, potential sensitive visual receptors were ruled out of the assessment including:

– East Augusta residential area
– Nillup General Store
– Cape Leeuwin lighthouse complex

The ZTVs showed that the wind turbines would be theoretically visible from Southern Ocean sensitive visual receptors (such as cruise passengers, commercial and recreational fisherpersons) to the south of the Proposal site. However, these areas were discounted from the assessment due to inaccessibility and limited public use.

Remaining sensitive visual receptor locations were chosen for viewpoint assessment in Section 7.3.



Paper Size ISO A4

0 3 6 9 12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Synergy Renewable Energy Developments Pty Ltd
Proposed Wind Farm - Scott River

Zone of Theoretical Visibility Mapping - Hub Height

Project No. **12632296**
Revision No. **1**
Date **07/01/2025**

FIGURE 14

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Print date: 07 Jan 2025 - 15:44

Data source: World Imagery: Earthstar Geographics. Created by: rbrown3



Paper Size ISO A4

0 3 6 9 12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposed Wind Farm - Scott River

Zone of Theoretical Visibility Mapping - Tip Height

Project No. **12632296**
Revision No. **1**
Date **07/01/2025**

FIGURE 15

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Print date: 07 Jan 2025 - 15:44

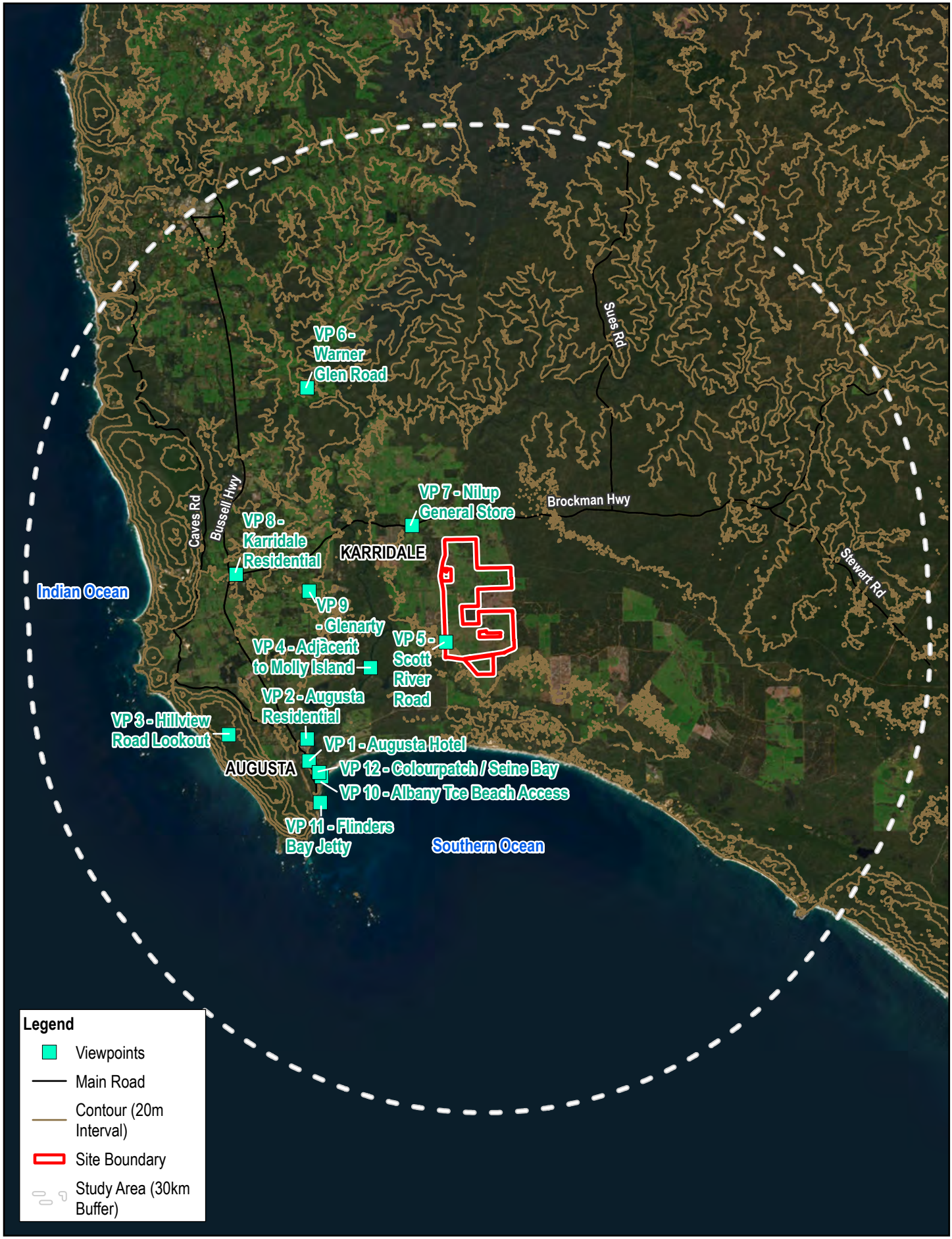
Data source: World Imagery: Earthstar Geographics. Created by: rbrown3

7.3 Viewpoint locations

Based on the visual analysis and understanding of the Proposal, viewpoint locations were selected for assessment of sensitive visual receptors. Refer to Table 17 and Figure 16 for viewpoint locations. For each viewpoint, a panorama of the existing view is provided, together with a description of the existing view, anticipated changes, and impact assessment rating.

Table 17 Viewpoint locations

VP	Title	Location
VP01	Augusta Hotel	Blackwood Avenue, Augusta
VP02	Augusta Residential	Hurford Place, Augusta
VP03	Hillview Road Lookout	Lawrence Road, Augusta
VP04	Adjacent to Molloy Island	Howe Road, Kudardup
VP05	Scott River Road	Scott River Road, Scott River
VP06	Warner Glen Road	Warner Glen Road, Forest Grove
VP07	Brockman Highway	Brockman Highway, Schroeder
VP08	Karridale Residential	Sawmill Loop, Karridale
VP09	Glenarty Road	Glenarty Road, Karridale
VP10	Albany Tce Beach Access	Albany Terrace, Augusta
VP11	Flinders Bay Jetty	Davies Road, Augusta
VP12	Colourpatch / Seine Bay	Albany Terrace, Augusta



Paper Size ISO A4

0 3 6 9 12

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposed Wind Farm - Scott River

Project No. **12632296**
Revision No. **3**
Date **07/01/2025**

Viewpoints

FIGURE 16

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Data source: World Imagery: Earthstar Geographics. Created by: rbrown3

7.4 Assessment of visual impacts

7.4.1 Viewpoint 1 Augusta Hotel

Viewpoint 1 Augusta Hotel is located on Blackwood Avenue, Augusta facing north-east, as shown in Photo 26. Refer to Table 18 for assessment. Refer to Appendix A for photomontages of this viewpoint.



Photo 26 ***Existing view from VP01 Augusta Hotel - Blackwood Avenue, Augusta***



Photo 27 ***Photomontage from VP01 Augusta Hotel - Blackwood Avenue, Augusta***



Photo 28 ***Proposed design rotated 90 degrees with rotated blades from VP01 Augusta Hotel - Blackwood Avenue, Augusta***

Table 18 VP01 assessment

Criteria	Comments
Location	50 34°19.19" S 115° 9' 38" E Elevation: 45.4 m VP01 is situated approximately 12 km south-west of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by Augusta residents and Augusta town centre visitors including patrons of Augusta Hotel. VP01 provides expansive views across Hardy Inlet and East Augusta.
Description of existing view	The foreground includes the grassed slope of the hotel alfresco area with frosted sphere lighting and a variety of fencing types including colorbond compound, rendered brick, hit and miss timber panel and post and rail fencing all of cream tones. A series of cream fibre cement buildings with forest green trim and red corrugated iron roofs are also located within the left to right of centre of the foreground view. The midground includes a proportion of the grassed embankment and the sweeping form of Hardy Inlet. The densely vegetated area of East Augusta is visible across the extent of the background view with a glimpse of the Southern Ocean to the far right of the view.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of the wind turbines (hub tip and blades) are highly likely to be visible in the centre of the background. This will be a permanent change in the view that will not be screened.
Sensitivity to change	The sensitivity of change is **high** as residents and visitors to Augusta town centre place value on the scenic, elevated long and wide views across Hardy Inlet and East Augusta from VP01 located on Blackwood Avenue, the main street of Augusta.
Magnitude of change	The magnitude of change is **high** as the top of the towers and blades of the Proposal will be visible above the vegetation cover resulting in a substantial and obvious change to the existing view, which permanently alters the characteristics and diminishes the perceived quality of the view.
Significance of impact	The significance of impact is **high**, as the sensitivity to change is **high** and the magnitude of change is high.

7.4.2 Viewpoint 2 Augusta Residential

Viewpoint 2 Augusta Residential is located on Hurford Place, Augusta facing north-east, as shown in Photo 29. Refer to Table 19 for assessment.



Photo 29 Existing view from VP02 Augusta Residential - Hurford Place, Augusta



Photo 30 *Photomontage from VP02 Augusta Residential - Hurford Place, Augusta*



Photo 31 *Red overlay showing maximum blade tip height from VP02 Augusta Residential - Hurford Place, Augusta*

Table 19 *VP02 assessment*

Criteria	Comments
Location	50 34°18'10"S 115°9'35"E Elevation: 19.4m VP02 is situated approximately 12 km south-west of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by Augusta residents. VP02 provides expansive views across Hardy Inlet and East Augusta.
Description of existing view	The foreground highlights landscaping, red asphalt driveways and cul-de-sac typical of the hillside residential areas of Augusta. Within the midground elevated two storey dwellings, orientated to capture the view of Hardy Inlet across to East Augusta, step down the hillside with street trees consisting of the weeping Peppermint tree (*Agonis flexuosa*). The calm waters of Hardy Inlet and undisturbed natural vegetation of East Augusta are visible in the background.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of the wind turbines (hub tip and blades) are highly likely to be visible in the centre - right of the background. This will be a permanent change in the view that will not be screened.
Sensitivity to change	Sensitivity to change is **high** as the community of Augusta, as a whole, place value on the scenic, elevated, and wide views that include the water body of Hardy Inlet with occupiers of residential properties such as those included in VP02 placing their living and outdoors areas on the second floor to take advantage of these views.

Criteria	Comments
Magnitude of change	The magnitude of change is **moderate** as the top of the towers and blades of the Proposal above the vegetation cover is a discernible change to the characteristics of the central - right view. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Significance of impact	The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

7.4.3 Viewpoint 3 Hillview Road Lookout

Viewpoint 3 Hillview Road Lookout is located just off Lawrence Road, Augusta facing north-east, as shown in Photo 32. Refer to Table 20 for assessment.



Photo 32 ***Existing view from VP03 Hillview Road Lookout, Lawrence Road, Augusta***



Photo 33 ***Photomontage from VP03 Hillview Road Lookout, Lawrence Road, Augusta***



Photo 34 ***Red overlay showing maximum blade tip height from VP02 Hillview Road Lookout, Lawrence Road, Augusta***

Table 20 VP03 assessment

Criteria	Comments
Location	50 34°17'39"S 115°6'13"E Elevation: 196 m VP03 is situated approximately 17 km south-west of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by visitors to Hillview Road Lookout and Augusta Golf Club members as Augusta Golf Club is of a similar vantage point, located adjacent to Hillview Road Lookout. VP02 provides expansive views from Leeuwin-Naturaliste Ridge across the flat to undulating plain of Leeuwin Naturaliste Coast and the Darling Uplands towards Hardy Inlet, East Augusta and the Southern Ocean.
Description of existing view	Situated within the Leeuwin-Naturaliste Ridge the foreground indicates wind pruned heath and stunted low forest located on top of a rounded undulating hillside. The midground view includes cleared agricultural lands with remnant vegetation and forested areas with the winding form of Hardy Inlet and the relatively undisturbed landscape surrounding East Augusta and a glimpse of the Southern Ocean in the background.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of the wind turbines (hub tip and blades) may be visible in the background but the prominence if this will be diminished due to the distance of VP03 from the Proposal.
Sensitivity to change	VP03 is situated with LCU1 Leeuwin-Naturaliste Coast which is protected by State Planning Policy 6.1. This policy nominates the Leeuwin-Naturaliste Ridge as an area of extraordinary landscape value and one of the key landscape features within this area. The sensitivity to change is **high** as VP03 is a designated lookout that provides long and wide-ranging, elevated views within a scenic landscape that includes the Hardy Inlet.
Magnitude of change	The view is approximately 17 km away from the Proposal, as a result, the wind turbines may be visible but would occupy a very small portion of a much wider view. Although the visual impacts would be permanent in nature the magnitude of change is considered **low** due to the introduction of components that may be new but may not be uncharacteristic within the existing landscape character.
Significance of impact	The significance of impact is **moderate**, as the sensitivity to change is high and the magnitude of change is low.

7.4.4 Viewpoint 4 Adjacent to Molloy Island

Viewpoint 4 Adjacent to Molloy Island is located just off Howe Road, Kudardup facing north-east, as shown in Photo 35. Refer to Table 21 for assessment.



Photo 35 Existing view from VP04 Adjacent to Molloy Island, Howe Road, Kudardup



Photo 36 *Photomontage from VP04 Adjacent to Molloy Island, Howe Road, Kudardup*



Photo 37 *Red overlay showing maximum blade tip height from VP04 Adjacent to Molloy Island, Howe Road, Kudardup*

Table 21 *VP04 assessment*

Criteria	Comments
Location	50 34°15'21"S 115°12'39"E Elevation: 8.7 m VP04 is situated approximately 6 km south-west of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by visitors of Molloy Hideaway Holiday Park, recreational river users and Molloy Island residents from the chain ferry vehicle barge. VP04 provides expansive views across Blackwood River, Molloy Island and Scott National Park.
Description of existing view	The varied and textured riparian vegetation of the Blackwood River (Goorbilyup Buerle) is indicated within the foreground of VP04. This provides a sense of intimacy and enclosure in juxtaposition to the large expanse of the Blackwood River (Goorbilyup Buerle), the rippled and calm nature of which dominated the midground. The muted dark green – charcoal tones of Molly Island and Scott River National Park in the background provide a high degree of tranquillity.
Anticipated change to view	As indicated in Photo 36 it is likely that a number of turbines will be visible from this public viewpoint, with intervening vegetation shielding the majority of the Proposal.
Sensitivity to change	Sensitivity to change is **high** as VP04 is a conservation and scenic area used for recreation with views that include bodies of water. In addition, occupiers of residential properties frequently engage with this view via use of the chain ferry vehicle barge.
Magnitude of change	The magnitude of change at VP04 is assessed as **moderate** as a proportion of the wind turbines would be visible in the left side of the view which causes discernible change to the characteristics of the view. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Significance of impact	The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

Note: This VP was the nearest to Molloy Island and offers representational views from the island. According to the assessment of VP04 and considering the dense vegetation on Molloy Island and in Scott River National Park it is unlikely that the Proposal will be visible from most areas of Molloy Island.

7.4.5 Viewpoint 5 Scott River Road

Viewpoint 5 Scott River Road is located on the Scott River Road, Scott River facing north, as shown in Photo 38. Refer to Table 22 for assessment.



Photo 38 ***Existing view from VP05 Scott River Road, Scott River Road, Scott River***



Photo 39 ***Photomontage from VP05 Scott River Road, Scott River Road, Scott River***



Photo 40 ***Red overlay showing maximum blade tip height from VP05 Scott River Road, Scott River Road, Scott River***

Table 22 VP05 assessment

Criteria	Comments
Location	50 34°14'26"S 115°16'11"E Elevation: 40.4 m VP05 is situated directly adjacent to the Proposal site and is facing in an eastern direction. This viewpoint is representative of views experienced by residents and agricultural workers of East Augusta and Scott River. VP05 provides expansive views across the pastureland and remnant vegetation located within the Proposal site.
Description of existing view	The sandy flats of the foreground include an open area of homogenous browning grassland with the midground including clumps of trees and fence line to the left. The background exemplifies the gradual and naturally appearing transition between agricultural land and naturally vegetated areas.
Anticipated change to view	**Construction** During the construction phase, potential short term visual impacts may be associated with construction of gravel access tracks and associated earthworks and vegetation clearing (between turbines and existing public access roads and within the site), trenching, concrete batching plant (100 m x 100 m), construction and laydown area (100 m x 400 m), wind turbine, meteorological mast and transmission post and lattice tower transportation and construction in addition to additional construction activities such as increased vehicle movements. **Operation** Windfarm components visible from VP05 are subject to finalisation of detailed design. Components that may be present in the view include wind turbines and foundations in the midground and background. Access tracks, hard stand areas and the meteorological mast.
Sensitivity to change	Sensitivity to change is **high** as VP05 will be experienced by occupiers of residential properties going to and from work with long viewing periods within close proximity to the Proposal. Outside workers will also have prolonged views of the Proposal from this vantage point.
Magnitude of change	The magnitude of change is considered **high** as the Proposal will have a substantial and obvious change to the existing view due to a change of elements within the view which cause a view to be permanently changed and its perceived quality diminished.
Significance of impact	The significance of impact is **high**, as the sensitivity to change is high and the magnitude of change is high.

7.4.6 Viewpoint 6 Warner Glen Road

Viewpoint 6 Warner Glen Road is located on Warner Glen Road, Forest Grove facing south-east, as shown in Photo 41. Refer to Table 23 for assessment. Refer to Appendix A for photomontages of this viewpoint.



Photo 41 Existing view from VP06 Warner Glen Road, Warner Glen Road, Forest Grove



Photo 42 *Photomontage from VP06 Warner Glen Road, Warner Glen Road, Forest Grove*



Photo 43 *Red overlay showing maximum blade tip height from VP06 Warner Glen Road, Warner Glen Road, Forest Grove*

Table 23 *VP06 assessment*

Criteria	Comments
Location	50 34°4'25"S 115°9'48"E Elevation: 148.6 m VP06 is situated approximately 15 km north-west of the Proposal and is facing in a south-east direction. This viewpoint is representative of views experienced by occupiers of residences and farm workers within Warner Glen in addition to recreational users and tourists (accessing scenic locations such as Chapman Pool). VP06 provides elevated views across reticulated undulating pastureland towards forested areas.
Description of existing view	The foreground is characterised by the gently undulating irrigated pastureland featuring textured, bright green pasture. A cleared, sloping valley is in the centre of the midground. Components of the mid-ground view include isolated trees, tree clumps, farm related infrastructure (access tracks, fencing, power pole) with the farm dwelling visible in the righthand side. Further irrigated fields and a farm building can be seen in the background, along with the boundary of the surrounding forested area with the cleared agricultural landscape.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of the wind turbines (hub tip and blades) may be visible in the background but the prominence if this will be diminished due to the distance of VP06 from the Proposal.
Sensitivity to change	Sensitivity to change is **high** as Warner Glen Road is a scenic road that is utilised by local residents, recreational users, and tourists. It provides long and wide scenic views across the rural landscape from an elevated vantage point and occupiers of rural properties will experience prolonged views of the Proposal from VP06.

Criteria	Comments
Magnitude of change	Due to the distance from the Proposal the magnitude of change is **low** as the introduced wind turbines are not out of character with the existing view. The wind turbines are likely to be seen in the righthand side of the background view, just above the tree canopy. As the view already includes a range of industrial elements such as fencing, farm building and tracks, irrigated pastureland, the addition of the diminished turbines, located approximately 15 km away will be mostly consistent with the existing characteristics of the view.
Significance of impact	The significance of impact is **moderate**, as the sensitivity to change is high and the magnitude of change is low.

7.4.7 Viewpoint 7 Brockman Highway Residential

Viewpoint 7 Brockman Highway Residential is located on Brockman Highway, Schroeder facing south, as shown in Photo 44. Refer to Table 24 for assessment.



Photo 44 ***Existing view from VP07 Brockman Highway Residential, Brockman Road, Schroeder***



Photo 45 ***Photomontages from VP07 Brockman Highway Residential, Brockman Road, Schroeder***



Photo 46 ***Red overlay showing maximum blade tip height from VP07 Brockman Highway Residential, Brockman Road, Schroeder***

Table 24 VP07 assessment

Criteria	Comments
Location	50 34°9'32"S 115°17'37"E Elevation: 44.9 m VP07 is situated approximately 1.6 km north of the Proposal and is facing in a southern direction. This viewpoint is representative of views experienced by Brockman Highway road users. VP07 provides views across agricultural pastureland towards the Proposal site.
Description of existing view	The diagonal line of the access track spans the foreground, midground and background of VP07, the colour of which is quintessential of the rubbly pale orange lateritic soil and pea gravel of the Darling Uplands LCU. Shaded by remnant roadside vegetation (out of view) the foreground encompasses fenceposts and gates either side of the access track, with patches of low untended grass. To the left of the track stands a clump of trees. The midground includes a large flat expanse of dry uniform unirrigated pastureland with rolls of hay adjacent to the access track and a herd of cows grazing in the paddock. Large trees delineate the extent of the background view.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of wind turbines will likely be visible in the background. Depending on where it is situated a component of the meteorological mast may also be visible from VP07.
Sensitivity to change	Brockman Highway is an arterial road between Karridale in the west and Nannup in the east. As stated in AMR Shire LPS Brockman Highway has associated visual management controls whereby large visually obtrusive developments on sites that are prominently located along travel route corridors and contribute to the natural and rural landscape amenity of the shire are discouraged. Categories of road users include, but are not limited to, local residents, agricultural workers, heavy haul vehicles and tourists. Based on the local government road designations and type of sensitive visual receptors and their likely interest in the view the sensitivity to change is defined as **high.**
Magnitude of change	The magnitude of change is **moderate** as the top of the towers and blades of the Proposal above the vegetation cover is a discernible change to the characteristics of the view. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Significance of impact	The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

7.4.8 Viewpoint 8 Karridale Residential

Viewpoint 8 Karridale Residential is located on Sawmill Loop, Karridale facing east, as shown in Photo 47. Refer to Table 25 for assessment.



Photo 47 Existing view from VP08 Karridale Residential, Sawmill Loop, Karridale



Photo 48 *Red overlay showing maximum blade tip height from VP08 Karridale Residential, Sawmill Loop, Karridale*

Table 25 *VP08 assessment*

Criteria	Comments
Location	50 34°4'25"S 115°9'48"E Elevation: 135.7 m VP08 is situated approximately 15 km west of the Proposal and is facing in an eastern direction. This viewpoint is representative of views experienced by residents of Karridale semi-rural residential area. VP08 provides representative views of the residential area.
Description of existing view	The view is centred along the residential street of Sawmill Loop. The centre of the foreground and midground view is composed of Sawmill Loop, adjacent grey concrete pathway and post and wire rural fencing. The residential street is sparse and includes (from left to right) the roadway, sparsely vegetated verge segregated by the concrete path and the sloped yard of the adjacent residential property. Residential dwellings and associated infrastructure such as sheds, a water tank and fencing material are evident in the midground with open swales with driveways over concrete culverts and newly planted street trees, between the road and pathway in the midground to background of the view. The remainder of the background view consists of construction machinery, power poles and an agricultural field lined with trees on the skyline.
Anticipated change to view	Due to the distance from the Proposal and intervening vegetation there is no anticipated changed to the view from construction or operation.
Sensitivity to change	The sensitivity to change is **moderate** as VP08 will be experienced by occupiers of residential properties with long viewing periods at a distance from and screened from the Proposal.
Magnitude of change	The magnitude of change is **negligible** as there is almost imperceptible or no change in the view as there is little or no loss of/or change to the elements, features, or characteristics of the view.
Significance of impact	The significance of impact is **negligible**, as the sensitivity to change is moderate and the magnitude of change is negligible.

7.4.9 Viewpoint 9 Glenarty Road

Viewpoint 9 Glenarty Road is located on Glenarty Road, Karridale facing east, as shown in Photo 49. Refer to Table 26 for assessment.



Photo 49 *Existing view from VP09 Glenarty Road, Glenarty Road, Karridale*



Photo 50 *Photomontages from VP09 Glenarty Road, Glenarty Road, Karridale*



Photo 51 *Red overlay showing maximum blade tip height from VP09 Glenarty Road, Glenarty Road, Karridale*

Table 26 *VP09 assessment*

Criteria	Comments
Location	50 34°12'20" S 115°9'49"E Elevation: 85.4 m VP09 is situated approximately 9.5 km west of the Proposal and is facing in an eastern direction. This viewpoint is representative of views experienced by occupiers of residences within the locality of Glenarty in addition to tourists and visitors to such places as local wineries. VP08 provides representative views across gently undulating pastureland towards forested area.
Description of existing view	Evident in the foreground is an open view of gently undulating low, dry pasture. The centre of the midground view includes sparsely scattered trees and cattle grazing. Within the gradual undulating form of the midground, scattered trees and vegetation are located to the left and right of the view, framing the open pastural landscape. Within the background the landscape transitions from agriculture to relatively undisturbed, low-lying forested areas.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. Views may be partially screened by intervening vegetation. **Operation** During operation, a proportion of the wind turbines (hub and blades) are likely to be visible in the background. Views may be partially screened by intervening vegetation.
Sensitivity to change	The sensitivity to change is **high** as Glenarty Road is a local road that provides scenic and rural views from an elevated position which is utilised by local residents, agricultural workers, recreational users and tourists.
Magnitude of change	The magnitude of change is **moderate** as the likely view of a proportion of the wind turbines above the vegetation cover is discernible change to the characteristics of the view. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Significance of impact	The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

7.4.10 Viewpoint 10 Albany Terrace Beach Access

Viewpoint 10 Albany Terrace Beach Access is located on Albany Terrace, Augusta facing north-east, as shown in Photo 52. Refer to Table 27 for assessment. Refer to Appendix A for photomontages of this viewpoint.



Photo 52 ***Existing view from VP10 Albany Terrace, Albany Terrace, Augusta***



Photo 53 ***Photomontage from VP10 Albany Terrace, Albany Terrace, Augusta***



Photo 54 ***Proposed design rotated 90 degrees with rotated blades from VP10 Albany Tce, Albany Terrace, Augusta***

Table 27 VP10 assessment

Criteria	Comments
Location	50 34°19'36" S 115°10'12"E Elevation: 7.9 m VP10 is situated approximately 12.5 km southwest of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by local residents, recreational beach users and tourists. VP10 provides representative views of the Hardy Inlet / Southern Ocean river mouth and the coastal zone of the Scott Coastal Plain from Albany Terrace beach access point.
Description of existing view	A sand dune with low-growing coastal vegetation is located in the left of the foreground view. The beach expands across the centre and right of the foreground view. The beach extends across the midground view where it merges with the Blackwood river mouth and into the Southern Ocean. In the background the gentle curve of the coastline allows for long unobstructed views of the Southern Ocean and coastal zone of the Scott Coastal Plain which provides and expansive and rugged coastal view.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. **Operation** During operation, a proportion of the wind turbines are highly likely to be visible in the background.
Sensitivity to change	Sensitivity to change is **high** as VP10 is a coastal vantage point that includes long scenic views of the Southern Ocean, Blackwood river mouth and the coastal zone of Scott Coastal Plain that will be experienced by recreation users in additional to local residents and tourists.
Magnitude of change	Although the Proposal is located approximately 12.5 km away Photo 53 highlights the permanent change the Proposal will have to an otherwise undeveloped and rugged coastal view. As such the magnitude of change is **high** as the Proposal will cause the view to be permanently altered and its perceived quality diminished through the inclusion of a substantial and obvious change to the existing view.
Significance of impact	The significance of impact is **high**, as the sensitivity to change is high and the magnitude of change is high.

7.4.11 Viewpoint 11 Flinders Bay Jetty

Viewpoint 11 Flinders Bay Jetty is located on Davies Road, Augusta facing north-east, as shown in Photo 55. Refer to Table 28 for assessment. Refer to Appendix A for photomontages of this viewpoint.



Photo 55 VP11 Flinders Bay Jetty, Davies Road, Augusta



Photo 56 *Photomontage from VP11 Flinders Bay Jetty, Davies Road, Augusta*



Photo 57 *Proposed design rotated 90 degrees with rotated blades from VP11 Flinders Bay Jetty, Davies Road, Augusta*

Table 28 *VP11 assessment*

Criteria	Comments
Location	50 34°20'36"S 115°10'6"E Elevation: 52.6 m VP11 is situated approximately 14 km south-west of the Proposal and is facing in a north-east direction. This viewpoint is representative of views experienced by local residents, recreational beach users and tourists. VP11 provides representative views across Flinders Bay to the Southern Ocean and the coastal zone of the Scott Coastal Plain, in addition to residential areas of Augusta from Flinders Bay Jetty.
Description of existing view	Framed by a platform on the left and a jetty on the right the foreground view consists of the gently rippling form of the ocean. Crystal clear and shallow, with scatterings of boulders adjacent to the shore, the shallow water also contains dark patches of reef and seaweed. To the left of the midground view is the moderately inclined hillslope adjacent to Augusta town centre. This is densely vegetated with numerous houses dispersed throughout. Across the large expanse of ocean, within the background view, is the coastal zone of Scott Coastal Plain. A slither of land with a high degree of naturalness.
Anticipated change to view	**Construction** During the construction phase potential short term visual impacts associated with assembly of the wind turbines (including use of cranes) may be achieved in the background view. **Operation** During operation, a proportion of the wind turbines are highly likely to be visible in the background.
Sensitivity to change	Sensitivity to change is **high** as VP11 is a coastal vantage point that includes long scenic views of the Southern Ocean, and the coastal zone of Scott Coastal Plain that will be experienced by recreation users in addition to local residents and tourists.

Criteria	Comments
Magnitude of change	Although the Proposal is located approximately 14 km away Photo 56 highlights the permanent change the Proposal will have to an otherwise undeveloped view across the Southern Ocean towards the Scott Coastal Plain coastal zone. As such the magnitude of change is **high** as the Proposal will cause the view to be permanently altered and its perceived quality diminished through the inclusion of a substantial and obvious change to the existing view.
Significance of impact	The significance of impact is **high**, as the sensitivity to change is high and the magnitude of change is high.

7.4.12 Viewpoint 12 Colourpatch / Seine Bay

Viewpoint 12 is located at Colourpatch / Seine Bay, within close proximity to Albany Terrace, Augusta. VP12 faces in a north-east direction, as shown in Photo 58. Refer to Table 29 for assessment. Refer to Appendix A for photomontages of this viewpoint.



Photo 58 ***Existing view from VP12 Colourpatch, Seine Bay, Augusta***



Photo 59 ***Photomontages from VP12 Colourpatch, Seine Bay, Augusta***



Photo 60 ***Red overlay showing maximum blade tip height from VP12 Colourpatch, Seine Bay, Augusta***

Table 29 VP12 assessment

Criteria	Comments
Location	50 34°19'27"S 115°10'6"E Elevation: 17 m VP12 is situated approximately 12 km south-west of the Proposal and faces a north-east direction. This viewpoint is representative of views experienced by local residents, recreational users of the inlet and tourists. VP12 provides representative views of the Hardy Inlet / Southern Ocean river mouth from Colourpatch / Seine Bay.
Description of existing view	The foreground showcases a well-maintained green lawn, a tall pine tree and shrubs fronted by a sandy beach. The midground is dominated by the deep grey/blue choppy form of the Hardy Inlet which, to the right of view, connects to the Southern Ocean. East Augusta is the landform shown in the distance. The gently sloping portion of East Augusta visible within this view, is covered with low, dense vegetation. Trees and shrubs make up the majority of the vegetation, which creates a dense natural buffer along the water's edge.
Anticipated change to view	**Construction** It is unlikely that the construction activities will impact VP12. **Operation** It is unlikely the wind turbines be visible from VP12. The wind turbine would be screened by the existing landform and topography.
Sensitivity to change	Sensitivity to change is **high**, as views of the landscape from this area are highly valued by the community, recreational users and tourists. Long scenic views of Seine Bay and Hardy Inlet, the Southern Ocean river mouth and East Augusta are afforded from VP12.
Magnitude of change	Although the Proposal is located approximately 12.5 km away it will impose a permanent change to an otherwise undeveloped view. The magnitude of change is **moderate** as a proportion of the wind turbines would be visible in the right side of the view which causes discernible change to the characteristics of the view. The change would appear to have an adverse effect on the view since it would be out of scale with the existing view.
Significance of impact	The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

7.5 Visual impact assessment summary

Table 30 provides a summary of the assessment of sensitive visual receptors. This assessment includes a panorama of the existing view, view description, anticipated visual changes in addition to an impact assessment rating. As highlighted in this table the overall visual impact rating ranges from high – negligible.

Table 30 Visual impacts assessment summary

VP	Title	Sensitivity to change	Magnitude of change	Significance of impact
VP01	Augusta Hotel	High	High	High
VP02	Augusta Residential	High	Moderate	High-moderate
VP03	Hillview Road Lookout	High	Low	Moderate
VP04	Adjacent to Molloy Island	High	Moderate	High-moderate
VP05	Scott River Road	High	High	High
VP06	Warner Glen Road	High	Low	Moderate
VP07	Brockman Highway	High	Moderate	High-moderate
VP08	Karridale Residential	Moderate	Negligible	Negligible
VP09	Glenarty Road	High	Moderate	High-moderate
VP10	Albany Tce Beach Access	High	High	High
VP11	Flinders Bay Jetty	High	High	High
VP12	Colourpatch / Seine Bay	High	Moderate	High-moderate

Mitigation and management measures



8. Mitigation and management measures

This section includes a discussion on how the Proposal responds to the visual management objectives identified in Section 5. Landscape and visual mitigation measures are proposed in Section 8.2

8.1 Response to landscape and visual management objectives

8.1.1 Best practice siting and design

Impacts on views from key landscape features identified in Section 4, including Leeuwin Naturaliste Ridge, Scott Coastal Plain, coastal environments, waterbodies, and Brockman Highway travel route corridor, in addition to sensitive visual receptors identified in Section 7, should be considered during initial wind farm layout design, having regard to other pertinent factors including wind quality and acoustic impacts that typically drive the wind turbine layout. Landscape character values identified in Section 6 should also be protected through appropriate siting and design.

The layout (e.g. grid pattern or clustered) of the wind farm should consider the existing landscape character (vegetation, waterform, landform and land use) and any topography variation. Best practice suggests that a regular shape, such as a double line, triangle or grid can appear appropriate within a wide open and level space where there is a regular landscape pattern, such as with in agricultural fields. As identified in Figure 4 the turbine layout seems to be dictated by the existing environmental constraints with turbines located within cleared agricultural areas. This has resulted in an irregular turbine layout which stands out from the natural surroundings and the turbines will interact in varying ways with each other as well as with the landscape.

8.1.2 Protection and maintenance of landscape character

The valued elements that define the existing landscape character are recommended to be protected. This includes but is not limited to, Leeuwin Naturaliste Ridge, wind pruned coastal heath, extensive areas of distinct Jarrah, Marri and Karri forest, agricultural lands, wetland corridors and V shaped river valleys, the coastal landscape of Leeuwin Naturaliste Coast (adjacent to the Indian Ocean), Scott Coastal Plain (adjacent to the Southern Ocean) and the rural amenity of Brockman Highway travel route corridor.

Elements of the Proposal, namely the wind turbines, are uncharacteristic with the existing landscape context. Turbine height and layout should be considered in future design iterations to manage impacts to landscape character.

8.1.3 Engagement

The significance of the landscape within the Study Area, specifically the Blackwood River (Goorbilyup Buerle) and Margaret River (Wooditjup Bilya) and their tributaries, to the Wardandi and Bibulmun/Piblemen people should be considered in the design of the Proposal. Where possible, engagement with Traditional Custodians to discuss the visual elements of the design should be considered. See Section 4.3 for a summary of the community engagement.

8.2 Mitigation

The following section identifies potential mitigation measures that respond to issues arising within the assessment that have the potential to impact on:

– The character of the landscape
– Views to the Proposal from sensitive visual receptors within the Study Area

Mitigation measures address the most visual elements of the Proposal, as well as referencing any relevant considerations drawn from the legislation and planning context review in Section 4.

8.2.1 Site layout and design

– To assist with blending the Proposal into the existing visual context, as far as practically possible, consider realigning turbine layout into a regular shape, such as double line or grid.
– Consider a reduction in the height of all turbines to ease visibility from sensitive visual receptors, including but not limited to VP01 – Augusta Hotel.
– To assist with blending the Proposal into the existing visual context, ensure that the colour, materiality and finishes of proposed supporting infrastructure are of a complementary muted colour palette, compatible with the surrounding visual landscape. Bright or highly contrasting colours, and reflective surfaces, should be avoided.
– Consider maintaining turbine access roads in an unsealed condition within the site boundary where appropriate, rather than sealed roads with dark coloured asphalt, to reduce visual impacts and blend with the surrounding rural setting.

8.2.2 Vegetation

– Retain as much existing remnant vegetation as possible within the Proposal site.
– Where clearing of remnant vegetation occurs in relation to construction of Proposal consider revegetation given due regard of regulatory requirements.
– Where possible, revegetate disturbed areas of native vegetation, using select endemic species from the existing palette within the surrounding area, using species of an appropriate maximum height.
– Consider potential screen planting in strategic locations. Ensure any screen planting is proposed in appropriate locations, does not increase bushfire risk and is undertaken in collaboration and with consent of landowners.
– Ensure native roadside vegetation is retained, where practicable, to screen views to the ancillary infrastructure and overhead transmission line.

8.2.3 Overhead transmission lines

– Where possible, minimise the number and height of transmission poles / towers required to reduce the associated visual impact.
– Where possible, in line with relevant standards, minimise the width of the transmission line easement required to be maintained, to reduce the area of vegetation clearance required (if any).

8.2.4 Ancillary infrastructure

Substation, operational and maintenance facility

– Ensure any permanent visible infrastructure uses a non-reflective material finishes and a recessive colour palette that responds to the landscape character (e.g., rural setting) and visual context within which it sits.
– Where practicable, locate permanent storage, operation and maintenance areas on relatively flat land already clear of canopy vegetation to minimise earthworks and vegetation removal.
– In consultation with landowners and ensuring it does not increase bushfire risk, where practicable, use native plant species to provide screening planting around permanent built form infrastructure to assist in filtering views to the infrastructure and reinstate the existing landscape character.

Meteorological masts

– If applicable and where practicable, micro-site meteorological masts to avoid tree removal.

Access tracks

– Where practicable, align access tracks to avoid the removal of existing vegetation.

8.2.5 Construction and decommissioning

– Minimise the area of disturbance during the construction period to areas within the Proposal site, where possible.
– After construction is complete, seek to ensure any disturbed areas (including temporary construction compounds, areas disturbed by the construction, erection, and transportation of Proposal infrastructure) are reinstated to their previous condition (or better), including the reinstatement of topography, soils, vegetation cover, and natural drainage patterns. Replace any trees, shrubs and ground covers that have been removed with the same (or similar) species of local provenance, in accordance with the rural landscape character.
– Where possible, ensure construction equipment, stockpiles, and other visible elements are located away from views to or from sensitive visual receptors. Should equipment or stockpiles be located in visually prominent locations for any reasonable period of time, incorporate screening measures and practices to ensure sites are kept tidy.
– During construction, protect any sensitive landscape features (e.g., remnant vegetation, waterways) via a construction management plan.

8.2.6 Cultural heritage values

To ensure that cultural heritage landscape values have been appropriately incorporated into this assessment, cultural knowledge holders, the Wardandi and Bibulmun/Piblemen people, should be consulted, and where appropriate relevant heritage approvals should be obtained.

8.3 Recommendations for further work

– The impacts of where one blade of each turbine is painted black have not been assessed. The effect of the black blade on views, particularly from Augusta town centre and the Southern Ocean coastline, Augusta, should be considered and assessed.

9. Conclusion

This LVIA report has been prepared to assess the possible effect of the Proposal on the surrounding landscape and views. The purpose of this report is to support the following:

– Environmental Protection Authority (EPA) referral under Part IV, Section 38 in accordance with *Environmental Factor Guideline –Social Surroundings* (EPA, 2023e) under the Environmental Protection Act 1986.
– Development approval application (Shire of Augusta Margaret River) to commence development of the Proposal.

The Proposal has been thoroughly assessed in relation to the relevant planning and environmental regulations concerning landscape and visual impact. The scope of the assessment is limited to the expected distance from which the Proposal would likely be visible in its surrounding environment. This determination has led to a Study Area covering roughly 30 km in each direction of the Proposal site. Accordingly, the Study Area encompasses regions within AMR Shire LGA and the Shire of Nannup.

The Proposal is located in Warren Bioregion (Figure 7) within the locality of Scott River in the AMR LGA which is situated approximately 294 km south-east of Perth. AMR Shire LGA has a population of approximately 16,791 (Australian Bureau of Statistics, 2021) which is expected to grow to approximately 25 000 people by 2036 (DPLH, 2022). The landscape within the Study Area contains the townsites of Augusta and a proportion of Margaret River, in addition to the settlements of Karridale, Kudardup and Witchcliffe. It also contains national parks, nature reserves, state forests, agricultural land, and tourism land uses.

The topography of the Study Area is a landscape dominated by gently undulating and rolling hills, rocky shorelines, towering sea cliffs, gently curving beaches, wetland corridors and areas of granite outcrops. Features of the landscape include Leeuwin Naturaliste ridge and the long stretch of coastline adjacent to the Indian and Southern Ocean free of disturbance. It encompasses various watercourses, including the Blackwood River

(Goorbilyup Buerle) and Hardy Inlet and the Margaret River (Wooditjup Bilya). The Study Area has a diverse array of vegetation, featuring native woodlands and forests, sedges, and low heath with cleared irrigated and non-irrigated areas linked to agricultural use.

This assessment was undertaken based on a comprehensive desktop study, and site inspections of the existing landscape and views.

Four LCU's were identified in the Study Area. The significance of impact on LCU1 is high-moderate, as the Proposal will likely affect the characteristics of LCU1, where the Leeuwin-Naturaliste Ridge is recognised as a key landscape feature. The significance of impact on LCU2 is also high-moderate, with contributing factors including scenic qualities and the inclusions of Scott National Park and Gingilup Swamps Nature Reserve, which host highly diverse flora and fauna species. The findings indicate a high-moderate significance of impact on LCU3 due to the high sensitivity and importance of notable drainage features that are registered Aboriginal heritage sites, as well as several national parks and nature reserves. The Proposal will likely result in notable changes to this landscape character. LCU4 would experience a moderate significance of impact, as the changes will be confined to specific locations within LCU4.

Visual impacts associated with construction were considered short term (approximately 2 years) with operation considered permanent. Based on the desktop study and ZTV analysis as well as a fieldwork conducted in March and August 2024, 12 representative viewpoints were selected for this LVIA. The assessment identified the significance of impact for the viewpoints, ranging from negligible to high.

After conducting a contextual analysis, the visual management objectives for the Study Area were outlined. The focus of the visual management objectives included optimising the siting and design of the Proposal to protect and maintain the distinct landscape characters with a key recommendation being to consider realignment of wind turbines into a regular layout such as a double line or grid and a reduction in turbine height. In addition, the impact of wind turbines on the visual landscape, from Brockman Highway needs to be taken into account and future design iterations should consider how the Proposal appears from the roadway.

Other recommended visual management measures include maintaining the rural landscape character through mitigation by adopting measures such as retaining as much existing remnant vegetation as possible within the Proposal site and re-establishing any pastural land disturbed during construction. In addition, consideration of Aboriginal heritage values and engagement with the Wardandi and Bibulmun/Piblemen people was recommended as a consideration for protection and maintenance of cultural heritage values.

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Appendices

Appendix A

Photomontages

EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 01 : Augusta Hotel

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
ROTATED 90
DEGREES WITH
ROTATED BLADES



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 01 : Augusta Hotel

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 02 : Augusta Residential

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 02 : Augusta Residential

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hillview Road, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 03 : Hillview Road Lookout

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	27° - 117°	**Location:**	Hillview Road, Augusta
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	330617, 6202805 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	32 m
Photograph Time & Date:	11:21, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 03 : Hillview Road Lookout

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	22º - 112º
Horizontal Field Of View:	90º
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:04, 8th March 2024

Location:	Howe Road, Kudardup
Coordinates:	335173, 6208016 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	10 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 04 : Adjacent to Molley Island

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	22° - 112°	**Location:**	Howe Road, Kudardup
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	335173, 6208016 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	10 m
Photograph Time & Date:	12:04, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 04 : Adjacent to Molley Island

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	X° - X°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:40, 7th March 2024

Location:	Scott River Road, Courtenay
Coordinates:	340650, 6209816 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	26 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 05 : Scott River Road

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	X° - X°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:40, 7th March 2024

Location:	Scott River Road, Courtenay
Coordinates:	340650, 6209816 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	26 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 05 : Scott River Road

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	115° - 205°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	8:54, 7th March 2024

Location:	Warner Glen Road, Forest Grove
Coordinates:	330530, 6228149 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	66 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 06 : Warner Glen Road

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	115° - 205°	**Location:**	Warner Glen Road, Forest Grove
Horizontal Field Of View:	90°	**Coordinates:**	330530, 6228149 (GDA 2020 MGA Zone 50)
Camera Height:	1.7 m	**Viewpoint Elevation:**	66 m
Camera Type:	Canon EOS 6D	**Date of Photomontage:**	11th November 2024
Lens Type:	50 mm	**Issue:**	v 01
Photograph Time & Date:	8:54, 7th March 2024		

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 06 : Warner Glen Road

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	125° - 215°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	14:18, 7th March 2024

Location:	Brockman Highway, Courtenay
Coordinates:	338204, 6218225 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	37 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 07 : Brockman Highway

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	125° - 215°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	14:18, 7th March 2024

Location:	Brockman Highway, Courtenay
Coordinates:	338204, 6218225 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	37 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 07 : Brockman Highway

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	21° - 111°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	14:46, 8th March 2024

Location:	Felling Road, Karridale
Coordinates:	352464, 6214724 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	64 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 08 : Karridale Residential

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	21° - 111°	**Location:**	Felling Road, Karridale
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	352464, 6214724 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	64 m
Photograph Time & Date:	14:46, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 08 : Karridale Residential

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	33° - 123°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	14:42, 8th March 2024

Location:	Glenarty Road, Karridale
Coordinates:	330766, 6213489 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	67 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 09 : Glenarty Road

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	33° - 123°	**Location:**	Glenarty Road, Karridale
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	330766, 6213489 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	67 m
Photograph Time & Date:	14:42, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 09 : Glenarty Road

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
Coordinates:	331663, 6200081 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5.2 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 10 : Albany Tce Beach Access

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
ROTATED 90
DEGREES WITH
ROTATED BLADES



KEY PLAN



View Direction:	349° - 79°	**Location:**	829 Albany Terrace, Augusta
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	331663, 6200081 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	5.2 m
Photograph Time & Date:	7:02, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 10 : Albany Tce Beach Access

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	325° - 55°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:24, 27th March 2024

Location:	Davies Road, Augusta
Coordinates:	331568, 6198202 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	6.7 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 11 : Flinders Bay

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
ROTATED 90
DEGREES WITH
ROTATED BLADES



KEY PLAN



View Direction:	325° - 55°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:24, 27th March 2024

Location:	Davies Road, Augusta
Coordinates:	331568, 6198202 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	6.7 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 11 : Flinders Bay

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:41, 28th August 2024

Location:	94 Albany Terrace, Augusta
Coordinates:	331500, 6200371 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	15.1 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	339° - 69°	**Location:**	94 Albany Terrace, Augusta
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	331500, 6200371 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	15.1 m
Photograph Time & Date:	15:41, 28th August 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	325° - 55°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	8:14, 8th March 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328651, 6194689 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	65.6 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Top

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	325° - 55°	**Location:**	Leeuwin Road, Augusta
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	328651, 6194689 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	65.6 m
Photograph Time & Date:	8:14, 8th March 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Top

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:12, 28th August 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328660, 6194692 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	33 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Base

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	344° - 74°	**Location:**	Leeuwin Road, Augusta
Horizontal Field Of View:	90°		
Camera Height:	1.7 m	**Coordinates:**	328660, 6194692 (GDA 2020 MGA Zone 50)
Camera Type:	Canon EOS 6D		
Lens Type:	50 mm	**Viewpoint Elevation:**	33 m
Photograph Time & Date:	15:12, 28th August 2024	**Date of Photomontage:**	11th November 2024
		Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Base

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The Power of Commitment

MAIN ACCESS
SCOTT RIVER ROAD
(SOUTHERN ACCESS)

MRWA RAV_2(C) – REV1
Custom

MRWA RAV_2(C) – REV1
Custom

VEGETATION CLEARING REQUIRED

MRWA RAV_2(C) – REV1
Custom

Technical Memorandum

March 10, 2026

To	[redacted]	**Contact No.**	[redacted]
Copy to	[redacted]	**Email**	[redacted]
From	[redacted]	**Project No.**	[redacted]
Project Name	Scott River Wind Farm LVIA		
Subject	Addendum to the LVIA to address agency comments.		

1. Introduction

The proposed Scott River Wind Farm (the Proposal) is located in Scott River, approximately 15 kilometres (km) north-east of Augusta, Western Australia. The Proposal site covers an area of approximately 4,000 hectares located on freehold agricultural land owned by multiple landholders and is primarily located within cleared agricultural land zoned 'General Agriculture'.

The Proposal includes 20 wind turbines, two meteorological masts, an on-site substation, operational and maintenance facility, hard stand areas, transmission line, and 33 kilovolts underground electrical transmission. Access to the Proposal site is via Scott River Road. The Proposal is being investigated by SynergyRED as part of its assessment of future renewable energy projects with the potential to connect to the South West Interconnected System.

GHD prepared a Landscape and Visual Impact Assessment (LVIA) for the Proposal in January 2025 to support the:

– Environmental Protection Authority (EPA) referral under Part IV, Section 38 in accordance with *Environmental Factor Guideline – Social Surroundings* (EPA, 2023) under the *Environmental Protection Act 1986*.
– Regional Development Assessment Panel Application for Development Approval to commence development of the Proposal.

The LVIA found that the landscape context is defined by a diverse rural and natural setting within the South West of Western Australia. The LVIA Study Area, extending 30 km in all directions from the Proposal site, includes agricultural land, national parks, nature reserves, state forests and tourism areas. The terrain varies from almost flat to gently undulating plains within cleared farmland to more elevated and visually prominent landforms. The Study Area also contains several key watercourses, including the Blackwood River (Goorbilyup Buerle) to the west and north, the Scott River immediately south of the Proposal site, and the Margaret River (Wooditjup Bilya) and Mowen River to the north, with tributaries present within the Proposal site. Key transport corridors traversing the Study Area include Brockman Highway, Bussell Highway and Caves Road, which contribute to the visual experience of the surrounding landscape.

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Refer to Figure 1 for the Proposal layout, which has been updated with turbine numbering and the Development Envelope.

1.1 Purpose of this Memorandum

This Technical Memorandum (memorandum) has been prepared by GHD Pty Ltd (GHD) to address comments issued by the Department of Biodiversity, Conservation and Attractions (DBCA), and the Department of Planning, Lands and Heritage (DPLH) in response to the Scott River Wind Farm LVIA.

The structure and content of this memorandum correspond directly with agency feedback, as provided in Appendix A: Agency Comments, with an additional section summarising additional mitigation recommendations relevant to LVIA. All commentary, analysis, and updated figures are cross-referenced to specific comment numbers for clarity and auditability. Updated photomontages produced to support this memorandum are included in Appendix B and Appendix C.

1.2 Scope and limitations

The scope of this memorandum includes:

– Technical Memorandum (addressing relevant DBCA and DPLH comments), including:
  - Update to figures, including zone of theoretical visibility (ZTV) mapping
  - ZTV analysis for the transmission line, substation and alternative wind farm layout
  - Detailed commentary for all visual receptor locations identified by DBCA and DPLH
  - Photomontages and red overlay figures for visual receptor locations identified by DBCA and DPLH
  - Discussion of mitigation in response to DBCA and DPLH comments
  - Additional mitigation discussion relative to the alternative wind farm layout
– Fieldwork has also been undertaken to obtain additional information to support the response to DBCA and DPLH comments.
– A wind turbine micro-siting meeting was undertaken with the Shire of Augusta Margaret River to discuss an alternative layout.

This technical memorandum has been prepared by GHD for SynergyRED. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

Accessibility of documents

If this Technical Memorandum is required to be accessible in any other format this can be provided by GHD upon request and at an additional cost if necessary.

1.3 Assumptions

– This memorandum is based on information provided by SynergyRED at the time of writing.
– This memorandum relies on assessments made within the Proposal LVIA, undertaken in 2025.

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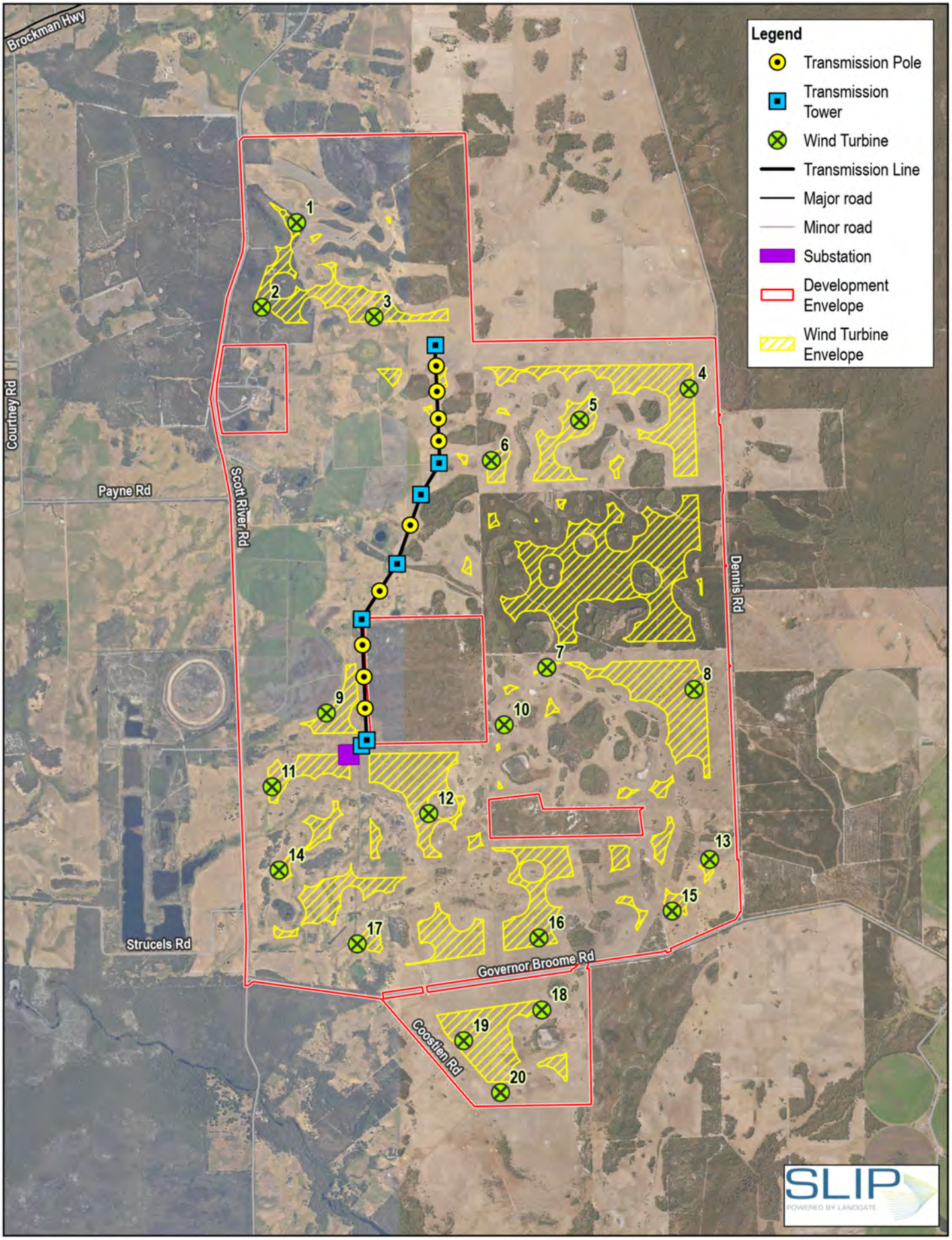

Paper Size ISO A4

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Project No. **12690217**
Revision No. **0**
Date **05/02/2026**

Proposal Site and Components Plan

FIGURE 1

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Print date: 02 Mar 2026 - 15:23

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2. Methodology

2.1 Assessment approach

As an addendum to the Proposal LVIA undertaken in 2025, this memorandum uses the same basis of assessment as that outlined in section 3 Methodology of the Proposal LVIA (2025) report.

2.2 Zone of theoretical visibility

Zone of theoretical visibility (ZTV) mapping has been prepared as part of this LVIA addendum, using the same methodology as outlined in section 3 Methodology of the Proposal LVIA (2025) report, however with the following parameters:

– A viewing height of 1.7 m, which is the average within the typical viewing level range of an adult
– Maximum transmission pole / tower height of 28 m
– Maximum substation height of 10 m
– Tip height of 250 m (for the alternative wind farm layout)
– Hub height of 164 m (for the alternative wind farm layout)

The GIS software then digitally determines the likely extent over which the component would be visible or not visible. In interpreting the ZTV, the following considerations must be made:

– The ZTV only considers the landform and does not include land cover factors such as the presence of buildings and trees. It therefore represents the worst-case scenario of potential visual impacts.
– The ZTV does not consider the effect of distance. The greater the distance from the Proposal, the lower the impact, as the development will take up a smaller portion of the view, and atmospheric conditions may reduce the visual prominence of the Proposal.
– The ZTV is only accurate to the resolution of the elevation model.

2.3 Site inspection

A site inspection was undertaken by a Landscape Planner on 6 February 2026. The purpose of the site inspection was to:

– further investigate specific public locations within the study area in order to address specific Agency comments
– undertaken site photography for visual assessment and preparation of additional photomontages and red-overlay views, in response to Agency comments.

2.4 Photomontages

All photographic images were captured using a 50 millimetre fixed focal length lens on a 35 millimetre full frame format camera at a camera height of 1.7 m, which is consistent with the approach undertaken in the Proposal LVIA (2025). All photograph locations were recorded and mapped.

The software used to model and render the photomontages was AutoDesk 3D Studio Max, and the methodology consistent with section 3 Methodology within the Proposal LVIA (2025).

Turbine individual numbering has been added to all photomontages. The turbines are numbered as per their respective location in the wind farm. Numbering has been generated using AutoDesk 3D Studio Max for accuracy. The number labels have been overlayed over the photomontages to align with the turbines, while not obstructing the elements of the view. Each label is facing the virtual camera and the label size has been adjusted for legibility and consistency across the photomontage.

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3. Response to DBCA submission

The following section outlined the specific DBCA comments and the response provided.

3.1 Comment 1

DBCA comment:

The methodology, process and outcomes as presented in Attachment 4 - Referral Supporting Documents (RSD), Ecological Australia 2025 and the main assessment documented in Proposed Wind Farm - Scott River Landscape and Visual Impact Assessment by GHD 2025 are generally supported given:

- *The methodology aligns with industry standards using established methodologies and approved documents, including the WAPC Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting, and design.*
- *Suitable Landscape Character Units (LCU) were developed highlighting the variety of landscape types that surround the project. These were then extended to describe the public's acceptance of visual change to the landscape quality of those LCUs.*
- *The Zones of Visual Influence (ZVI) capture where the wind farm infrastructure will be seen across the landscape.*

Response:

Noted and confirm the above comment.

3.2 Comment 2

DBCA comment:

Views specific to DBCA managed lands are largely absent, including the Cape to Cape Track, recreation sites and activity on and along the Blackwood River / Scott River and Hardy Inlet, and the Cape Leeuwin Lighthouse (from the ground and the top viewing deck). Assessing more receptors could help to identify small scale or local mitigation measures.

Response:

The wind farm hub and tip height ZTV figure have been updated to show the Cape to Cape Track, Leeuwin Lighthouse, key waterways and the Scott River National Park (Refer to Figure 2 and Figure 3). As shown in these figures, the Cape to Cape Track and Leeuwin Lighthouse are not within the visible area, and therefore no views to the Proposal would be achieved from these locations. However other recreational sites such as the Scott River National Park, Hardy Inlet, Blackwood River, and Scott River are within the visible area. However, as noted in section 2.2, the ZTV considers only the landform and exclude the effect of distance and existing canopy cover and buildings.

In addition to the ZTV figures, within the Proposal LVIA report (2025), two photomontages were provided in Appendix B from the top and bottom of Cape Leeuwin Lighthouse, illustrating that there would be no views of the Proposal from these locations due to intervening landform.

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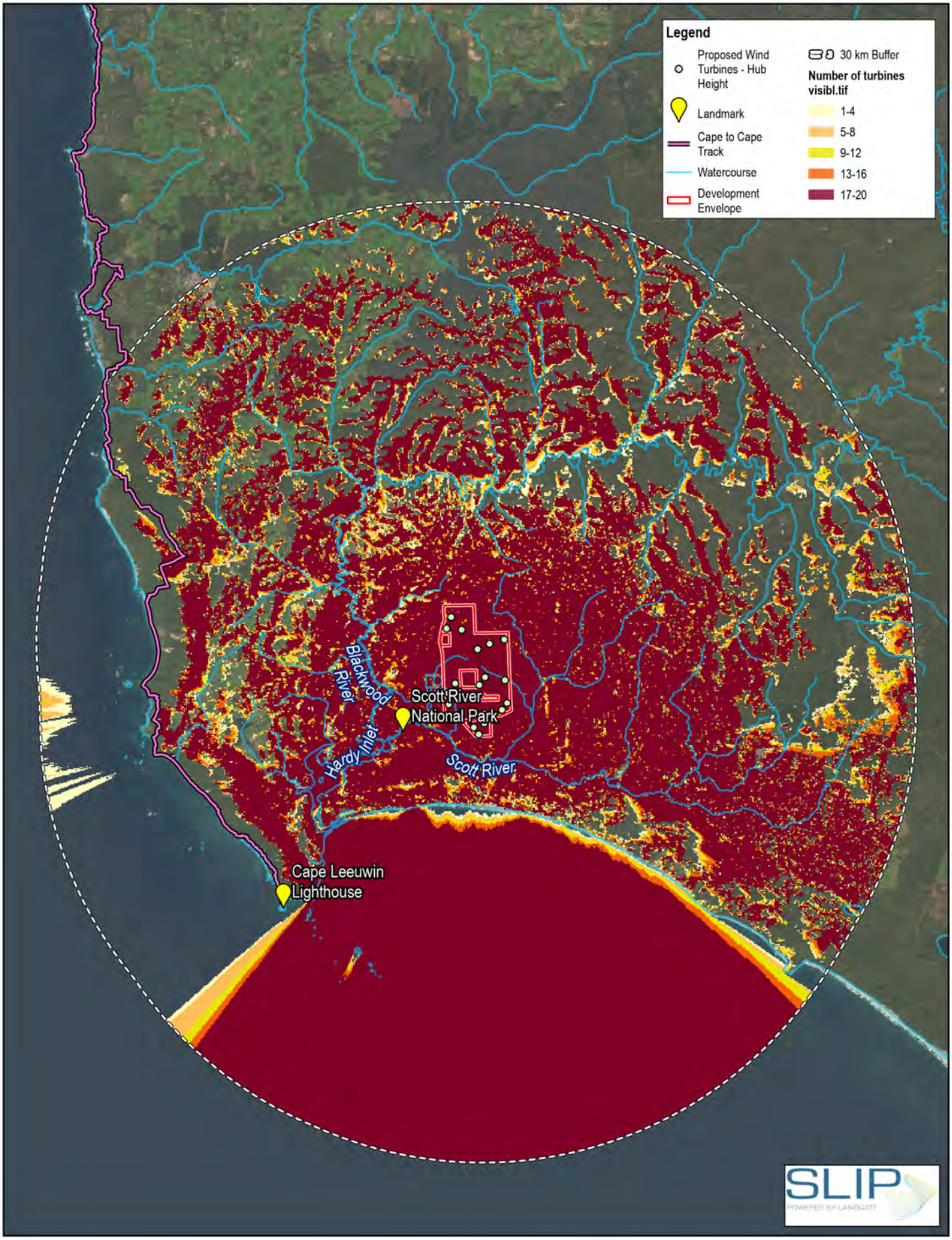

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Zone of Theoretical Visibility Mapping - Hub Height

Project No. **12690217**
Revision No. **B**
Date **02/03/2026**

FIGURE 2

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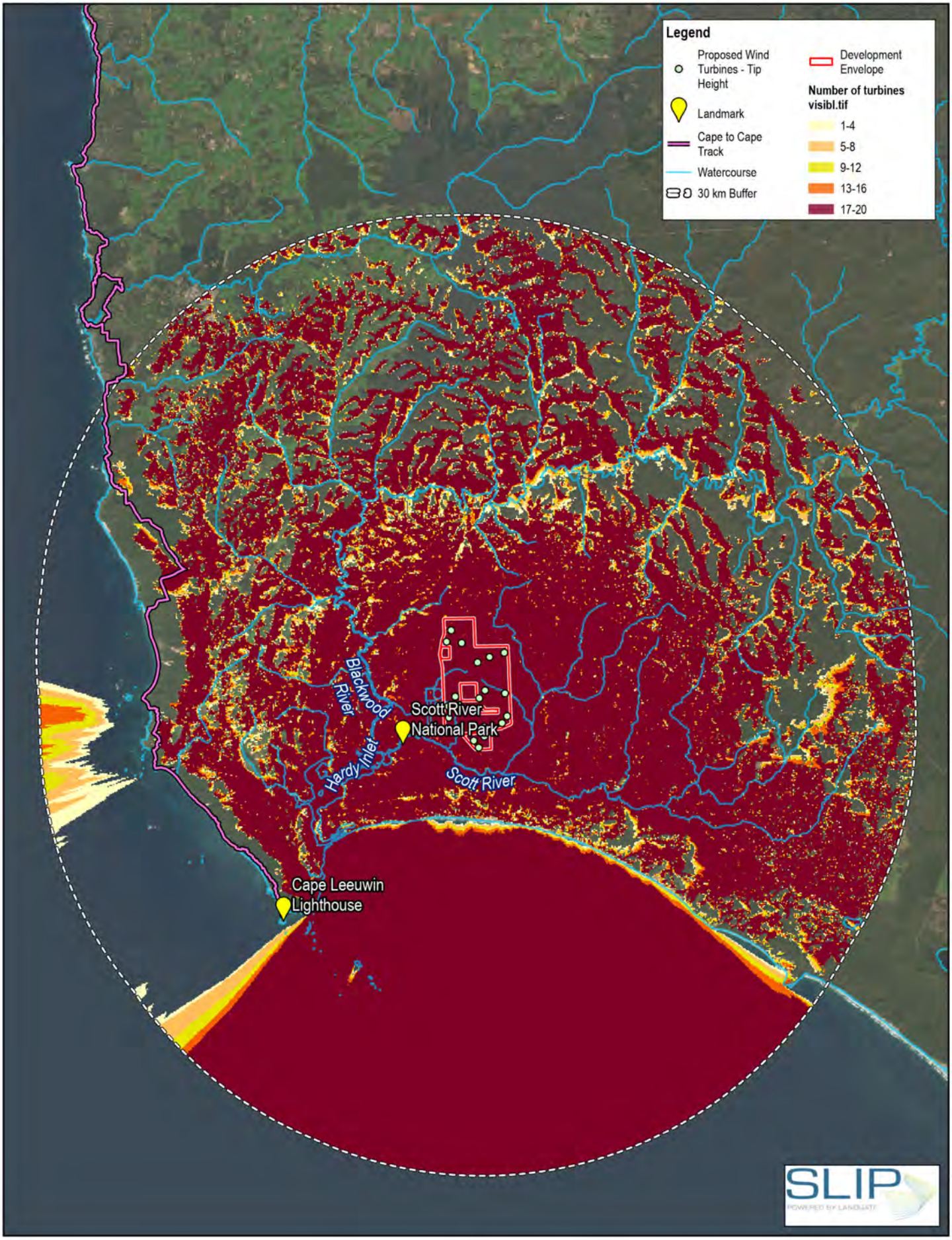

Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Zone of Theoretical Visibility Mapping - Tip Height

Project No. **12690217**
Revision No. **B**
Date **03/03/2026**

FIGURE 3

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Print date: 03 Mar 2026 - 15:37

Data source: World Imagery: Earthstar Geographics. Created by: cbataller

3.3 Comment 3

DBCA comment:

The majority of the assessment focuses on the WTGs as these are the largest elements in the landscape - this includes the mapping of ZVIs. Other infrastructure worthy of the same detailed assessment as the WTGs include the access and maintenance roads, transmission line, meteorological masts and the substation, given they are of significant scale or length in the landscape and will be seen in a different context to the towers.

Individual ZVIs for the other infrastructure will determine where these elements will be seen from the landscape and sensitive visual receptors. These ZVIs could inform mitigation measures that could reduce the individual visual impact of these items and therefore reduce the collective total visual impact for the project as a whole.

Response:

To address the request for a more detailed assessment of non-turbine infrastructure, additional ZTV modelling has been undertaken for key project components beyond the wind turbine generators.

Two additional ZTV figures have been produced for inclusion in this addendum, modelling visibility from the transmission line and the substation (refer to Figure 4 and Figure 5, respectively). The ZTV for the transmission line has been modelled to a study area of 3 km from the transmission line, while the ZTV for the substation has been modelled to a study area of 1 km from the substation, reflecting the relative scale and anticipated visual influence of these elements within the landscape.

Figure 4 shows that the transmission line would be theoretically visible from areas surrounding the Proposal site, with higher levels of visibility (shown in red) occurring predominantly within the central part of the study area. A patchy visibility of the transmission line is expected along the northern section, Governor-Broome Road and west of Scott River Road. Visibility is generally low or absent toward the northwest and northeast, and western parts of the study area, where landform provides increased screening, as reflected by areas of reduced or no visibility shown in lighter colours.

Figure 5 shows that the substation would be theoretically visible within most parts of the 1 km study area, where higher levels of visibility are indicated in closer proximity to the substation location. The substation may be visible from the Scott River Road looking east.

Regarding the metrological masts, two permanent masts with a maximum height of 164 m are proposed within the Proposal site. While these structures are taller than other ancillary infrastructure, they are slender elements with a limited physical footprint and lack moving components. Their potential visibility has been considered qualitatively by reference to their scale, form and siting within the broader wind farm context, including surrounding landform and vegetation screening. The visual presence of the meteorological masts is expected to be localised and generally perceived in association with the wind turbine generators and other project infrastructure. On this basis and given their limited contribution to overall visual change relative to the turbines, separate ZTV modelling has not been undertaken.

With respect to access and maintenance roads, while these elements are low-lying, they may result in localised impacts through vegetation removal and changes to existing land cover. Where visible, access tracks would be generally perceived in close proximity and within an established rural agricultural context alongside existing farm access tracks and agricultural infrastructure. Mitigation measures are recommended to minimise these effects, including aligning access tracks to avoid the removal of existing vegetation and to follow existing land patterns where practicable, thereby reducing the need for earthworks, aligned with the recommendation provided in Section 8.2.4 of the Proposal LVIA (2025), which identifies the importance of locating access tracks to minimise vegetation loss and landscape disturbance.

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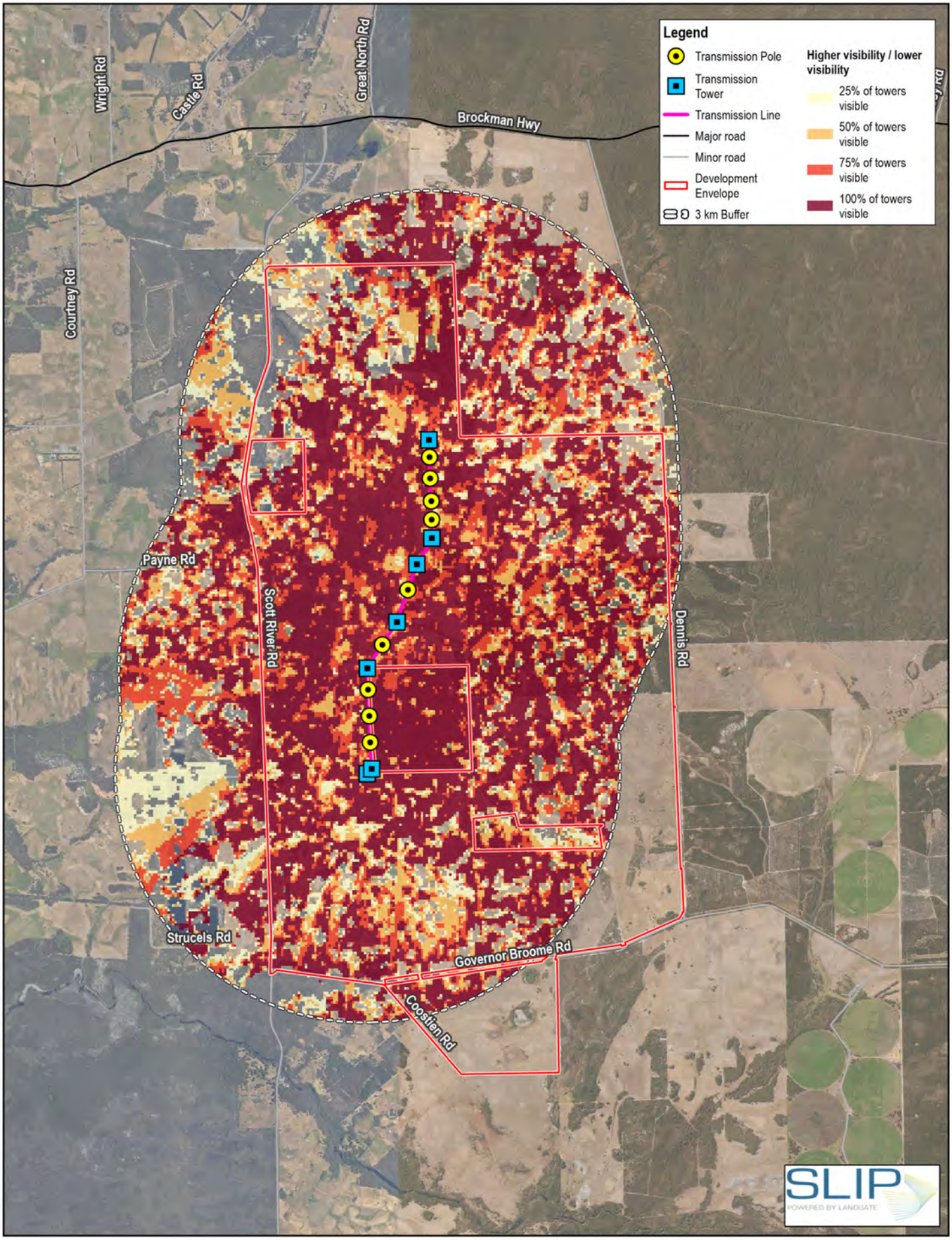

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Zone of Theoretical Visibility - Transmission Line

Project No. **12690217**
Revision No. **D**
Date **03/03/2026**

FIGURE 4

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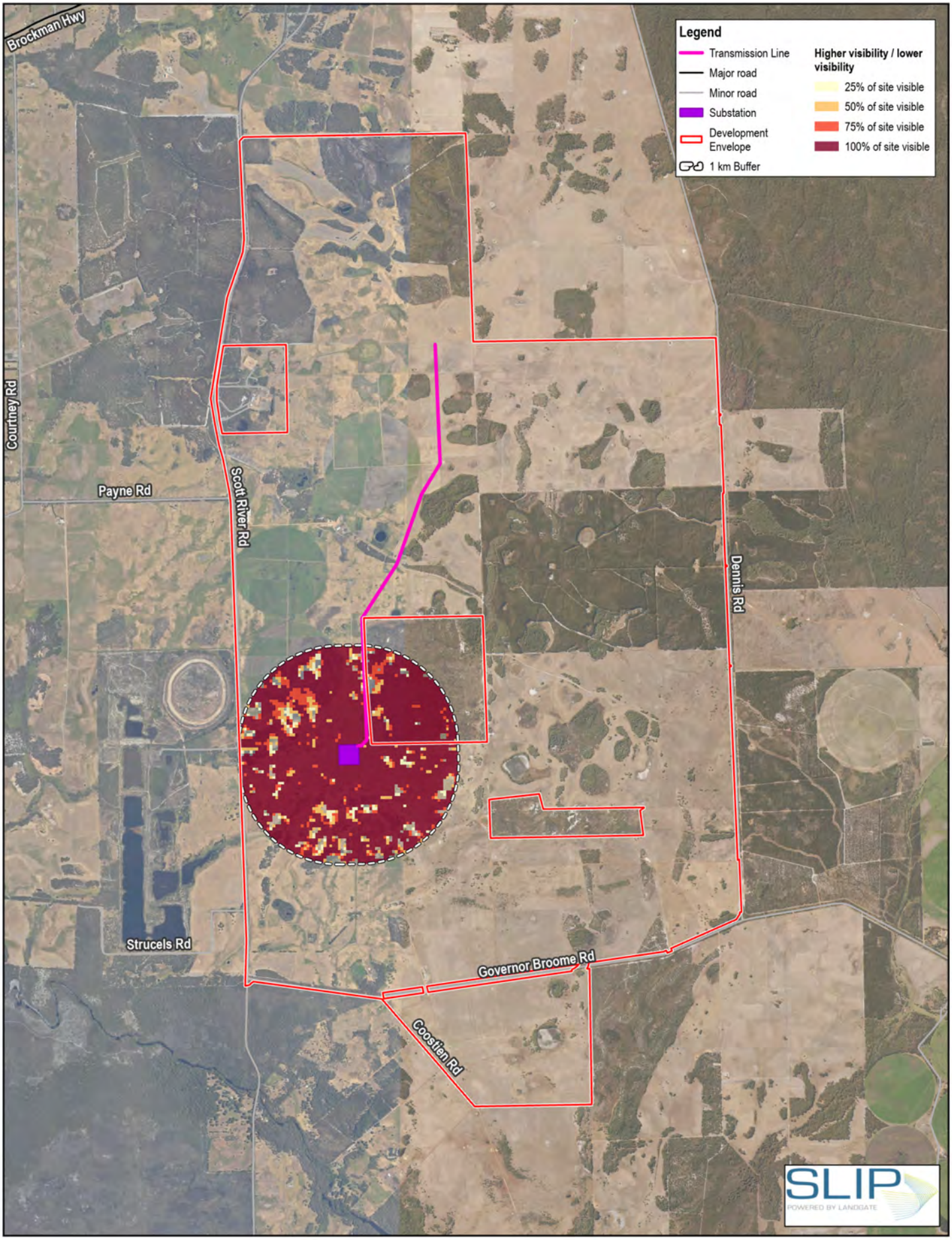

Paper Size ISO A4

0 250 500 750 1,000

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Zone of Theoretical Visibility - Substation

Project No. **12690217**
Revision No. **D**
Date **02/03/2026**

FIGURE 5

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Print date: 02 Mar 2026 - 15:35

Data source: Landgate_Subscription_Imagery\WANow: . Created by: cbataller

3.4 Comment 4

DBCA comment:

The report notes that there will be an impact to the quality of the visual landscape from this proposal. Because of this acknowledgment, and the degree of the impact, the proposed mitigation measures appear limited. More advanced assessment of mitigation measures, based on a more detailed assessment of sensitive visual receptors, infrastructure assessment and associated ZVI may provide more protection of landscape quality and the viewer's sensitivity to the proposal.

Response

To further inform mitigation, additional ZTV analysis has been undertaken for the transmission line and substation (Figure 4 and Figure 5). The ZTVs illustrate potential visibility based on landform only and provide further context regarding the extent and distribution of visibility within the immediate vicinity of the Proposal site. The ZTV figures have been discussed in section 3.3.

In addition, as part of community engagement activities, photomontages were prepared from selected private residences to provide a more detailed, receptor-based understanding of potential visual effects, beyond the landform-based ZTV analysis. Together, this information supports the suitability of the mitigation measures proposed in the LVIA and informs consideration of further mitigation, where practicable, during detailed design.

Additional mitigation considerations are also outlined in the following responses to comments, and in section 4.

3.5 Comment 5

DBCA comment:

1. *The viewing deck at the Cape Leeuwin Lighthouse sits ~40m above ground, and the base of the lighthouse is ~ 20m above sea level. As this is a significant tourism site it would warrant an assessment.*
2. *The Visual Impact Assessment identifies that this proposal will be highly visible in the surrounding landscape and that there is limited scope in most instances to reduce this visual impact.*
3. *The proposed mitigation measures are limited and reflect the high impact of the proposal from scattered receptor sites but do not consider local or small-scale mitigation measures or interventions to protect visual quality from the entire landscape.*
4. *Potential mitigation measures to address landscape-wide and locally identified impacts could include:*

– *Road edge vegetation screening along surrounding travel route corridors of all types managing and screening views along the length of these corridors.*

– *Localised screening surrounding the ancillary infrastructure.*

– *Broadscale landscape planting within the project area.*

Response to point 1:

As noted in comment 1 response, within the Proposal LVIA (2025), two photomontages from the top and bottom of the Cape Leeuwin Lighthouse viewing deck were provided (refer to Appendix B of this report). These photomontages demonstrate that there would be no views of the Proposal from these locations due to intervening landform. In addition, the wind turbine ZTVs have been revised to show the Cape Leeuwin Lighthouse location, which shows that the Lighthouse is not in the wind turbine visible area.

Response to point 2:

Comment noted.

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Response to point 3:

In response to DBCA's comment regarding the extent of mitigation measures, two additional ZTV figures have been prepared for the transmission line and substation (Figure 4 and Figure 5). These ZTVs, which are based on landform only, provide a more detailed understanding of the extent and distribution of potential visibility in the immediate vicinity of the Proposal site and in relation to landscape character and sensitive visual receptors.

The additional ZTVs indicate that visibility of these components is generally localised and strongly influenced by topography. This refined understanding supports the suitability of the mitigation measures currently proposed in the LVIA, including infrastructure siting to utilise landform screening, minimisation of disturbance, and rehabilitation of disturbed areas.

Response to point 4:

The additional ZTV analysis also informs consideration of localised and landscape-wide mitigation measures, where practicable, including detailed micro-siting during final design, localised screening of ancillary infrastructure, and rehabilitation and landscape planting to reduce visual exposure over time. Where appropriate, a simplified Landscape Plan may be developed at later design stages to address locally identified visual impacts in a targeted manner. In addition, it is recommended that offsite mitigation is offered to adjacent residents to mitigate landscape and visual impacts.

4. Response to DPLH submission

The following section outlines the specific DPLH comments and the response provided.

4.1 Comment 6

DPLH comment:

The following comments and attached photos are provided on the visual impact of the proposed Scott River wind farm and the proponent's Landscape and Visual Impact Assessment (LVIA). The comments are made with reference to the WAPC "Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design" and the Department of Planning, Lands and Heritage GIS "InQuiry", as well as knowledge of the area.

The viewshed mapping indicates that the turbines may be extensively visible. However, it is likely that roadside trees would obscure views from two of the three major roads to Augusta (Bussell Highway and Caves Road), and views from narrow, treelined secondary roads oriented generally towards the site e.g. Challis Road, and Fisher Road, which is used to access the settlement on Molloy Island.

Response:

Noted and confirm the above comment. As outlined in the Proposal LVIA (2025) section 3 Methodology, the ZTV only considers the landform and does not include land cover factors such as the presence of buildings and trees. It therefore represents the worst-case scenario of potential visual impacts.

4.2 Comment 7

DPLH comment:

Analysis using Google Streetview images indicates that the greatest visibility is likely to be from:

– *private residences in Augusta which have northeasterly views, comprising*
  - *elevated sites*

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- *sites along the shore of the Blackwood River, Hardy Inlet, or ocean*

– *public recreation sites on the western banks of the Blackwood River (e.g. the river end of Howe Road), Hardy Inlet (e.g. end of Ellis Road) or open ocean (e.g. Flinders Bay).*

– *from western portions of Hardy Inlet.*

– *from the open ocean.*

It also appears that there will also be significant visibility from Augusta's main intersection at Blackwood Avenue and Ellis Street, other locations along Blackwood Avenue, and from Scott River Road and Governor Broome Road, which are at the project site and are used to access East Augusta and more distant coastal areas e.g. for recreational purposes.

Response:

Noted. The locations identified by DPLH as having the greatest potential for visibility are acknowledged and are consistent with the landscape and visual impact assessment findings. Representative viewpoints and receptor locations have been used to assess visual exposure and sensitivity from these areas, including views from public roads, recreation areas, coastal and inlet environments, and residential receptors. The assessment therefore adequately captures the range of viewing contexts and receptor types from which the proposal may be visible and addresses the potential landscape and visual effects associated with these locations.

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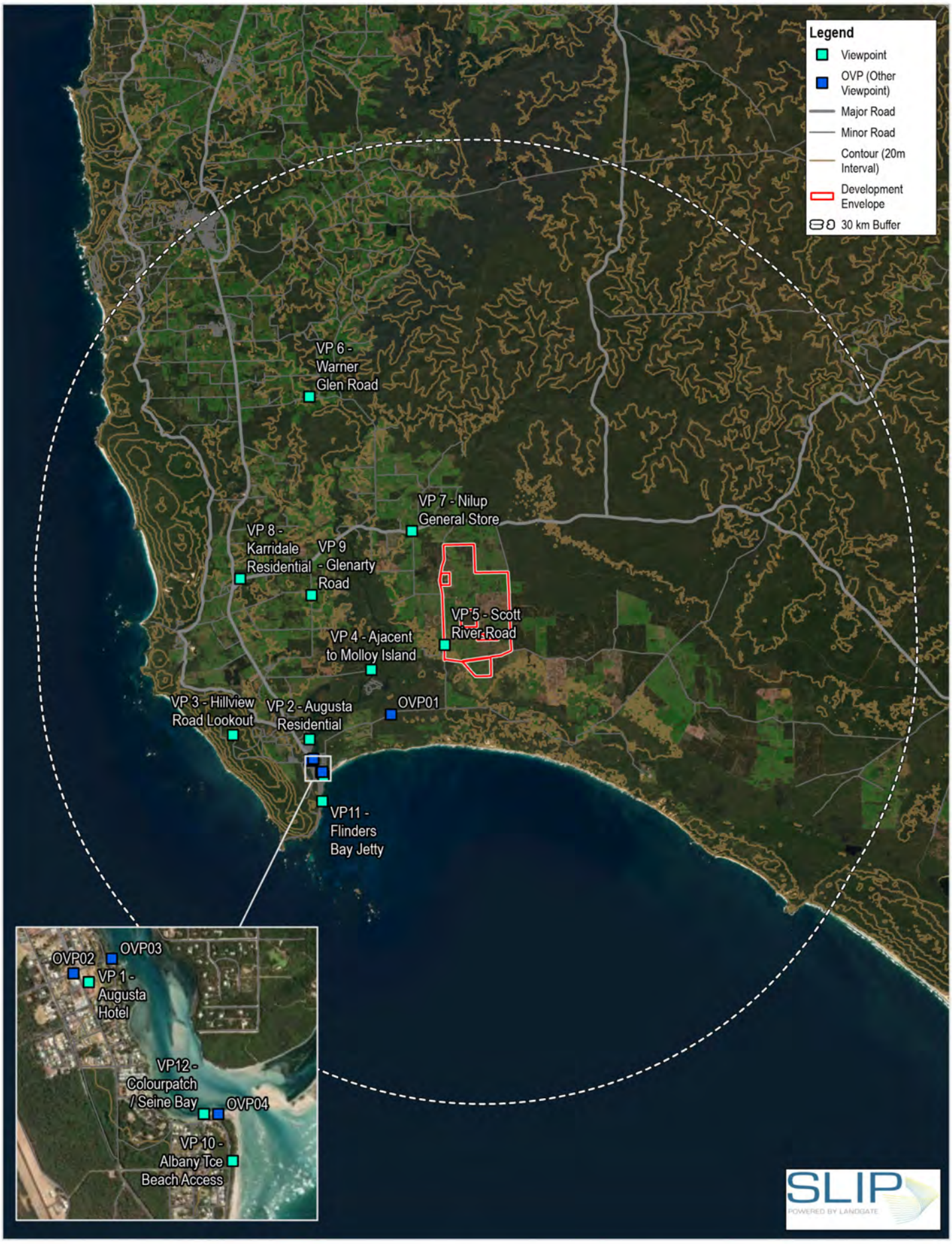

Paper Size ISO A4

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Viewpoints

Project No. **12690217**
Revision No. **C**
Date **02/03/2026**

FIGURE 6

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Print date: 02 Mar 2026 - 15:42

Data source: World Imagery: Vantor
World Imagery: Earthstar Geographics. Created by: cbataller

4.3 Comment 8

DPLH comment:

Assessment report - method and conclusions

– *The method used for the assessment is generally suitable, with two exceptions as below. Several important viewpoints have been overlooked in analysis:*

1. *Travelling east along Scott River Road leaving East Augusta, in locations where the vegetation is naturally low (see attached Photo 1).*
2. *Main street intersection, Ellis Street moving downhill into the intersection with Blackwood Avenue (Photo 2 – two examples).*
3. *Main town foreshore opposite East Augusta (Photo 3).*
4. *Albany Terrace, close to the opening between Hardy Inlet and the ocean (Photo 4).*

– *Reference to the three primary visual management objectives as being 'protection', best practice, and 'engagement', but the third objective advised in the WAPC's manual is 'enhancement', not 'engagement'.*

It is beneficial to identify potential engagement opportunities, but this should occur elsewhere in the report and 'enhancement' should be addressed. This objective would justify introducing roadside tree planting to Scott River Road and Governor Broome Road, within the project site, as it would reduce turbine visibility from the closest viewpoints, and would enhance environmental values in the landscape.

Response summary:

Additional fieldwork has been undertaken to assist in addressing this comment. All specific locations outlined were visited. Additional assessment has been undertaken to address the viewpoints identified by DPLH as requiring further consideration. Detailed commentary has been prepared for all locations identified, including key locations within the Augusta townsite (Ellis Street and Blackwood Avenue), the Hardy Inlet foreshore, Albany Terrace near the Hardy Inlet–ocean opening, and Scott River Road, including sections where roadside vegetation is naturally low.

The viewpoint assessment commentary has been prepared for these locations and photomontages and red-line visibility overlays provided to illustrate the extent of potential turbine visibility. These assessments are informed by field verification and ZTV analysis and represent the viewing conditions experienced at each location.

The viewpoint assessment commentary discusses the relationship between the viewpoints identified by DPLH and existing Proposal LVIA (2025) viewpoints. In particular, the views experienced from Ellis Street and the Blackwood Avenue intersection (Centre of Augusta) are comparable in terms of viewing direction, distance and receptor sensitivity to those illustrated in existing town-based viewpoints. Similarly, views from Centre of Augusta, the Hardy Inlet foreshore and Albany Terrace are consistent with those represented by existing photomontages at VP01 (Augusta Hotel), VP02 (Augusta Residential), VP10 (Albany Terrace Beach Access) and VP12 (Colourpatch / Seine Bay), which capture comparable town, coastal and inlet-based viewing contexts.

By providing both new illustrative material and explicit cross-referencing to existing assessed viewpoints, the assessment addresses concerns regarding overlooked viewpoints and demonstrates that visibility from all key locations identified by DPLH has been appropriately considered.

Additional mitigation has also been explored in the form of an amended wind turbine layout, revised ZTV and updated photomontages for the locations specified, which is discussed in comment 10 response, and provided in Appendix C.

With respect to visual management objectives, it is acknowledged that the term 'enhancement', as set out in the *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting and design* (The Western Australian Planning Commission, 2007), was not explicitly identified as a primary objective. This matter is addressed separately in the mitigation and discussion sections of this memo (refer

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to Comment 10 and Comment 11). Notwithstanding this, enhancement outcomes are considered through the identification of mitigation and landscape enhancement measures this memorandum, and section 8.2.2 Vegetation within the Proposal LVIA (2025). Landscape enhancement strategies focus on retaining existing remnant vegetation within the Proposal site and restoring disturbed areas using locally endemic species of appropriate height to reinforce existing vegetation patterns and landscape continuity. These measures support the recovery and long-term strengthening of the existing rural and agricultural landscape character.

Response to point 1:

OVP01 - Scott River Road

OVP01 Scott River Road is located on the east of east Augusta, facing north-east. Refer to Figure 6 for the viewpoint location, Photo 1 for the existing view, Photo 2 for photomontage of the proposed view, and Photo 3 for the red overlay image.



Photo 1 ***Existing view from OVP01 Scott River Road***



Photo 2 ***Proposed view from OVP01 Scott River Road***



Photo 3 ***Red overlay showing maximum blade tip height from OVP01 Scott River Road***

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Description of the view:

The foreground includes low, dense coastal heath and scrub vegetation interspersed with areas of pale sandy ground, with narrow and unsealed Scott River Road extending along the right-hand side of the view. Vegetation is predominantly low in height and comprises mixed native shrubs and grasses. A series of timber power poles with overhead lines run parallel to the road, introducing a minor vertical and linear element within the foreground and midground of the view. The midground includes an expansive area of flat to gently undulating heathland, with subtle variations in vegetation texture and colour creating a broad, open landscape. The background consists of a continuous horizon of low native vegetation, with no prominent built elements visible, reinforcing the rural and sparsely modified character of the view.

Visual assessment commentary:

Sensitivity to change is assessed as **moderate**, as short term views area experienced by road users travelling through an area of nature reserve valued for its conservation and scenic qualities.

During the construction phase, short-term visual impacts associated with the assembly of the wind turbines, including the use of cranes, are likely to be visible in the midground and background of the view. These elements would appear above the low heathland vegetation and increase the presence of man-made features within an otherwise predominantly open rural landscape. During operation, the wind turbines will be visible in the midground and background of the view as a series of vertical elements rising above the low heathland vegetation. The turbines will introduce movement through rotating blades and increase the presence of built form along the distant horizon, although they will be viewed within a landscape that already contains linear infrastructure such as the unsealed road and associated power poles. This will represent a permanent change to the view.

The magnitude of change is assessed as **moderate**, reflecting the clear visibility and scale of the turbines balanced against the openness of the landscape and its existing modified elements. Taking into account the moderate sensitivity of receptors and the moderate magnitude of change, the overall significance of visual impact is assessed as **moderate**.

Response to point 2:

OVP02 - Centre of Augusta (Ellis Street, Blackwood Avenue)

OVP02 Centre of Augusta is located in the centre of Augusta, at the intersection of Ellis Street, Blackwood Avenue, facing northeast. Refer to Figure 6 for the viewpoint location, Photo 4 for the existing view, Photo 4 for photomontage of the proposed view, and Photo 5 for the red overlay image.



Photo 4 Existing view from OVP02 Centre of Augusta

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Photo 5 *Proposed view from OVP02 Centre of Augusta*



Photo 6 *Red overlay showing maximum blade tip height from OVP02 Centre of Augusta*

Description of the view:

OVP02 is located in the centre of Augusta at the intersection of Ellis Street and Blackwood Avenue, with the view facing northeast. The foreground includes a sealed road intersection incorporating traffic islands, signage, street lighting and pedestrian footpaths. Low-scale commercial buildings with painted masonry walls and red or terracotta tiled roofs are located to the left and right of the view, forming a cohesive small-town streetscape. The midground includes additional town buildings, overhead service lines and scattered street trees, with partial views across Hardy Inlet visible between built elements. The background comprises the waterbody of Hardy Inlet and the densely vegetated shoreline beyond, providing a natural coastal backdrop to the developed town centre setting.

The view is similar in character to VP01 August Hotel assessed in the Proposal LVIA (2025) report, located on Blackwood Avenue and in the vicinity of OVP02, sharing a combination of low-scale residential development in the foreground and midground with open views across Hardy Inlet and the vegetated shoreline beyond. In both views, the contrast between the built townscape and the natural coastal setting is a defining feature, contributing to a consistent visual experience within this part of Augusta.

Visual assessment commentary:

During the construction phase, potential short-term visual impacts associated with the assembly of the wind turbines, including the use of cranes, may be visible in the background of the view. Views may be partially screened by intervening vegetation and built form within the town centre. During operation, a proportion of the wind turbines (including hub, tower tip and blades) are highly likely to be visible above the vegetated horizon in the background of the view. This will represent a permanent change that will not be screened.

Sensitivity to change at OVP02 is assessed as **high**, as residents and visitors to the Augusta town centre place value on the scenic, elevated long and wide views across Hardy Inlet and East Augusta from Blackwood Avenue, the main street of Augusta. The view forms part of a valued coastal townscape setting and is experienced frequently by pedestrians, motorists and visitors, often for prolonged periods.

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The proposed wind turbines are visible in the background of the view, appearing above the distant vegetated horizon beyond Hardy Inlet. While the turbines introduce new vertical and moving elements into the skyline, they would be seen at distance and would not dominate the townscape or foreground built form. The magnitude of change is therefore assessed as **moderate**, reflecting a noticeable but not overwhelming alteration to the existing view.

Taking into account the **high** sensitivity of receptors and the **moderate** magnitude of change, the overall significance of visual impact is assessed as **high–moderate**.

Response to point 3:

OVP03 - Town Beach (Ellis Street Jetty)

OVP03 Town Beach is located on the east of Augusta, on the western foreshore of Hardy Inlet, facing northeast. Refer to Figure 6 for the viewpoint location, Photo 7 for the existing view, Photo 8 for photomontage of the proposed view, and Photo 9 for the red overlay image.



Photo 7 ***Existing view from OVP03 Town Beach***



Photo 8 ***Proposed view from OVP03 Town Beach***

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Photo 9 Red overlay showing maximum blade tip height from OVP03 Town Beach

Description of the view:

OVP03 is located at the Augusta Town Beach, which forms the main foreshore area of the town. The foreground includes the sheltered shoreline of Hardy Inlet with a timber jetty and associated mooring infrastructure extending into the water, as well as small vessels moored adjacent to the jetty. The midground is dominated by the open waterbody of Hardy Inlet, which provides expansive and uninterrupted views across the inlet. The background comprises the low, densely vegetated shoreline of East Augusta, forming a largely continuous natural horizon, within which small jetties, a boat launching area and beached recreational craft are visible, reinforcing the recreational coastal character of the view.

Visual assessment commentary

The sensitivity to change is **high**, as residents and visitors place value on the scenic, recreational coastal views experienced from the Augusta Town Beach, which forms the main foreshore area of the town and is used frequently for leisure and recreation.

During the construction phase, no visual impacts associated with turbine assembly are anticipated at OVP03, as the turbines would be fully screened by intervening landform and dense vegetation on the opposite side of Hardy Inlet.

During operation, the wind turbines would not be visible from OVP03, as they would be entirely obscured by the landform and vegetated shoreline of East Augusta in the background. No change to the existing view is anticipated. The magnitude of change therefore would be **negligible**, as the Proposal would not be visible from this viewpoint and would result in no discernible alteration to the existing view.

Taking into account the high sensitivity of receptors and the negligible magnitude of change, the overall visual impact at OVP03 is assessed as **negligible**.

Response to point 4:

OVP04 - Albany Terrace

OVP04 Albany Terrace is located on the Albany Terrace Beach, overlooking Hardy Inlet near its mouth, opposite opening to Swan Lake, facing northeast. Refer to Figure 6 for the viewpoint location, Photo 10 for the existing view, Photo 11 for photomontage of the proposed view, and Photo 12 for the red overlay image.

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Photo 10 ***Existing view from OVP04 Albany Terrace***



Photo 11 ***Proposed view from OVP04 Albany Terrace***



Photo 12 ***Red overlay showing maximum blade tip height from OVP04 Albany Terrace***

Description of the view:

The foreground includes low coastal grasses and sandy foreshore areas adjacent to the inlet edge. The midground is dominated by the open waters of Hardy Inlet, with a sand spit extending across part of the inlet mouth. The background comprises a gently undulating, low vegetated landform, with a subtly sloping dune at the entrance to Swan Lake. The view is characterised by a strong natural coastal setting defined by expansive water views, subtle landform variation and native coastal vegetation.

This OVP is located between VP11 and VP12 presented in the Proposal LVIA (2025). OVP04 is similar in character to VP12, with both comprising expansive coastal and inlet views and a low, gently undulating vegetated horizon. OVP04 is located approximately 100 m to the east of VP12, and in both views the turbines are perceived at distance above the background landform, resulting in a comparable visual relationship with the proposed development.

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Visual assessment commentary

The sensitivity to change is **high**, as residents and visitors place value on the scenic coastal views from this location, which are associated with recreational use and appreciation of the natural inlet, dune systems and ocean setting.

During the construction phase, short-term visual impacts associated with turbine assembly, including the use of cranes, may be visible in the background of the view. These elements would appear beyond Hardy Inlet above the low vegetated landform and would not affect the foreground or midground coastal features.

During operation, a proportion of the wind turbines would to be visible above the gently undulating vegetated landform in the background of the view. The turbines would appear as vertical elements against the sky and introduce movement through rotating blades, resulting in a permanent change to the existing skyline.

The magnitude of change is assessed as **moderate**, as the turbines will be clearly visible above the background vegetation and introduce new vertical and moving elements into an otherwise predominantly natural coastal view. However, the turbines are seen at distance, remain confined to the background, and do not dominate or substantially alter the key characteristics of the foreground and midground landscape.

The significance of impact is **high-moderate**, as the sensitivity to change is high and the magnitude of change is moderate.

4.4 Comment 9

DPLH comment:

Further analysis advised

The significance of the project's potential visual impacts on the tourist town of Augusta warrants further work by consultants:

1. *Provision of photomontages for the additional viewpoints listed above, possibly using a simpler method to produce wireframe images but with vegetation overlaid.*
2. *Provision of a project site plan showing individually numbered turbines, with numbers also shown on the existing and new photomontages, to enable further assessment of the siting of individual turbines with a view to relocating some of the turbines elsewhere within the project site.*

Response summary:

As mentioned in Comment 8 response summary, additional fieldwork has been undertaken to assist in addressing this comment. All specific locations outlined in comment 8 were visited, including sites within Augusta. Photomontages have been prepared for all four locations listed in comment 8. An amended layout has also been explored in relation to views from Augusta (refer to Appendix C and comment 11 response for further detail).

In addition, a photomontage overlay has been prepared from the Viewpoint 01 Augusta Hotel comparing the proposed 250 m tip height turbines with 235 m tip height turbines (refer to Viewpoint 01 Augusta Hotel in Appendix B and Appendix C), illustrating that lower wind turbines may not result in a substantial reduction in visual impacts from this viewpoint location.

Response to point 1:

As outlined in comment 8 response, 4 additional photomontage and red overlays along with viewpoint assessment commentary has been provided for the specified locations on Scott River Road, centre of Augusta, Town Beach, and Albany Terrace. Refer to comments 8 response.

Response to point 2:

The Proposal Site and Components Plan has been updated with individually numbered turbines (refer to Figure 1). VP01, VP02, VP04, VP10, VP11 and VP12 photomontages provided in the Proposal LVIA

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(2025), as well as the other viewpoints (OVPs) photomontage prepared for the four views suggested in comment 8, have been updated with individual turbine numbers. Refer to Appendix B for photomontages with individual turbine numbering.

4.5 Comment 10

DPLH comment:

Two measures to mitigate visual impacts are recommended:

1. *Relocate approximately three of the outlying turbines at each of the north and south ends of the layout, using numbered photomontages to identify the particular turbines which have the greatest impact.*
2. *Plant local trees to form a screen along the Scott River Road and Governor Broome Road boundaries of the project site (see Photos 5-7).*

Response to point 1:

Amended turbine layout

A 3D model of the wind farm and surrounding area was explored from various key viewpoint locations to investigate the potential to relocate wind turbines to reduce visual effects. As such, an alternative turbine layout was prepared, which can be found in Appendix C, Figure 1-A. These investigations found that there was an opportunity to adjust the layout in order to reduce visual clustering of turbines and spread the visual effects across the view more evenly, subsequently removing visual 'gaps' within key views. Five turbines were relocated, including at the northern, southern and eastern extents of the layout (turbine 3, 5, 6, 10 and 20).

To support this revision, updated numbered photomontages have been prepared from viewpoints assessed in the Proposal LVIA (2025), including VP01 (Augusta Hotel), VP02 (Augusta Residential), VP10 (Albany Terrace Beach Access) and VP12 (Colourpatch / Seine Bay), as well as requested viewpoint locations provided as part of this response memo, OVP01 (Scott River Road), OVP02 (Centre of Augusta), OVP03 (Town Beach), and OVP04 (Albany Terrace). These photomontages identify the turbines with the greatest visual influence and demonstrate the effect of the revised layout on key public views (Appendix C).

Revised ZTV mapping has been undertaken for the alternative layout hub and tip heights, which is also provided in Appendix C, Figures 2-A and 3-A respectively.

See below for viewpoints OVP01 (Scott River Road), OVP02 (Centre of Augusta), and OVP04 (Albany Terrace), reflecting the visual change associated with the alternative layout. There was no change associated with OVP03 (Town Beach), as there would be no view of the wind farm.

OVP01 - Scott River Road



Photo 13 Proposed view from OVP01 Scott River Road

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Photo 14 *Proposed view from OVP01 Scott River Road, alternative layout*

OVP02 - Centre of Augusta (Ellis Street, Blackwood Avenue)



Photo 15 *Proposed view from OVP02 Centre of Augusta*



Photo 16 *Proposed view from OVP02 Centre of Augusta, alternative layout*

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OVP04 - Albany Terrace



Photo 17 ***Proposed view from OVP04 Albany Terrace***



Photo 18 ***Proposed view from OVP04 Albany Terrace, alternative layout***

Response to point 2:

The Department's comments regarding potential screen planting along Governor Broome Road and Scott River Road are noted.

Key public views of the Proposal are primarily experienced from Augusta, located at distance to the west of the project site. For tall infrastructure such as wind turbines and transmission lines, landscape screening is generally more effective when located closer to the receptor rather than adjacent to the project components; therefore, planting within or immediately adjacent to the project site would not meaningfully address longer-range views from Augusta or other distant receptors.

Potential roadside planting along Scott River Road and Governor Broome Road within the project site may be considered where it is limited, selective and locally appropriate, and where it would reduce turbine visibility for nearby road users and contribute to improved landscape and environmental values. To be effective, such planting would need to be located either within the road corridor or within the project site, with potential land access or ownership considerations. Currently, discontinuous linear roadside vegetation corridor is present within the road reserve along both roads, providing visual screening and open views to the landscape. An existing overhead distribution power line along both roads adjacent to the Proposal boundary may also need considering.

The Local Planning Strategy and Local Planning Scheme No.1 emphasise maintaining the open rural character and valued long-range views from travel route corridors across agricultural land. Extensive or continuous screen planting has the potential to block views across farmland and alter the established visual character of the road corridor, which would conflict with the intent of these policies. Vegetation screening may therefore only be appropriate where it is limited, selective and reinforces existing vegetation patterns. For example, roadside planting may be appropriate as a continuation of existing linear vegetation within the road corridor, adjacent to areas with visual exposure to the nearest turbines, as shown in VP05 Scott River

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Road within the Proposal LVIA (2025). Where appropriate, a simplified Landscape Plan may be developed at later design stages to address locally identified visual impacts in a targeted manner.

4.6 Comment 11

DPLH comment:

The proponent concludes that a grid layout would be preferable to the proposed irregular layout, on the basis that this is more appropriate for the open, agricultural setting. This is consistent with Scottish wind farm guidance which recommends a regular layout for wide open and level landscapes with regular agricultural fields.

It is noted that there is a significant proportion of woodland vegetation, so the landscape is not fully 'open', and the overall landscape setting is gently undulating, not level, partly due to clumps of trees set amongst areas of lower dune and wetland vegetation. From distant viewpoints such as Augusta and the south coastline of town, the horizon-line is not level, but hillocky, with variations in colour and texture of remnant vegetation. Although the turbines are located in an agricultural setting, from the significant viewpoints the wind farm appears to be located within a broadly natural wider landscape. Therefore, the currently proposed irregular layout is considered to be the most suitable and should therefore be retained.

Response:

The Department's comments regarding turbine layout are noted. While the turbines are located within agricultural land, the wider landscape is gently undulating and includes woodland, wetland vegetation and a hillocky horizon when viewed from distant viewpoints such as Augusta and the southern coastline. From these sensitive viewpoints, the wind farm is perceived within a broader, predominantly natural landscape rather than a level, open agricultural plain. In this context, the retained irregular layout is considered more responsive to landform and vegetation patterns and better integrated with the wider landscape character. The existing layout pattern has therefore been retained, however with the adjusted layout of 5 turbines.

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Appendix A

Agency comments

Agency Comments

DBCA comments

Ref	Feedback
1	The methodology, process and outcomes as presented in Attachment 4 - Referral Supporting Documents (RSD), Ecological Australia 2025 and the main assessment documented in Proposed Wind Farm - Scott River Landscape and Visual Impact Assessment by GHD 2025 are generally supported given: – The methodology aligns with industry standards using established methodologies and approved documents, including the WAPC *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting, and design*. – Suitable Landscape Character Units (LCU) were developed highlighting the variety of landscape types that surround the project. These were then extended to describe the public's acceptance of visual change to the landscape quality of those LCUs. – The Zones of Visual Influence (ZVI) capture where the wind farm infrastructure will be seen across the landscape.
2	Views specific to DBCA managed lands are largely absent, including the Cape to Cape Track, recreation sites and activity on and along the Blackwood River / Scott River and Hardy Inlet, and the Cape Leeuwin Lighthouse (from the ground and the top viewing deck). Assessing more receptors could help to identify small scale or local mitigation measures.
3	The majority of the assessment focuses on the WTGs as these are the largest elements in the landscape - this includes the mapping of ZVIs. Other infrastructure worthy of the same detailed assessment as the WTGs include the access and maintenance roads, transmission line, meteorological masts and the substation, given they are of significant scale or length in the landscape and will be seen in a different context to the towers. Individual ZVIs for the other infrastructure will determine where these elements will be seen from the landscape and sensitive visual receptors. These ZVIs could inform mitigation measures that could reduce the individual visual impact of these items and therefore reduce the collective total visual impact for the project as a whole.
4	The report notes that there will be an impact to the quality of the visual landscape from this proposal. Because of this acknowledgment, and the degree of the impact, the proposed mitigation measures appear limited. More advanced assessment of mitigation measures, based on a more detailed assessment of sensitive visual receptors, infrastructure assessment and associated ZVI may provide more protection of landscape quality and the viewer's sensitivity to the proposal.
5	1. The viewing deck at the Cape Leeuwin Lighthouse sits ~40m above ground, and the base of the lighthouse is ~ 20m above sea level. As this is a significant tourism site it would warrant an assessment. 2. The Visual Impact Assessment identifies that this proposal will be highly visible in the surrounding landscape and that there is limited scope in most instances to reduce this visual impact. 3. The proposed mitigation measures are limited and reflect the high impact of the proposal from scattered receptor sites but do not consider local or small-scale mitigation measures or interventions to protect visual quality from the entire landscape. 4. Potential mitigation measures to address landscape-wide and locally identified impacts could include: – Road edge vegetation screening along surrounding travel route corridors of all types managing and screening views along the length of these corridors. – Localised screening surrounding the ancillary infrastructure. – Broadscale landscape planting within the project area.

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DPLH comments

	Feedback
6	The following comments and attached photos are provided on the visual impact of the proposed Scott River wind farm and the proponent's Landscape and Visual Impact Assessment (LVIA). The comments are made with reference to the WAPC *"Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design"* and the Department of Planning, Lands and Heritage GIS "InQuiry", as well as knowledge of the area. The viewshed mapping indicates that the turbines may be extensively visible. However, it is likely that roadside trees would obscure views from two of the three major roads to Augusta (Bussell Highway and Caves Road), and views from narrow, treelined secondary roads oriented generally towards the site eg Challis Road, and Fisher Road, which is used to access the settlement on Molloy Island.
7	Analysis using Google Streetview images indicates that the greatest visibility is likely to be from: – private residences in Augusta which have northeasterly views, comprising • elevated sites • sites along the shore of the Blackwood River, Hardy Inlet, or ocean – public recreation sites on the western banks of the Blackwood River (e.g. the river end of Howe Road), Hardy Inlet (e.g. end of Ellis Road) or open ocean (e.g. Flinders Bay). – from western portions of Hardy Inlet. – from the open ocean. It also appears that there will also be significant visibility from Augusta's main intersection at Blackwood Avenue and Ellis Street, other locations along Blackwood Avenue, and from Scott River Road and Governor Broome Road, which are at the project site and are used to access East Augusta and more distant coastal areas e.g. for recreational purposes.
8	**Assessment report - method and conclusions** – The method used for the assessment is generally suitable, with two exceptions as below. Several important viewpoints have been overlooked in analysis: 1. Travelling east along Scott River Road leaving East Augusta, in locations where the vegetation is naturally low (see attached Photo 1). 2. Main street intersection, Ellis Street moving downhill into the intersection with Blackwood Avenue (Photo 2 – two examples). 3. Main town foreshore opposite East Augusta (Photo 3). 4. Albany Terrace, close to the opening between Hardy Inlet and the ocean (Photo 4). – Reference to the three primary visual management objectives as being 'protection', best practice, and 'engagement', but the third objective advised in the WAPC's manual is 'enhancement', not 'engagement'. It is beneficial to identify potential engagement opportunities, but this should occur elsewhere in the report and 'enhancement' should be addressed. This objective would justify introducing roadside tree planting to Scott River Road and Governor Broome Road, within the project site, as it would reduce turbine visibility from the closest viewpoints, and would enhance environmental values in the landscape
9	**Further analysis advised** The significance of the project's potential visual impacts on the tourist town of Augusta warrants further work by consultants: 1. Provision of photomontages for the additional viewpoints listed above, possibly using a simpler method to produce wireframe images but with vegetation overlaid. 2. Provision of a project site plan showing individually numbered turbines, with numbers also shown on the existing and new photomontages, to enable further assessment of the siting of individual turbines with a view to relocating some of the turbines elsewhere within the project site.
10	**Mitigation measures** Two measures to mitigate visual impacts are recommended: 1. Relocate approximately three of the outlying turbines at each of the north and south ends of the layout, using numbered photomontages to identify the particular turbines which have the greatest impact. 2. Plant local trees to form a screen along the Scott River Road and Governor Broome Road boundaries of the project site (see Photos 5-7).
11	**Conclusions**

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	Feedback
	The proponent concludes that a grid layout would be preferable to the proposed irregular layout, on the basis that this is more appropriate for the open, agricultural setting. This is consistent with Scottish wind farm guidance which recommends a regular layout for wide open and level landscapes with regular agricultural fields. It is noted that there is a significant proportion of woodland vegetation, so the landscape is not fully 'open', and the overall landscape setting is gently undulating, not level, partly due to clumps of trees set amongst areas of lower dune and wetland vegetation. From distant viewpoints such as Augusta and the south coastline of town, the horizon-line is not level, but hillocky, with variations in colour and texture of remnant vegetation. Although the turbines are located in an agricultural setting, from the significant viewpoints the wind farm appears to be located within a broadly natural wider landscape. Therefore, the currently proposed irregular layout is considered to be the most suitable and should therefore be retained.

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Appendix B

Photomontages

EXISTING VIEW



ORIGINAL
20 TURBINE LAYOUT



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 01 : Augusta Hotel

GHD Pty Ltd
999 Hay Street Perth, Western Australia
Western Australia, 6000
T 61 8 6222 8222 **E** permail@ghd.com.au **W** www.ghd.com

ORIGINAL
20 TURBINE LAYOUT
WITH RED OVERLAY



ORIGINAL
20 TURBINE LAYOUT
NUMBERED



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
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235m TURBINE HEIGHT LAYOUT



235m TURBINE HEIGHT LAYOUT WITH RED OVERLAY



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
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EXISTING VIEW



ORIGINAL
20 TURBINE LAYOUT



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 02 : Augusta Residential

GHD Pty Ltd
999 Hay Street Perth, Western Australia
Western Australia, 6000
T 61 8 6222 8222 **E** permail@ghd.com.au **W** www.ghd.com

ORIGINAL
20 TURBINE LAYOUT
WITH RED OVERLAY



ORIGINAL
20 TURBINE LAYOUT
NUMBERED



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 02 : Augusta Residential

GHD Pty Ltd
999 Hay Street Perth, Western Australia
Western Australia, 6000
T 61 8 6222 8222 **E** permail@ghd.com.au **W** www.ghd.com

EXISTING VIEW



ORIGINAL
20 TURBINE LAYOUT



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
Coordinates:	331663, 6200081 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5.2 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 10 : Albany Tce Beach Access

GHD Pty Ltd
999 Hay Street Perth, Western Australia
Western Australia, 6000
T 61 8 6222 8222 **E** permail@ghd.com.au **W** www.ghd.com

ORIGINAL
20 TURBINE LAYOUT
WITH RED OVERLAY



ORIGINAL
20 TURBINE LAYOUT
NUMBERED



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
Coordinates:	331663, 6200081 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5.2 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 10 : Albany Tce Beach Access

GHD Pty Ltd
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EXISTING VIEW



ORIGINAL
20 TURBINE LAYOUT



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:41, 28th August 2024

Location:	94 Albany Terrace, Augusta
Coordinates:	331500, 6200371 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	15.1 m
Date of Photomontage:	19th February 2026
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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ORIGINAL
20 TURBINE LAYOUT
WITH RED OVERLAY



ORIGINAL
20 TURBINE LAYOUT
NUMBERED



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:41, 28th August 2024

Location:	94 Albany Terrace, Augusta
Coordinates:	331500, 6200371 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	15.1 m
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Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	325° - 55°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	8:14, 8th March 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328651, 6194689 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	65.6 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Top

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	325° - 55°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	8:14, 8th March 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328651, 6194689 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	65.6 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Top

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EXISTING VIEW



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:12, 28th August 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328660, 6194692 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	33 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Base

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PROPOSED DESIGN
ROTATED BLADES



PROPOSED DESIGN
BLADE TIPS AT
MAXIMUM HEIGHT
OVERLAY



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:12, 28th August 2024

Location:	Leeuwin Road, Augusta
Coordinates:	328660, 6194692 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	33 m
Date of Photomontage:	11th November 2024
Issue:	v 01

Proposed Wind Farm - Scott River Region
SynergyRED

Photomontage : Cape Leeuwin Lighthouse - Base

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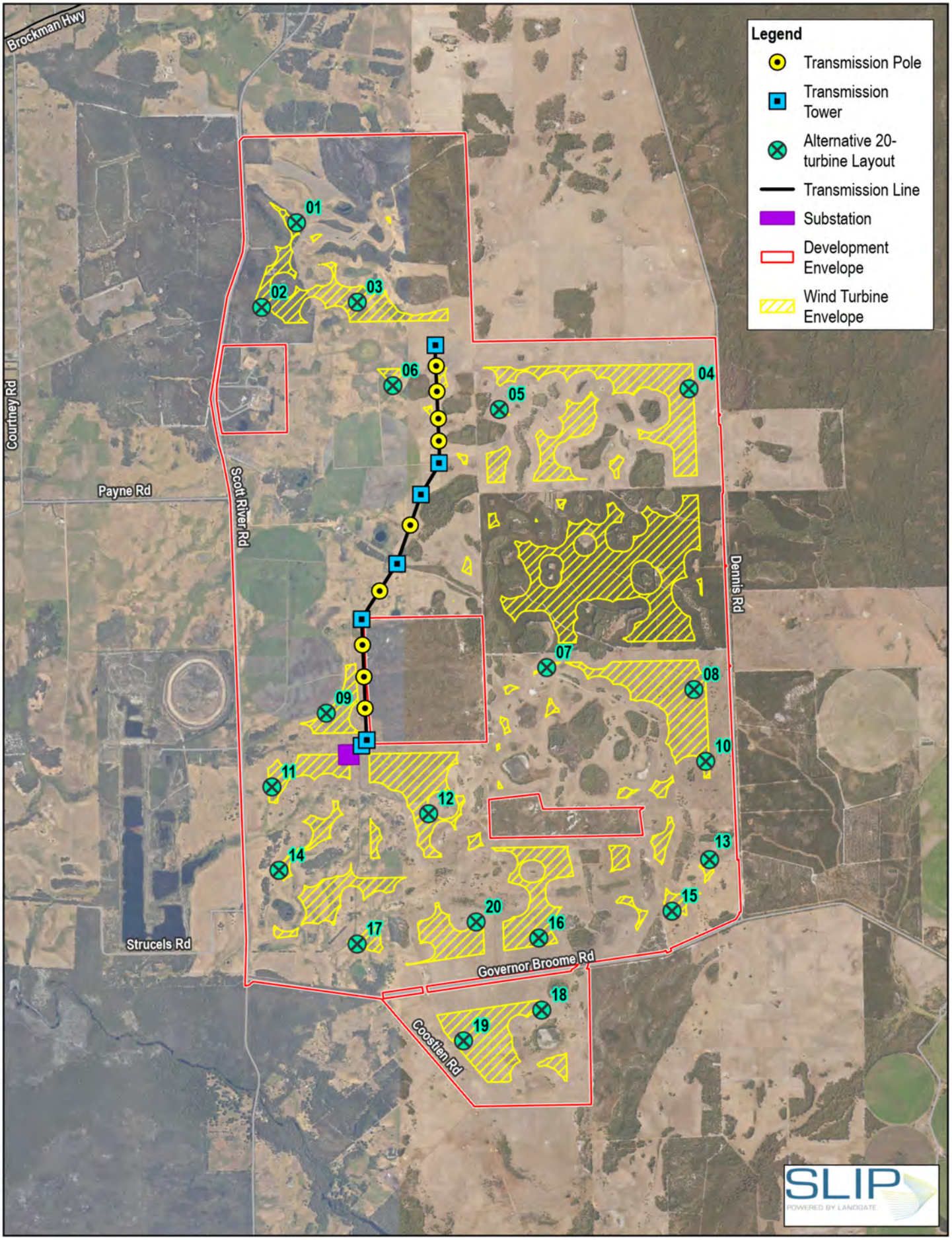
Appendix C

Alternative Layout and photomontages



Paper Size ISO A4

0 250 500 750 1,000

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

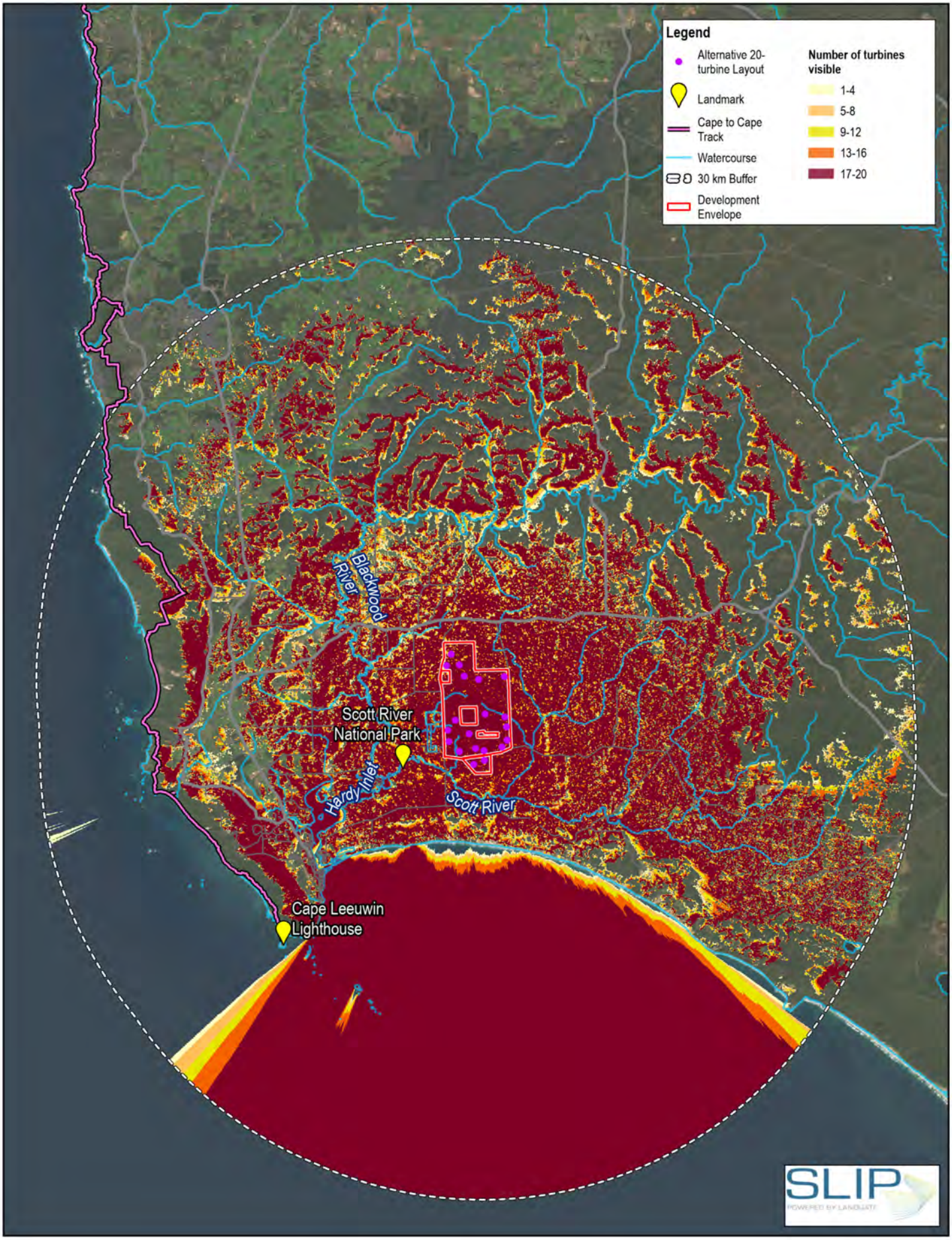
Proposal Site and Components Plan – Alternative 20-turbine Layout

Project No. **12690217**
Revision No. **B**
Date **02/03/2026**

FIGURE 1-A

\\ghdnet\ghd\AU\Perth\Projects\61\12690217\GIS\Maps\Working\12690217\12690217.aprx - 12690217_001A_20TurbineAlternativeLayout_RevB
Print date: 02 Mar 2026 - 15:23

Data source: Landgate_Subscription_Imagery\WANow: . Created by: cbataller



Paper Size ISO A4

0 2 4 6 8

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

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Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

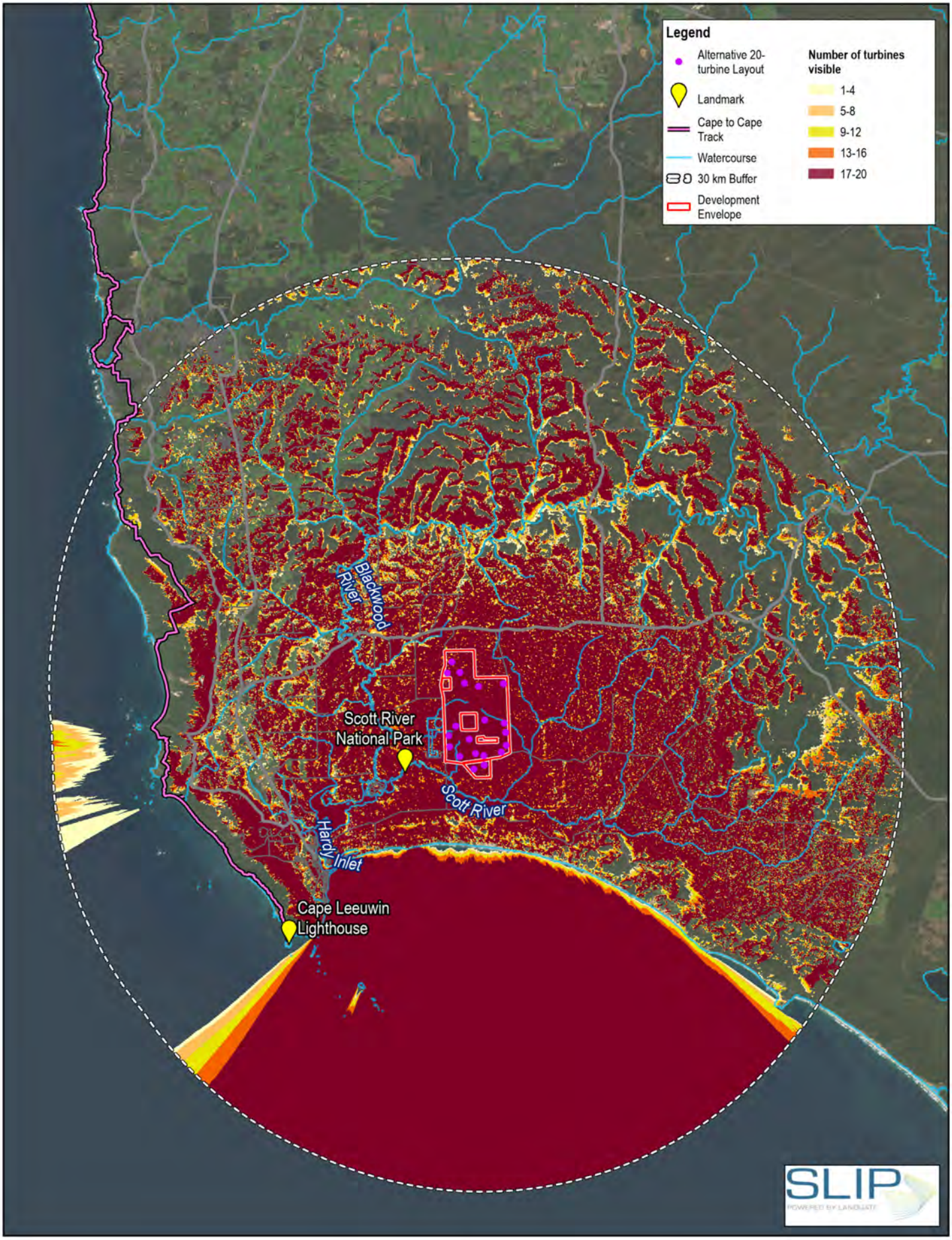
Zone of Theoretical Visibility - Hub Height, Alternative 20-turbine Layout

Project No. **12690217**
Revision No. **A**
Date **03/03/2026**

FIGURE 2-A

\\ghdnet\ghd\AU\Perth\Projects\61\12690217\GIS\Maps\Working\12690217\12690217.aprx - 12690217_002A_ZTV_Hub_20TurbineAlternativeLayout_RevA
Print date: 03 Mar 2026 - 15:38

Data source: World Imagery: Earthstar Geographics. Created by: cbataller



Paper Size ISO A4

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 50

N

GHD

Synergy Renewable Energy Developments Pty Ltd
Proposal Location Plan

Zone of Theoretical Visibility - Tip Height, Alternative 20-turbine Layout

Project No. **12690217**
Revision No. **A**
Date **02/03/2026**

FIGURE 3-A

\\ghdnet\ghd\AU\Perth\Projects\61\12690217\GIS\Maps\Working\12690217\12690217.aprx - 12690217_002B_ZTV_Tip_20TurbineAlternativeLayout_RevA
Print date: 02 Mar 2026 - 17:05

Data source: World Imagery: Earthstar Geographics. Created by: cbataller

EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 01 : Augusta Hotel

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	4 March 2026
Issue:	v 02

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Viewpoint 01 : Augusta Hotel

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



PROPOSED ALTERNATIVE TURBINE LAYOUT 250M AND 235M TIP HEIGHT COMPARISION OVERLAY



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	4 March 2026
Issue:	v 02

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Viewpoint 01 : Augusta Hotel

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PROPOSED ALTERNATIVE TURBINE LAYOUT 235m HEIGHT



PROPOSED ALTERNATIVE TURBINE LAYOUT 250m HEIGHT



KEY PLAN



View Direction:	336° - 66°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:50, 27th March 2024

Location:	53 Blackwood Avenue, Augusta
Coordinates:	330764, 6201222 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	39 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
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Viewpoint 01 : Augusta Hotel

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 02 : Augusta Residential

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River SynergyRED

Viewpoint 02 : Augusta Residential

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	27° - 117°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:21, 8th March 2024

Location:	Hurford Place, Augusta
Coordinates:	330617, 6202805 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	32 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River SynergyRED

Viewpoint 02 : Augusta Residential

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
Coordinates:	331663, 6200081 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5.2 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 10 : Albany Tce Beach Access

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
Coordinates:	331663, 6200081 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5.2 m
Date of Photomontage:	4 March 2026
Issue:	v 02

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Viewpoint 10 : Albany Tce Beach Access

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	349° - 79°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	7:02, 8th March 2024

Location:	829 Albany Terrace, Augusta
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Viewpoint Elevation:	5.2 m
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Viewpoint 10 : Albany Tce Beach Access

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:41, 28th August 2024

Location:	94 Albany Terrace, Augusta
Coordinates:	331500, 6200371 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	15.1 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	15:41, 28th August 2024

Location:	94 Albany Terrace, Augusta
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Viewpoint Elevation:	15.1 m
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Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	339° - 69°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
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Location:	94 Albany Terrace, Augusta
Coordinates:	331500, 6200371 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	15.1 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

Viewpoint 12 : Colourpatch / Seine Bay

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	352° - 82°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:19, 6th February 2026

Location:	Scott River Road, Scott River
Coordinates:	336665, 6204648 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	16 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 01 : Scott River Road

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PROPOSED
ALTERNATIVE
TURBINE LAYOUT
ROTATED BLADES



PROPOSED
ALTERNATIVE
TURBINE LAYOUT
RED OVERLAY



KEY PLAN



View Direction:	352° - 82°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:19, 6th February 2026

Location:	Scott River Road, Scott River
Coordinates:	336665, 6204648 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	16 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 01 : Scott River Road

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	352° - 82°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	11:19, 6th February 2026

Location:	Scott River Road, Scott River
Coordinates:	336665, 6204648 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	16 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River SynergyRED

OVP 01 : Scott River Road

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	5° - 95°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:57, 6th February 2026

Location:	Ellis Street, Augusta
Coordinates:	330663, 6201266 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	36 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 02 : Centre of Augusta

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	5° - 95°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:57, 6th February 2026

Location:	Ellis Street, Augusta
Coordinates:	330663, 6201266 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	36 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
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OVP 02 : Centre of Augusta

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	5° - 95°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:57, 6th February 2026

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Proposed Wind Farm - Scott River
SynergyRED

OVP 02 : Centre of Augusta

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	309° - 39°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:48, 6th February 2026

Location:	Ellis Street Jetty, Ellis Street, Augusta
Coordinates:	330904, 6201358 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	7 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 03 : Town Beach

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	309° - 39°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:48, 6th February 2026

Location:	Ellis Street Jetty, Ellis Street, Augusta
Coordinates:	330904, 6201358 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	7 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 03 : Town Beach

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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	309° - 39°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:48, 6th February 2026

Location:	Ellis Street Jetty, Ellis Street, Augusta
Coordinates:	330904, 6201358 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	7 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 03 : Town Beach

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EXISTING VIEW



PROPOSED ALTERNATIVE TURBINE LAYOUT MAXIMUM HEIGHT



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:25, 6th February 2026

Location:	Albany Terrace, Augusta
Coordinates:	331575, 6200381 (GDA 2020 MGA Zone 50)
Viewpoint Elevation:	5 m
Date of Photomontage:	4 March 2026
Issue:	v 02

Proposed Wind Farm - Scott River
SynergyRED

OVP 04 : Albany Terrace

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PROPOSED ALTERNATIVE TURBINE LAYOUT ROTATED BLADES



PROPOSED ALTERNATIVE TURBINE LAYOUT RED OVERLAY



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:25, 6th February 2026

Location:	Albany Terrace, Augusta
Coordinates:	331575, 6200381 (GDA 2020 MGA Zone 50)
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PROPOSED ALTERNATIVE TURBINE LAYOUT NUMBERED



KEY PLAN



View Direction:	344° - 74°
Horizontal Field Of View:	90°
Camera Height:	1.7 m
Camera Type:	Canon EOS 6D
Lens Type:	50 mm
Photograph Time & Date:	12:25, 6th February 2026

Location:	Albany Terrace, Augusta
Coordinates:	331575, 6200381 (GDA 2020 MGA Zone 50)
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Appendix C: DPLH Community SVA and LVIA

1 SOCIAL IMPACT (ASSOCIATED WITH VISUAL IMPACT)

The Shire, through an RFI, has requested further detail on how community perspectives relating to landscape and visual impact have been considered and mitigated. The Shire has noted the high level of submissions during the DA public consultation period relating to visual impact.

To support this, SynergyRED has prepared the following updated information, which incorporates the completed LVIA, responses to feedback raised in public submissions, insights from subsequent engagement activities, and how we have addressed the concern.

1.1 Summary of the Social Values Assessment (SVA)

Synergy's Social Values Assessment (SVA) was delivered to support the engagement and decision making for the pre-feasibility stage of the proposed wind farm in Scott River. The SVA was delivered early in the feasibility assessment process, prior to the Landscape and Visual Impact Assessment (LVIA). This timing allowed the SVA findings to influence project decisions made throughout the feasibility assessment.

The SVA gathered evidence to identify key social impacts (both negative and positive) that may result from the proposal, focusing on:

- Community and stakeholder engagement perceptions
- Workforce management
- Housing and accommodation
- Local business and industry procurement
- Community health and wellbeing

In investigating the above potential social impacts, visual amenity was also explored as a potential impact. The following sections of the SVA discussed visual impact and suggested recommendations:

- **6.3.6 Sense of Place** – Feedback from participants suggested perceived impacts on amenity specific to visual and noise were a key area of interest to the community.
- **6.5.6 Way of Life** – Changes to visual amenity and potential for turbine lighting were cited among the main concerns from participants. The section also notes opposing opinions that the Scott River location is able to accommodate the visual impact or a wind farm without adversely compromising way of life, or significant landscape values.
- **7.2 Project Scale and Size** – It was recommended that visual amenity should be factored into decision-making around project size and scale.
- **7.5 Clearing Requirements** – It was recommended that clearing of any previously disturbed or undisturbed areas should consider the high social value placed on the visual amenity.

It was noted in the SVA that, at the time of the assessment, Synergy was delivering work to profile the potential visual impacts of the project. Participants in both the qualitative and quantitative stages of the SVA highlighted a strong interest in viewing the outcomes of these studies. Residents of Molloy Island highlighted their interest in understanding potential impacts from turbine lighting and other participants were interested in the potential visual impacts from the Hill View Road Lookout in Augusta, the Augusta Hotel and other local and tourist viewing areas. These potential impacts have since been shared with the community, as outlined in section 1.2.2 below.

1.2 Community feedback on visual impact

Synergy recognised the importance placed on visual amenity by the community and delivered the below activities following the completion of the SVA.

1.2.1 Landscape and Visual Impact Assessment

An initial Landscape and Visual Impact Assessment (LVIA) was delivered in January 2025 to evaluate how the proposed turbines and associated infrastructure could change the existing landscape character and the views experienced by the community. The LVIA included photomontages from the following 12 viewpoints, many of which were selected due to having been highlighted as areas of importance by participants of the SVA:

- Augusta Hotel
- Augusta residential
- Hillview Road lookout
- Molloy Island adjacent
- Scott River Road
- Warner Glen Road
- Brockman Highway residential
- Karridale residential
- Glenarty Road
- Albany Terrace beach access
- Flinders Bay jetty
- Colourpatch

1.2.2 Community engagement

Following the completion of the LVIA, outcomes were shared with the community through the following means:

- Community drop-in sessions (December 2024 and September 2025)
- Mail-out to all landowners within 5 km (March 2025)
- Synergy website
- Eleven editions of the Pelican Post
- Emails to subscribers
- Augusta Community Resource Centre, Library, and Synergy Drop-In Office

During these engagements, community feedback received included:

- Concerns regarding visual change
- Neutral responses
- Lack of concern regarding the visual change
- Acceptance of visual impacts considering renewable-energy benefits

This feedback was noted in engagement summaries, internally and publicly and shared with the project team for consideration of mitigation.

1.2.3 Public submissions

As part of the public comment period led by the Shire of Augusta Margaret River for Synergy's Development Approval application, 531 submissions were received with 153 submissions in support of the project, 8 submissions indifferent and 370 opposed.

Of the 531 submissions, 204 cited visual impact as a contributing factor for their objection to the proposal. The key concerns raised regarding visual impact included:

- Perceived incompatibility with the landscape character
- Changes to views from Augusta, Flinders Bay, Scott River, and Molloy Island
- Possible loss of dark sky if lighting is required
- Perceived negative impact on tourism
- Loss of open horizons
- Turbine height and perceived large scale

One hundred and fifty-three submissions were received in support of the proposal, and eight submissions were indifferent. Key comments of support received included:

- Acceptance of visual change
- Appreciation of turbines in the landscape
- Minimal perceived impact by some residents
- Response to community and DPLH submissions

2 RESPONSE TO COMMUNITY SUBMISSIONS

Based on the community and agency feedback regarding the LVIA impacts outlined in Section 1.2.3, additional work was undertaken to meaningfully address the concerns raised, while ensuring refinements remained within the margins of project viability for a site with a complex combination of environmental, technical and planning constraints such as sensitive receptors, transmission lines, roads, lodged heritage sites, landowner exclusion areas, native vegetation and DBCA managed areas..

Figure 5spel below shows the resulting constraint free area.

2.1 Project LVIA history

The initial 30-turbine configuration, developed only for internal feasibility testing, helped identify environmental, social and engineering constraints but was never advanced for planning. Through detailed assessment, the layout was refined to 20 turbines, addressing environmental limits, LVIA sensitivity around Augusta and Hardy Inlet, coastal proximity, noise and shadow-flicker constraints, residential setbacks, constructability and power line capacity.

This one-third reduction constitutes major early-stage visual mitigation: the 30-turbine layout would have placed turbines noticeably closer to waterbodies and coastal viewpoints, increasing apparent turbine height, horizon intrusion and overall visual presence from Augusta and the inlet. Figure 1 and Figure 2 below illustrate the difference between the early 30-WTG concept and the refined 20-WTG layout submitted for assessment.



Figure 1 Albany Terrace - 30 WTG photomontage



Figure 2 Albany Terrace 20 WTG photomontage

2.2 Additional Visual Technical Work Completed

Additional works were undertaken to address the Public and Agency LVIA feedback. This work included additional viewpoint analysis, updated formats have been developed to enhance transparency and ensure visual impacts are accurately understood by the community and decision-makers. These works are outlined in the **Appendix B: Addendum to the LVIA to address agency comments** of the Applicant Response to Shire, Agency and Public Submissions. The assessment method, viewpoints, camera settings and rendering process were unchanged; only the turbine geometry was revised

2.3 Relocating turbines

DPLH provided feedback relocate three of the outlying turbines at each of the north and south ends of the layout, using numbered photomontages to identify the turbines which have the greatest impact.

3 WTGs - North

Relocation all 3 turbines from the North WTGs was deemed not feasible for the following reasons

- The wind resource in the North is better than most of the other areas and relocating the turbines would have an economic impact to the overall business case for the wind farm
- The northern landowner was an initial project stakeholder from inception, and this would effectively cut them out of the project they have supported for over 3 years.
- The three northern turbines are furthest away from most key viewpoints and generally appear smaller and have less impact than the others, they are also not visible from a few locations.
- The northern area of the site, furthest from the rivers contains land with less complex geotechnical conditions and is therefore more viable and cost effective for the project to build on
- The site is already heavily constrained due to complex combination of environmental, technical, and planning constraints that must be balanced when determining appropriate turbine placement, see Figure 5 below.
- Reduced energy production associated with placing turbines closer together if moved amongst the other 17 to the south.

3 WTGs - South

Assessment of relocating all three of the outlying turbines (WTG 18, WTG 19 and WTG 20) in the south showed that only WTG 20 produced a meaningful improvement in visual impact. The relocation of WTG 18 and WTG 19 delivered only minimal change across key viewpoints and from some angles, no change.

Relocating WTG 20, shifted the southernmost turbine approximately 600 m further from the site's southern boundary and increasing its separation from the inlet and ocean, which reduced its prominence in coastal and water-facing views.

While this relocation improved the southern extent of the layout, it did not fully resolve the broader feedback received. Additional analysis was therefore undertaken to determine whether relocating other turbines could further reduce visible gaps and improve overall skyline cohesion across key viewpoints.

Relocation of Turbines T3, T5, T6, T10, T20

Through an iterative process, five WTGs were relocated (T3, T5, T6, T10, T20) to reduce visual clustering, smooth the skyline, and remove visual gaps in key outlooks from Augusta town, Albany Terrace, Scott River Road and Town Beach as shown below in Figure 3. Figure 4 shows where the WTGs T3, T5, T6 and T20 were relocated to.

Relocating the WTGs reduced the overall visual exposure of the wind farm. The adjustments pull the most prominent edge turbine further inside the site to create a cleaner, more consistent profile in views from Augusta, Albany Terrace and Scott River Road.

Relocating T20 delivers the greatest improvement by moving the southernmost turbine approximately 600 m further inland, increasing its setback from the inlet. All relocations remain within the available constraint-free area.

Figure 6 and Figure 7 below show the difference in view from Albany Terrace. and impact improvement. Other photomontages and associated viewpoint assessments for the alternative layout are presented in the Appendix B.

2.4 Commitment to Screening and Visual Mitigation

SRED is committed to offering targeted visual screening, vegetation strategies, or similar low-impact mitigation measures to adjacent landowners should these prove effective and appropriate in consultation with affected parties.

2.5 Assessment of Reduced Turbine Tip Heigh

A comparative assessment was undertaken to evaluate whether lowering turbine tip height from 250 m to 235 m would reduce visual impacts. Photomontage comparisons prepared for the LVIA addendum show negligible differences between the two heights, with the reduced tip height producing no material change in turbine visibility, prominence, or overall impact in any of the assessed viewpoints. Based on this assessment, lowering turbine height does not provide a meaningful visual benefit and therefore does not alter the LVIA outcomes.

2.6 Model refinement

For the LVIA addendum, the turbine model was updated to use the correct tower diameters, blade chord lengths and nacelle dimensions supplied for the project, replacing the simplified model used in the original LVIA. The assessment method, viewpoints, camera settings and rendering process were unchanged; only the turbine geometry was revised. This update provides a more accurate representation of the turbines and explains the difference in appearance between the original and updated photomontages

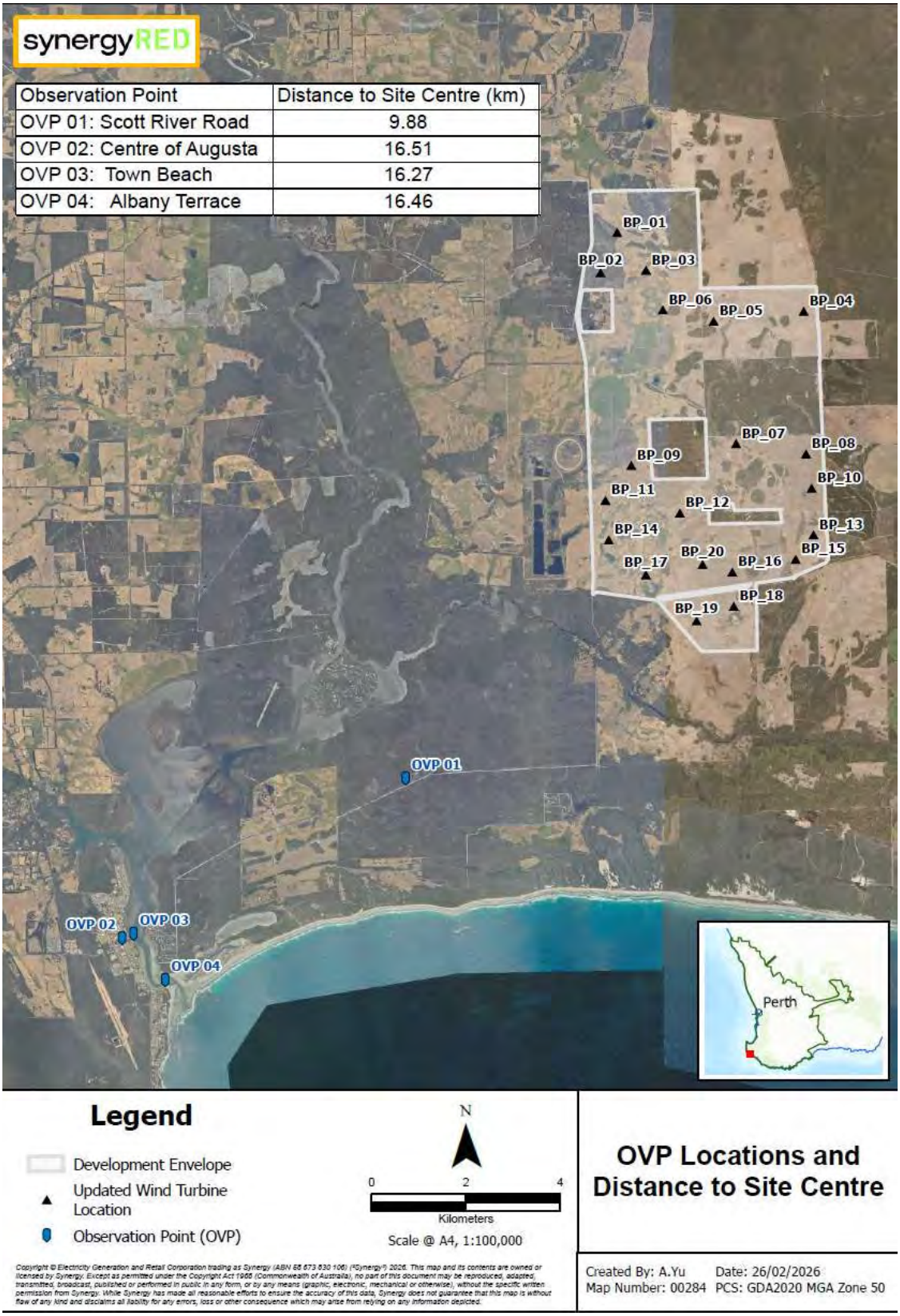


Figure 3 OVP location and distances from site

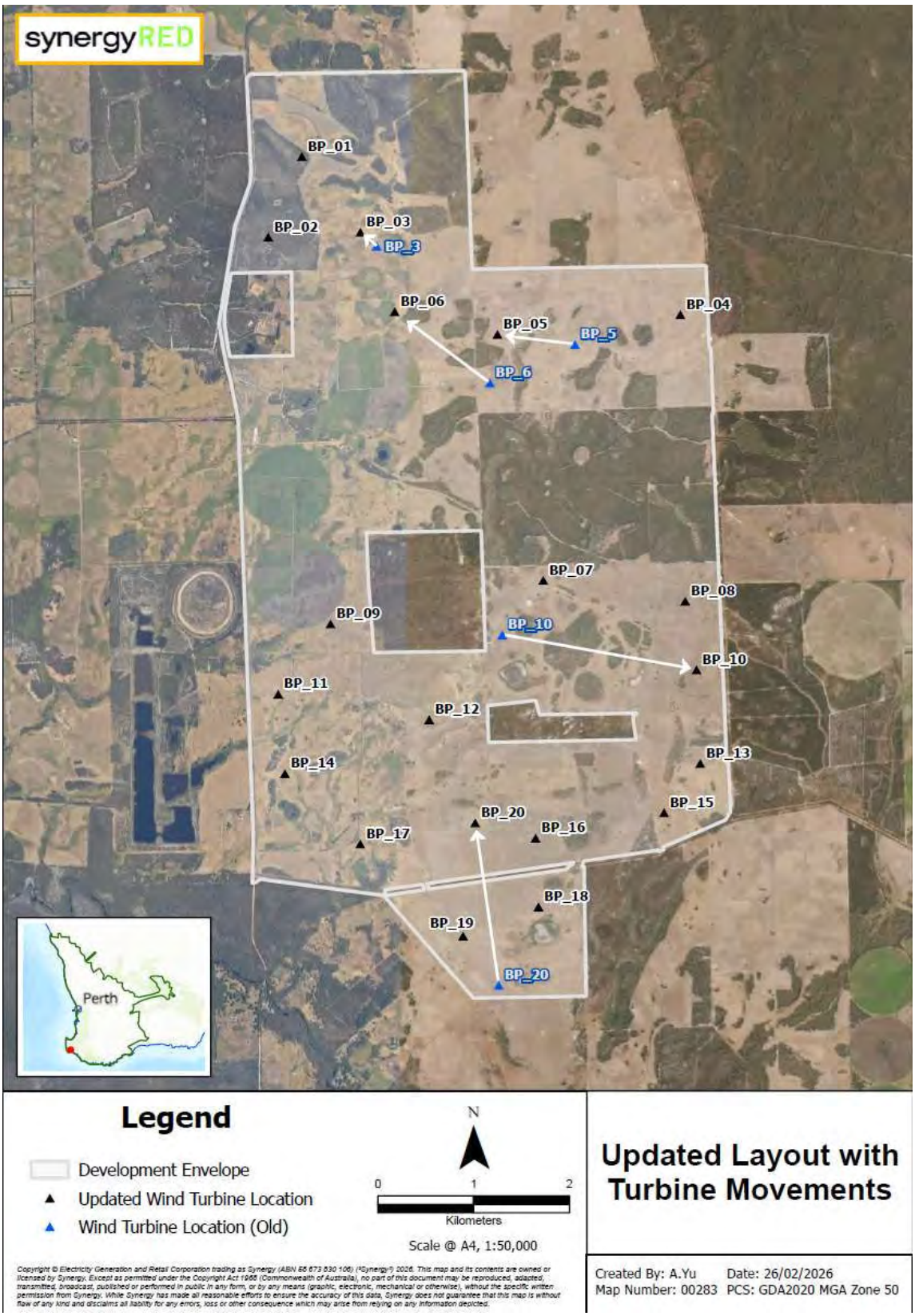


Figure 4 Relocation of WTGs 3,5,6,10 and 20

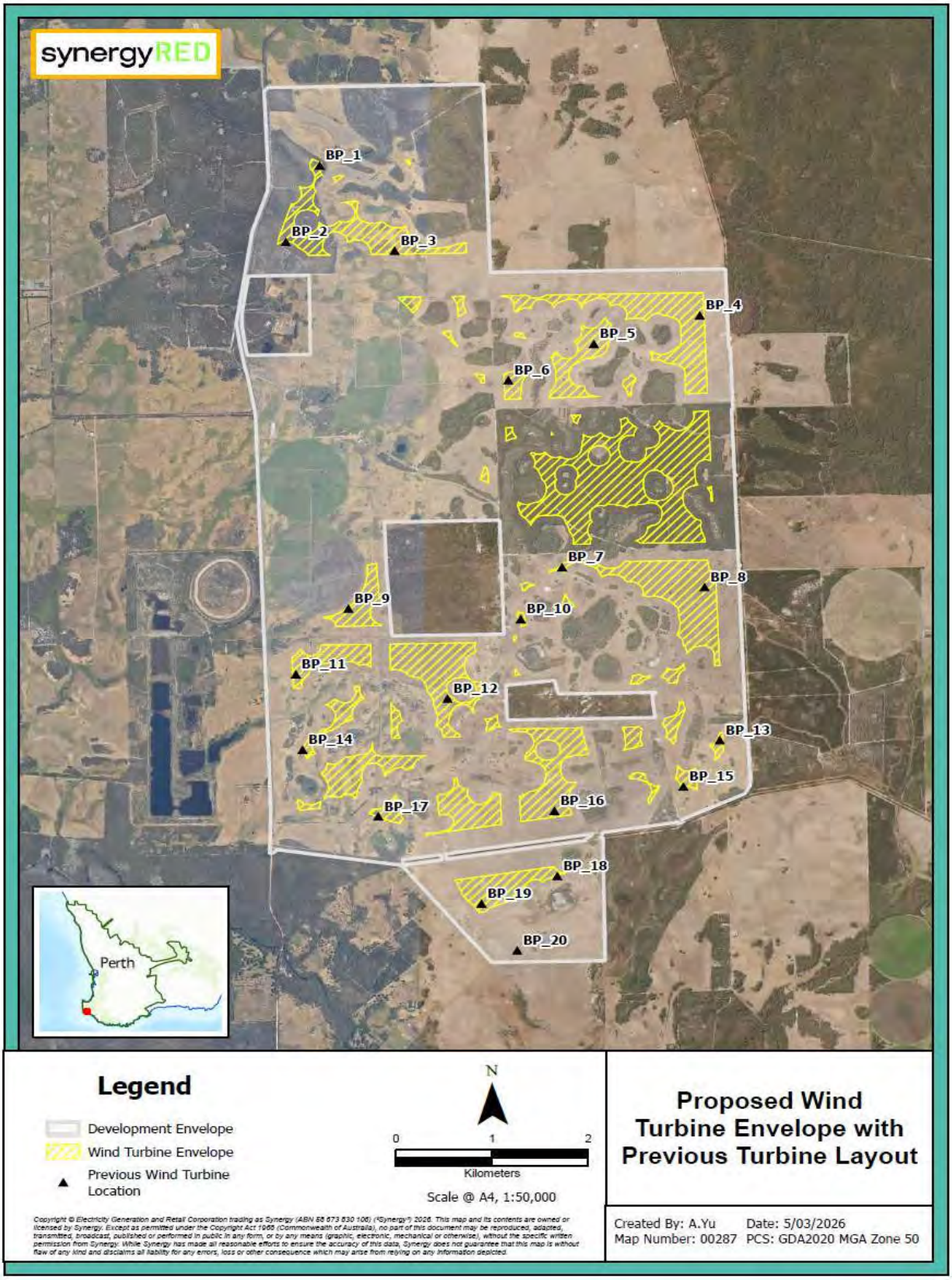


Figure 5 Constraint free areas



Figure 6 Before relocation



Figure 7 After relocation

Proposed Wind Farm at Scott River

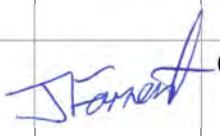
Noise Impact Assessment

Synergy Renewable Energy Developments Pty Ltd

05 March 2026

→ **The Power of Commitment**



Project name	Wind Farm in Scott River delivery noise support					
Document title	Proposed Wind Farm at Scott River | Noise Impact Assessment					
Project number	12690447					
File name	12690447-Wind Farm in Scott River delivery noise support					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	H Satari	V Lenchine B Hillion		J Forrest		12/11/2024
S3	B	H Satari	V Lenchine B Hillion		J Forrest		19/12/2024
S4	0	H Satari	B Hillion		J Forrest		24/02/2025
S4	1	H Satari R Febriyandi	B Hillion		J Forrest		12/05/2025
S3	C	H Satari R Febriyandi B Hillion	V Lenchine		J Forrest		18/02/2026
S4	D	H Satari R Febriyandi B Hillion	V Lenchine		J Forrest		05/03/2026

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Executive summary

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is proposing to develop a wind farm at Scott River in southwest WA (the Project). A noise impact assessment (NIA) for the operation of wind turbine generators (WTGs) has been conducted to support the relevant environmental and planning approvals for the Project.

A dual criteria approach was adopted for this NIA which involved deriving the criteria based on both the WA *Environmental Protection (Noise) Regulations* 1997 and SA *Wind Farm Environmental Noise Guidelines, 2021* using the background noise monitoring data collected at seven locations around the Development Envelope. The project aims to comply with both sets of criteria.

A 3D environmental noise model of the Project was created to predict noise levels at the adjacent noise sensitive receptors, using the ISO9613-2:2024 calculation algorithm implemented in SoundPLAN (v 8.2) software. A proposed 20 WTG layout with a hub height of 164 metres was considered in the 3D noise model. The turbine source noise input data was based on the overall sound power level and the 1/3 octave source spectra data provided by SynergyRED, who selected an unmitigated wind turbine so that the noise model is conservative.

Noise modelling results show that predicted noise levels from turbine operation at adjacent noise sensitive receptors are expected to comply with the noise criteria in accordance with both WA Noise Regulations (1997) and the SA Guidelines (2021).

SynergyRED may consider additional noise mitigation measures to minimise noise impact from the proposed development. It may include further optimisation of the wind farm layout and consideration of other types of WTGs that are characterised by lower noise emission at wind speeds that are critical for noise compliance.

The wind turbine manufacturers aim to design modern WTGs so they are free from tonality. The report considers noise mitigation measures in case this characteristic is present. Presence of such a characteristic at large separation distances is unlikely, however may be confirmed only during post construction monitoring.

This report summarises the results of the NIA. This report is subject to and must be read in conjunction with the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout this report.

Glossary

Term	Description
Background noise level	The measured background noise level at a noise receptor location as per the SA Guidelines.
dB	Decibel, which is 20 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	A-weighted decibel measurement to represent the sound frequency sensitivity of the human ear.
Downwind direction	Wind direction for which a noise receptor location is downwind of the nearest WTG as per the SA Guidelines.
Downwind background noise level	Measured background noise level at a noise receptor location for winds within ±45° of the downwind direction as per the SA Guidelines.
Dwelling	Building used for a noise sensitive purpose,
DWER	WA Department of Water and Environmental Regulation
EPA	Environmental Protection Authority of Western Australia
Cut-in wind speed	Wind speed at which the turbine starts power production
GHD	GHD Pty Ltd
IEC 61400-11:2012	International Standard published by the International Electrotechnical Commission regarding wind turbines.
IF	Influencing Factor which is calculated to determine the noise criteria at a specific noise receptor location and depends on the ratio of commercial and industrial land zoning and the presence of major and secondary roads within 100 metres and 450 metres of the point under consideration.
ISO 9613-2: 2024	Recent version of international standard *ISO9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO9613-2), used for noise propagation modelling by considering the distance between source and noise sensitive receptor topography, ground attenuation, atmospheric absorption at different frequencies and meteorological conditions favourable to noise propagation.
L_{A1}	A-weighted sound pressure level that is exceeded for 1 percent of the measurement period.
L_{A10}	A-weighted sound pressure level that is exceeded for 10 percent of the measurement period.
L_{Amax}	Maximum A-weighted sound pressure level recorded during a specified time period.
$L_{Aeq,10\text{-}min}$	The predicted equivalent noise level adjusted for tonality over a 10-minute period.
$L_{A90,10\text{-}min}$	Measured ambient background noise in the absence of the noise under investigation that is equalled or exceeded for 90 percent of the measurement time interval.
$L_{Aeq\ (time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L_{Afast}	A-weighted sound level measured with a fast time constant of 125 milliseconds.
L_{Aslow}	A-weighted sound level measured with a slow time constant of 1 second

Term	Description
L_{Apeak}	A-weighted peak sound level. It represents the highest instantaneous sound pressure level measured.
Mitigation	Reduction in severity.
NIA	Noise impact assessment
NMP	Noise monitoring point
Premises	Residential, industrial or other premises of any kind whatsoever and includes land, water and equipment
Project	Proposed wind farm at Scott River in southwest WA
Rated power wind speed	Lowest hub height wind speed at which the WTG reaches its rated power
SA Guidelines	*SA Wind Farm Environmental Noise Guidelines, 2021*
Noise receptor	A noise modelling term used to describe a location/premises used for different purposes where the noise by a specific source is received, measured, predicted or mitigated. The noise receptor types vary depending on the usage of the premises e.g. sensitive, non-sensitive, involved, or not-involved.
Noise sensitive receptor	A noise modelling term used to describe a building or dwelling used for residential or accommodation purposes.
Non-sensitive noise receptor	A noise modelling term used to describe a building not used for residential or accommodation purposes e.g. a shed.
Involved noise sensitive receptor	A noise sensitive receptor in a parcel of land that accommodate part of a wind farm development.
Not-involved noise sensitive receptor	A noise sensitive receptor in a parcel of land that do not accommodate any part of a wind farm development.
Position statement	The Position Statement: Renewable Energy Facilities (WAPC, March 2020) outlines the Western Australian Planning Commission's guidelines for the development and assessment of renewable energy facilities.
pW	Picowatt, which is a unit of power equal to one trillionth of a watt
Sound pressure level (SPL)	The change in air pressure above and below the average atmospheric pressure caused by a passing pressure wave; this is then converted to decibels and can be abbreviated as SPL or L_p.
Sound power level (SWL)	Represents the total noise output of the plant or equipment. Also presented as L_{wA} or SPW.
SynergyRED	Synergy Renewable Energy Developments Pty Ltd
The Regulations	*Environmental Protection (Noise) Regulations, 1997*
Tonal noise	Noise with perceptible and definite pitch or tone.
TF	Transport Factor
Wind speed bin	±0.5 m/s at each integer of wind speed from cut-in to cut-out.
WAPC	Western Australian Planning Commission
WHO	World Health Organization
WTG	Wind turbine generator

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1. Introduction

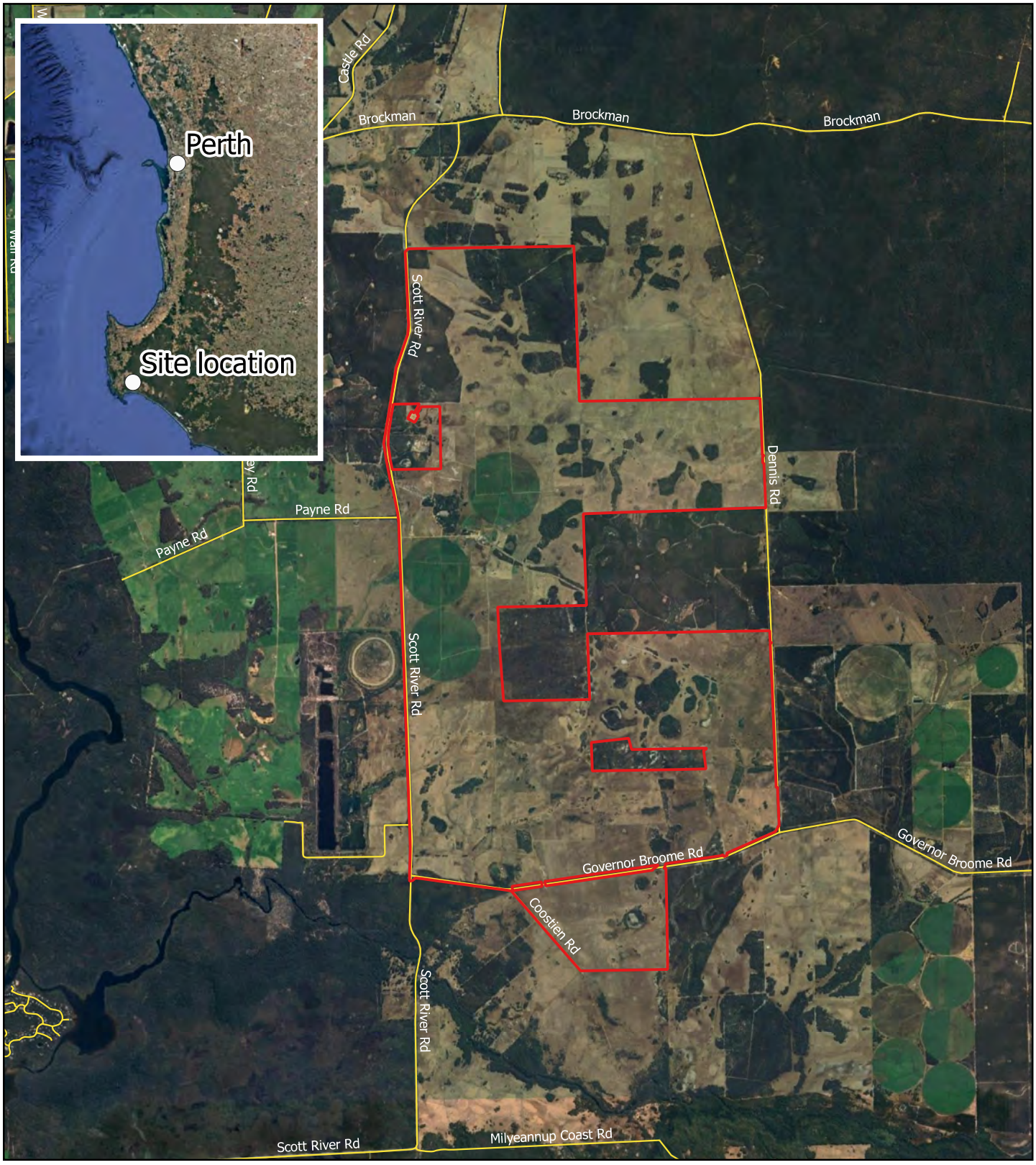
1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED) is currently investigating development of a new wind energy project at Scott River in southwest WA (the Project). The Project has the potential to connect to the Southwest Interconnected System.

The Project Development Envelope is located at Scott River in southwest WA, predominantly surrounded by rural lands developed for agricultural purposes with small areas of remnant and regenerated vegetation (Figure 1.1). The development Envelope is generally bound by the following roads:

– Brockman Highway
– Dennis Road
– Milyeannup Coast Road
– Scott River Road

SynergyRED engaged GHD Pty Ltd (GHD) to undertake an environmental noise impact assessment (NIA) for the Project.



Legend

Development Envelope — Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

N

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Project Development Envelope

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE 1.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
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1.2 Purpose of this report

This report summarises the results of an operational NIA for the Project, including background noise monitoring, noise modelling and impact assessment in accordance with applicable regulatory requirements.

1.3 Scope of works

The scope of works for this assessment is as follows:

– Background noise monitoring:
  - Review of adjacent noise receptor locations to identify representative noise receptor locations to conduct noise monitoring.
  - Five months of unattended background noise monitoring at seven representative noise receptor locations, with one local weather monitoring station (wind speed, wind direction and rainfall) deployed at one of the seven representative noise receptor locations.
  - NIA based on dual criteria. The criteria were derived primarily based on the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The baseline noise monitoring results were used to determine criteria in accordance with the SA Environment Protection Authority's (SA EPA) *Wind Farms Environmental Noise Guidelines* (SA Guidelines, 2021). The criteria derived based on the SA Guidelines were used as secondary noise criteria for NIA and details of the background noise data processing are provided in Appendix B.
– Noise modelling of the Project:
  - Development of 3D noise model of the Project and surrounding area, incorporating topographic data and all identified noise receptors.
  - Review noise emission data for the candidate turbines being considered for the Project.
  - Conduct noise impact modelling of the Project site according to the prediction procedures as specified in SA Guidelines using ISO9613-2:2024 modelling algorithm.
  - Assess the compliance margin for the proposed layout at noise receptors based on the modelling results. In the case that potential non-compliance is predicted at any noise sensitive receptor, liaise with Project team to discuss mitigation strategies (e.g. changes to turbine layout) to ensure compliance can be achieved. If non-compliance with relevant criteria is still predicted, explore further mitigation measures such as turbine noise curtailment, to achieve the noise criteria
  - Assess operational noise for the substations in accordance with the Regulations.
– Provide a NIA report, summarising the findings relevant to the agreed layout within the scope components above.

1.4 Limitations

This report has been prepared by GHD for SynergyRED and may only be used and relied on by SynergyRED for the purpose agreed between GHD and SynergyRED as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than SynergyRED arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.5 Assumptions

This report is subject to the following general assumptions at the time of writing this report:

All information provided by SynergyRED, including relevant Project location and noise receptor information, wind turbine generator (WTG) layout and specification, wind data from the Project's meteorological mast, and relevant noise data are deemed correct.

All parameters used in the assessment and other relevant data are based on best estimates using information provided by SynergyRED and other relevant sources.

Operating hours for the wind farm would be 24 hours a day, seven days a week.

It is assumed that noise emission from WTGs for the development do not exhibit tonal character that evokes noise level adjustment in accordance with SA Guidelines.

Hub heights for the layouts of proposed WTGs used in the current assessment were assumed to be 164 metres above ground level.

Due to the substantial separation distance to the nearest noise receptors (the nearest noise receptor to the substation is located more than 1700 metres away) it is not expected that vibration impacts would be relevant during the operation of the Project.

2. Assessment criteria

2.1 Operation of wind turbines

Specific noise guidelines are applicable to assessment of noise from wind farms due to their unique noise generating characteristics in conjunction with typically low ambient noise surroundings.

Following advice from the Department of Water and Environmental Regulation (DWER), the *Environmental Protection (Noise) Regulations 1997* (the Regulations) will be used as the primary noise criteria for the NIA.

In addition, and for completeness, the SA Guidelines will be also used to derive the secondary noise criteria based on the background noise monitoring data, this allows to also compare predicted project noise levels with this secondary criteria which historically has been used in Western Australia to assess wind farm developments.

2.1.1 Environmental Protection (Noise) Regulations 1997

Noise emissions from the operation of WTG and associated substation will be assessed against criteria according to the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 8 sets out the maximum allowable noise levels (assigned noise levels) based on different time of day and land use (i.e. noise sensitive premises, commercial and industrial type premises), applicable at the premises receiving the noise. Various parameters of the assigned noise levels (L_{A10}, L_{A1} and L_{Amax}) also depend on influencing factor (IF) which are calculated in accordance with Schedule 3 of the Regulations, taking into account the area of industrial and commercial land and the presence of major and secondary roads within a 100 m and 450 m radius around the noise receptor.

A summary of the assigned noise levels from Regulation 8 is presented in Table 2.1.

Table 2.1 Assigned noise levels based on the Environmental Protection (Noise) Regulations 1997

Type of premises receiving noise	Time of day	Assigned noise level. dB(A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: Highly sensitive area (i.e. noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use)	7:00 am to 7:00 pm Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	9:00 am to 7:00 pm Sunday and public holidays	40 + IF	50 + IF	65 + IF
	7:00 pm to 10:00 pm all days (Evening)	40 + IF	50 + IF	55 + IF
	10:00 pm on any day to 7:00 am Monday to Saturday and 9:00 am Sunday and public holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: Any area other than highly sensitive area (i.e. Noise Sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use)	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

2.1.1.1 Influencing factor

Influencing factors (IFs) have been calculated and used to determine assigned noise level criteria as presented in Table 2.2 for nearest noise receptors (refer to Figure 3.5).

Schedule 3 of the Regulations details the process to determine the IF for noise sensitive premises, which can be summarised as the following steps:

1. Obtain a Council zoning map covering an area up to 500 m from the receiving location.
2. Draw two circles around the receiving point, of 100 m radius and 450 m radius.
3. Determine the percentage of each circle that is taken up with industrial and commercial zonings. Note that the industrial and commercial areas in the inner circle are also counted in the outer circle.
4. Add the percentages up as follows:
   - (Percent industrial in small circle + percent industrial in a large circle) x 1/10 = I
   - (Percent commercial in small circle + percent commercial in large circle) x 1/20 = C
5. Determine the transport factor (TF) as follows (Note – TF cannot be more than 6):
   - Major road (more than 15,000 vehicles/day) in small circle, TF = 6
   - A major road in a large circle, TF = 2
   - For each secondary road (6,000 - 15,000 vehicles/day) in small circle, TF = 2
6. Add I, C and TF from steps 4 and 5 above to obtain the IF (i.e., IF = I + C + TF), and
7. Fill in the table of assigned levels by adding in the IF to obtain the L_{A10}, L_{A1} and L_{Amax} assigned levels.

Table 2.2 summarises the list of noise receptors, their coordinates and calculated IFs surrounding the Development Envelope.

Table 2.2 Influencing factor (IF) calculated for noise receptors

ID	Noise Receptor Type	Coordinates, GDA2020 / MGA Zone 50		IF
		Easting, metres	Northing, metres	
R01	Not-involved noise sensitive receptor	339933	6218605	0
R02	Not-involved noise sensitive receptor	340681	6218532	0
R03	Not-involved noise sensitive receptor	340852	6218785	0
R04	Not-involved noise sensitive receptor	341008	6219011	0
R05	Not-involved noise sensitive receptor	341249	6219088	0
R06	Not-involved noise sensitive receptor	341069	6218419	0
R07	Not-involved noise sensitive receptor	341535	6217905	0
R08	Not-involved noise sensitive receptor	342043	6218890	0
R09	Not-involved noise sensitive receptor	342690	6218163	0
R10	Not-involved noise sensitive receptor	343549	6218312	0
R11[1]	Non-sensitive noise receptor	343548	6214495	NA
R12[1]	Non-sensitive noise receptor	340638	6214626	NA
R13	Not-involved noise sensitive receptor	338412	6215131	0
R14	Not-involved noise sensitive receptor	338464	6214395	0
R15	Not-involved noise sensitive receptor	338587	6213882	0
R16	Not-involved noise sensitive receptor	338768	6213383	0
R17 [2]	Involved noise sensitive receptor	340924	6213832	0
R18 [2]	Involved noise sensitive receptor	341392	6213419	0
R19	Not-involved noise sensitive receptor	338804	6211691	0

ID	Noise Receptor Type	Coordinates, GDA2020 / MGA Zone 50		IF
		Easting, metres	Northing, metres	
R20	Not-involved noise sensitive receptor	340492	6207596	0
R21	Not-involved noise sensitive receptor	340852	6207358	0
R22	Not-involved noise sensitive receptor	341310	6207260	0
R23	Not-involved noise sensitive receptor	341585	6206886	0
R24	Not-involved noise sensitive receptor	341494	6206613	0
R25[1]	Non-sensitive noise receptor	342437	6208749	NA
R26[1]	Non-sensitive noise receptor	344716	6209189	NA
R27[1]	Non-sensitive noise receptor	345036	6210136	NA
R28	Not-involved noise sensitive receptor	347575	6209225	0
R29	Not-involved noise sensitive receptor	347645	6208472	0
R30	Not-involved noise sensitive receptor	346773	6204588	0
R31	Not-involved noise sensitive receptor	347732	6203961	0
R32	Not-involved noise sensitive receptor	341223	6207695	0
R33	Not-involved noise sensitive receptor	341234	6207287	0
R34	Not-involved noise sensitive receptor	339819	6217839	0

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] R17 and R18 are involved noise sensitive receptors (participating landowners).

2.1.1.2 Annoying noise characteristics

Regulation 7 requires that the noise character received at noise sensitive receptors must be free from annoying characteristics of tonality, modulation, and impulsiveness. If these characteristics cannot reasonably and practicably be removed, then a series of adjustments to the measured or calculated received levels are set out, and the adjusted level must comply with the assigned level. The adjustments are set out in Table 2.3 and are further defined in Regulation 9(1). These adjustments are cumulative up to a maximum of 10 dB in the absence of music in the received sound (for a wind farm project music is not expected to be present in the emitted sound).

Table 2.3 Table of adjustments

Adjustment where noise emission is not music (Adjustments are cumulative to a maximum of 15 dB)		
Where tonality is present	**Where modulation is present**	**Where impulsiveness is present**
+5 dB	+5 dB	+10 dB

– Tonality is defined in Regulation 9(1) as being present where the difference between the A- weighted sound pressure level in any one third octave band and the arithmetic average of the A weighted sound pressure levels in the two adjacent one third octave bands is greater than 3 dB in terms of $L_{Aeq, T}$ where the time period T is greater than 10 percent of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A, Slow}$ levels.

– Modulation is defined as a variation in the emission of noise that:

- Is more than 3 dB $L_{A, Fast}$ or is more than 3 dB $L_{A, Fast}$ in any one third octave band

- Is present for at least 10 percent of the representative assessment period, and
- Is regular, cyclic and audible

– Impulsiveness is defined as present where the difference between $L_{A,\,peak}$ and $L_{Amax,\,S}$ is more than 15 dB when determined for a single representative event.

2.1.2 SA Guidelines

The *Position Statement: Renewable energy facilities (WAPC, March 2020) (Position Statement)* has been used by the Western Australian Planning Commission (WAPC) for wind farm development. For assessment purposes, the Position Statement endorses the use of the SA Guidelines. For completeness, the criteria derived based on the SA Guidelines will also be presented as an additional criterion (secondary criterion) in this study.

To prevent adverse impacts from the WTG noise, the SA Guidelines require that the received noise levels at the relevant noise sensitive receptors be compared to the corresponding background noise.

The predicted equivalent noise level ($L_{Aeq,10\text{-}min}$) adjusted for tonality in accordance with these guidelines, should not exceed:

– 35 dB(A) at relevant noise sensitive receptors in localities which are primarily intended for rural living (equivalent to noise sensitive receptors in accordance with the WA Regulations), or

– 40 dB(A) at relevant noise sensitive receptors in localities in other zones (equivalent to other types of premises apart from noise sensitive premises in accordance with the WA Regulations), or

– Background noise ($L_{A90,10\text{-}min}$) by more than 5 dB(A)

whichever is the greater, at all relevant noise sensitive receptors for wind speed from cut-in to rated power of the WTG and each integer wind speed in between. These criteria apply for both daytime and nighttime hours.

The proposed project site is located within a rural area. Therefore, the 35 dB(A) baseline criterion or the adjusted "background + 5" dB(A) criteria apply to all relevant noise sensitive receptors.

2.1.2.1 Participating landowners

It should be noted the criteria based on SA Guidelines have been developed to minimise the impact on the amenity of premises that do not have an agreement with wind farm developers (i.e. Not-involved noise sensitive receptors).

Wind farm developers commonly enter into agreements with the owners of private land suitable for a wind farm site (participating landowners). The agreement provides the developer with the appropriate siting and generally rewards the landowner with a level of compensation and diversity in their income stream. Notwithstanding this, the Environmental Protection Authority (EPA) cannot ignore noise impacts on the basis that an agreement has been made between the developer and the landowner. Developers cannot absolve themselves of their obligations under the *Environmental Protection Act 1986* (EP Act) by entering into an agreement with a landowner, i.e., the development should not have an adverse effect on the amenity of the area which unreasonably interferes with the enjoyment of the area. In terms of health impacts in particular, the likely exposure level should not result in sleep disturbance.

The World Health Organization (WHO) *Guidelines for Community Noise* (1999) recommend a 30 dB(A) indoor limit to prevent negative effects on sleep. *The Working Group on Noise from Wind Turbines* (Final Report, ETSU for DTI, 1996) recommends the outdoor noise limit of 45 dB(A) after any adjustment for tonality for landowners having financial involvement in the wind farm. As such, if the received noise level from a wind farm does not exceed 30 dB(A) indoor and 45 dB(A) outdoor at an involved noise sensitive receptor having financial involvement with the developers, then it is considered that the development is not having adverse effect on the amenity of the involved noise sensitive receptor.

2.1.2.2 Background noise monitoring

Long term (unattended) noise measurements were conducted at seven noise logger locations in the area within and adjacent to the Development Envelope. The details of the background noise monitoring and data processing are provided in Appendix B.

As can be seen on appended Figures B.2 to B.8 the measured noise levels generally:

– range approximately from 20 dB to 50 dB L_{A90} at NMP02 (at 4 m/s and 15 m/s wind speed respectively), with averaged values ranging from 30 to 45 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP03 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 30 to 44 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP04 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 30 to 39 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP05 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 28 to 38 dB L_{A90}.
– range approximately from 20 dB to 50 dB L_{A90} at NMP06 (at 4 m/s and 15 m/s wind speed respectively) with averaged values ranging from 28 to 42 dB L_{A90}.

Appended Figure B.2 to Figure B.6 show results of postprocessed data and relevant noise criteria calculated in accordance with SA Guidelines 2021. Data postprocessing is performed for arithmetic averages of measured noise levels in integer wind speed bins as per Section 3.4 of the SA Guidelines.

Relevant SA guidelines noise criteria are derived for each of the monitoring locations for wind speeds referenced to hub height of 164 m.

The resulting SA guidelines criteria are summarised in Table 2.4, along with other criteria.

2.1.3 Summary of wind farm noise criteria

Table 2.4 summarises the criteria derived from both the state Regulations and the SA Guidelines. The full list of noise receptors and their types are provided in Table 2.2.

For the NIA of the WTGs operation, the most stringent criteria i.e. 35 + IF, L_{A10} during nighttime will be adopted for the criteria based on the Regulations. Advice provided by DWER is that the assigned levels in the Regulations are unlikely to apply to involved noise sensitive receptors. DWER recommended that 40 dB L_{A10} be used as the criteria for the involved noise sensitive receptors.

The details of the noise monitoring including the representative monitoring locations and the calculations to derive the noise criteria according to the SA Guidelines are provided in Appendix B. It should be noted that R17 and R18 are involved noise sensitive receptors (Section 2.1), the SA Guideline criteria of 45 dB(A) for an involved receptor has been used.

Table 2.4 Noise criteria for 164 m hub height – Dual criteria for wind farm NIA

Noise receptor [1]	Reference of noise criteria	Representative monitoring location [2]	Hub height wind speed, m/s							
			4	5	6	7	8	9	10	11
Involved, noise sensitive										
R17, R18	The Regulations [3]	-	40	40	40	40	40	40	40	40
	SA Guidelines [4]	-	45	45	45	45	45	45	45	45
Not-involved noise sensitive										
R01, R02, R03, R04, R05, R06, R07, R08, R09, R10, R34	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP02	35	36	38	39	40	40	39	41
R20, R21, R22, R23, R24, R32, R33	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP03	35	35	36	36	37	37	37	39
R28, R29, R30, R31	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP04	35	36	37	37	37	37	37	38
R14, R15, R16, R19	The Regulations	-	35	35	35	35	35	35	35	35

Noise receptor [1]	Reference of noise criteria	Representative monitoring location [2]	Hub height wind speed, m/s							
			4	5	6	7	8	9	10	11
	SA Guidelines	NMP05	35	35	35	35	35	35	35	36
R13	The Regulations	-	35	35	35	35	35	35	35	35
	SA Guidelines	NMP06	35	35	36	36	37	37	37	38

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] Background noise monitoring results and representative monitoring locations are not applicable to the criteria based on the Regulations.

[3] R17 and R18 are involved noise sensitive receptors (i.e. participating landowners) for which 40 dB(A) is used upon advice from DWER.

[4] R17 and R18 are involved noise sensitive receptors for which the SA Guideline criteria of 45 dB(A) for an involved receptor is used.

2.2 Operation of the substation

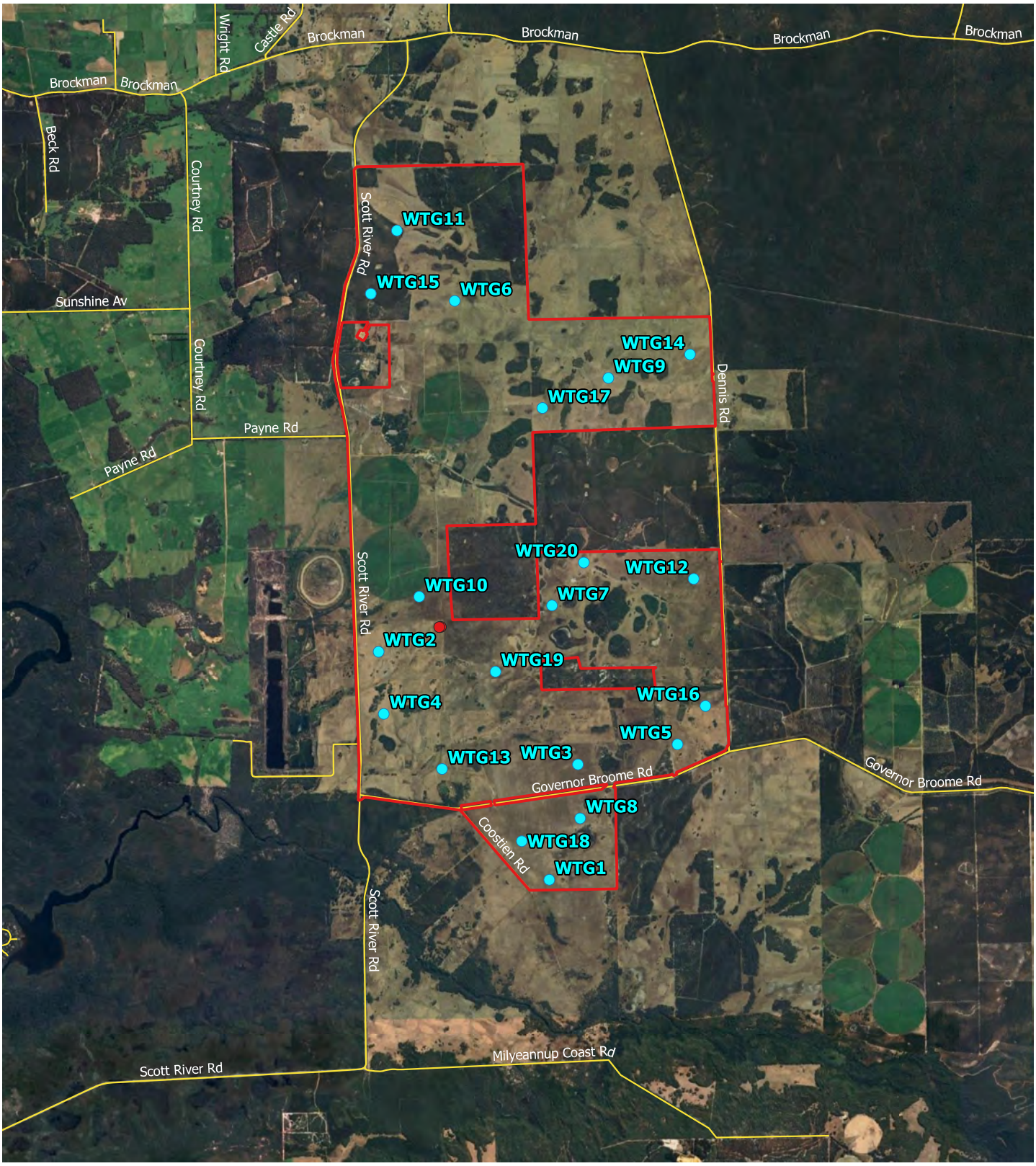
The noise emissions from the substation proposed for the Project are governed by the *Environmental Protection (Noise) Regulations 1997* (Refer to section 2.1.1 above).

3. Project overview

3.1 Wind turbines

3.1.1 Wind turbine locations

A 20-WTG layout has been used for the NIA as presented in Figure 3.1 along with the locations of the transformers. The WTG coordinates are provided in Appendix D.



Legend

Wind turbines | Substation transformer | Development Envelope | Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

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SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Wind turbines and transformers locations
20 WTG Layout

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Version **1**

Date. **09/05/2025**

FIGURE 3.1

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Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
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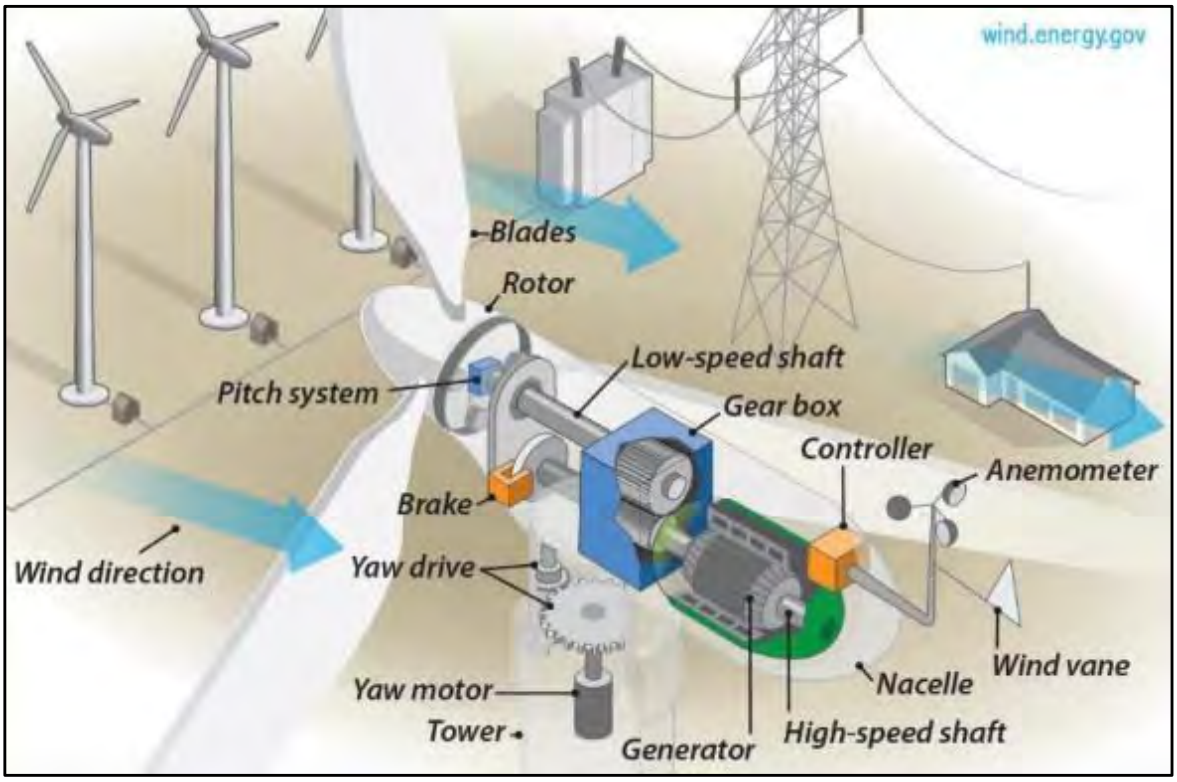
3.1.2 Sources of noise

There are two main groups of noise sources originating from a WTG: mechanical and aerodynamic noise. Sources of mechanical noise include the following (refer to Figure 3.2):

- Gearbox
- Generator
- Yaw drives
- Cooling fans
- Auxiliary equipment
- Brakes (when applied)

Sources of mechanical noise tend to be both tonal and broadband in nature since the emitted sound is associated with the rotation of mechanical and electrical equipment. However, in modern turbines, mechanical noise is not usually audible above aerodynamic noise at greater separation distances. Mechanical noise can be effectively reduced through standard noise control practices such as vibration isolation, damping and noise enclosures.

Aerodynamic noise is associated with the passage of air over the turbine blades and is considered the most dominant source of WTG noise emissions. Aerodynamic noise levels typically increase with rotor speed.



– Source: US Office of Energy Efficiency & Renewable Energy

Figure 3.2 WTG components

3.1.3 Sound power levels

The proposed WTG make and model for the Project will be determined through a procurement process prior to commencement of construction. The turbine hub height is not yet finalised and is expected to be a maximum of 164 m.

Among the turbine options considered, the WTG make and model with worst-case noise emissions and their spectral data are used for the noise assessment study. The overall sound power levels (SWLs) are presented in Figure 3.3 with reference to the IEC 61400-11 standard. The SWLs presented are valid for the corresponding wind speeds referenced to the hub height. The prototype cut-in wind speed is 4 m/s and speed of rated power is 11 m/s.

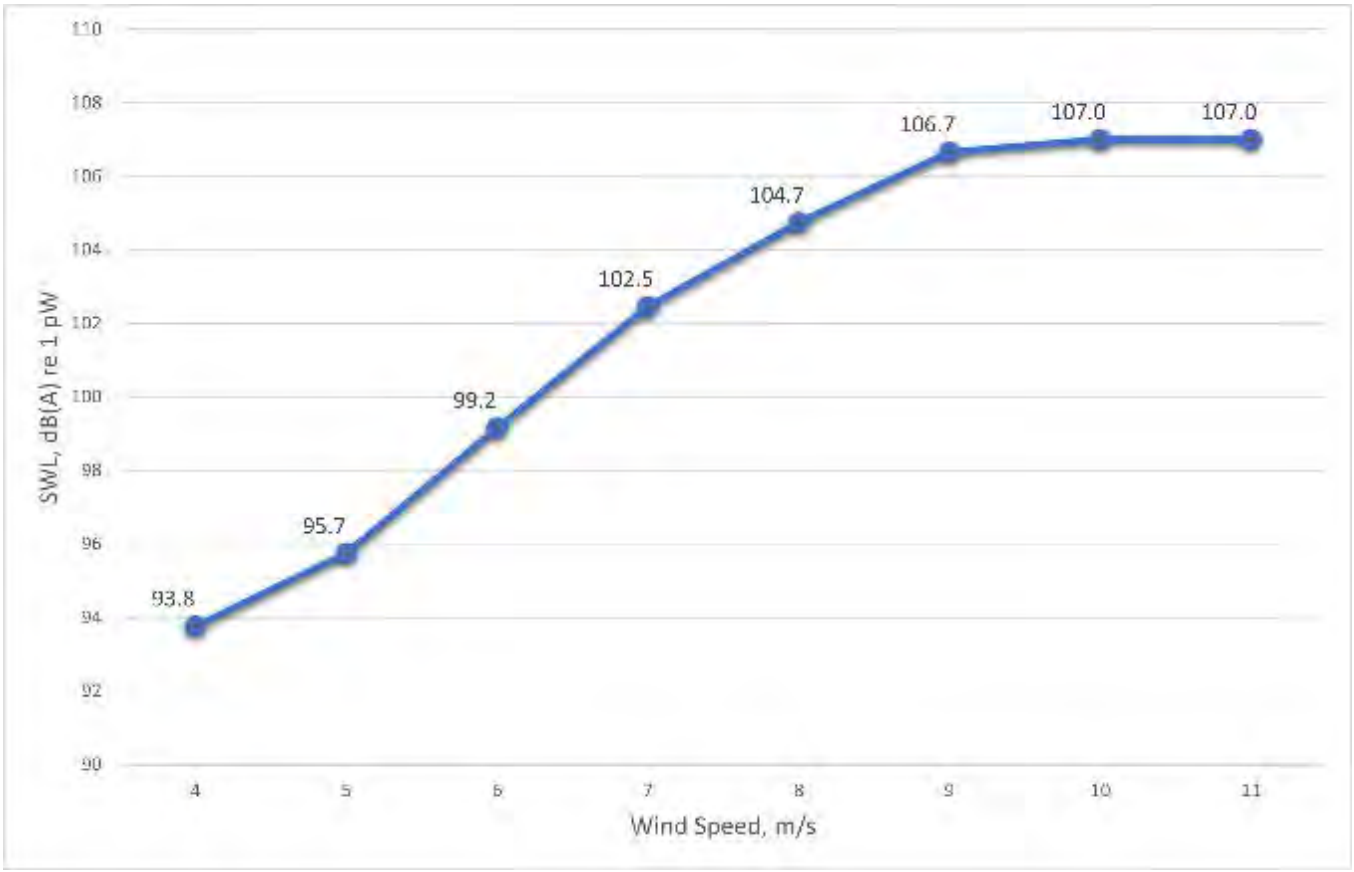


Figure 3.3 WTG SWL vs wind speed

The 1/3 octave source spectra in dB(A) re 1 pW for the corresponding centre frequencies are shown in Figure 3.4 for the wind speed of 8 m/s as an example, referred to the hub height as per IEC 61400-11. Appendix A provides the turbine source spectra for the full range of wind speeds.

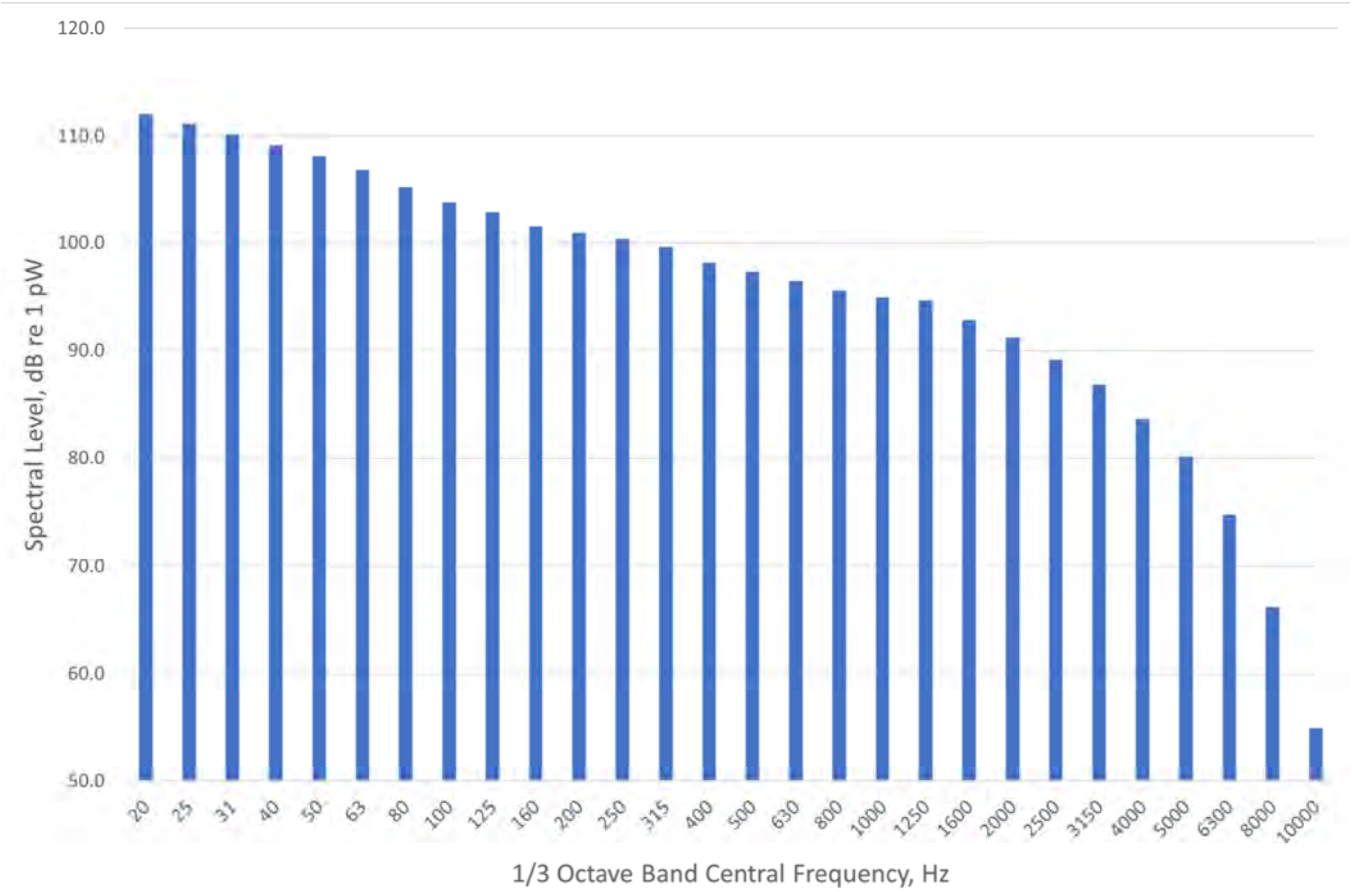


Figure 3.4 1/3 octave band spectral levels at hub height for wind speed 8 m/s

3.1.4 Tonality, infrasound and modulation

WTG manufacturers are expected to conduct independent acoustic tests in accordance with IEC 61400-11 to assess tonal audibility.

According to both the Regulations and the SA Guidelines, an additional 5 dB should be added to the measured noise level from a wind farm where tonality is shown to be a characteristic and is audible at the relevant noise sensitive receptor. GHD assumes no tonal characteristics associated with the WTG to be used and therefore tonality has been excluded from this assessment.

Infrasound (sound spectral component below 20 Hz) is not tested as an obligatory part of IEC61400-11 or the SA Guidelines. Infrasound was a characteristic attributable to earlier design of WTGs where turbine blades were downwind of the main tower. This generated an infrasound effect as the blades cut through the turbulence generated around the downwind side of the tower. Modern WTG designs typically have the blades upwind of the main tower and combined with improved blade design, infrasound is found not to be one of the major audible characteristics at modern wind farm sites (SA Guidelines). SynergyRED is committed to using WTGs of modern design for the Project.

While SA Guidelines do not suggest additional penalties for excessive modulation, WA Noise Regulations may consider an additional penalty of 5 dB(A) where modulation is present. The Noise Regulations do not suggest wind farm-specific methods for the accurate identification of amplitude modulation at distant receptors. It is unlikely that modulation from WTGs will be detected at substantial separation distances in an environment with a high influence of background noise.

Options available to mitigate noise pre-construction are:

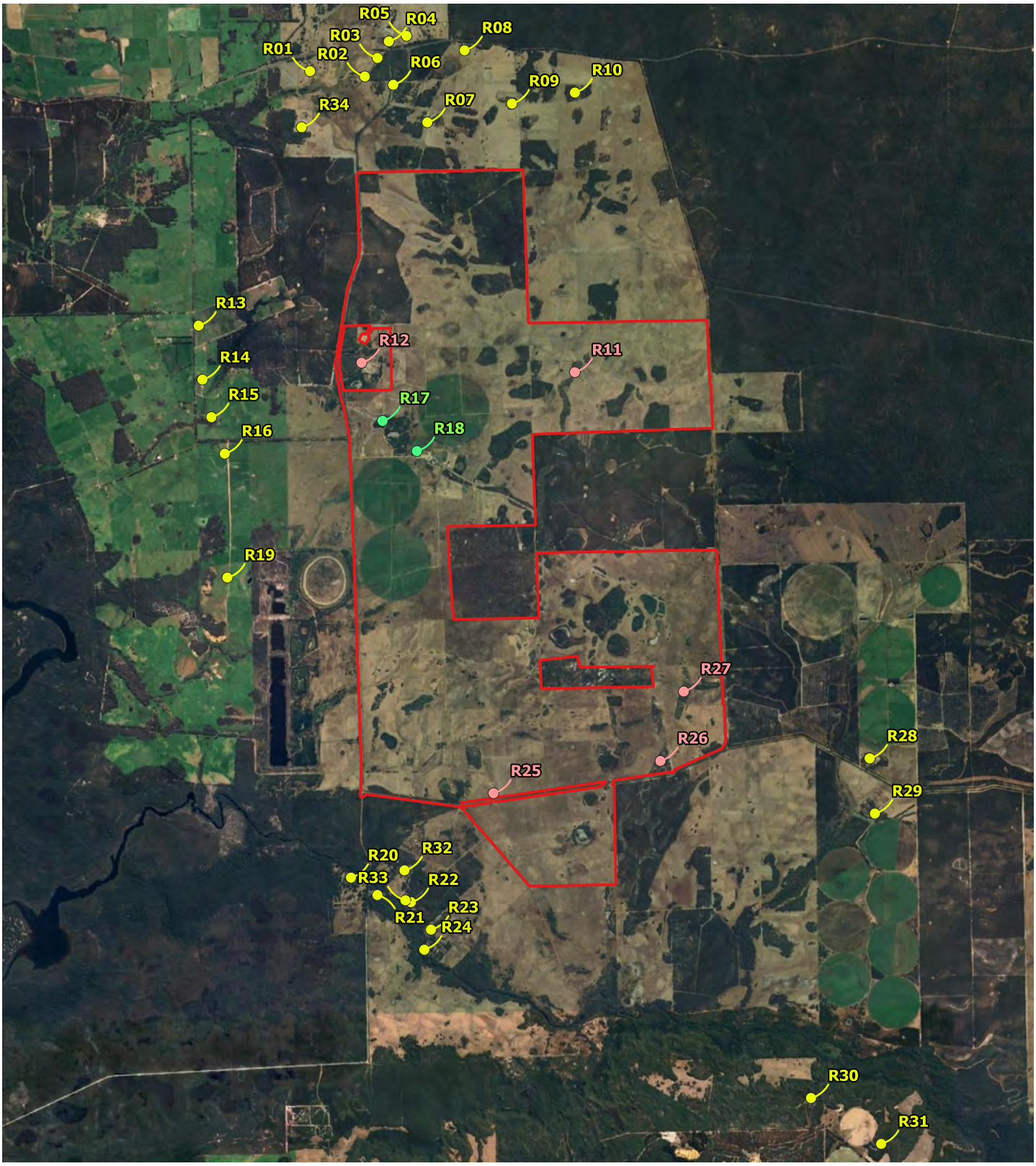
– Selection of a quieter WTG than that modelled (which was considered worst case) prior to construction - this can reduce sound power levels by up to 3 dB

– Optimising the wind turbine layout prior to construction – this can reduce noise if required at a particular noise sensitive receptors.
– Implementing WTGs with serrated trailing edges prior to construction – this can reduce sound power levels by 2 dB

Should modulation be detected at some noise sensitive receptors during post construction noise monitoring, and penalties applied resulting in non- compliance with applicable noise limits, the use of mitigation such as curtailment modes would be acted in order to reduce the noise impact at these receptors and result in compliant noise levels. Implementing quieter turbine modes can provide up to 7 dB reduction based on manufacturer specifications.

3.1.5 Noise receptors

The noise assessment methodology, as specified in both the Regulations and the SA Guidelines, require all noise receptors within the area surrounding the Development Envelope to be identified. Noise receptors identified within 5 km of the Development Envelope are presented in Figure 3.5.



Legend

- Development Envelope
- Local road
- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

N

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Receptor Locations

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE 3.5

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Print Date: 09/05/2025

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The coordinates and types of these noise receptors are detailed in Table 2.2. It should be noted that R12 is a commercial building, and in agreement with the landowners, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA. Also, receptors R17 and R18 are participating landowners (i.e. involved noise sensitive receptors).

4. Noise modelling and impact assessment

4.1 Noise modelling algorithm and inputs

4.1.1 Modelling algorithm

Both the Regulations and SA Guidelines state that a suitable model must be selected to predict worst-case noise levels at all relevant noise receptors. SA Guidelines recommend the use of prediction methods in accordance with ISO9613-2 or CONCAWE.

Noise from the Project has been predicted using the most recent version of international standard *ISO9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO9613-2). The ISO9613-2 noise propagation algorithm is used around the world and is generally accepted as an appropriate model for assessment of wind farms. The model has the ability to take into account the distance between source and noise receptor topography, ground attenuation, atmospheric absorption at different frequencies and meteorological conditions favourable to noise propagation.

In general accordance with the SA Guidelines, noise levels at relevant noise receptor locations were predicted for each reportable wind speed. Appendix D.4 of ISO 9613-2:2024 states that:

When the source is a WTG, attenuation due to ground effect appears lower than considered in the "General method" and selection of the ground factor in a) – c) in 7.3.1 should be modified as follows:

– *Hard ground, which includes paving, water, solid ice, concrete, and all other ground surfaces having a low porosity. Tamped ground, for example, as often occurs around industrial sites, can be considered hard. For hard ground G = 0.*
– *Porous or mixed ground, which includes ground covered by grass, trees or other vegetation, and farming land should be modelled using a maximum of G = 0.5.*
– *When using G = 0.5, a minimum receiver height of 4 m is recommended for the purposes of the predictions, regardless of actual receiver height.*

Because the ground surrounding the Development Envelope comprises mostly of sand, soil and vegetation, ground absorption was set to G=0.5. In order to adhere to ISO 9613-2:2024 for WTG noise prediction as per advice from DWER, noise receptors were set at 4 metres above ground level (instead of typical 1.5 metres above ground level) as this leads to more consistent outcomes for noise prediction of WTGs.

4.1.2 Modelling of wind turbine generators

The noise model was developed based on the following data inputs:

– Topographic elevation contours (5 m resolution) for the Development Envelope and surrounding area, obtained from publicly available data.
– A single scenario for the proposed Project turbine layout (20 WTG layout) (refer to Appendix D for the coordinates) and the hub height (164 m above ground level).
– Noise receptor locations and types, received from SynergyRED.
– The following modelling parameters were used in the model:
  - Atmospheric conditions at 10°C temperature and 80 percent relative humidity.
  - 50 percent acoustically porous or mixed ground (G = 0.5 ground factor).
  - No barriers or intervening structures were included in the model.
  - 4 m noise receptor height.
– Turbine source noise emissions and the 1/3 octave source spectra data, received from SynergyRED.

For modelling purposes, representative WTG type and noise emission data have been used to assess noise compliance. The overall SWLs and 1/3 octave source spectra data (20 Hz to 10 kHz) under integer wind speeds between 4 m/s and 15 m/s are provided in Appendix A. No penalty for tonality was applied to the modelling prediction results.

It should be noted that the following conservative assumptions were implemented in the noise model:

1- Noisiest turbine available at the time was used (i.e. with no mitigation applied).

2- General wind roses available from the BOM website for the area suggest that winds are predominantly south-easterly. However, in the noise model wind has been stipulated to occur in all directions which makes for a conservative assessment (i.e. the noise predicted in the assessment assumes downwind noise conditions have been used for all receptors).

4.1.3 Modelling of substations

The Project proposes a substation comprising two 132 kVA transformers. The overall sound power level of the transformers is 85 dB(A), estimated in accordance with Australian Standard AS 60076 Part 10: 2009 *Power Transformers – Determination of Sound Levels (IEC 60076-10, Ed.1 (2001) MOD)* and the proposed transfer rating (in kVA). The 1/3 octave sound power spectral curve used for the model input, as presented in Appendix A, is based on a reference spectral curve measured for a typical transformer facility.

It should be noted that the equivalent continuous noise parameter L_{Aeq} is used to characterise the noise emissions from the substation transformers. Considering the noise emissions from the transformers are constant in nature, it is expected that the parameter L_{Aeq} will be consistent with the parameter L_{A10} based on which the noise assessment criteria have been specified as in Table 2.1. For this conversion, a 3 dB conversion factor has been used (i.e. $L_{A10} = L_{Aeq} + 3$ dB(A)).

4.2 Impact assessment

4.2.1 WTG noise

Received noise levels have been predicted at all identified noise sensitive receptors with all WTGs (20 WTGs) operating simultaneously, for all source noise emission inputs under relevant individual integer wind speeds as provided in Appendix A.

As explained in Section 1.3, a dual criteria approach has been used for the NIA by assessing the predicted noise levels against the criteria based on the Regulations (Section 2.1.1) and based on the background noise monitoring data processing as indicated by the SA Guidelines (Section 2.1.2). The predicted noise levels for the Project assessed against the criteria derived are provided in Table 4.1 and Table 4.2 based on the Regulations and the SA Guidelines, respectively. As explained in section 2.1.3, the nighttime L_{A10} assigned noise levels for the nighttime (35 + IF) has been used as the most stringent criteria for the NIA at the Not-involved noise sensitive receptors based on the Regulations. Also 40 dB L_{A10} has been used as a conservative criteria for the involved noise sensitive receptors based on DWER advice. All predicted results and criterion values are rounded to the nearest integer for compliance assessment. As can be seen from the tables, the predicted noise levels at all noise sensitive receptors comply with the criteria derived based on both the Regulations and the SA Guidelines.

It should be noted that the criteria derived based on the Regulations, are more stringent which results in smaller safety margines at wind speeds above 10 m/s. The smallest safety margin is less than 1 dB predicted for noise sensitive receptor R32 at wind speeds above 10 m/s (Table 4.1).

Noise contour maps are provided in Figures C1 to C4 in Appendix C for 4 m/s, 6 m/s, 8 m/s and 10-11 m/s which constitute four representative wind speeds from the cut-in to the rated power wind speeds. It should be noted that the turbine source spectra and thus the predicted noise levels are similar for 10 and 11 m/s for the proposed WTG type (Appendix A).

4.2.2 Substation noise

Due to the large distances from the proposed substation to the noise sensitive receptors assessed (i.e. more than 2 km), the predicted noise levels from the substation transformers at all noise sensitive receptors are below 5 dB(A), which is well below the expected ambient noise levels.

Considering the +5 dB adjustment on received levels due to the potential tonal characteristics for transformer noise emissions, the predicted noise levels from the proposed substation are still well below the worst-case 35 dB(A) nighttime assigned level applicable to the fixed equipment under the Regulations.

Table 4.1 Predicted noise levels (dB(A)) assessed against criteria based on the WA Noise Regulations (Section 2.1.1)

Noise sensitive receptor [1]	Predicted noise level at each wind speed																Compliance
	4 m/s		5 m/s		6 m/s		7 m/s		8 m/s		9 m/s		10 m/s		11 m/s		
	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	
R01	16	35	18	35	21	35	24	35	26	35	27	35	28	35	28	35	Yes
R02	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	35	Yes
R03	15	35	17	35	20	35	23	35	25	35	27	35	27	35	27	35	Yes
R04	14	35	16	35	19	35	22	35	24	35	26	35	26	35	26	35	Yes
R05	15	35	17	35	20	35	23	35	25	35	27	35	27	35	27	35	Yes
R06	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	35	Yes
R07	19	35	21	35	25	35	28	35	30	35	31	35	32	35	32	35	Yes
R08	15	35	17	35	21	35	24	35	25	35	27	35	27	35	27	35	Yes
R09	17	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R10	15	35	17	35	21	35	23	35	25	35	27	35	27	35	27	35	Yes
R13	16	35	19	35	22	35	25	35	27	35	29	35	29	35	29	35	Yes
R14	16	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R15	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	35	Yes
R16	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	35	Yes
R17 [2]	21	40	24	40	27	40	30	40	32	40	34	40	34	40	34	40	Yes
R18 [2]	22	40	24	40	27	40	30	40	32	40	34	40	34	40	34	40	Yes
R19	18	35	21	35	24	35	27	35	29	35	30	35	31	35	30	35	Yes
R20	20	35	23	35	26	35	29	35	31	35	33	35	33	35	33	35	Yes
R21	21	35	23	35	27	35	30	35	31	35	33	35	33	35	33	35	Yes
R22	21	35	23	35	27	35	30	35	31	35	33	35	33	35	33	35	Yes
R23	21	35	23	35	27	35	29	35	31	35	33	35	33	35	33	35	Yes
R24	19	35	22	35	25	35	28	35	30	35	31	35	32	35	32	35	Yes
R28	18	35	20	35	23	35	26	35	28	35	29	35	30	35	30	35	Yes
R29	17	35	19	35	22	35	25	35	27	35	28	35	29	35	29	35	Yes
R30	11	35	13	35	16	35	19	35	21	35	22	35	23	35	23	35	Yes
R31	9	35	12	35	14	35	17	35	19	35	20	35	21	35	21	35	Yes
R32	22	35	25	35	28	35	31	35	33	35	34	35	35	35	35	35	Yes
R33	21	35	23	35	26	35	29	35	31	35	33	35	33	35	33	35	Yes
R34	17	35	19	35	22	35	25	35	27	35	29	35	29	35	29	35	Yes

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA.*[2] R17 and R18 are involved noise sensitive receptors (i.e. participating landowners) for which 40 dB(A) is used upon advice from DWER (Section 2.1.3).*

Table 4.2 Predicted noise levels (dB(A)) assessed against the criteria based on SA Guidelines (Section 2.1.2)

Noise sensitive receptor [1]	Predicted noise level at each wind speed																Compliance
	4 m/s		5 m/s		6 m/s		7 m/s		8 m/s		9 m/s		10 m/s		11 m/s		
	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	L_{Aeq} 10 min	Criteria	
R01	16	35	18	36	21	38	24	39	26	40	27	40	28	39	28	41	Yes
R02	16	35	18	36	21	38	24	39	26	40	28	40	28	39	28	41	Yes
R03	15	35	17	36	20	38	23	39	25	40	27	40	27	39	27	41	Yes
R04	14	35	16	36	19	38	22	39	24	40	26	40	26	39	26	41	Yes
R05	15	35	17	36	20	38	23	39	25	40	27	40	27	39	27	41	Yes
R06	16	35	19	36	22	38	25	39	26	40	28	40	28	39	28	41	Yes
R07	19	35	21	36	25	38	28	39	30	40	31	40	32	39	32	41	Yes
R08	15	35	17	36	21	38	24	39	25	40	27	40	27	39	27	41	Yes
R09	17	35	19	36	22	38	25	39	27	40	28	40	29	39	29	41	Yes
R10	15	35	17	36	21	38	23	39	25	40	27	40	27	39	27	41	Yes
R13	16	35	19	35	22	36	25	36	27	37	29	37	29	37	29	38	Yes
R14	16	35	19	35	22	35	25	35	27	35	28	35	29	35	29	36	Yes
R15	16	35	18	35	21	35	24	35	26	35	28	35	28	35	28	36	Yes
R16	16	35	19	35	22	35	25	35	26	35	28	35	28	35	28	36	Yes
R17 [2]	21	45	24	45	27	45	30	45	32	45	34	45	34	45	34	45	Yes
R18 [2]	22	45	24	45	27	45	30	45	32	45	34	45	34	45	34	45	Yes
R19	18	35	21	35	24	35	27	35	29	35	30	35	31	35	30	36	Yes
R20	20	35	23	35	26	36	29	36	31	37	33	37	33	37	33	39	Yes
R21	21	35	23	35	27	36	30	36	31	37	33	37	33	37	33	39	Yes
R22	21	35	23	35	27	36	30	36	31	37	33	37	33	37	33	39	Yes
R23	21	35	23	35	27	36	29	36	31	37	33	37	33	37	33	39	Yes
R24	19	35	22	35	25	36	28	36	30	37	31	37	32	37	32	39	Yes
R28	18	35	20	36	23	37	26	37	28	37	29	37	30	37	30	38	Yes
R29	17	35	19	36	22	37	25	37	27	37	28	37	29	37	29	38	Yes
R30	11	35	13	36	16	37	19	37	21	37	22	37	23	37	23	38	Yes
R31	9	35	12	36	14	37	17	37	19	37	20	37	21	37	21	38	Yes
R32	22	35	25	35	28	36	31	36	33	37	34	37	35	37	35	39	Yes
R33	21	35	23	35	26	36	29	36	31	37	33	37	33	37	33	39	Yes
R34	17	35	19	36	22	38	25	39	27	40	29	40	29	39	29	41	Yes

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] R17 and R18 are involved noise sensitive receptors for which the SA Guideline criteria of 45 dB(A) for a not-involved receptor is used (Section 2.1.3).

4.2.3 Noise from substation vs noise from WTGs

Currently there are no known significant sources of noise in the area adjacent to the Development Envelope which is predominantly rural in nature. The noise modelling results for both WTG and substation demonstrate that the received noise levels at assessed noise sensitive receptors from the proposed substation are more than 20 dB lower than the noise levels received from the proposed WTGs. Therefore, the combined noise impact from the Project is dominated by the WTG noise emissions, and the proposed substation is unlikely to result in any noticeable increases in received noise levels at the assessed noise sensitive receptors.

5. Conclusion

A NIA has been conducted for the operation of the Project in general accordance with the requirements of the Regulations and the SA Guidelines (2021) for the operation of the WTGs.

A dual criteria approach was adopted for this NIA: 1- the criteria was derived based on the Regulations, and 2- baseline noise monitoring was conducted at seven monitoring locations around the Development Envelope, and the baseline noise criteria were derived in accordance with the SA Guidelines.

A 3D environmental noise model of the Development Envelope was created using the SoundPLAN software to predict noise levels at the adjacent noise sensitive receptors, using the ISO9613-2:2024 calculation algorithm. A 20 WTG layout with hub height of 164 metres was considered in the 3D noise model. The turbine source noise input data is based on the 1/3 octave source spectra data provided by SynergyRED.

The noise modelling results show that the predicted noise levels from the Project received at the adjacent noise sensitive receptors comply with the noise criteria in accordance with both the Regulations and the SA Guidelines. The smallest safety margin is less than 1 dB predicted for noise sensitive receptor R32 at wind speed 10 m/s and above when assessed against the criteria based on the Regulations which are more stringent especially at high wind speeds.

It should be noted that the following conservative assumptions were implemented in the noise model:

1- Noisiest turbine available at the time was used (i.e. with no mitigation applied, non-serrated blades).

2- General wind roses available from the BOM website for the area suggest that winds are predominantly south-easterly. However, in the noise model wind has been stipulated to occur in all directions which makes for a conservative assessment (i.e. the noise predicted in the assessment assumes downwind noise conditions have been used for all receptors).

SynergyRED can explore a number of pre-construction design options to minimise noise impact from the proposed wind farm which may include:

- Selection of a quieter WTG than that modelled (which was considered worst case) prior to construction - this can reduce sound power levels by up to 3 dB
- Optimising the wind turbine layout prior to construction – this can reduce noise if required at particular noise sensitive receptors.
- Implementing WTGs with serrated trailing edges prior to construction – this can reduce sound power levels by 2 dB.

It is recommended that the turbines are properly maintained to ensure the noise emissions of the turbines are not adversely affected by the turbine wear, which could potentially result in audible tonality.

Once the wind farm is operating, in accordance with the Regulations and SA Guidelines, it is recommended that compliance monitoring be undertaken at the noise sensitive receptors with the highest predicted noise levels (e.g. R32).

Should post construction noise monitoring find intrusive noise characteristics, such as modulation or tonality, to be present at one or more of the noise sensitive receptors, and resulting in non-compliance with assigned noise levels, SynergyRED would consider the following mitigations to ensure compliance::

- Investigate engineering options to reduce modulation.
- Implement noise curtailment modes for relevant WTGs in applicable wind directions for each impacted noise sensitive receptor – this can reduce sound power levels by up to 7 dB if necessary.

Based on the NIA assessment results and range of mitigation measures that may be implemented, compliance is expected at all noise sensitive receptors even if tonality or modulation is present.

6. References

Australian Standard AS 60076 Part 10: 2009 *Power Transformers – Determination of Sound Levels (IEC 60076-10, Ed.1 (2001) MOD)*

Berglund, Birgitta, Lindvall, Thomas, Schwela, Dietrich H & World Health Organization, Occupational and Environmental Health Team, (1999), *Guidelines for community noise*, World Health Organization, https://apps.who.int/iris/handle/10665/66217

Environment Protection Authority, *South Australia - Wind farms environmental noise guidelines*, EPA South Australia (2021)

International Electrotechnical Commission 2012, *Wind turbine generator systems – Part 11: Acoustic emission measurement techniques*, IEC Wind Energy Standard 61400-11

ISO9613-2 *Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation* (ISO9613-2)

New Zealand Standards NZS 6808:2010 *Acoustics – Wind farm noise, New Zealand Standard* (2010)

The Working Group on Noise from Wind Turbines, *The assessment and rating of noise from wind farms*, Final Report, September 1996, ETSU-R-97

The Western Australian Planning Commission (WAPC), *Guidelines for Wind Farm Development*, Planning Bulletin, Number 67

The Western Australian Planning Commission (WAPC), *Position Statement: Renewable energy facilities*, March 2020

Western Australia Environmental Protection Act 1986 (EP Act) *Environmental Protection (Noise) Regulations 1997*, Government of Western Australia

Appendices

Appendix A

Sound power levels for WTGs and substation transformers

Table A.1 Sound power levels (dB) for the proposed WTG type

Unweighted 1/3 octave band centre frequency	Hub height wind speed – 164 m											
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s
20 Hz	103	104	107	110	112	114	114	114	114	114	114	114
25 Hz	102	103	106	109	111	113	113	113	113	113	113	113
31.5 Hz	101	102	105	108	110	112	112	112	112	112	112	112
40 Hz	100	101	104	107	109	111	111	111	111	111	111	111
50 Hz	99	100	103	106	108	110	110	110	110	110	110	110
63 Hz	97	99	102	104	107	109	109	109	109	109	109	109
80 Hz	96	98	100	103	105	107	108	108	108	108	108	108
100 Hz	95	97	99	102	104	106	106	106	106	106	106	106
125 Hz	94	97	99	101	103	105	105	105	105	105	105	105
160 Hz	93	96	98	100	102	103	103	103	103	103	103	103
200 Hz	92	95	98	100	101	102	103	103	103	103	103	103
250 Hz	91	94	97	99	100	102	102	102	102	102	102	102
315 Hz	89	92	96	98	100	101	101	101	101	101	101	101
400 Hz	87	90	94	97	98	100	100	100	100	100	100	100
500 Hz	86	88	92	95	97	99	99	99	99	99	99	99
630 Hz	84	86	90	94	96	98	98	98	98	98	98	98
800 Hz	83	85	89	93	96	97	98	98	98	98	98	98
1 kHz	83	84	88	92	95	97	97	97	97	97	97	97
1.25 kHz	83	83	87	92	95	97	97	97	97	97	97	97
1.6 kHz	81	82	86	90	93	95	96	96	96	96	96	96
2 kHz	81	81	84	88	91	94	94	94	94	94	94	94
2.5 kHz	79	81	83	86	89	92	92	92	92	92	92	92
3.15 kHz	77	79	82	84	87	89	89	89	89	89	89	89
4 kHz	75	77	79	82	84	86	86	86	86	86	86	86
5 kHz	71	73	76	78	80	82	82	82	82	82	82	82

Unweighted 1/3 octave band centre frequency	Hub height wind speed – 164 m											
	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s
6.3 kHz	65	68	71	73	75	76	76	76	76	76	76	76
8 kHz	55	59	62	65	66	67	68	68	68	68	68	68
10 kHz	43	46	50	53	55	56	56	56	56	56	56	56
Overall A-Weighted dB(A)	94	96	99	102	105	107	107	107	107	107	107	107

Table A.2 Sound power overall and 1/3 octave spectral levels – Substation transformer

Overall, dB(A)	1/3 octave band central frequency (Hz) and noise level, in dB (linear)													
	20	25	31	40	50	63	80	100	125	160	200	250	315	400
85	71	73	75	73	68	71	71	91	71	67	87	72	83	85
	500	630	800	1 K	1.25 K	1.6 K	2 K	2.5 K	3.15 K	4 K	5 K	6.3 K	8 k	
	80	75	69	70	68	62	60	54	53	52	53	54	53	

Appendix B

Background noise monitoring

B. Background noise monitoring

Long term (unattended) noise measurements were conducted at seven monitoring locations in the area adjacent to the Development Envelope. Loggers at locations NMP01 and NMP05 were deployed on 8 December 2023 and loggers at locations NMP02, NMP03, NMP04, NMP06 and NMP07 on 7 December 2023. Loggers at locations NMP01, NMP02, NMP03 and NMP04 were retrieved on 14 May 2024 and loggers at locations NMP05, NMP06 and NMP07 on 13 May 2024.

For measurement of local ground level meteorology and rainfall, one ultrasonic automatic weather mast was co-located at the NMP01 logger location during the deployment period (from 8 December 2023 to 14 May 2024). Wind data at greater heights was taken from the existing meteorological mast near the Development Envelope provided by the client.

The data across all noise loggers, local weather masts, and existing site meteorological masts was date and time synchronised over 10-minute data intervals.

B-1 Instrumentation

Ambient noise levels were monitored using SVAN 977 environmental noise loggers. Details of the noise measurement instrumentation used are presented in Table B.1.

All noise monitoring instrumentation was in current National Association of Testing Authorities (NATA) calibration at the time of use. All instrumentation was field-checked and calibrated both before and after noise measurements using a Svantek SV-36 calibrator. No discrepancies equal to or greater than 1 dB were noted throughout the measurement exercise as is required under Section 5.6 of Australian Standard AS 1055:2018 *Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 2018).

Table B.1 Unattended noise monitor equipment details

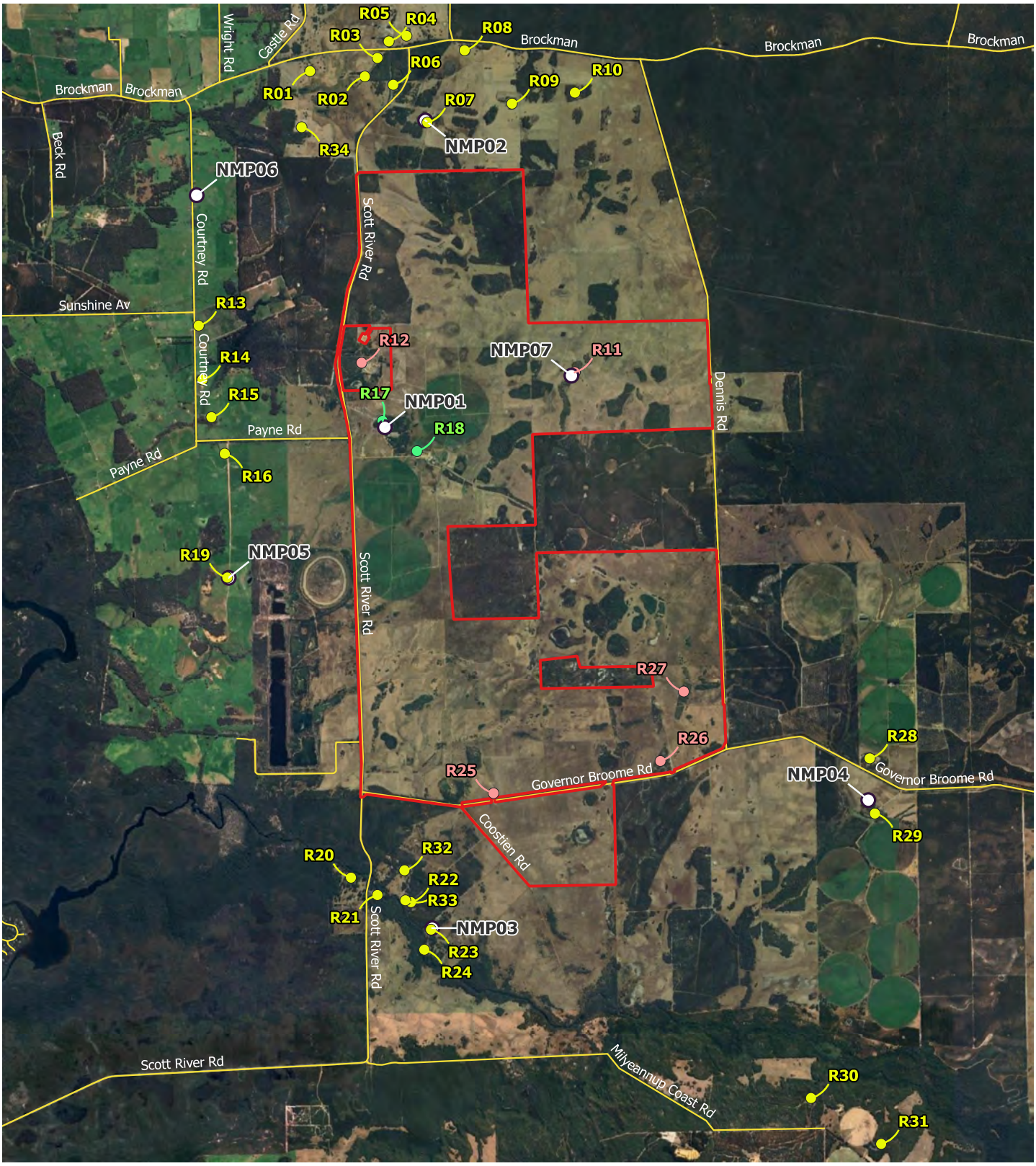
Instrumentation details	NMP01	NMP02	NMP03	NMP04	NMP05	NMP06	NMP07
Model and class	SVAN 977 Type A	SVAN 977 Type C	SVAN 977 Type D	SVAN 977 Type D	SVAN 977 Type C	SVAN 977 Type D	SVAN 977 Type D
Serial No.	69721	98077	99011	99009	92622	99010	99261
Deployment date	08 Dec 2023	07 Dec 2023	07 Dec 2023	07 Dec 2023	08 Dec 2023	07 Dec 2023	07 Dec 2023
Collection Date	14 May 2024	14 May 2024	14 May 2024	14 May 2024	13 May 2024	13 May 2024	13 May 2024

B-2 Noise measurement locations

Long term monitoring was performed at locations close to residences. Coordinates of the monitoring locations details are summarised in Table B.2. Figure B.1 shows the location of monitoring locations in relation to the noise receptors. As can be seen from Figure B.1, the monitoring locations were selected to cover a reasonable range of wind directions and to represent several NSRs by designating similar criteria to a number of noise receptors based on similarity of acoustic environment.

Table B.2 Noise logger coordinates

Logger location	Coordinates, GDA2020 / MGA Zone 50	
	Easting, metres	Northing, metres
NMP01	340955	6213742
NMP02	341506	6217931
NMP03	341602	6206907
NMP04	347555	6208654
NMP05	338823	6211690
NMP06	338384	6216910
NMP07	343502	6214448



Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Development Envelope
- Noise monitoring points
- Local road

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise monitoring locations

Project No. **12623449**
Version **1**
Date. **09/05/2025**

FIGURE B.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
Print Date: 09/05/2025

Data Source:Google Earth Imagery 2025.
Created By: dfebriyandi

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B-3 Meteorology

B-3-1 Hub height wind speed

Data from a meteorological mast provided by SynergyRED was used for collecting wind data at various hub heights (from 60 m to 150 m with 30 m steps). Wind speeds were calculated at the proposed 164 m hub height and then used to calculate the noise criteria (refer to Section B-4-1).

B-3-2 Rainfall and local wind speed

SA Guidelines state: As part of the development application, developers should confirm that the reported noise levels are not influenced by high wind speed across the microphone.

Hence, in the case of wind farm noise monitoring, it is a requirement to undertake measurements in a manner that allows collection of noise measurements in situations where the wind speed exceeds the 5 m/s at the microphone position normally provided as the upper limit for environmental noise monitoring. The limit is a guide to reduce air pressure fluctuations across the microphone artificially increasing the measured noise level. Standard 90 mm wind shield was used during noise monitoring.

According to the SA Guidelines, sound level measurements should be made during a representative range of wind speeds and directions generally expected at the wind farm, and include the normal operating range of the turbines, that is from cut-in to rated power. Extraneous sound levels caused by events, including precipitation, insects, fauna, and so on, as far as is practical for an unattended monitoring exercise, be identified and removed from the data set.

Rain data collected by the co-located weather station placed at the logger location NMP01 was utilised to confirm rain events during the monitoring period. The location NMP01 was specifically selected as it is in an open area free from terrain obstructions and is deemed representative of other conditions at other monitoring locations. This data has been used to exclude periods where rain events were recorded.

Average 10-minute noise measurements where rainfall, high local wind speeds were defined as ‘extraneous events’ and were excluded from the background noise assessment. Data points that were visible outliers in the wind speed bin analysis (i.e. noise levels much higher than the trend but don’t occur often) were also assumed to be caused by extraneous events and excluded from the background noise calculation. Data acquired during local wind speeds (microphone height) exceeding 5 m/s was excluded from further analysis. The process for excluding outliers was to plot the data points (i.e. wind speed) for each wind bin and exclude points that are noisier than the bulk of the points thus resulting in a conservative estimate of background noise.

The SA Guidelines methodology for assessing local wind conditions was adopted for this assessment (refer to Section 3 of the SA Guidelines).

B-4 Results of noise monitoring and derived noise criteria

Applicable noise criteria were calculated for the proposed 20 WTG layout with 164 m hub height.

Background noise was processed and analysed in accordance with procedures in the SA Guidelines. The number of valid monitoring points is summarised in Table B.3. The total number of valid data points is well above 2000 which gives sufficient basis to derive applicable noise criteria.

Table B.3 Number of valid background noise monitoring data

Monitoring location			Valid data points- Guidelines 2021
Logger location	**Start time**	**End time**	**Hub height 164 m**
NMP01	7/12/2023	14/05/2024	22699
NMP02	7/12/2023	14/05/2024	22853

Monitoring location			Valid data points- Guidelines 2021
NMP03	7/12/2023	14/05/2024	22862
NMP04	7/12/2023	14/05/2024	22858
NMP05	8/12/2023	13/05/2024	22632
NMP06	7/12/2023	13/05/2024	22753
NMP07	7/12/2023	13/05/2024	22748

The SA Guidelines also recommend that no less than 500 data points are to be collected for downwind conditions. Wind direction for downwind conditions is defined as ±45° from line connecting the noise receptor and the nearest turbine. If there are more than one turbine at similar distances from the noise receptor, SA Guidelines recommend identification of more than one downwind angle. The resulted downwind angles and the number of downwind data points for each monitoring location is presented are presented in Table B.4.

Table B.4 Background noise data points - Downwind direction

Monitoring location			Nearest turbine ID	Downwind direction, degree	Valid downwind data points at hub height 164 m
Logger location	Start time	End time			
NMP01	3/08/2023	27/09/2023	WTG 15	356	1269
NMP02	3/08/2023	27/09/2023	WTG 11	196	2068
NMP03	16/08/2023	27/09/2023	WTG 1	101	10993
NMP04	3/08/2023	27/09/2023	WTG 5	300	794
NMP05	3/08/2023	27/09/2023	WTG 2	113	10974
NMP06	17/10/2023	22/11/2023	WTG 11	103	11021
NMP07	17/10/2023	22/11/2023	WTG 9	99	8773

Table B.3 and Table B.4 show that the background noise monitoring program allowed to collect a suitable number of downwind data points in accordance with the requirements of the SA Guidelines.

It is understood that relevant noise sensitive receptors around the Development Envelope are situated in zones classified as rural living. As such, Project specific noise criteria based on the SA Guidelines are derived as:

– 35 dB(A) at affected noise sensitive receptors, or
– Background noise ($L_{A90,10\text{-}min}$) plus 5 dB(A)

whichever is greater for wind speed from cut-in to rated power of the WTG.

The Project Development Envelope is located within a rural area. It should be noted that R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be “Non-sensitive” and are not considered within the NIA. Therefore, the 35 dB(A) baseline criterion or the adjusted “background + 5” dB(A) criterion apply to all Not-involved noise sensitive receptors identified in Table 2.2. R17 and R18 are involved noise sensitive receptors (section 2.1.2.1) for which the SA guidelines criteria of 45 dB(A) is used.

B-4-1 Background noise monitoring data and noise criteria for hub height 164 m

Results of background noise monitoring were processed in accordance with SA Guidelines 2021 and relevant noise criteria are derived for each of the monitoring locations for wind speeds referenced to hub height of 164 m.

Wind speed at the hub height was calculated using the wind shear model (Appendix D3 of standard IEC 64100-11: 2018 Ed.3.1):

$$V_2 = V_1 \left(\frac{z_2}{z_1}\right)^{\alpha}$$

where,

V_2 - is the wind speed at height z_2 above ground level;

V_1 - is the wind speed at height z_1 above ground level (typical hub height);

z_2 is the height above ground for the desired wind speed;

z_1 - is the height above ground where the wind speed is known;

α - is the wind shear factor.

The wind shear was computed for each of 10 min measurement periods form indication of sensors at heights of 150 m and 90 m. The wind speed at 164 m was then calculated using known wind speed at 150 m (sensor nearest to the hub height) and the computed wind shear factor.

Figure B.2 to Figure B.6 show results of postprocessed data and relevant noise criteria calculated in accordance with SA Guidelines 2021. Data postprocessing is performed for arithmetic averages of measured noise levels in integer wind speed bins as per Section 3.4 of the SA Guidelines.

One can see that applicable noise criteria correspond to the baseline limit of 35 dB(A) where the background noise is equal or smaller than 30 dB and based on background plus 5 dB(A) where the background noise exceeds 30 dB (at higher wind speeds). The maximum applicable noise criterion used for the compliance assessment reaches approximately 41 dB(A) at monitoring location NMP02.

B-4-2 Summary of wind farm noise criteria based on SA guidelines

There are 35 noise receptors in the area within and adjacent to the Development Envelope. SA Guidelines recognise that it is not always practicable to perform background noise measurements at each of affected noise receptor. Noise monitoring has been undertaken at representative locations and used to derive the criteria at a number of adjacent noise receptors. Table 2.2 contains the list of noise receptors in the area surrounding the Development Envelope. Results of the background noise monitoring survey are used to assign criteria to relevant noise receptors with expected similar background. It should be noted that compliance with noise criteria at the nearest noise receptor typically ensures that noise from the wind farm will meet similar criteria at greater separation distances from a wind farm. Table B.5 presents noise limits for each integer wind speed from cut-in to the speed of the rated power as referenced to 164 m hub height. Results are presented for procedures included in the SA Guidelines.

Table B.5 Noise criteria for 164 m hub height - SA Guidelines

Noise receptor	Representative monitoring location	Hub height wind speed, m/s							
		4	5	6	7	8	9	10	11
R12[1]	NMP01	38	38	39	39	39	39	38	39
R17[2], R18[2]	-	45	45	45	45	45	45	45	45
R01, R02, R03, R04, R05, R06, R07, R08, R09, R10, R34	NMP02	35	36	38	39	40	40	39	41
R20, R21, R22, R23, R24, R25[1], R32, R33	NMP03	35	35	36	36	37	37	37	39
R26[1], R27[1], R28, R29, R30, R31	NMP04	35	36	37	37	37	37	37	38
R14, R15, R16, R19	NMP05	35	35	35	35	35	35	35	36
R13	NMP06	35	35	36	36	37	37	37	38
R11[1]	NMP07	35	35	35	35	35	35	35	36

[1] R12 is a commercial building, and in agreement with the landowner, R11, R25, R26 and R27 will not be used for residential, or accommodation purposes when the wind farm is built. For these reasons, these premises are considered to be "Non-sensitive" and are not considered within the NIA.

[2] *R17 and R18 are involved noise sensitive receptors, the SA Guideline criteria of 45 dB(A) for a not-involved receptor will be used for the NIA.*

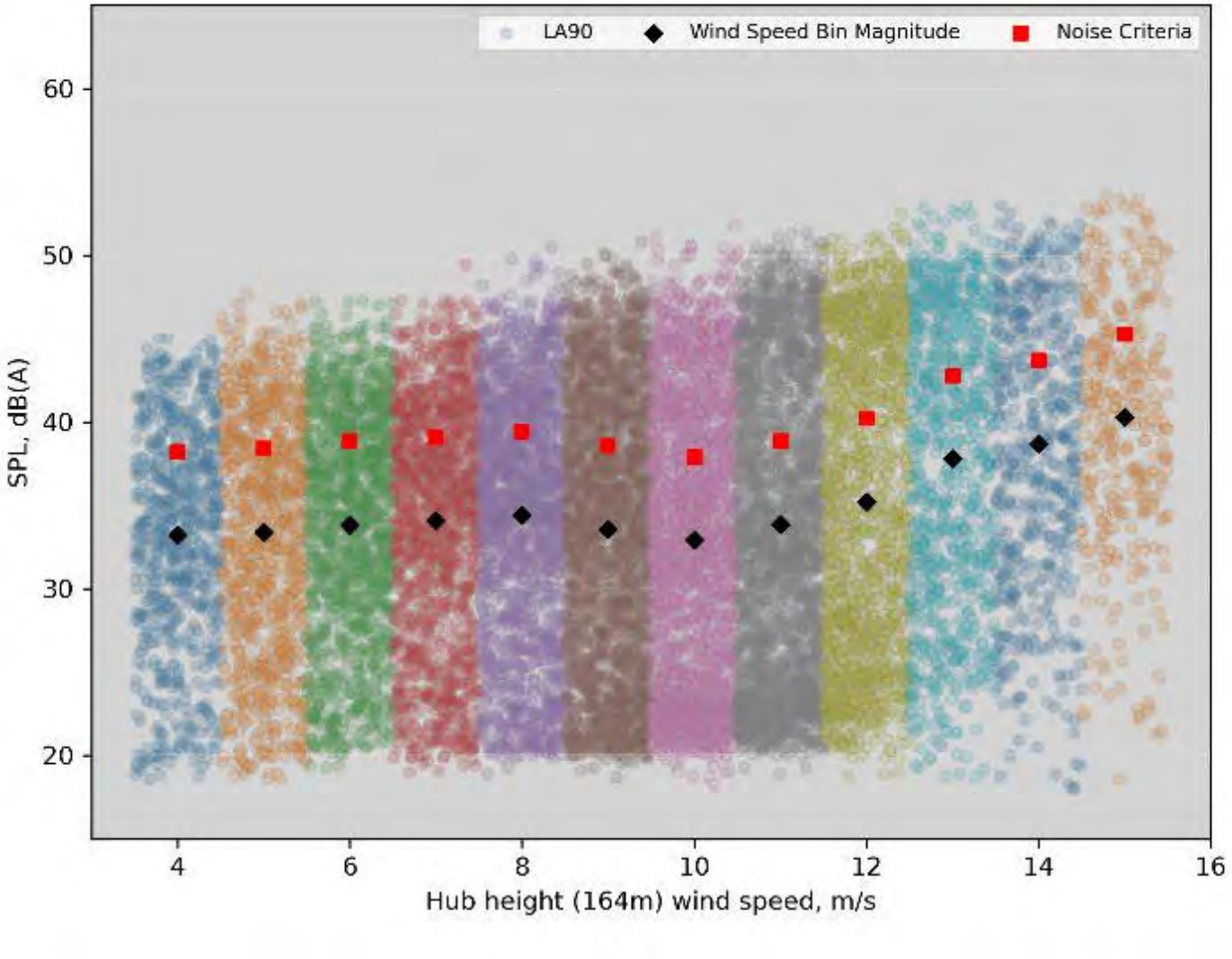


Figure B.2 ***Background noise monitoring data and applicable noise criteria at logger location NMP01, 164 m hub height - SA Guidelines, 2021***

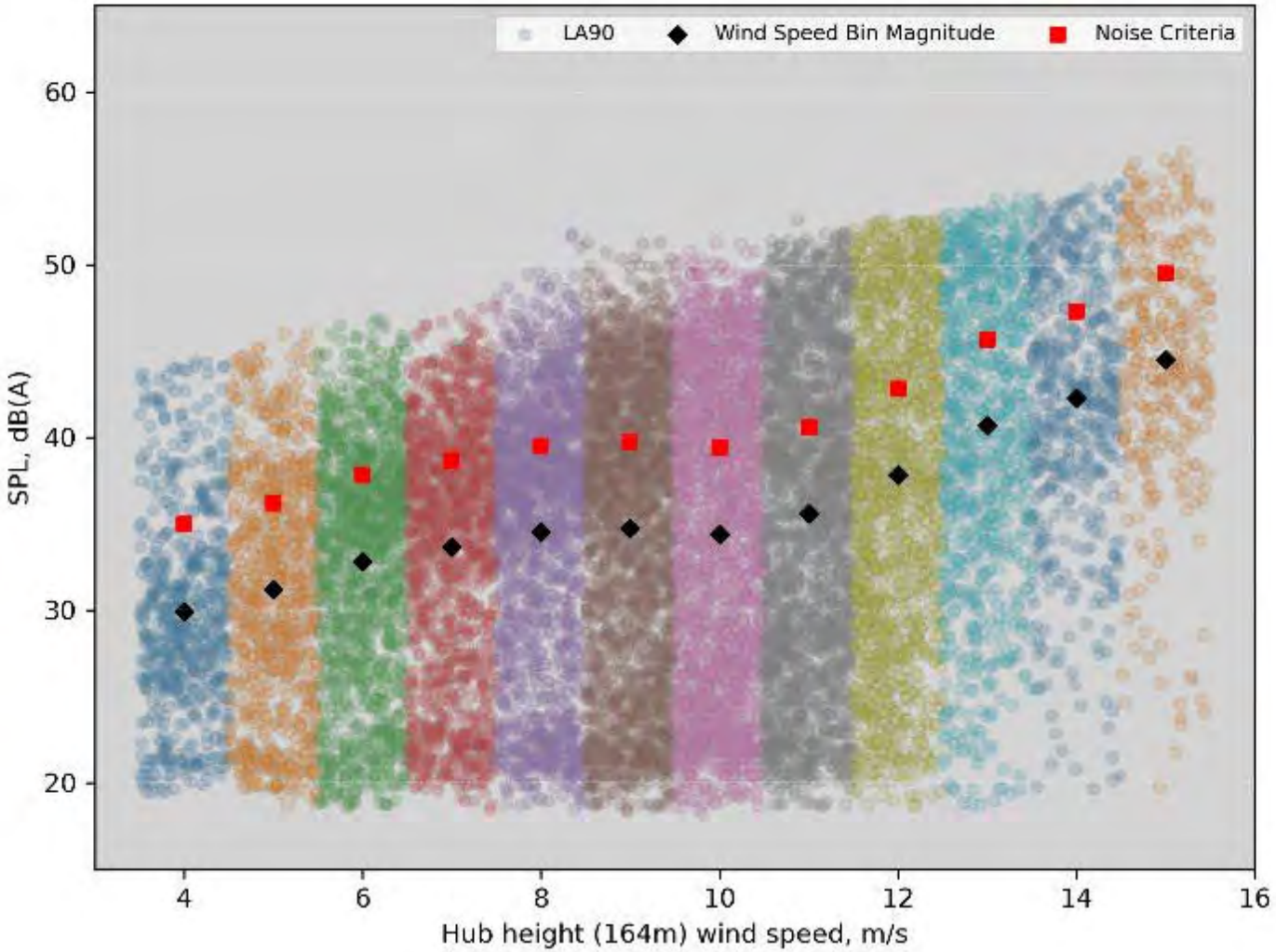


Figure B.3 ***Background noise monitoring data and applicable noise criteria at logger location NMP02, 164 m hub height - SA Guidelines, 2021***

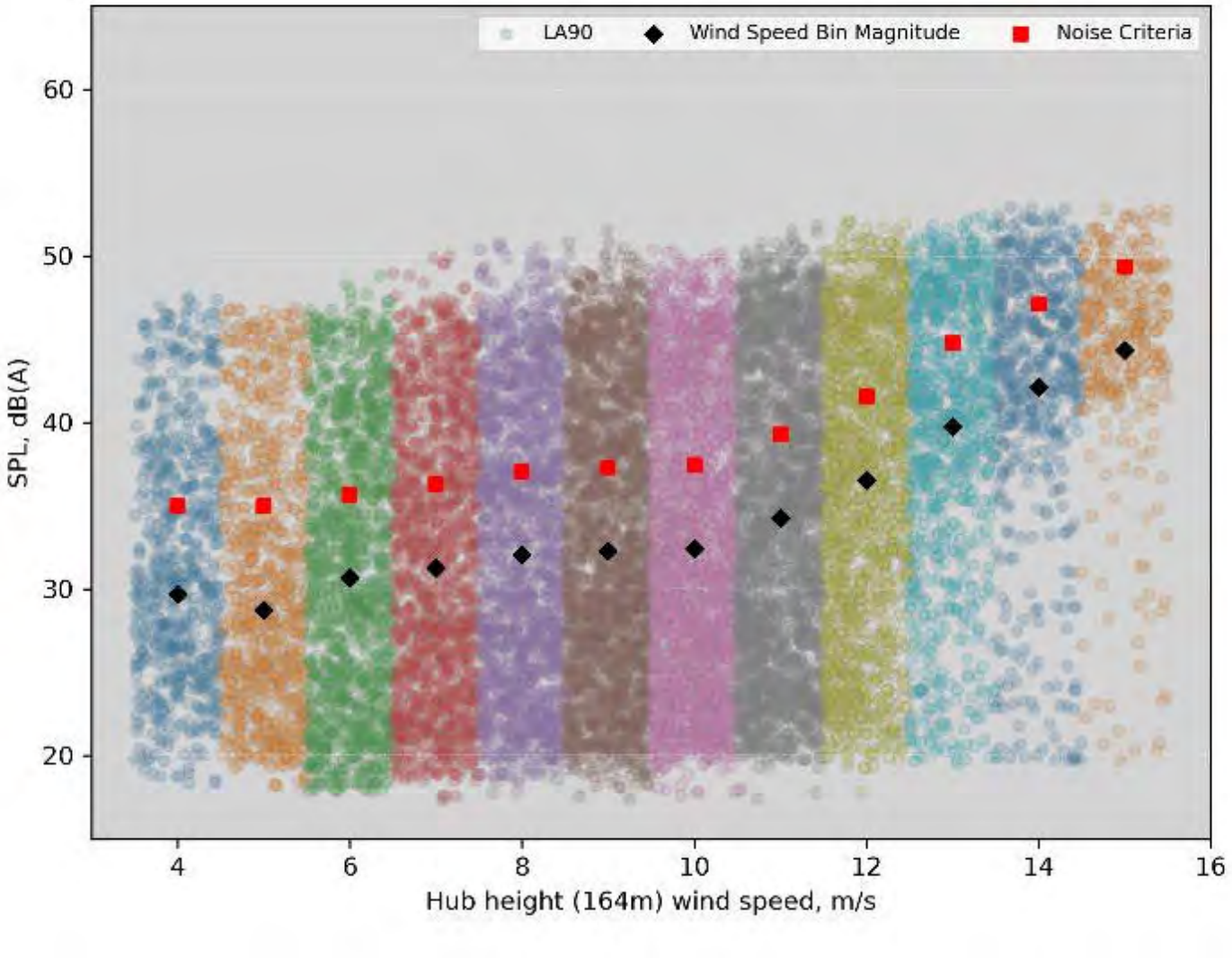


Figure B.4 ***Background noise monitoring data and applicable noise criteria at logger location NMP03, 164 m hub height - SA Guidelines, 2021***

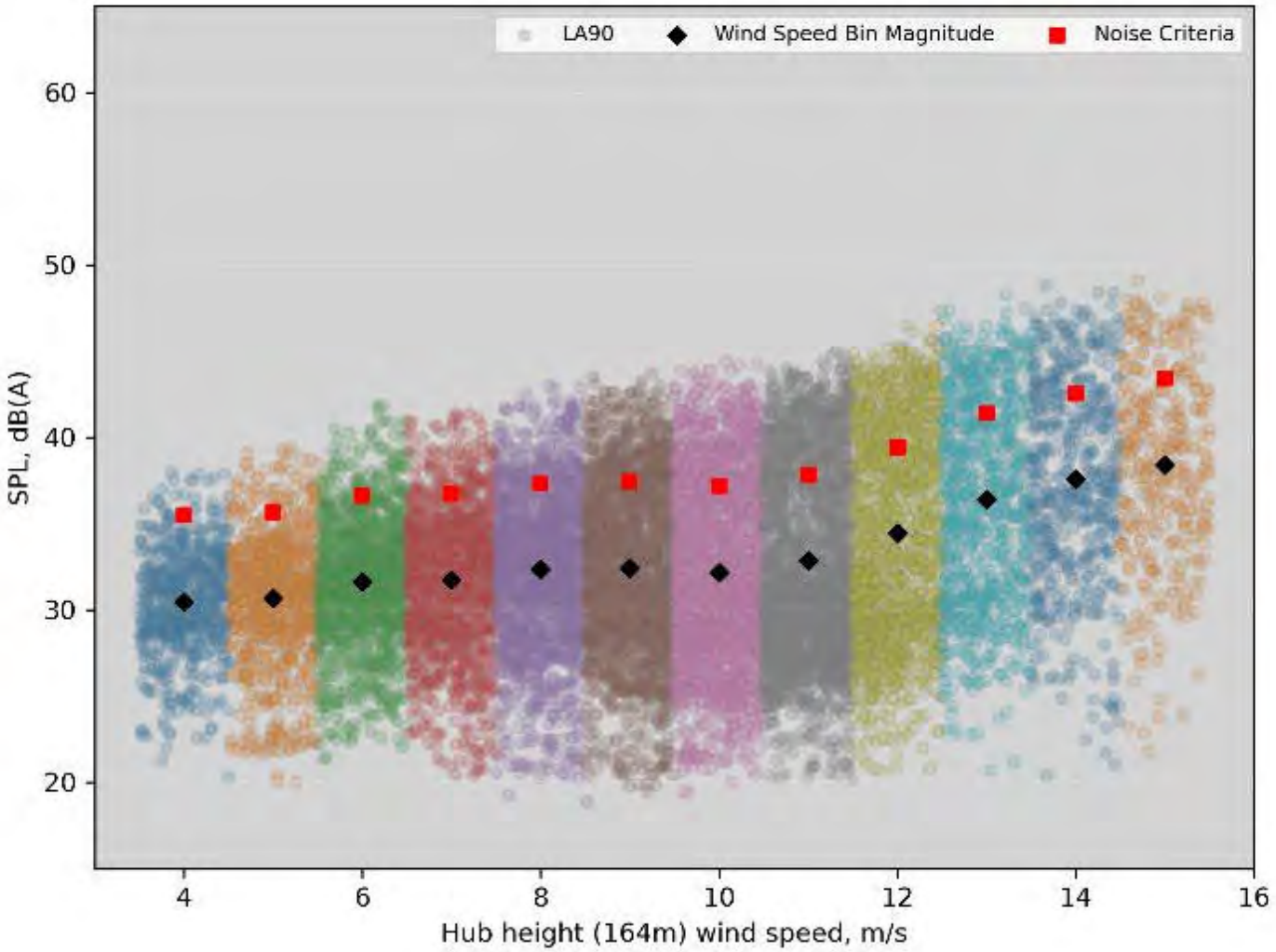


Figure B.5 ***Background noise monitoring data and applicable noise criteria at logger location NMP04, 164 m hub height - SA Guidelines, 2021***

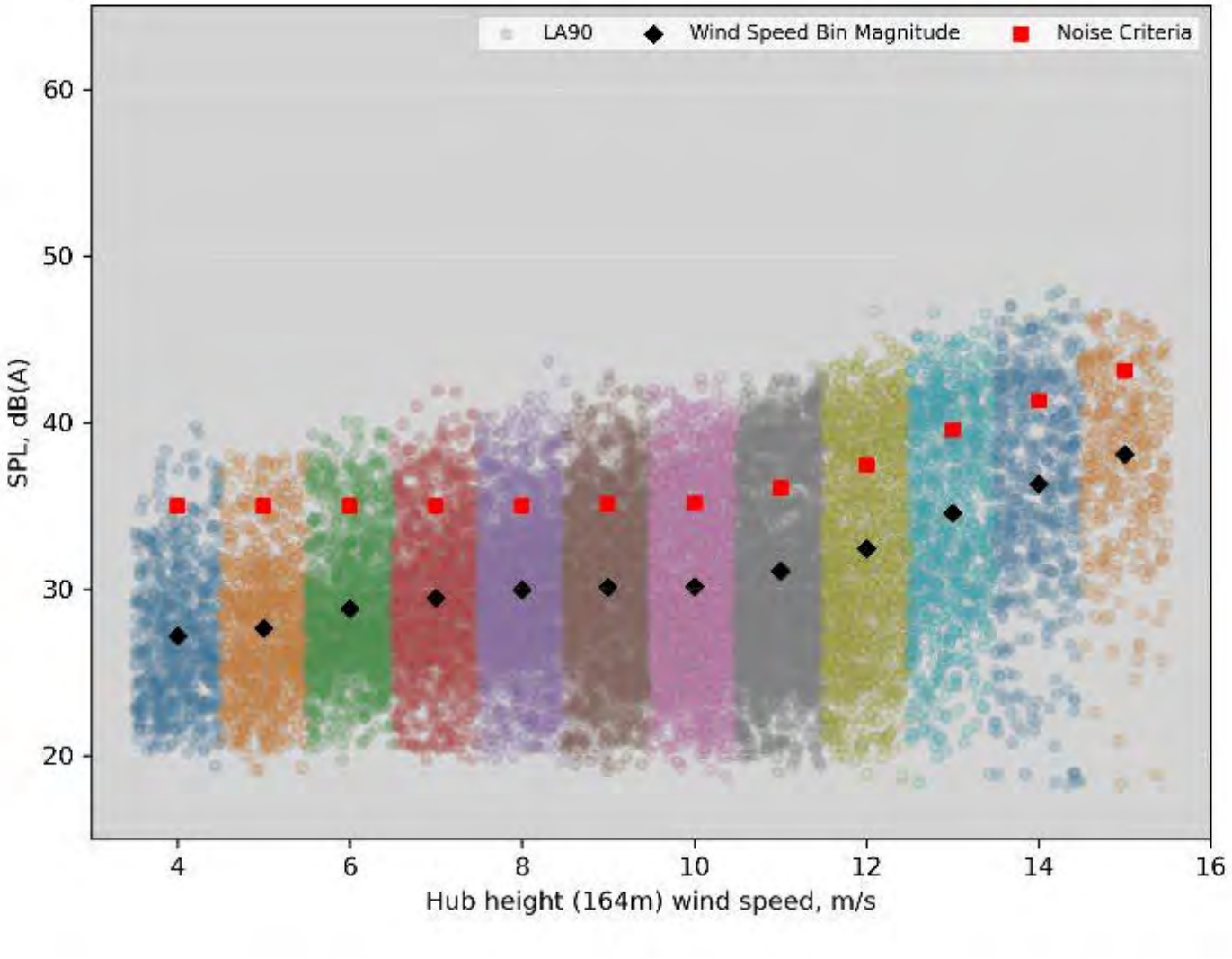


Figure B.6 ***Background noise monitoring data and applicable noise criteria at logger location NMP05, 164 m hub height - SA Guidelines, 2021***

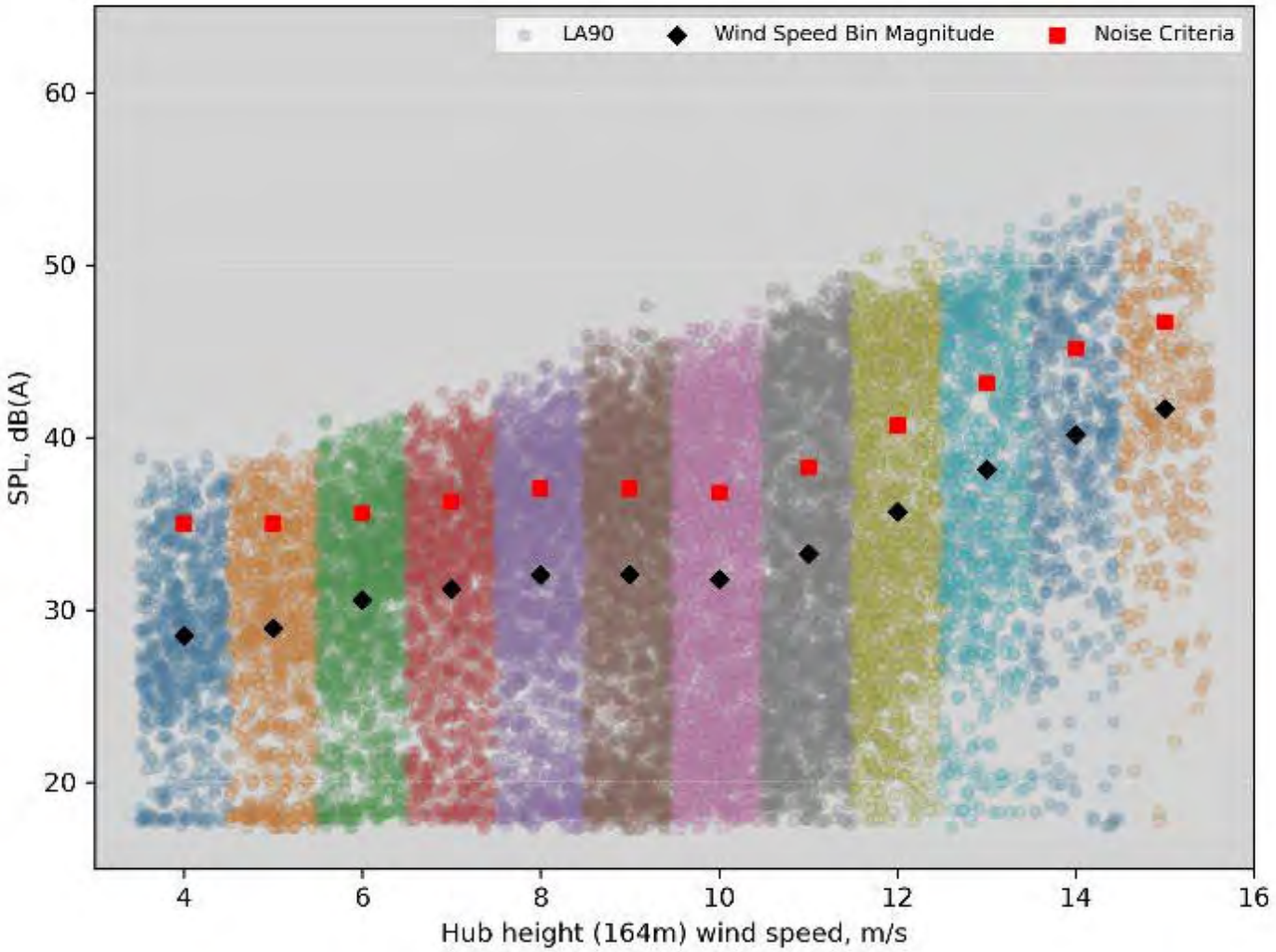


Figure B.7 ***Background noise monitoring data and applicable noise criteria at logger location NMP06, 164 m hub height - SA Guidelines, 2021***

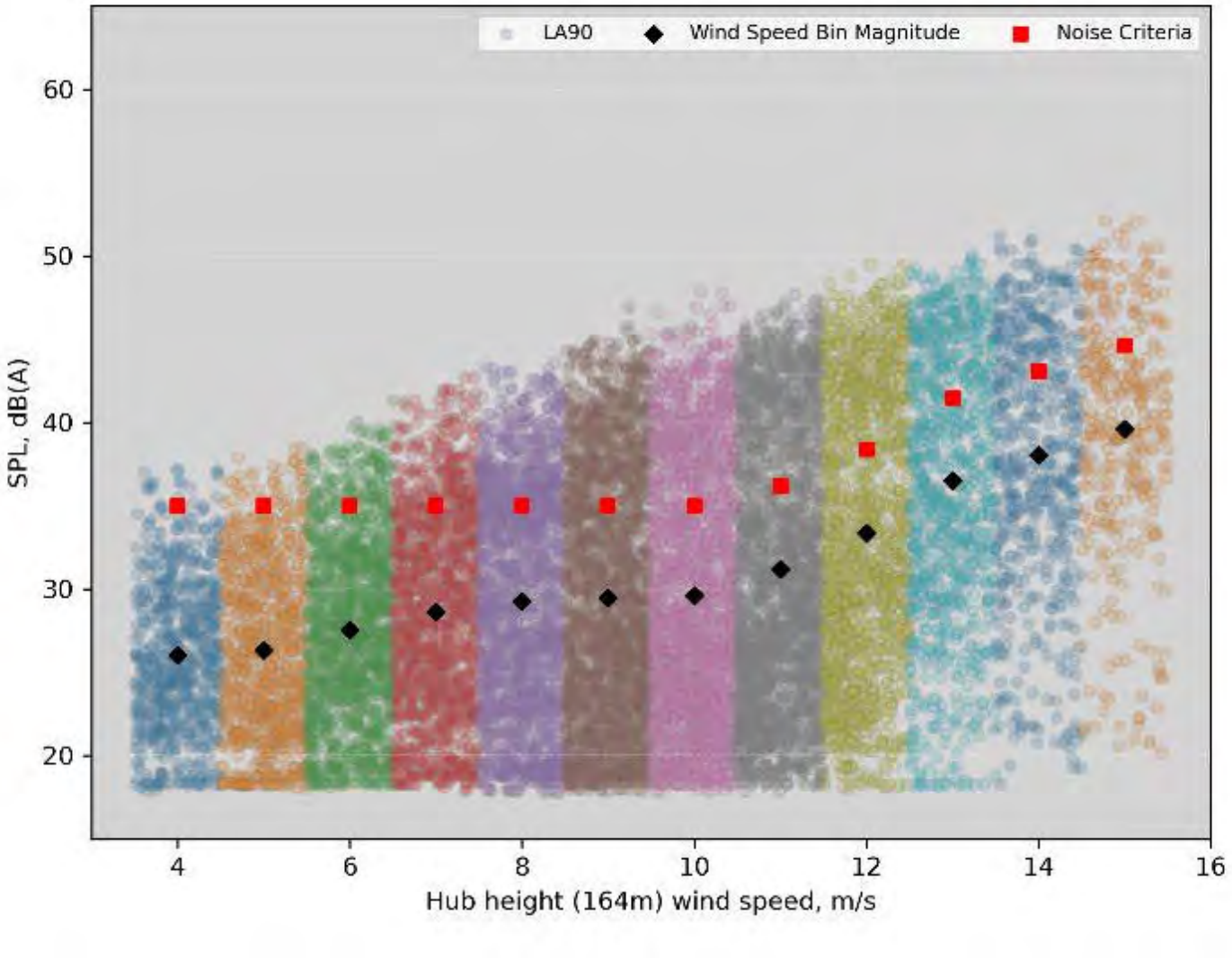


Figure B.8 ***Background noise monitoring data and applicable noise criteria at logger location NMP07, 164 m hub height - SA Guidelines, 2021***

Site photographs of the monitoring instrumentation are provided below.

Description	Site photo
Logger location NMP01 and local weather station	

Description	Site photo
Logger location NMP02	

Description	Site photo
Logger location NMP03	

Description	Site photo
Logger location NMP04	

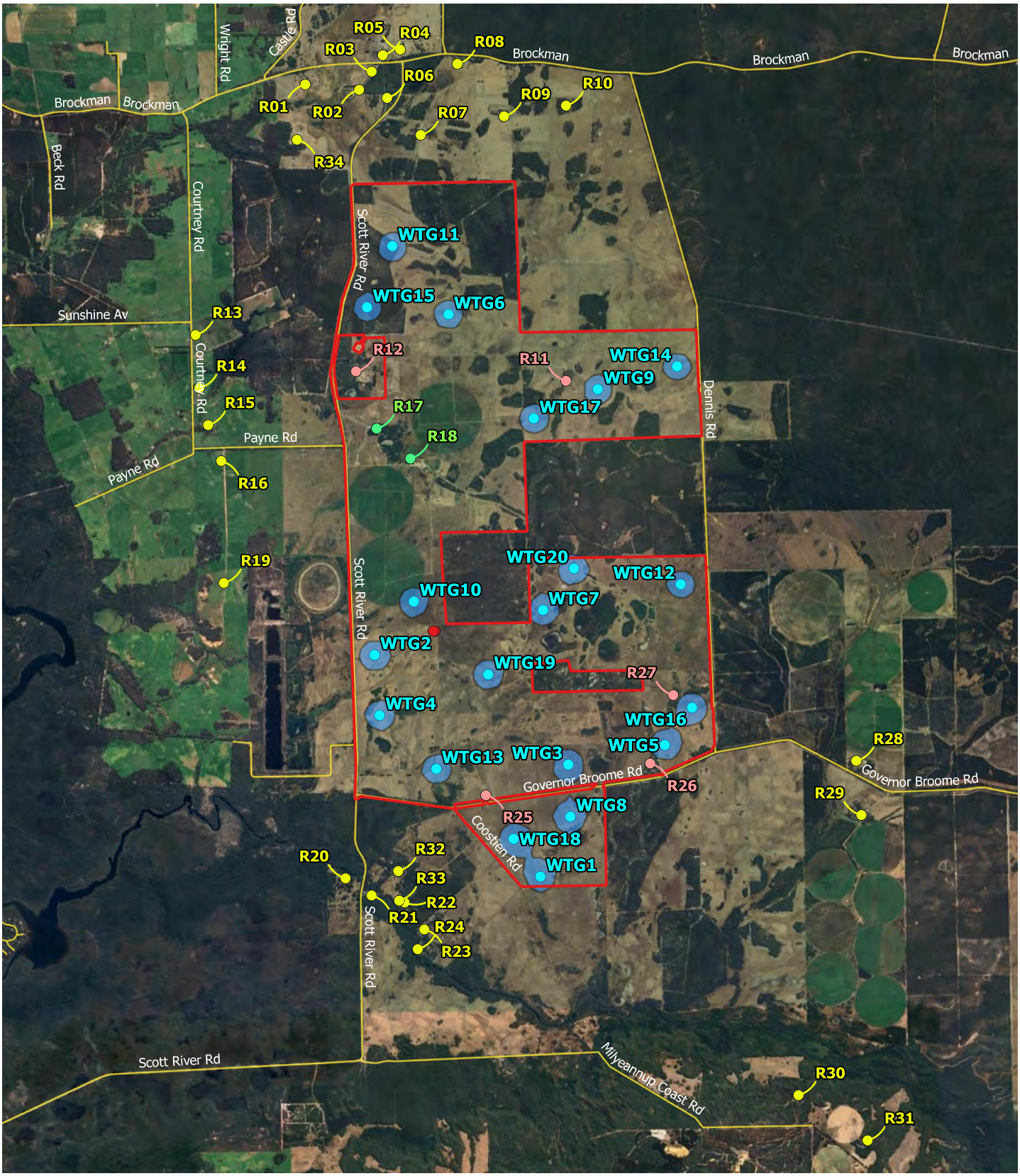
Description	Site photo
Logger location NM05	

Description	Site photo
Logger location NM06	

Description	Site photo
Logger location NM07	

Appendix C

Noise contour maps



Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope
- Noise Contours dB, LAeq, 10-min
  - 35 - 40
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

N

GHD

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 4 m/s

Project No. **12623449**

Version **1**

Date. **09/05/2025**

FIGURE C.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12623449\Tech\Noise\03_GIS\QGIS\Beenup_WindFarm.qgz
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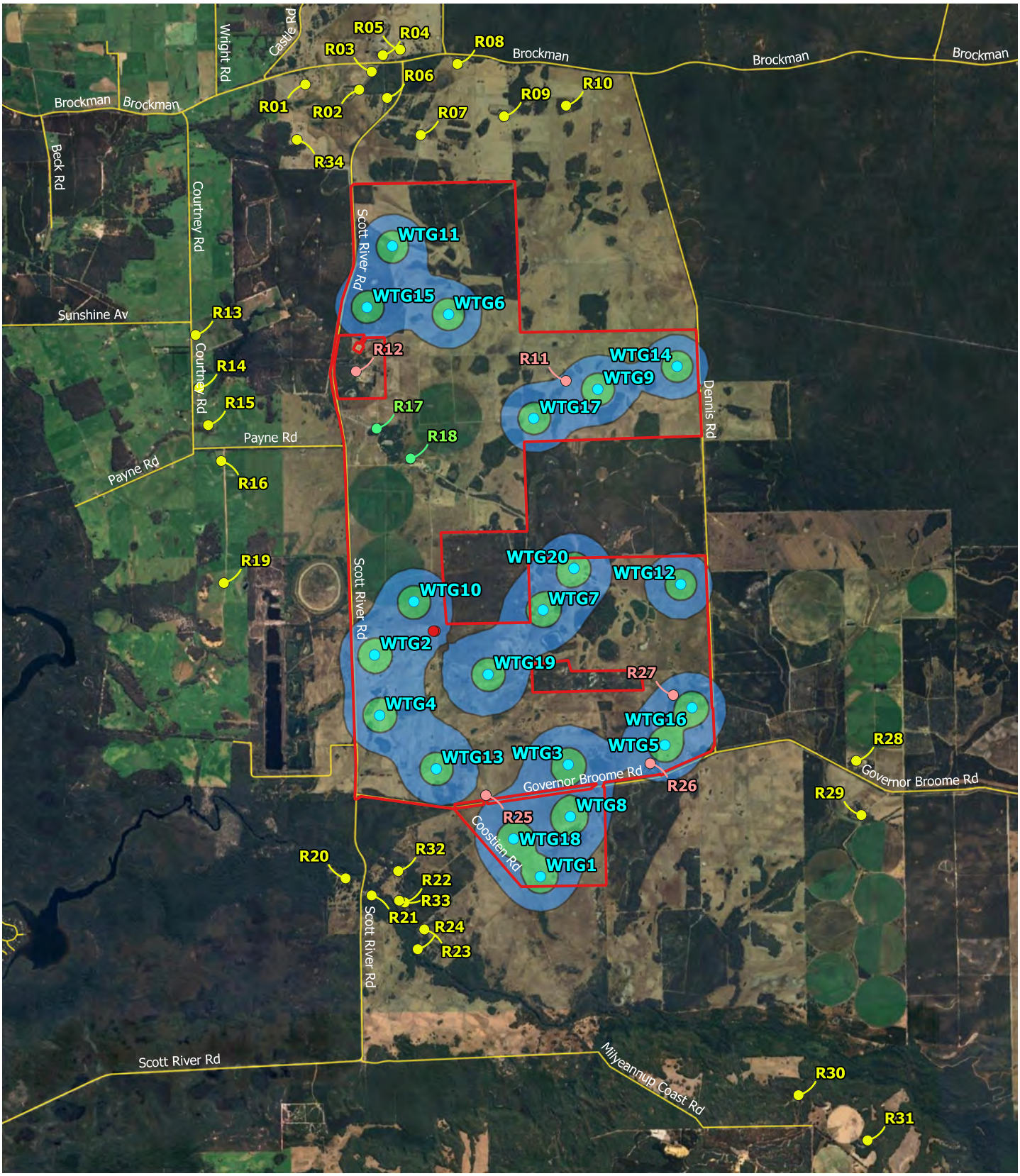

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope
- Noise Contours dB, LAeq, 10-min
  - 35 - 40
  - 40 - 45
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 6 m/s

Project No. **12623449**
Version **1**
Date. **09/05/2025**

FIGURE C.2

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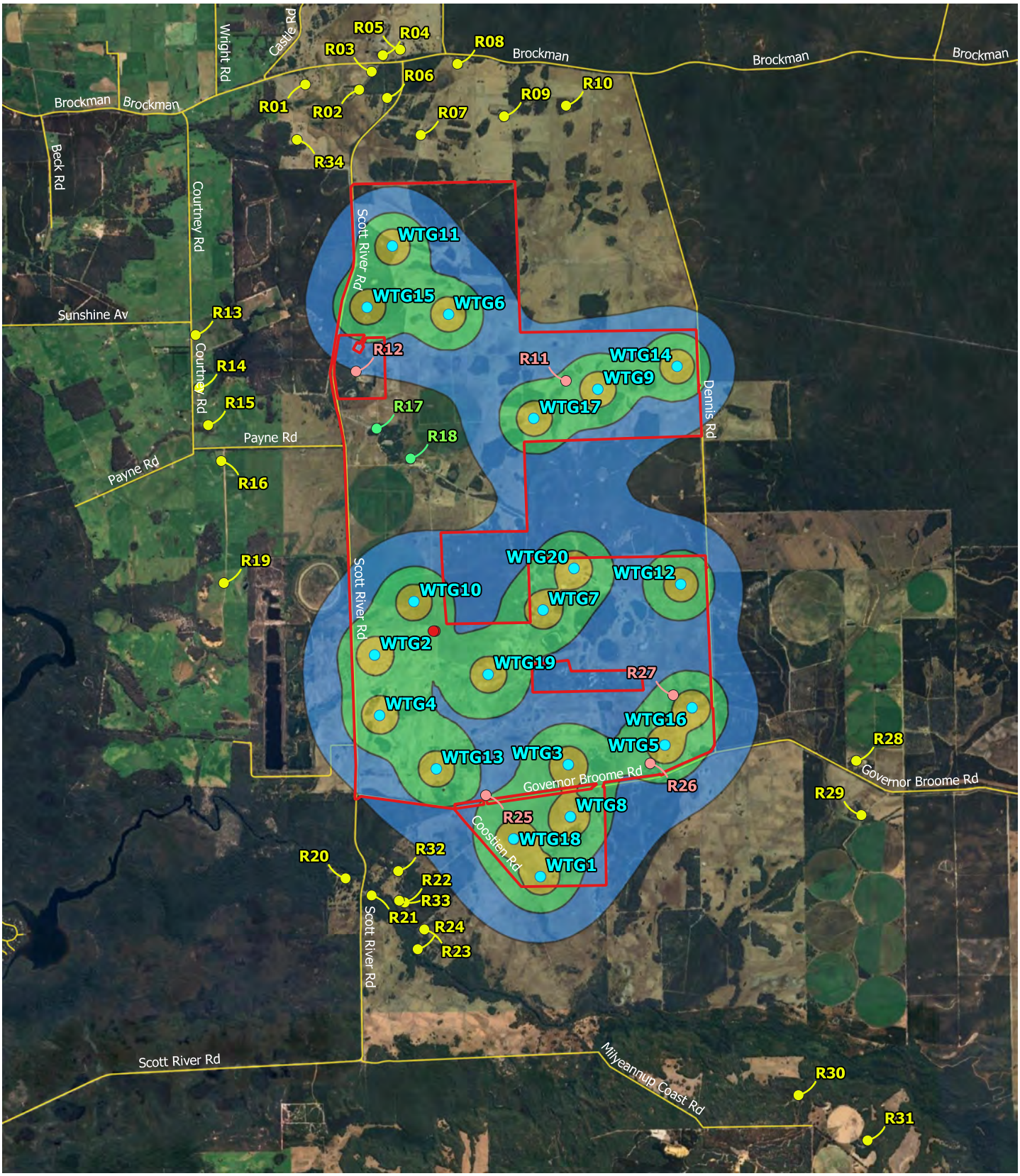

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope

Noise Contours dB, LAeq, 10-min

- 35 - 40
- 40 - 45
- 45 - 50
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 8 m/s

Project No. **12623449**
Version **1**
Date. **09/05/2025**

FIGURE C.3

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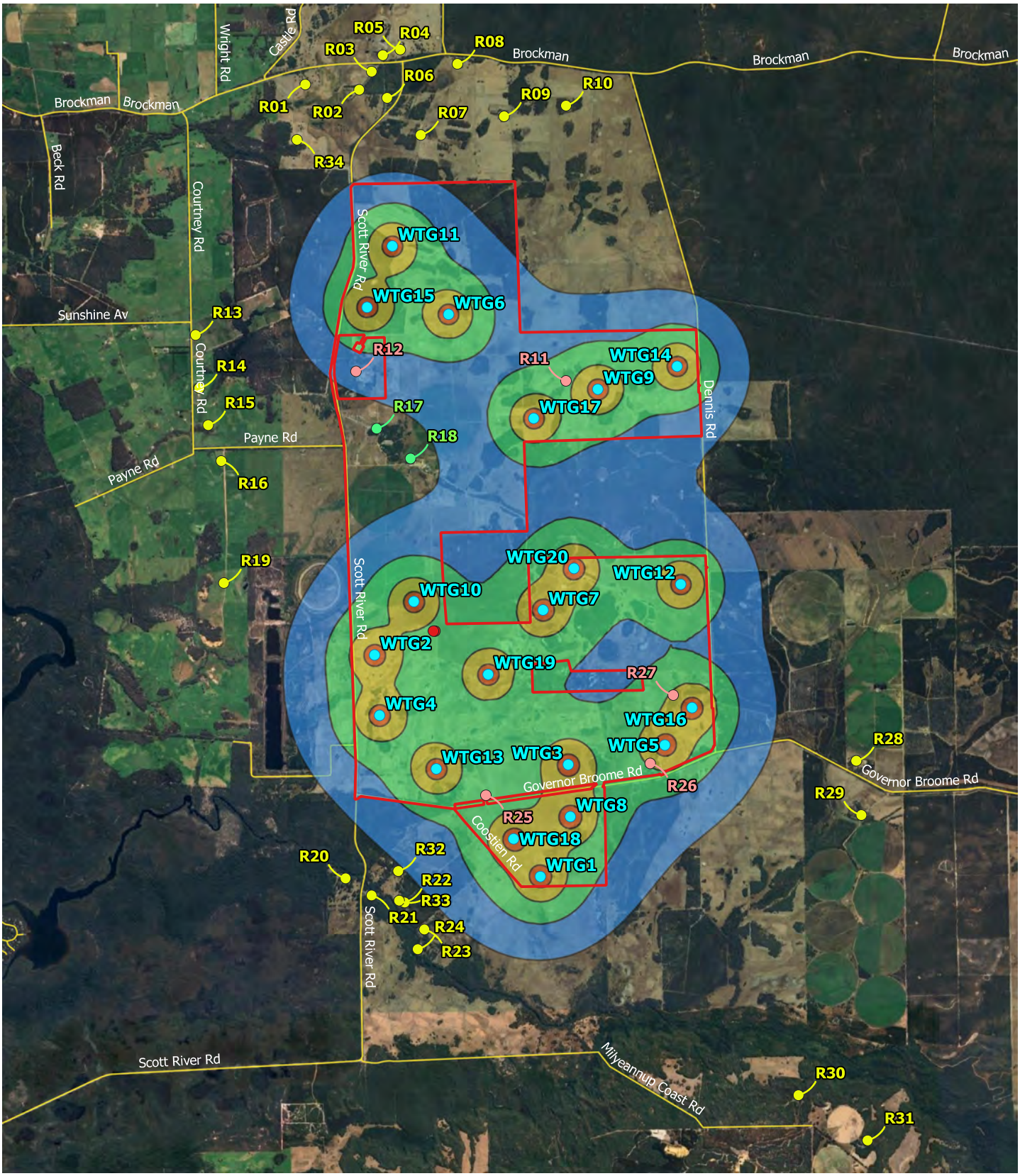

Legend

- Not-involved noise sensitive receptor
- Involved noise sensitive receptor
- Non-sensitive noise receptor
- Substation transformer
- Development Envelope

Noise Contours dB, LAeq, 10-min
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- Local road
- Wind turbines

Paper Size ISO A4

0 0.5 1 1.5 2 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 / MGA zone 50

SynergyRED

Proposed Wind Farm at Scott River
Noise impact assessment

Noise Contours (dB, $L_{Aeq, 10\ min}$), 20 WTG Layout, 10 -11 m/s

Project No. **12623449**
Version **1**
Date. **09/05/2025**

FIGURE C.4

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Appendix D

WTG coordinates

Table D.1 Wind turbine coordinates

Location	Coordinates, GDA2020 / MGA Zone 50	
	Easting, metres	Northing, metres
WTG 1	343194	6207620
WTG 2	340894	6210692
WTG 3	343580	6209174
WTG 4	340964	6209855
WTG 5	344919	6209444
WTG 6	341920	6215417
WTG 7	343230	6211316
WTG 8	343610	6208450
WTG 9	343990	6214378
WTG 10	341440	6211434
WTG 11	341141	6216364
WTG 12	345140	6211673
WTG 13	341750	6209114
WTG 14	345090	6214696
WTG 15	340790	6215514
WTG 16	345297	6209963
WTG 17	343101	6213974
WTG 18	342823	6208141
WTG 19	342469	6210424
WTG 20	343659	6211894



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→ The Power of Commitment

Scott River Wind Farm

Scott River Road, Scott River

Bushfire Risk Management Plan (Renewable Energy)

Date: 11 March 2026

Prepared For: Synergy Renewable Energy Developments Pty Ltd

Linfire Ref: 20231220334SYN-BRMP-002_1

Linfire Consultancy

ABN: 577 930 47299

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Revision	Issue Date	Revision Description	Approved By
0	27 Mar 2025	Issued for Approval	Linden Wears (Level 3 BPAD 19809)
1	11 Mar 2026	Issued for Approval	Linden Wears (Level 3 BPAD 19809)

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1.0 Introduction

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is seeking to lodge a development application (DA) for a new wind farm across a number of lots in Scott River (the wind farm development boundary) approximately 15 km north-east of Augusta, in the Shire of Augusta-Margaret River.

The proposed development will require the installation of the following infrastructure:

- New building/s (within nominated wind farm building envelope)
- 20 wind turbine generators
- 132 kV transmission line (above-ground)
    - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation.
    - Consisting of above-ground towers, poles and electrical lines
    - To be designed and constructed to Western Power specifications
- 33 kV distribution lines
    - Reticulated from each turbine to substation, preferably through use of underground cables, but could be above-ground if ground conditions are unsuitable for underground cables
- High voltage substation
- Internal access driveways providing access to proposed buildings, turbines and firewater tanks.
- Firewater tanks

A plan of the proposed wind farm is provided on Figures 1, 2, 3 and 4 in the project Bushfire Management Plan, which includes the location of proposed wind turbines, transmission lines, building and substation envelopes, driveways and firewater tanks.

Regarding onsite personnel, once operational, the following is expected:

- Occupant numbers likely to be 2 to 4 staff, 5 days a week (business hours)
- There will be at least one on-call technician allocated to the facility for all other times

Further information on the existing site is provided in the project BMP, namely Section 1.2.

As detailed in Section 1.4, this BRMP has been prepared to assess the proposed renewable infrastructure against the relevant the Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities, to demonstrate the bushfire risk associated with this infrastructure has been appropriately managed. This differs to the purpose of the project BMP which is to demonstrate compliance for habitable buildings against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

1.2 Relevant Legislation and Guidance

- State Planning Policy 3.7: Bushfire (SPP 3.7) and the Planning for Bushfire Guidelines (the WA Guidelines).
- WAPC Position Statement: Renewable energy facilities, 2020
- Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities v4, 2023
- Building Code of Australia / National Construction Codes (BCA/NCC)

- AS 3959 Construction of Buildings in Bushfire Prone Areas
- AS/NZS ISO 31000:20018 Risk management – Guidelines
- Australian Disaster Resilience - National Emergency Risk Assessment Guidelines (NERAG) 2020.
- AS 3745-2010 Planning for Emergencies in Facilities
- Dangerous Goods Safety Act 2004
- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (the Regulations)
- Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail.

1.3 Regulatory Context

The entire wind farm development extent is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2024), due to native vegetation located within 100 m of the site which triggers bushfire planning requirements under *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

A Bushfire Management Plan (Linfire 2026) has been prepared to accompany the development application, as per SPP 3.7 Policy Measure 7(ii), given the proposed permanent buildings are sited in a designated bushfire prone area and would have a pre-development rating of BAL-40/FZ. The BMP demonstrates how the proposed buildings will comply with bushfire protection criteria of the WA Guidelines.

Given the renewable energy infrastructure (e.g. wind turbines) are not considered “habitable buildings” as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn’t triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4* (CFA; 2023; CFA Design Guidelines) from Victoria fire brigade, is the best publication to demonstrate compliance with at this stage, albeit rationalised for WA context.

Under the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007*, the operator may also be required to complete a separate risk assessment that addresses risks other than bushfire for the proposed development and the associated Dangerous Goods, should the development trigger the need to do so, although it is noted that there isn’t significant quantities of any Dangerous Goods proposed at the facility.

Some high-level information from the following has been provided in the subsections below, regarding the following guidance documents with respect to renewable energy infrastructure bushfire risk management:

- CFA Design Guidelines for Renewable Energy Facilities
- WAPC Position Statement: Renewable Energy Facilities
- Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

1.3.1 CFA Design Guidelines for Renewable Energy Facilities

This guidance material developed by the CFA for renewable energy facilities, namely their publication *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA 2023), requires that a Risk Management Plan is to be developed for renewable energy facilities which includes the following:

- Description of the risks and hazards at the facility to and from the facility and related infrastructure.

- Detail the following:
    - The location of the renewable energy infrastructure on-site and in the landscape.
    - Emergency vehicle access to and within the facility that:
        - Includes site access points of a number suitable to the size and hazard of the facility
        - Provides access to renewable energy infrastructure, substations and fire service infrastructure.
    - Firefighting water supply for the facility.
    - Asset Protection Zone/s of 10m or greater, based on radiant heat flux (output) as an ignition source:
        - Around the perimeter of the facility.
        - Between any landscape buffer/vegetation screening and renewable energy infrastructure.
    - The separation distance, based on radiant heat flux (output) as an ignition source, between:
        - Renewable energy infrastructure, buildings/structures, and vegetation.
        - All other controls for the management of on and off-site hazards and risks at the facility (including all proposed safety and protective systems).
- Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.
- Form the basis for the design of the facility

While the facility Risk Management Plan is to address both onsite fires within renewable energy infrastructure and bushfires, this BRMP provides this relevant information detailed above for the bushfire-related risk to (and from) the proposed development.

The CFA Guidelines is organised with a number of sections as follows, each section containing guidance and what it terms “Model Requirements” for all renewable energy facilities as well as specific measures for wind, solar, battery energy storage (BESS) and substation/electric line infrastructure:

- Fire Risk Management
- Facility Location
- Facility Design
- Facility Construction and Commissioning
- Facility Operation
- Emergency Planning

A summary of the CFA Guidelines sections (relevant to this project) is provided in the compliance assessment on Table 2 in Section 4.0.

1.3.2 WAPC Position Statement: Renewable Energy Facilities

WAPC have released a Position Statement on renewable energy facilities, in which they note the following with respect to bushfire risk management:

- Renewable energy facilities in Western Australia are principally wind turbine and solar array systems.
- The objectives of this position statement include facilitate appropriate development of

renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas

- Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an 'extreme' bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
- A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended.
    - The APZ should be managed in a low threat state, in accordance with the Guidelines.

This BRMP will aim to comply with the WAPC Position Statement as much as practical.

1.3.3 Shire of Augusta-Margaret River – Local Planning Policy 23 (Renewable Energy Systems)

In 2012, the Shire of Augusta-Margaret River released LPP 23 relating to Renewable Energy Systems which they amended in March 2021. LPP 23 provides guidance on the appropriate location, scale and design of wind and/or solar energy systems in the Shire. There is no specific guidance relating to bushfire compliance or risk management, other than stating that a *"fire management plan"* may be required *"where planning approval is sought large renewable energy systems"*.

The preparation of this BRMP and the project BMP, is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

1.4 Purpose

The focus of this BRMP is to apply and demonstrate compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Guidelines, with summary of the derived bushfire management measures from this BRMP included in the project BMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

Additionally, the preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

2.0 Renewable Energy Assets and Hazard Analysis

2.1 Onsite Renewable Energy Assets

The proposed development is expected to include the following onsite renewable energy infrastructure:

- ***Wind turbine generators***
  - 20 turbines
  - Maximum tip height of 250 metres (hub height up to 164 m with blade length of up to 90 m)
  - Turbines are steel tower casings to ground level, with fibreglass/aluminium/steel blades
  - All turbines are to have fire detection, alarm and suppression systems
- ***High voltage substation***
  - To be designed and constructed to relevant Australian Standards
  - Expected to contain infrastructure such as main transformer, STATCOM, switchroom, NSP room, harmonic filters, back-up generator/auxiliary supply.
- ***132 kV transmission line***
  - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation
  - Consisting of above-ground towers, poles and electrical lines
  - To be designed and constructed to Western Power specifications
- ***33 kV distribution lines***
  - Reticulated from each turbine to substation, preferably through use of underground cables.
  - If ground conditions are unsuitable for underground cables, portions of these 33 kV lines may need to be above-ground.

2.1.1 Wind Turbine Component Overview

A wind turbine (also known as a wind turbine generator), is a device that converts the kinetic energy of wind into electricity. In simple terms, the turbines blades use the aerodynamic force of the wind (much like an aeroplane) to turn a rotor, which spins a generator to produce electricity, which is typically fed into the mains power network as a source of renewable energy.

The horizontal axis wind turbine generators proposed at the wind farm consist of the following elements (see Plate 1):

- Tower
  - The tower supports the structure of the turbine
  - Constructed of steel
- Nacelle
  - The nacelle sits on top the tower, and houses the key mechanical elements: the gear box, generator, shaft and brake.
  - Typically constructed of metal, fibreglass or composite materials
- Hub
  - The turbine blades fit into the hub that is connected to the turbine's main shaft.
  - Typically of metal construction.
- Blades
  - Three blades located on top of the turbine, which connect to the turbine hub.

- When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin.
- The blade construction is generally proprietary, however typically the blade core structure mostly balsa wood or foam, with the outer shell generally fibreglass or composite material.

- Drivetrain
  - Rotor
    - The blades and hub together form the turbine's rotor.
  - Main bearing
    - The main bearing supports the rotating low-speed shaft and reduces friction between moving parts so that the forces from the rotor don't damage the shaft.
  - Shafts (low-speed and high-speed)
    - The low-speed shaft connects the rotor and hub to the gearbox
    - The high-speed shaft connects from the gearbox to the generator
  - Gearbox
    - The gearbox connects the main (low-speed) shaft to the high-speed shaft, thereby converting the low-speed incoming rotation to high-speed rotation required by the generator to produce electricity.
  - Generator
    - The generator, which is driven by the gearbox, houses copper windings that turn through a magnetic field to produce electricity.
  - The majority of the drive train components are metal, but there are a number of lubricants also contained in this system.
- Rotor Brake and Lock
  - A rotor brake keeps the rotor from turning after it's been shut down. Once the turbine blades are stopped by the controller, the brake keeps the turbine blades from moving.
  - The system typically consists of a friction disc brake that is often hydraulically activated.
  - In addition to the rotor brake, a rotor lock (or locking bolt) is required to manually fix the rotor in place for maintenance.
- Yaw System
  - The yaw drive rotates the nacelle on upwind turbines to keep them facing the wind when wind direction changes. The yaw motors power the yaw drive to make this happen.
  - Downwind turbines don’t require a yaw drive because the wind manually blows the rotor away from it.
- Controller
  - The controller manages the starting and stopping of the turbine, usually based on wind speed (i.e. sufficient wind to start and shutting off at excessive wind speeds).
  - Contains a number of sensors and a control system, to continuously monitor wind speed, direction, turbine performance, and other vital parameters.
  - This system adjusts the blade pitch and other aspects to optimize power generation while ensuring safe operation within wind speed limits.



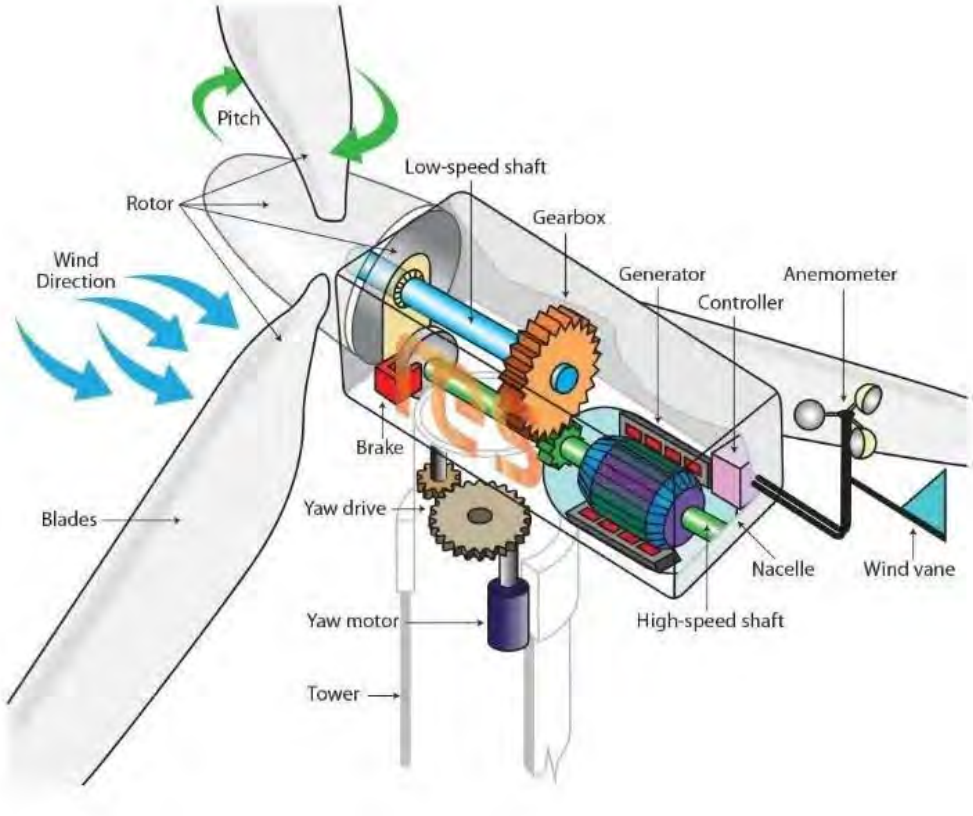


Plate 1: Wind Turbine Components

2.2 Wind Farm Site Description

A detailed description of the wind farm site is provided in Section 1.2.1 of the project BMP, with a brief summary provided below:

- The proposed wind farm extends over a number of existing lots as detailed in the BMP
- All the lots have been largely cleared of native vegetation and used by private landholders for agricultural purposes other than the following exceptions:
    - Lot 4269 in the north-western part of the wind farm, which currently contains existing timber plantations, which are relatively mature and while they are expected to be harvested in coming years, the exact timing is not confirmed.
    - Lot 4265 in the north-eastern part of the wind farm, which currently contains existing timber plantations, again which are relatively mature but with exact harvest timing not yet confirmed.
- Other lots located adjacent to the development boundary worthy of note include:
    - Lot 2 on Diagram 090280, Courtenay
        - Contains the existing Beenup substation
    - Lot 101 on Plan 038071, Scott River
        - Currently identified as a DBCA Lands of Interest (Register No. 2555/700), and potentially a future nature reserve.
    - Lot 4924 on Plan 217962, Scott River
        - Crown Reserve 42377
        - Zoned under local Shire planning scheme as “National Parks and Nature Reserves”
        - Flora reserve
- Surrounding the wind farm boundary:
    - To the east of Dennis Road is agricultural land and timber plantation and Pagett Nature Reserve and Chester Nature Reserve.
    - To the north of Lots 4266 and 4269 are existing agricultural lots largely cleared of vegetation, other than isolated forest plots, with Brockman Highway and South Blackwood State Forest further north.
    - To the west is Scott River Road, with largely cleared agricultural land further west other than some existing timber plantation in the north-west.
    - To the south is primarily cleared agricultural land, with some forest and scrub vegetation south of Lot 4260 and Governor- Broome Road, which fringes the Scott River.

Public road access to the wind farm is via:

- Brockman Highway from the north, which extends west to eventually connect to Bussel Highway at Karridale (17 km west), and east to Nannup (approximately 55 km away)
- Scott River Road, Governor Broome Road and Dennis Road forming a loop road arrangement around the perimeter of much of the wind farm.
    - Governor-Broome Road extends 12 km east of the wind farm to connect to Milyennup Coast Road, where travel can be undertaken 13 km north to connect to Stewart Road and Brockman Highway and on to Nannup.
- The only other public road near the wind farm is Coostien Road, which is an existing dead-end public road providing access to lots south of the Governor Broome Road.

Vehicular access within the various wind farm lots is currently via existing unsealed farm tracks, which provide access from a number of existing entrance gates along the public road network, into the lots.

There is no known reticulated town main water supply currently provided to any lots within the wind

farm development boundary, nor is there any existing street hydrants.

2.3 Bushfire Hazard

The proposed development is to be located across a number of existing rural land holdings, which have largely been cleared of vegetation for agricultural purposes and is now mostly grassland, with only Lot 4269 in the north-west and Lot 4265 in the north-east of the wind farm, containing blue gum plantations. These plantations are likely to be harvested in the future, but the timing is not confirmed so it will be assumed it is uncleared for this assessment.

Surrounding the wind farm lots is mostly a combination of rural land holdings largely cleared of vegetation, timber plantations, and areas of remnant native vegetation within land holdings but also in State Forest and Nature Reserves. The most notable bushfire hazard is to the east and north of the wind farm, where continuous forest vegetation exists within Pagett Nature Reserve, South Blackwood State Forest and Blackwood National Park, that extends to Nannup and beyond. Vegetation in other directions is typically more fragmented by agricultural development, with tracts of forest along the Blackwood River to the west of the wind farm and coastal scrub and forest to the south, presenting the only other significant bushfire hazards in the local area.

2.3.1 Bushfire Hazard Assessment

As the renewable energy infrastructure is not required to achieve target BAL ratings as per the CFA Guidelines, there is no specific requirement to provide BAL contour mapping. The CFA Guidelines do provide some high-level guidance on separation of turbines from unmanaged vegetation, so on that basis, vegetation and effective slope mapping using the AS 3959 site assessment methodology has been undertaken for the wind turbine site to inform the discussion and compliance assessment with CFA Guidelines.

2.3.2 Vegetation classification and effective slope

Linfire assessed classified vegetation, exclusions and effective slope within 150 m of the wind farm development boundary through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 1 and Table 1, and depicted on Figure 1 and Figure 2. Effective slope results were cross-referenced with Landgate 5 m contour data and are depicted in Table 1, and depicted on Figure 1 and Figure 2.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed to the south and south-east of the building and substation envelopes, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state (if not managed within an APZ).

Site observations indicate that land is undulating, with elevation decreasing from the north of the wind farm to the south-west. The effective slope for the remainder of the classified vegetation further than 150 m from the building and substation envelopes is not technically required, however has been provided to give some guidance of the general slope in the areas around the turbines which is almost always downslope 0°-5°.

The mapping has been conducted at a relatively broad scale, to provide some indication regarding the proximity of proposed renewable energy infrastructure, to continuous non-grassland vegetation.

2.3.3 Summary of inputs

Table 1 summarises the vegetation classifications and exclusions within 150 m of the proposed wind farm. The post-development vegetation classifications/exclusions and effective slope are illustrated

on Figure 1.

Table 1: Vegetation classifications/exclusions and effective slope (within 150 m of wind farm site)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height throughout much of the wind farm site, cleared of vegetation for agricultural purposes.
2	Class C Shrubland	Downslope >0–5°	Shrubland vegetation (<2 m high), primarily within Lot 4924 and small plots in Lot 101.
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land to be modified to low threat vegetation as part of proposed development within building and substation envelopes and associated APZs.
4	Class D Scrub	Downslope >0–5°	Plots of scrub vegetation (2 m to 6 m high) typically as isolated plots throughout the wind farm site.
5	Class A Forest	Downslope >0–5°	Multi-layered forest vegetation with trees >6m high, typically occurring as isolated plots within agricultural land and along roads, but as larger more continuous plots in plantations (until harvest) and retained native vegetation within surrounding nature reserves.
6	Class B Woodland	Downslope >0–5°	Trees >6m high, well-spaced with grassy or grazed understorey, typically occurring as isolated plots within agricultural land.
7	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing public roads.

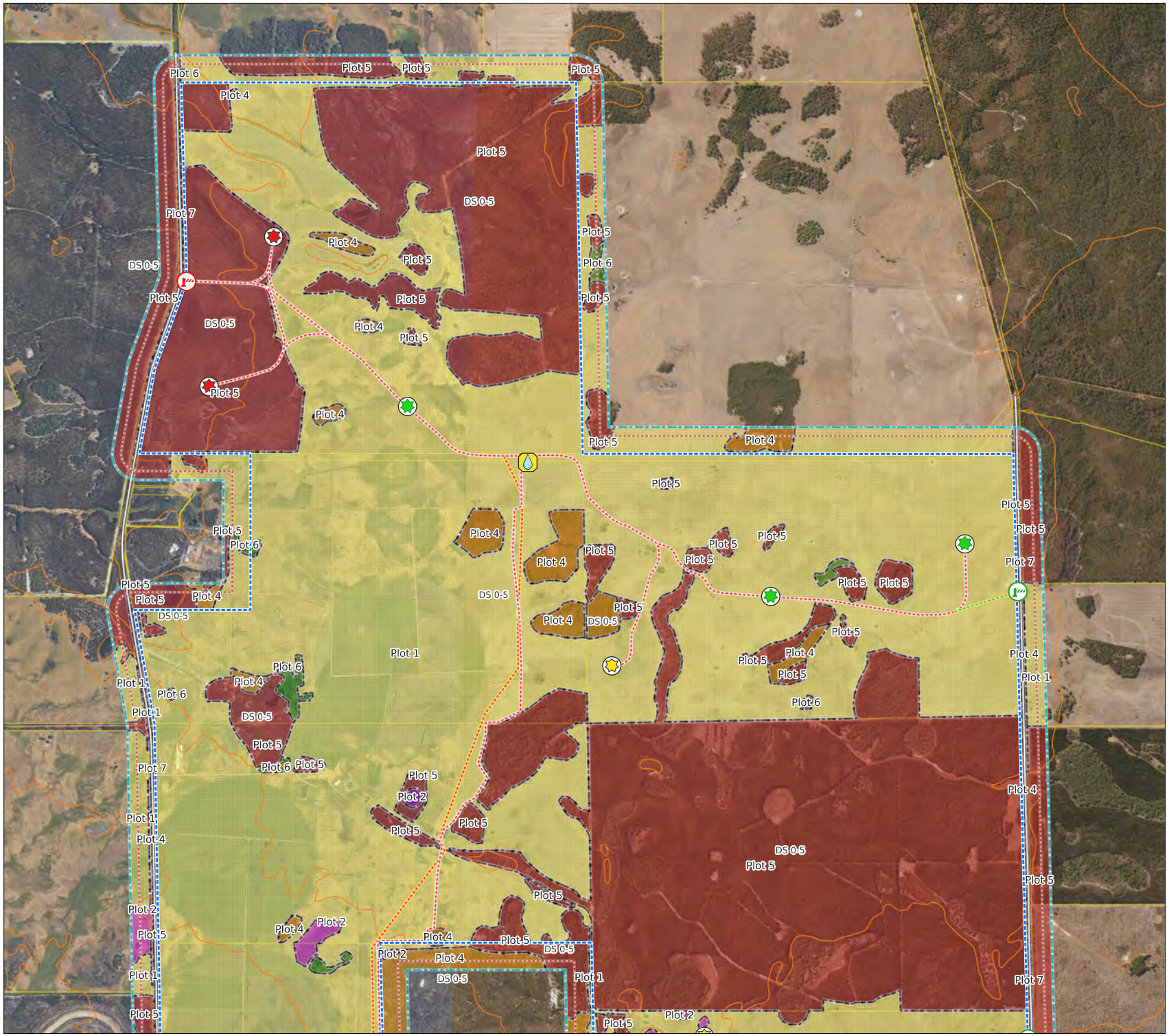
2.3.4 Bushfire Hazard Summary

The wind farm itself is comprised mostly of agricultural land, largely previously cleared of native vegetation other than isolated plots of retained shrubland, scrub and forest vegetation. The only significant plots of non-grassland vegetation within the wind farm site, are the timber plantations in the north-west and north-east.

Outside the wind farm site, the greatest bushfire threat to the site exists to the north, north-east and east of the site, where extended fire runs tens of kilometres long are possible through continuous forest vegetation within National Parks, State Forest and Nature Reserves, capable of creating landscape-scale bushfire behaviour. While the greatest bushfire threat to the development is from those directions, bushfire is capable of spreading toward the wind farm from any other direction over significant distances, which could also develop to steady-state bushfire behaviour.

Given the majority of proposed renewable energy infrastructure is located in the agricultural grassland areas, where any bushfire impact would be limited to grassfire behaviour with a very quick residence time, producing a brief exposure to elevated radiant heat, supplemented with some ember

attack from surrounding forest vegetation. The greatest potential bushfire impact will be on the two turbines proposed in the plantation in the north-west of the site, where surrounding forest vegetation could result in elevated radiant heat, potential flame impingement and ember attack on these turbines, if the risk is unmanaged.



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (WA Guidelines)
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:25,000

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 1: Vegetation and Effective Slope - North (Overall Wind Farm)

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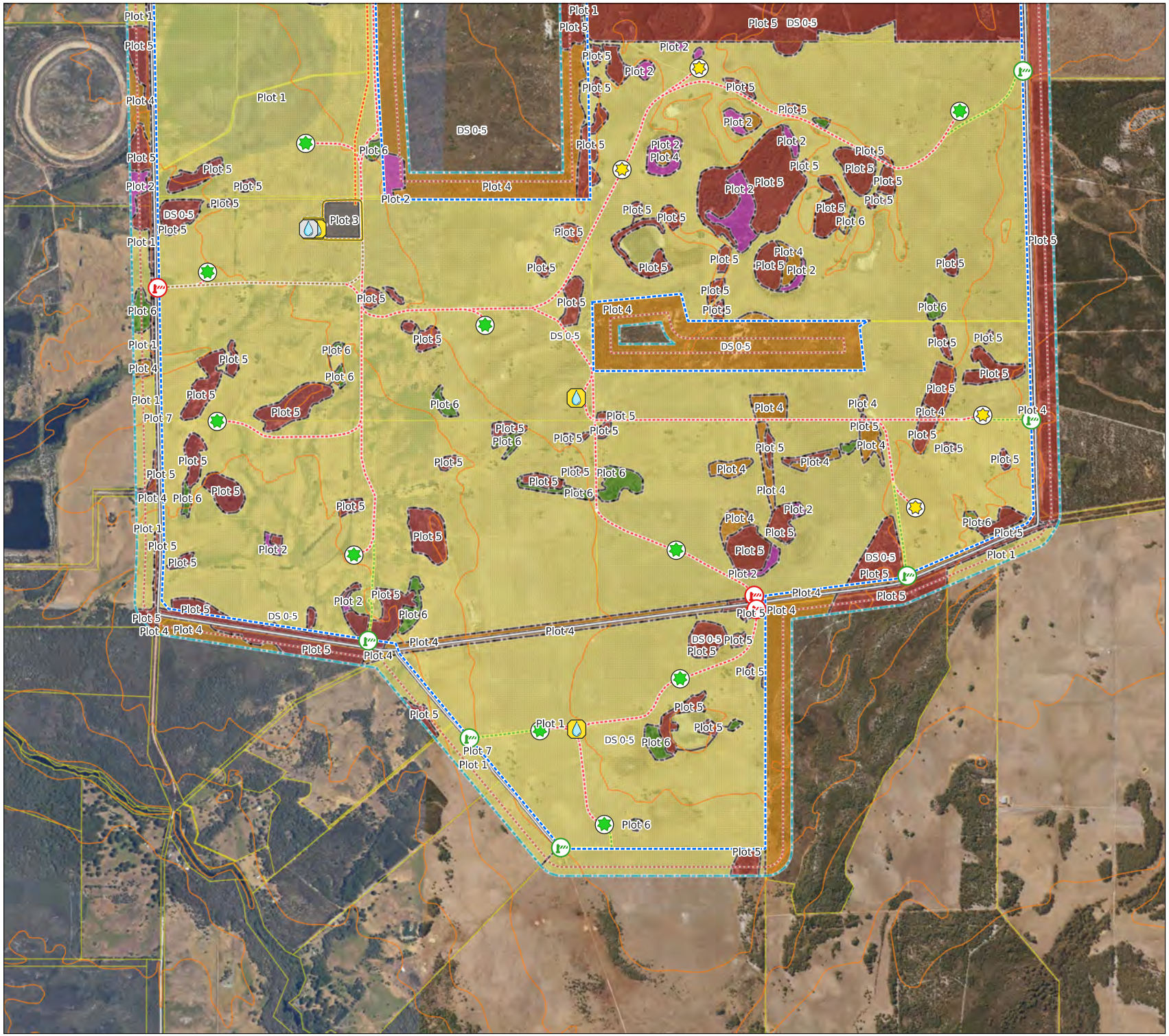

Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)
- Contours
- Transmission Line
- Public Road
- Internal Driveway (WA Guidelines)
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:25,000

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 2: Vegetation and Effective Slope - South (Overall Wind Farm)

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2.4 Wind Farm Hazard and Risk Analysis

The CFA Guidelines notes that fire hazards at wind energy facilities may include the following:

- Electrical hazards, such as wind turbine electrical faults; power surges; hot surfaces; lightning strike
- Chemical hazards, such as the leakage of oils and lubricants within the turbine/ancillary equipment
- Potential fire spread, due to air flow impact or falling debris from fire-impacted turbines
- Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers or radiant heat
- Falling blades
- Wind turbines as a potential obstruction for aerial firefighting

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed turbines, and the ability for significant turbine fires to ignite a bushfire.

2.4.1 Wind Farm Fires in Australia

While there haven't been many significant fire events at wind farms in Australia (either ignited by wind turbines, or impacted by bushfire), or at least not many publicly reported, review of those reported fires do provide a useful tool to review potential risks, as well as the relevant learnings from such events. Below is a summary of several that have occurred and reported upon in the past 10 years.

2.4.1.1 Cape Nelson Wind Farm, Victoria (June 2024)

- Cape Nelson is a 195 megawatt (MW) wind farm in the Portland area of Victoria, that was constructed in 2009 and is owned by Pacific Blue.
- The wind farm site is home to native coastal Mallee scrub.
- The wind turbine fire occurred at the top of the turbine at approximately 8pm, and occurred in a Senvion MM82 turbine, which has a hub height of 69 metres and a maximum blade tip height of 110 metres.
- The fire destroyed the turbine and resulted in a blade falling off the turbine, and others expected to follow. Firefighters were called to the scene and allowed the turbine to burn out as there was nothing the firefighters could do to suppress the turbine fire.
- The Fire Rescue Victoria commander noted that:
    - This fire is the first in the Portland area since wind farms started to be built around 20 years ago
    - The rarity of wind turbine blazes mean they aren't a big fire risk.
- There were no reported injuries from the fire.

2.4.1.2 Clements Gap Wind Farm, South Australia (February 2024)

- Clements Gap Wind Farm was one of the first wind farms in South Australia, being constructed in 2010, and had 27 of the Suzlon S88 turbines.
- Smoke from the turbine was spotted by a maintenance crew at 8:30am, and emergency services were alerted at about 8.50am.
- The fire destroyed the wind turbine and ignited a grassfire underneath it due to debris from the turbine. The resultant fire turbine burnt about 30 hectares of grassland, with no one injured in the incident.
    - The Country Fire Service (CFS) created an exclusion zone around the wind turbine to enable firefighters are staying on top of spot fires created by falling debris, while remaining clear from the turbine collapse zones.

- The CFS noted that:
    - Wind turbine fires are uncommon, but can occur including in South Australia the previous year.

2.4.1.3 *Waterloo Wind Farm, South Australia (January 2017)*

- A bushfire started on a paddock near the Waterloo Wind Farm in South Australia. The fire quickly spread through the area due to gusty westerly and north-westerly winds, and including into area the wind farm was located.
    - The exact cause of the fire was never reported, but is not believed to be ignited by the Vestas wind turbines or any wind farm operations.
    - The fire burned approximately 50 hectares before it was controlled (around 2.45p the next day), including land beneath turbines as the northern end of the wind farm.
    - There had been no reported loss of structures but it was not clear what, if any, damage had been caused to turbines at the wind farm.
    - There were no reported injuries to any people.
- The bushfire was reported by a local farmer to the CFS just prior to 2pm, with the firefighting and wind turbine actions including the following:
    - CFS deployed water bombers to fire and requested that a number of turbines be shut down.
        - By 2.17pm, the wind farm operations had paused 18 wind turbines.
        - CFS also made contact with the wind farm General Manager to obtain approval for decisions relating to wind farm operations as much as required, including requesting that the turbines be paused and shut down remotely by applying their brakes.
    - CFS also requested that where safe to do so, all access gates within the wind farm site be opened to enable the CFS quick access to respond and manage the incident, without restrictions.
    - CFS worked to halt the fire advance with multiple runs of water bombing and ground-based firefighting, with fixed-wing water bombers able to manoeuvre through the turbines to target the grass fire and were followed by ground crew.
    - At 3.15 pm, CFS deemed it safe enough for the onsite crew to attend six of the paused wind turbines, to apply the brakes and set the blades in ‘rabbit ear position’, further assisting aircraft to pass through the turbines to continue water bombing.
    - The wind farm’s access tracks worked as a fire break and without these the CFS believes the fire would have likely spread further, creating a much bigger incident.
    - The turbine’s footings, with their clear line of site, were used by crews to coordinate air and ground crew actions.
    - Firefighting continued through the afternoon and, by 6 pm, the CFS approved the re-start of the turbines located outside of the fire ground area.

2.4.2 *Wind Farm Fire Risk*

The Australasian Fire and Emergency Services Authorities Council (AFAC) released a position paper titled *Wind Farms and Bushfire Operations* (AFAC, 2018) with the expressed intent to “*provide guidance relating to planning for bushfire prevention, preparedness, response and recovery operations in and around existing and planned wind farm facilities”*. This publication rightly stated that wind power is a rapidly expanding form of renewable energy production, and noted that *“…wind farms are not expected to adversely affect fire behaviour, nor create major ignitions risks”*. More

specifically AFAC noted the following:

- ***Ignition caused by wind farm infrastructure or operations***
    - It is possible that turbines can malfunction and start fires within the unit.
    - The above is generally considered a low risk given appropriate protection measures, with automatic shutdown and isolation procedures are generally installed within the turbine system.
    - Operation of winches and machinery during monitoring and maintenance tasks may also lead to ignitions.
- ***Lightning risks***
    - Wind turbines can attract lightning during thunderstorms.
    - If struck by lightning, turbine towers are generally not expected to start fires as they have built-in protection mechanisms.
    - On this basis, it is possible that wind turbines may reduce the risk of bushfires caused by lightning, particularly if turbines are located on a ridge or local high point.
- ***Hazards and firefighting limitations in and around the wind farm facilities***
    - Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers.
        - The bushfire at the Waterloo wind farm demonstrated that if conditions are clear and wind turbines are turned off, wind turbines are clearly visible from aircraft and are not likely to constrain aerial firefighting operations (Clean Energy Council 2017).
            - If wind turbines were not shut down, moving blades and wake turbulence would create significant hazards for low flying aircraft, thus the shutting down of wind turbines, in an emergency situation, is defined in wind farm emergency procedures.
        - However, transmission infrastructure, meteorological towers and guy-ropes were difficult to see (Clean Energy Council 2017) and this infrastructure does have potential to limit the effectiveness of aerial firefighting operations.
            - This can be addressed through appropriate marking of this infrastructure.
    - Access and egress challenges on the ground as well as water supply issues can also create firefighting limitations, if not planned for appropriately.
- ***Bushfire spread within wind farm facilities and impacts on wind farms as critical infrastructure***
    - Wind farms are not expected to adversely affect fire behaviour in their vicinity.
    - Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings.
    - Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event.
    - Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.

2.4.2.1 Learnings from Past Wind Farm Fires

There are number of learning opportunities from the past wind farm fires, which can be used to

inform the bushfire risk management strategy.

With respect to bushfires impacting the wind farm site (such as the Waterloo Wind Farm fire), AFAC noted the following:

- *The wind farm's access roads were beneficial in helping fight the bushfire on the ground and provided an effective firebreak.*
- *The wind farm's turbines did not present a hazard to aerial firefighting and the turbines were clearly visible to the pilots involved in operations. However, transmission infrastructure, transmission lines and meteorological masts were difficult to see by pilots and did pose a safety risk.*
- *Improved communication protocols need to be in place between wind farm operators and fire and land management agencies to direct turbine shut-down procedures in an emergency situation and initiate emergency response plans.*
- *Wind farm operators should ensure that they have the capacity to respond to emergency events.*
- *Wind farm operators should ideally select turbines that can be rapidly shut down to the preferred position.*
- *Additional precautionary measures should be considered to allow for aerial identification of meteorological masts (measurement towers), guy wires and other infrastructure such as transmission lines that are not easily visible from air.*

Additionally, the Clean Energy Council also added the following comments:

- *Ensure aerial-friendly identification and markings for meteorological ("met") masts and guy wires is provided at wind farm locations.*
- *Review and update emergency management plans and protocols with a focus on:*
    - *Communications practices including advising state air-desk (who control aerial firefighting assets)*
    - *On site asset management/operations centre control procedures to pause, brake and 'lock' individual turbines*
    - *Best practice approaches to support aerial and ground-based responses*
    - *Water storage point signage, access track markings and site mapping.*
- *Ensure ongoing and regular engagement with local volunteer organisations and services.*

In addition to the comments above, the following is also noted:

- The considerable cleared areas at the base of turbines (footings and crane pads) provide useful areas for firefighting operations.
- While locking the turbines in the "Y" position is ideal, the CFS reported that the aerial operations were able to occur with the turbines "paused" which is understood to be with the turbines shutdown, but the blades not locked (i.e. turning very slowly).

With respect to turbine fires, the following is noted:

- Both the Victorian and South Australian fire services have noted that turbine fires are a low likelihood event, with very few having occurred.
- Most turbine fires have occurred in old turbines that are likely 20 years old, and which:
    - Have older technology without the and more advanced fault monitoring, detection, etc currently installed in most modern-day turbines in wind farms.
    - Likely lack nacelle suppression systems to control the fire and prevent escalation to an uncontrolled turbine failure event.
- Prevention of an uncontrolled turbine fire or failure event should be seen as the primary

objective to prevent potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.

- Early notification of local fire brigade, nearby farmers/landowners and the wind farm personnel is critical to ensure a rapid and coordinated response.

2.4.3 Likelihood of Wind Farm Fire

As noted by AFAC, the likelihood of turbine fires is considered to be relatively low, and while it is accepted the statistics around fire losses are based on historical estimates and incomplete datasets, the likelihood wind turbine fire per year is generally accepted to be around 1-in-2000, but potentially lower than that (Krcmar, 2020). There are varying levels of resultant damage associated with these fires, which can range from small fire events through to complete burnout of the turbine nacelle, with uncontrolled nacelle fires resulting in significant damage or total turbine loss much of the time.

The likelihood of bushfire impact on wind farms is tied to the potential for bushfires within the wind farm site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.

On the DBCA dataset depicted on Plate 3, it is worth noting:

- A number of the larger fires in the northern part of the site and to the west (on the) are from the 1950's and 1960's, when the landscape may been different and less developed.
- Some of the fires to the north, north-west and west of the subject site within forest vegetation, are prescribed burns within the Nature Reserves and State Forest dating back to the 1970's.

The historical data clearly depicts that while bushfires have occurred in the local area, few have ever spread into the wind farm site. This is likely due to the improved ability to manage the bushfire fires as they spread into the agricultural land from the forest areas due to reduced fire behaviour and increased access for attending firefighters. While there appear to be few historical bushfires within the wind farm site, this BRMP assumes that bushfire impact could occur in the future, and addresses the risk accordingly.

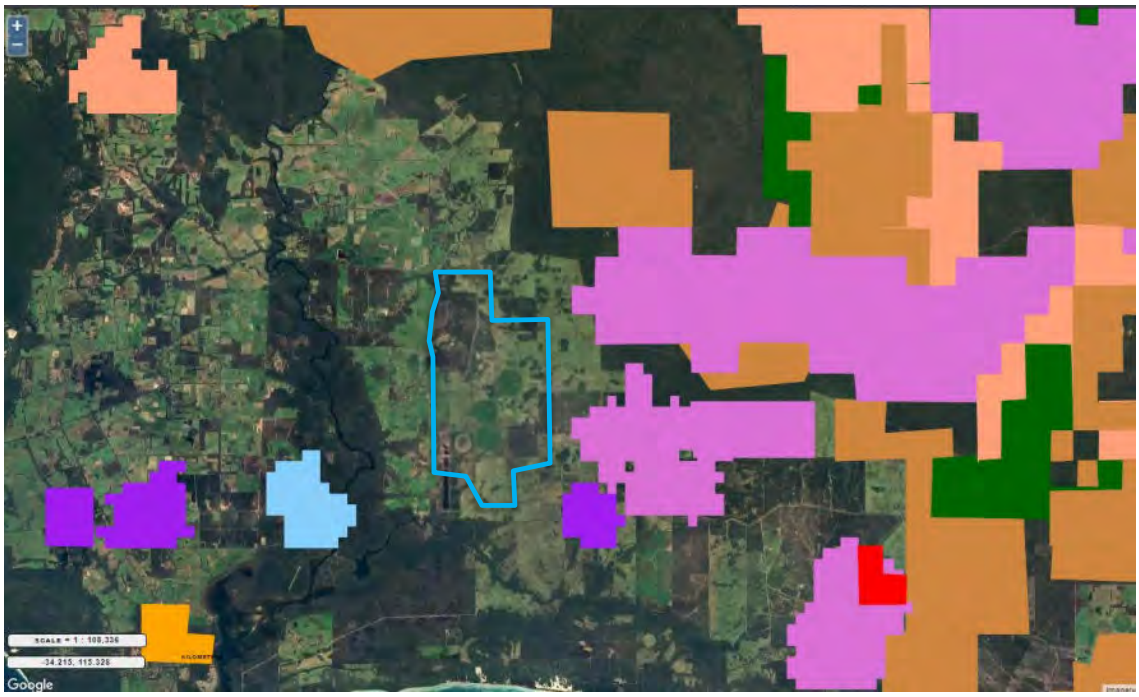

Plate 2: Bushfire History (Firewatch 2025)

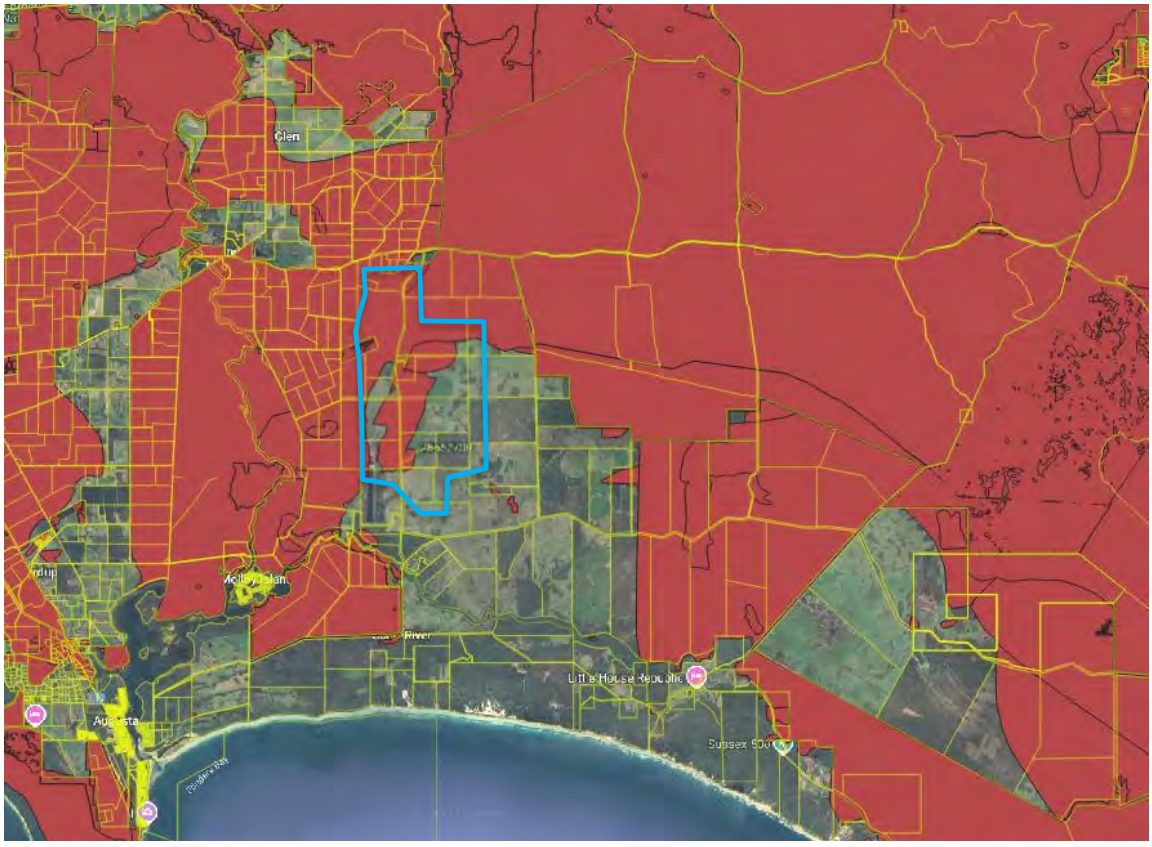

Plate 3: Bushfire History (DBCA 2025)

2.5 Bushfire Risk Management Requirements

Based on the analysis of the bushfire hazards and risk associated with wind farms, the following are considered key bushfire risk management requirements to be incorporated into wind farm proposals:

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of wind turbines is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit bushfire escape.
- Provision of appropriate vehicular access to each turbine for emergency services and wind farm operations vehicles, including permitting fire appliance turnaround.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.
- Design and construction of turbines should ensure that the risk of uncontrolled turbine fire or failure events is mitigated, to avoid potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so. This would be expected to include:
    - Remote monitoring of the operational status of the turbines, including any faults, with ability to remotely shutdown and de-energisation of turbine/s.
    - Fire detection, alarm and suppression system to provide early warning of internal fire and automatic response.
- Ensure all infrastructure that could potentially present a risk to pilots and aerial operations (e.g. turbines, meteorological monitoring towers etc) are recorded with relevant aviation authorities and provided with any required markers/lights etc to minimise risk during aerial firefighting operations,
- Ensure sufficient information is available for attending firefighters to assist any fire suppression efforts, including the following:
    - Key emergency contacts including wind farm personnel
    - General site plan including location of buildings and renewable energy infrastructure including transmission towers, meteorological monitoring towers etc.
    - Information on any fire/bushfire risk management measures including Asset Protection Zones, fire detection/suppression systems etc.
    - Firewater access locations, including hydrants, tanks and any other static water supplies suitable for firefighting purposes.
    - Access information including public roads, available entrance/exits, internal vehicular access routes and gates (locked/unlocked)
    - Any safety considerations and procedures
- Provision of mobile firefighting equipment and training for wind farm personnel to manage risk of onsite hot works, and potentially intervene any small ignitions until fire brigade arrive.
- Ensure an emergency management plan is established for the facility addressing all relevant hazards, including bushfires and turbine fires, that includes the following with respect to fire:
    - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations)
    - Limiting any onsite ignition sources or fuel loads
    - Ensure communication protocols are established for contacting DFES, nearby farmers/landowners, and relevant agencies (e.g. Western Power, AEMO etc) to

enable management of emergencies, access to land and shutdown of turbines.

- Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
- Staff training and exercises of emergency management procedures
- Ensure DFES (and local fire brigade) familiarisation with the facility
- Response actions for in the event of bushfire in the local area with focus on:
  - Evacuation of staff offsite
  - Ensuring all onsite wind farm access routes are unlocked and available for attending firefighters.
  - Remote shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) and facility closure, if safe to do so.
- Response actions for onsite turbine ignition or fire including
  - Rapid notification of wind farm personnel (including on-call technician), DFES and nearby landowners/ farmers
  - Remote shutdown and de-energisation of relevant turbine/s
  - Conduct first attack response on spot fires until DFES arrival etc.
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the wind farm or any fire events.

3.0 Bushfire Risk Strategy and Management Measures - Renewable Energy Assets

As detailed in Sections 1.3 and 1.4, the CFA *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA, 2023) are currently seen as the best guidance for renewable energy facilities available at this point in time. The CFA Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

CFA (2023) notes that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).

CFA Guidelines Requirements for Wind Turbines

- ***Turbine Siting and Vegetation Modification***
  - CFA Guidelines recommend siting of turbines in "low-risk environments" which it defines as being in gently undulating grassland with good road access and away from "continuous" non-grassland vegetation (noting the term "continuous is not defined), which are considered "high-risk environments".
    - The CFA Guidelines don't preclude siting of renewable infrastructure in "high-risk environments", but note that strengthened or additional risk mitigation measures will be required.
  - A Non-Vegetated Zone (NVZ) must be established and maintained around the base of wind turbines.
    - In low-risk environments, this is to be 10m wide and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.
  - Where wind turbines are sited in high-risk environments (including timber plantations), strengthened or additional fire risk mitigations will be required as per the stage approach detailed in the CFA Guidelines, with the following recommended:
    - Implementation of an additional Asset Protection Zone (APZ; reduced-fuel zone cleared of trees and scrub [as permitted by authority] and grass to <100mm high in bushfire season) around the base of wind turbines, on the outside perimeter of the NVZ, with width:
      - no less than 20m, or
      - to the envelope of the wind turbine blades.
    - There is no further guidance on how to apply this.

Interpretation Note – Continuous and Non-Continuous Vegetation

- *Given the lack of definition around the term "continuous" vegetation, which is critical to the assessment of what is considered 'low-risk' and 'high-risk' environments as per CFA Guidelines it is recommend the following broad principles are considered as being "non-continuous" when assessing the siting and vegetation management around turbines:*
  - *Plots of non-grassland vegetation that are sufficiently small and/or isolated from other forest/woodland/scrub vegetation, by either grassland or low*

shrubland, such that the resultant bushfire passing through these plots would not be considered to be a significantly exacerbated or likely to reach steady state, or be uncontrollable by attending firefighters.

- *Consideration is given to the size and location of the plot, proximity to continuous non-grassland vegetation, access to and around the plot (either via roads, tracks or agricultural land).*
- *Examples are plots of paddock trees or isolated plots of forest/woodland/scrub vegetation within paddocks, where a bushfire passing through would not represent a significant escalation in bushfire behaviour, nor produce behaviour that would make the fire uncontrollable attending firefighters, who would be expected to have reasonable access and water supply.*

- ***Vehicular Access***
  - Suitable emergency vehicle access is required to each turbine and building on-site (with number and location of access point to be determined in liaison with fire brigade).
    - Specifications are similar to private driveways from WA Guidelines, but with passing bays permitted every 600 m in lieu of 200 m.
- ***Firewater***
  - At least one static fire water storage tank of at least 45,000L effective capacity at each site entrance
    - Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design (in consultation with fire brigade)
- ***General Design***
  - Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.
  - Wind turbines must be located no less than 300 metres apart.
  - Wind turbines must be provided with automatic shut-down capability, and the ability to be completely disconnected from the power supply in the event of fire.
- ***Emergency Planning***
  - Include measures in Fire Management Plan for attending firefighters and Emergency Plan for onsite personnel
  - Training and Exercises

CFA Guidelines Requirements for Substations

- The entire substation must be surfaced to eliminate all vegetation including grasses.
- Firewater must be provided to cover substations

CFA Guidelines Requirements for Transmission Lines

- Comply with any local electricity supply legislation or guidance prescribing the vegetation clearance requirements for electric lines.

The CFA Guidelines provide the best guidance available to wind farm design at this current point in time, certainly in terms of infrastructure and bushfire risk management. On that basis, this BRMP seeks to apply the Model Requirements, and associated guidance, from the CFA Guidelines, as much as practical to the proposed wind farm.

It is noted that while most management measure relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

Based on the guidance from the review of the assets and hazards in Section 2.0, and informed by the compliance requirements of the CFA Guidelines and the WA Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

The subsections below detail the proposed bushfire risk management measures to be adopted by the project, with a compliance assessment in Section 4.0 demonstrating how these measures align with the principles from the CFA Guidelines.

The risk management measures have also been summarised in the BMP, to provide a comprehensive list of the Proponents bushfire risk management obligations for this project.

3.1 Wind Turbines

3.1.1 Siting and Vegetation Modification and Management

Based on the guidance from the CFA Guidelines, in addition to the interpretation note on "continuous" and "non-continuous" non-grassland vegetation, the following vegetation modification and management philosophy is proposed around the base of the turbines, based on location and proximity to "continuous" non-grassland vegetation.

- Turbines would ideally be separated by at least 300 m from "continuous" non-grassland vegetation on the following basis, in order to minimise vegetation management measures:
    - CFA Guidelines require separation between turbines of 300 m and the maximum Non-Vegetated Zone (NVZ)/Asset Protection Zone (APZ) in high-risk environments is to the blade envelope.
    - The proposed turbines will have a maximum tip height of 250 m, which with a 10% safety margin, if they toppled would be a safe distance of 275 m.
- Given the above, and in the absence of any specific siting guidance, the following turbine risk categories and associated vegetation management measures are to be adopted:

  Low-Risk Turbine Site

    - ***A turbine is considered to be in a low-risk environment when it is sited further than 300 m from "continuous" non-grassland vegetation.***
    - If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
        - ***10 m NVZ around base of turbine tower***
    - While target BAL rating is not specifically required, a 10 m NVZ would achieve BAL-29 at the turbine tower casing.
    - Currently 13 of the 20 proposed wind turbines are assessed as Low Risk, as depicted on Figure 1 and Figure 2.

  Transition Risk Turbine Site

    - ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
        - ***closer than 300 m to "continuous" non-grassland vegetation, (but not within this non-grassland vegetation) or***
        - ***within "non-continuous" non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
    - If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:

        - ***10 m NVZ around base of turbine tower; and***
        - ***20 m APZ outside the 10 m NVZ***
    - While target BAL rating is not specifically required, the 30 m NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, and would generally provide a BAL-19 or BAL-12.5 impact.
        - The Transition Risk category is aimed more at providing greater separation from "non-continuous" non-grassland vegetation when turbines are sited in/near small plots of forest, woodland, scrub or shrubland vegetation, rather than the instances where turbines are still in grassland areas but within 300 m of "continuous" non-grassland vegetation, and the overall 30 m NVZ/APZ is probably greater than required. Notwithstanding, a consistent vegetation management approach is being applied to both occurrences.
    - Currently 5 of the 20 proposed wind turbines are assessed as Transition Risk, as depicted on Figure 1 and Figure 2.

<u>High-Risk Turbine Site</u>

- ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within "continuous" non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
- If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
    - ***10 m NVZ around base of turbine tower***
    - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- While target BAL rating is not specifically required, the NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing, more likely BAL-12.5.
- Currently 2 of the 20 proposed wind turbines are assessed as High Risk, as depicted on Figure 1 and Figure 2.
    - These 2 turbines are sited in existing timber plantations in the north of the facility, however the timing of harvesting has not yet been determined.
    - The risk to the turbines is likely to be significantly reduced following future harvesting, however given the uncertainty regarding the timing and future use, a High Risk rating has been applied.

- Should turbines be relocated:
    - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
    - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of forest and grassland may be both high-risk and transition risk). In these instances, we propose that:
        - The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
        - the highest risk category is blanketly applied
- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for "firebreaks" from CFA Guidelines as follows:

  - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
  - Free of vegetation and obstructions at all times.
  - No combustible plant or equipment.
- The Asset Protection Zone (APZ) is to comply with the APZ standards from the WA bushfire Guidelines
- All NVZ and APZ around turbines are to be established and maintained by the Proponent during bushfire season, for the life of the wind farm.

3.1.2 Vehicular access to turbines

- The following site entrances are to be established for the facility:
  - Main site entrance from Scott River Road, near the proposed building and substation envelopes
  - Three additional site entrances as follows:
    - One on Scott River Road, approximately 5.5 km north of the main entrance.
    - One on Governor Broome Road, providing access to turbines to the north.
    - One on Governor Broome Road, providing access to turbines to the south.
- All nominated site entrances are be fitted with gates as follows:
  - Provide at least 6m clear horizontal width
  - If locked, any keys are issued to DFES and any local fire brigade.
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
  - Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 600m that increase the overall driveway width to no less than 6 m wide.
  - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
  - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to each proposed firewater tank, with access is to be provided to within 4 m of the tank suction point.
- In addition to the internal wind farm access driveways, there are existing farm tracks and farm gates, also noted on the concept plan, that could be used in a bushfire emergency by attending firefighters.
  - These are shown for information purposes only, and it is noted that these are not being constructed or maintained by the Proponent as part of this project.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
- The internal wind farm access driveways, site entrances, gates and signage are to be

constructed and maintained by the Proponent in perpetuity (or for the life of the wind farm).

3.1.3 Firewater for turbines

- As detailed on Figures 8 and 9 in the BMP, firewater tanks as proposed in the following locations around the wind farm site (following initial consultation with DFES) to provide 180 kL of firewater capacity for the renewable energy infrastructure:
    - One (1No) 45 kL firewater tank in the northern part of the site, at an intersection of the internal driveways and the termination of the transmission line.
    - One (1No) 45 kL firewater tank at the wind farm building envelope, either collocated or combined with the firewater requirements for the proposed buildings.
    - One (1No) 45 kL firewater tank in the southern part of the site, at an intersection of the internal driveways to a number of turbines.
    - One (1No) 45 kL firewater tank south of Governor Broome Road, at an intersection of the internal driveways to the three turbines in this part of the site.
- While the firewater tank locations above represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- All firewater tanks will comply with the standards from the WA bushfire Guidelines, and the following from the CFA Guidelines:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - Firewater tanks are to be at least 10 m from wind turbines
    - The tank suction point must be within 4 m of a driveway or hardstand
- All firewater tanks are to be sited in an area of BAL-29 or lower as follows:
    - Within a BAL-29 or lower area within the wind farm building envelope
    - Where outside the wind farm building envelope, have a 9 m wide APZ around the perimeter of the tank.
- Vehicular access to each firewater tank is to be via proposed internal wind farm driveways.
    - Access is to be provided to within 4 m of the tank suction point.
- Emergency Information Book and Signage (see Section 3.4.4) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- The firewater tanks, and associated APZs, are to be constructed and maintained for the life of the project by the Proponent.

3.1.4 General turbine design and emergency management

In addition to the measures detailed above, the following are also required for the proposed turbines to manage the risk of turbine fires.

3.1.4.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.

- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.
- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel onsite, or offsite monitoring.
    - A procedure to be incorporated to ensure that activation of the fire detection system results in notification being provided immediately to the following people that there is an onsite turbine fire:
        - Wind farm personnel (including on-call technician),
        - DFES and local fire brigades
        - Nearby landowners/ farmers

3.1.4.2 Operational Status Monitoring and Control of Turbines

- In addition to the fire detection, alarm and suppression systems, appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
    - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both onsite and remotely offsite.
- Operational control of turbines should be able to be conducted onsite and offsite, to enable remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
    - It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

3.1.4.3 Turbine Shutdown and Disconnection from Power

- In addition to turbine operation status monitoring and control, all wind turbines are to be configured to automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely from offsite.
    - The intent is that in the event of a turbine fire, only the affected turbine would automatically shut-down.
- There will also be ability to remotely shut-down and de-energise the turbines in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]).
    - This will result in the turbine blades turning very slowly but not generating any power nor supplying to the grid.

3.1.4.4 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

3.2 Substation

- The substation envelope is proposed to be co-located with wind farm building envelope, which is a location surrounded by grassland vegetation.
- There are several buildings proposed within the substation envelope, and these will

comply with the WA Guidelines as follows:

- Provision of a compliant 9 m wide APZ around the perimeter of the substation envelope to ensure a rating of BAL-29 or lower is achieved on all substation infrastructure and buildings (e.g. switchroom, NSP building, Statcom building and harmonic filter room)
- All land within the substation envelope is to be non-vegetated
- Provision of compliant private driveway access to the substation envelope, from Scott River Road, that is compliant with the private driveway specifications of the WA bushfire Guidelines
- No specific firewater provided for the substation, however the firewater tanks within the wind farm building envelope, will provide nearby firewater for bushfire fighting around substation.

- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards.

3.3 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per Western Powers own standards.
  - It is noted that the majority of the proposed transmission line is over existing grassland so there is likely to be limited vegetation clearing required for construction or ongoing maintenance.

3.4 Additional Management Measures

In addition to the measures detailed previously for the specific renewable energy infrastructure, the following is also required to manage bushfire risk for the wind farm facility.

3.4.1 Provision of mobile fire trailer

- Provision of a mobile fire trailer (or similar approved) is required to enable wind farm staff to:
  - have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
  - provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire
- This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.
- As a minimum, the fire trailer (or similar approved) should have:
  - No less than 1000 L tank
  - Fire pump and hose reel
  - Mounted on trailer or ute to enable easy transport around the site.
    - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).
- The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

3.4.2 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will

operate in the event of power failure

- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for dangerous goods as per relevant Australian Standards.
- Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days
- Ensure tight ignition source control, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility which includes:
    - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to
        - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in turbines or substation)
        - Bushfires
    - Emergency procedures for bushfires (adopting similar concepts to those detailed in the BMP for the operational wind farm)
    - Emergency procedures for fires within the renewable energy infrastructure and buildings.
- Provide wind farm mobile fire trailer (or similar approved) prior to commissioning of the turbines.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 3.4.5.

3.4.3 Operation and Maintenance

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 3.4.6 below).
- Ensure the Emergency Information Book and/or signage is appropriately stored at all

nominated site entrances, and reviewed on an annual basis (see Section 3.4.4).

- Ensure inspection, maintenance and any required repair activities are conducted for all renewable energy infrastructure (turbines, substation), associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.
- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements of the BMP.

3.4.4 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at each nominated site entrance to the wind farm, with any plans or information books provided in a weatherproof container.

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- Details of any emergency equipment, including the type and location of fire and gas detection systems.
- Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire)

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

3.4.5 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 3.4.5) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

3.4.6 Emergency Management Plan

An Emergency Management Plan is to be developed for the facility, which comprehensively details the following (noting this plan it to be for all emergencies and not specifically just to bushfire risk management):

- Facility details including technical support during an emergency, site plans, details of emergency resources and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure.
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:
    - Ongoing compliance with approved BMP and BRMP, including ensuring NVZ/APZs are maintained, vehicular access routes and firewater is maintained and available, and conducting regular bushfire housekeeping inspections.
    - Ensuring ongoing maintenance of all fire and communication systems.
    - Determining forecast Fire Danger Rating Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - Modifying Site Activities (based on Forecast FDR and TFB/HVMB) including limiting activities which may introduce bushfire ignition (hot works, unnecessary vehicle movement etc).
    - Monitoring DFES Bushfire Emergency Warnings (and/or bushfire activity within 50 km of the facility, during bushfire season, and the decision-making triggers
- Detail emergency response procedures to address the nominated hazards.
- For a bushfire emergency, the response should include the following
    - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
    - Conducting early offsite evacuation of all staff away from the bushfire if safe to do (preferred response), ideally to Margaret River, however Augusta, Busselton or Nannup may also be considered.
    - If there is insufficient time to safely travel offsite to Margaret River, Augusta, Busselton or Nannup, without being impacted by bushfire, conduct onsite shelter in place in the O&M building.
        - <u>It is noted that this building is not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.</u>
    - If safe to do so prior to staff evacuation,
        - Unlock all access gates and ensure vehicular access routes and firewater tanks within the wind farm, are available for use by attending fire brigade.
        - Physically shutdown the facility including closing doors/windows of any buildings, storing combustible goods inside buildings etc.
        - Conduct shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) remotely from offsite location.
- The response to onsite fire, including involvement of turbines, is to involve:
    - Immediately notify:
        - Relevant wind farm personnel, in addition to DFES and local brigade to

ensure a rapid turnout.
    - Any relevant nearby landowners.
- Confirm shutdown and de-energisation of turbine that is on fire.
- Conduct first attack response on spot fires until DFES/ local brigade arrival etc.

The emergency management plan is to be reviewed regularly and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

Further specific detail on the requirements of the emergency management plan is provided in Section 5 of the project BMP.

4.0 CFA Guidelines Compliance Assessment

As detailed previously, the project is applying the Model Requirements from the CFA Guidelines to the renewable energy infrastructure of the project as much as possible as part of the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g. use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 3.0, with a compliance assessment of these measures against the Model Requirements of the CFA Guidelines provided below in Table 2.

As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 2: Summary of Renewable Energy Facility requirements relating to bushfire and the development response (CFA, 2023)

CFA Guideline Section	Requirement	Type	Development Response
Section 2: Consultation	***Consulting with CFA*** • Early consultation with DFES, before developing a planning permit application.	***All Facilities***	• The Proponent has liaised with DFES regarding the proposal on several occasions as follows, and sought to incorporate their feedback as much as practical o Initial meeting and proposal presentation on 18th April, 2024 o Preliminary concept plan and bushfire risk management strategy issued to DFES on 15th August 2024 o Meeting held with DFES on 16th August 2024 o Follow-up concept plan and bushfire risk management strategy issued to DFES on 31 October 2024 o Meeting held with DFES on 13th November 2024 o Onsite meeting held with Shire of Augusta Margaret River Community Emergency Services Manager (CESM) on 29th January 2025. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 3: Fire Risk Management	***Risk Management Plan*** • A Risk Management Plan must be developed for the facility, before development starts. *Additional Guidance from CFA Guidelines* • A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	***All Facilities***	• This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the requirements of the CFA Guidelines, and details how the risk has been appropriately managed. • The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the life of the project. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets. o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o NVZ and APZs around renewable energy infrastructure to reduce bushfire impact to moderate levels, especially on the basis that the turbines are non-combustible materials at their base. ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ The concepts for the above are detailed in Section 3.1.1 of this BRMP and summarised in Section 5.1.1 of the project BMP. This involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. o Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight bushfires both within the wind farm site, and also throughout the local area: ▪ The internal driveway network enables attending firefighters to access all proposed turbines and the substation in a bushfire emergency, while also improving access throughout the wind farm site in general and to the surrounding public roads. ▪ The internal driveways and crane pads also provide significant cleared areas within the wind farm site, which in grassland areas, may also be useful in controlling bushfire spread. ▪ The onsite firewater supplies, provide a significant quantity of additional firewater for attending firefighters to refill appliances, without extended travel time. o All turbines will automatically shut-down upon detection of fire in the turbine. o During a bushfire emergency, all turbines can be remotely shut-down from offsite to limit risk to aerial firefighting appliances, from the turbines, as much as possible. o All turbines, monitoring towers are registered with CASA and compliantly marked, to manage risk to aerial firefighting appliances and enable them to move around the wind farm in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response

	Facility Risk to Landscape
	• As assessment of the fire risk from the proposed facility to the landscape
		All Facilities	• The focus on addressing risk to the landscape is primarily through prevention of uncontrolled turbine fire through the provision of the following:
			  ○ Operational status monitoring, fault monitoring etc, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
			  ○ Fire detection and alarm systems to ensure early notification to wind farm personnel and DFES/local fire brigade and enable early turnout.
			  ○ Automatic fire suppression system in the nacelle to prevent any ignition events from becoming uncontrolled turbine fires.
			• The above is supplemented by the provision of NVZ/APZ that are commensurate with the surrounding bushfire hazard.
			• Ensuring appropriate onsite response capabilities, through provision of:
			  ○ Emergency Information Book and signage at site access points, to assist firefighter when turning out, aided by DFES/local brigade familiarisation both prior to facility operation and regularly throughout operation as required.
			  ○ Compliant internal vehicular access and firewater supplies for attending firefighters,
			  ○ Mobile fire trailer and training, to enable a rapid response by onsite wind farm personnel to address any spot fires until firefighter turnout.
			• ***Based on the above, all requirements with the CFA Guidelines have been met.***

Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)***
	• The provision of NVZ and/or APZ that reduces the potential for fire to enter or leave an area:
	  ○ Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite.
	  ○ Of a width of at least 10m.
	• A NVZ must be:
	  ○ Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
	  ○ Free of vegetation and obstructions at all times.
	  ○ No plant or equipment of any kind is to be stored in fire breaks.
	
	Additional Requirements for Wind Facilities
	• The provision of NVZ (and APZ if required) is not required around the perimeter of the wind energy facility, but must be established around the base of each wind turbine.
	• Where wind turbines are sited in high-risk environments, additional vegetation management must be considered, with the implementation of an additional reduced-fuel zone recommended around the base of wind turbines, abutting the fire break. The reduced fuel zone may be:
	  ○ No less than 20m, or
	  ○ To the envelope of the wind turbine blades.
		All Facilities
		Wind Energy Facilities
			• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1.1 and 3.1.3 of this BRMP.
			  ○ Primarily this involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation.
			  ○ An APZ is also to be established around firewater tanks to achieve BAL-29 or lower.
			  ○ No perimeter NVZ has been provided for the wind farm, as permitted by the CFA Guidelines.
			• These vegetation modification and management requirements have been incorporated into Sections 5.1 and 5.3 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility).
			• ***Based on the above, all requirements with the CFA Guidelines have been met.***

	Emergency Vehicle Access
	• Construction of a minimum four (4) metre perimeter road within the perimeter fire break.
	• Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth).
	• Constructed roads should:
	  ○ Be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.
	  ○ Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.
		All Facilities
		Wind Energy Facilities
			• Vehicular access requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.2 and 3.2 of this BRMP.
			  ○ Compliant internal driveway access is to be provided from the nominated wind farm site entrances, to each turbine and firewater tank, including turnaround.
			  ○ The specifications are to comply with the private driveway specifications of the WA bushfire Guidelines, with the only deviation from the WA bushfire Guidelines will be that if the internal wind farm roads are less than 6 m wide, passing bays will be provided every 600 m (6m wide x 20m long) in accordance with the CFA Guidelines.
			• These vehicular access requirements have been incorporated into Section 5.2 of the project BMP.
			• ***Based on the above, the proposed of wind farm driveway and site entrances, supplemented by the use of existing public roads, farm roads and entrances, is considered sufficient to provide a flexible vehicular***

CFA Guideline Section	Requirement	Type	Development Response
	○ Otherwise comply with the private driveway specifications of the WA bushfire Guidelines ○ Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Requirements for Wind Facilities* • Construction of a four (4) metre perimeter road is not required for wind energy facilities, however, suitable emergency vehicle access is required to each turbine and building on-site. • Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes.		***access network to, and within the proposed wind farm, for emergency services use in a bushfire emergency.***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines: ○ The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. ○ An external water level indicator must be provided to the tank and be visible from the hardstand area. ○ Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. ○ Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure • The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. ○ The hard-suction point must be protected from mechanical damage where necessary. ○ The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with the private driveway specifications of the WA bushfire Guidelines and at least 6 m wide and 8 m long, must be provided to the hard-suction point. ○ The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. *Additional Requirements for Wind Facilities* • Fire water storage tanks of at least 45,000L are provided at each site entrance. • Additional fire water storage tanks of at least 45,000L are incorporated in facility design.	***All Facilities*** ***Wind Energy Facilities***	• Firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.3 of this BRMP. ○ At least 180 kL of firewater is to be provided for the renewable energy infrastructure, currently proposed to be stored in four (4) 45 kL firewater tanks across the site. ○ These firewater tanks will comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA bushfire Guidelines, supplemented by some requirements from the CFA Guidelines: ○ Rather than siting the tanks at the wind farm site entrances, signage will be placed at all wind farm site entrances to indicate to attending firefighters the location of the firewater tanks within the wind farm. The siting of the firewater tanks away from site entrances was noted as the preference of the Shire CESM who advised that water theft was a problem from publicly accessible firewater tanks. • These firewater requirements have been incorporated into Section 5.3 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met, other than the siting of the firewater tanks away from site entrances in some instances, however signage will be provided to clearly indicate the location of the firewater tanks in the development.***
	Fire Detection and Suppression Equipment • Suitable fire detection and suppression equipment must be provided: ○ For on-site buildings and structures, according to the requirements of the National Construction Code. ○ For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. ○ For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. ○ In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	***All Facilities***	***National Construction Code compliance*** • All buildings are to comply with the fire detection and suppression requirements of the NCC. • From a bushfire construction perspective, the NCC requires additional resilience to be added to Class 1, 2, 3, associated 10a and “certain” Class 9 buildings. None of these building classifications are proposed at the facility, however the Proponent may consider voluntary adoption of bushfire construction measures to some buildings. ***Dangerous Goods compliance*** • It is understood that no significant quantities are proposed at the facility, however if this changes in the future, it is expected it will be transported, handled and stored in accordance with relevant Australian Standards and Dangerous Goods legislation.

CFA Guideline Section	Requirement	Type	Development Response

			Portable fire extinguishers
			• Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards and Synergy requirements:
			  ○ Each wind turbine
			  ○ Each building
			  ○ Substation rooms (e.g. switchroom, control room)
			  ○ Wind farm vehicles
			
			• ***Based on the above, all requirements with the CFA Guidelines have been met.***

	Design Specific to Facility Type
	Additional Requirements for Wind Facilities
	• As wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions, the following design requirements are to be incorporated:
	  ○ Wind turbines are located no less than 300 metres apart.
	  ○ Provision of automatic shut-down, and the ability for wind turbines to be completely disconnected from the power supply in the event of fire.
	  ○ Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA).
	  ○ Marking of all guy wires and monitoring towers.
	• Nacelles are equipped with automatic fire detection, alarm, and fire suppression systems.
		Wind Energy Facilities	***Turbine Siting***
			• The wind turbines will all be located further than 300 m from each other.
			Turbine Automatic Shutdown and Disconnection
			• Wind turbines will be automatically shut-down in the event of turbine fire, with the ability to be completely disconnected from the power supply.
			• There will also be ability to remotely shut-down the turbines in a bushfire event if required
			Installed Weather Monitoring Station Notification
			• While outside the scope of this bushfire risk management plan, it is noted that the Proponent will advise CASA of all-weather monitoring stations installed as part of the proposed development
			Marking Guy Wires and Monitoring Towers
			• While outside the scope of this bushfire risk management plan, it is noted that the Proponent will mark all guy wires and monitoring towers installed as part of the proposed development.
			Turbine Fire Systems
			• All turbines are to be fitted with fire detection, alarm and suppression system to provide early warning of internal fire and automatic response
			• Activation of fire detection systems will be remotely monitored at all times
			• An emergency management procedure will be incorporated into the wind farm Emergency Management Plan to rapidly notify DFES, wind farm personnel (including on-call technician) and nearby landowners/farmers, of the onsite turbine fire detection or suppression system activation.
			
			• ***Based on the above, all requirements with the CFA Guidelines have been met.***

Section 5: Facility Construction and Commissioning	***Emergency Plan (Construction)*** • An Emergency Plan must be developed for the construction and commissioning phase of the facility. *Additional Guidance from CFA Guidelines* • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction. • Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to:	***All Facilities***	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as summarised in Section 3.4.2 of this BRMP. • It is recommended that the bushfire emergency management concepts detailed in the project BMP for the operational wind farm, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. ***Based on the above, all requirements with the CFA Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	○ Electricity and chemical management. ○ Vegetation management. ○ Ignition source control, including hot works. ○ Infrastructure, equipment and vehicle maintenance. ○ Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).		
Section 6: Facility Operation	***Fire Management Plan*** • A Fire Management Plan must be developed for the facility, in consultation with fire brigade, before development starts. *Additional Guidance from CFA Guidelines* • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: ○ A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. ○ Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. ○ Description of control measures to prevent and reduce the consequences of external fire impacting the facility. ○ Details of equipment and resources to manage fire at the facility ○ Policies and procedures that ensure all control measures are appropriate and effective, and remain so. ○ Procedures for review of the Plan	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and summarised in Section 3.0 of this BRMP. • These bushfire risk management measures for the renewable energy infrastructure have also been summarised in Section 5.0 of the project BMP, including the nomination of responsible entities for implementation and ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Bushfire and Grassfire • If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Guidelines* • Your facility may be at-risk of bushfire if it is: ○ Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. ○ Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities	***All Facilities***	• Bushfire preparedness and response actions for the renewable energy infrastructure has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire preparedness and response actions have been incorporated into Section 5.8 of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): ○ Grass must be maintained at or below 100mm in height during the nominated bushfire season. ○ Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. ○ Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days	***All Facilities***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Section 3.1, 3.2 and 3.3 of this BRMP. • These vegetation modification and management requirements have been incorporated into Section 5.1 of the project BMP, which are to be maintained in perpetuity (or for the life of the wind farm facility). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Arc Flash Hazard Management • Where required, appropriate demarcation of arc boundaries to at least 10m from PCU arc flash outlet flaps (blow-out panels) must be provided.	***All Facilities***	• Not applicable – no PCU are proposed as part of this project (typically part of Battery Energy Storage Systems). • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Facility and System Monitoring • Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or	***All Facilities***	• The proposed wind turbines are to be remotely monitored, both onsite (during business hours) and offsite (at all times), with the following emergency response procedures included in the bushfire emergency management arrangements (documented in the BMP):

CFA Guideline Section	Requirement	Type	Development Response
	equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.		○ Turbine fire detection and suppression systems will be remotely monitored at all times, and upon activation, the response procedure is to include immediate notification to DFES, wind farm personnel (including on-call technician) and local landowners/farmers (if required) of potential onsite turbine fire. ○ The wind turbine will be automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely if required (in consultation with DFES, Western Power, AEMO). • The substation functionality will be monitored by wind farm operator. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Maintenance • Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. • Maintenance must be in line with any relevant Australian Standards, the manufacturer's requirements.	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and documented in this BRMP. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management requirements, have also been summarised in the project BMP, including the nomination of responsible entities for ongoing management. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Fire Risk Review • The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. • The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility.	***All Facilities***	• Like any BMP or BRMP, if there are significant changes to the development, they should be reviewed to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 3.4.6 of the BRMP and Section 5.8 (in particular Section 5.8.5) of the project BMP. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: ○ Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) ○ Personnel Training ○ Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Requirements for Wind Facilities* • Any EP for a Wind Energy Facility must include: ○ Emergency procedures for fires within, and in the vicinity of, wind turbines. ○ Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Extreme or above days or approach of bushfire/grassfire to the facility. ○ Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk. ○ This information must also be provided within the facility's Emergency Information Book. ○ Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies	***All Facilities***	• Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 3.4.6 of this BRMP. • The bushfire emergency management preparedness and response concepts detailed in Section 5.8 of the project BMP, which cover both proposed buildings and renewable energy infrastructure, are to be incorporated into the overall wind farm Emergency Management Plan. • The additional requirements for Wind Facilities, documented in the CFA Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan • The CFA Guidelines specifically notes that wind turbines should be capable of being stopped in the "Y" pattern ○ The process for placing the turbines in the "Y" pattern (rabbit ears position) is a manual one, that needs to be conducted by staff within each actual turbine, and climbing up to the nacelle. ○ Given staff need to be within each turbine, while all turbines will have the capability to be stopped in the "Y" pattern, this is not considered a safe procedure for wind farm staff to undertake in a bushfire emergency. • ***Based on the above, all requirements with the CFA Guidelines have been met.***
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: ○ A description of the premises, its infrastructure and operations. ○ Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire	***All Facilities***	• The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Guidelines and detailed in Sections 3.4.4 and 3.4.5 of this BRMP. • These requirements have been incorporated into Sections 5.6 and 5.7 of the project BMP.

CFA Guideline Section	Requirement	Type	Development Response
	protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. ○ A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. ○ Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) ○ Details of emergency equipment, including the type and location of gas detectors. ○ Up-to-date contact details for site personnel, regulatory authorities and site neighbours. ○ Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. ○ A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade ○ A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.		• ***Based on the above, all requirements with the CFA Guidelines have been met.***

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Appendix 1 Vegetation plot photos and description

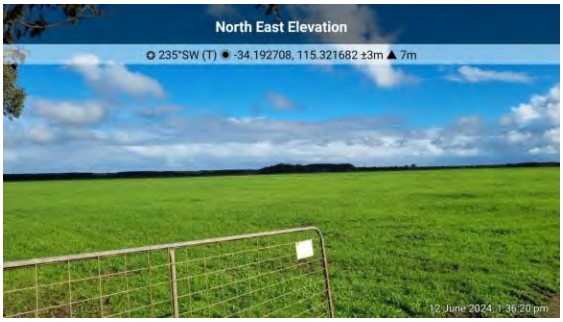

Photo ID: 1a



Photo ID: 1b



Photo ID: 1c



Photo ID: 1d



Photo ID: 1e



Photo ID: 1f



Photo ID: 1g



Photo ID: 1h

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1i



Photo ID: 1j



Photo ID: 1k



Photo ID: 1l



Photo ID: 1m



Photo ID: 1n



Photo ID: 1o



Photo ID: 1p

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1q



Photo ID: 1r



Photo ID: 1s



Photo ID: 1t



Photo ID: 1u



Photo ID: 1v



Photo ID: 1w



Photo ID: 1x

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1y



Photo ID: 1z



Photo ID: 1aa



Photo ID: 1ab



Photo ID: 1ac



Photo ID: 1ad



Photo ID: 1ae



Photo ID: 1af

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1ag



Photo ID: 1ah



Photo ID: 1ai



Photo ID: 1aj



Photo ID: 1ak



Photo ID: 1al



Photo ID: 1am



Photo ID: 1an

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1ao



Photo ID: 1ap



Photo ID: 1aq



Photo ID: 1ar



Photo ID: 1as



Photo ID: 1at



Photo ID: 1au



Photo ID: 1av

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1aw



Photo ID: 1ax



Photo ID: 1ay



Photo ID: 1az



Photo ID: 1ba



Photo ID: 1bb



Photo ID: 1bc



Photo ID: 1bd

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1be



Photo ID: 1bf



Photo ID: 1bg



Photo ID: 1bh



Photo ID: 1bi



Photo ID: 1bj



Photo ID: 1bk



Photo ID: 1bl

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bm



Photo ID: 1bn



Photo ID: 1bo



Photo ID: 1bp



Photo ID: 1bq



Photo ID: 1br



Photo ID: 1bs



Photo ID: 1bt

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 1bu



Photo ID: 1bv



Photo ID: 1bw

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 2a



Photo ID: 2b



Photo ID: 2c



Photo ID: 2d



Photo ID: 2e

Plot number	Plot 2
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 4a



Photo ID: 4b



Photo ID: 4c



Photo ID: 4d



Photo ID: 4e



Photo ID: 4f



Photo ID: 4g



Photo ID: 4h

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4i



Photo ID: 4j



Photo ID: 4k

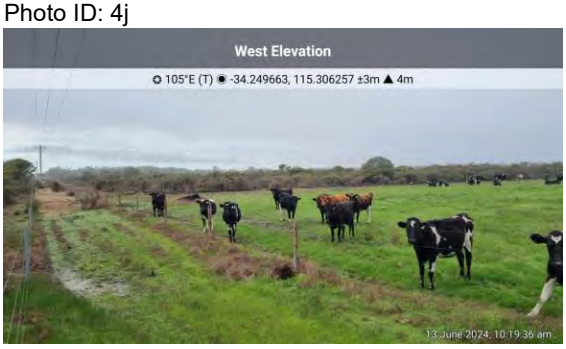

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Photo ID: 4m



Photo ID: 4n



Photo ID: 4o



Photo ID: 4p

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 4q



Photo ID: 4r

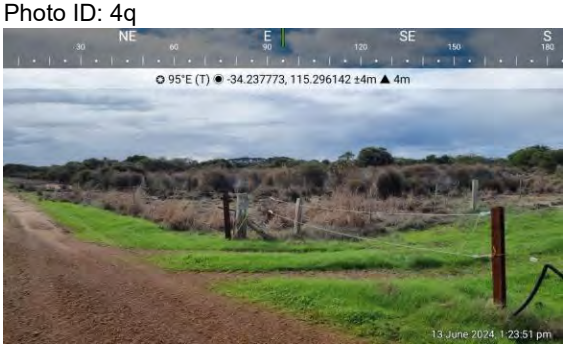

Photo ID: 4s

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c



Photo ID: 5d



Photo ID: 5e



Photo ID: 5f



Photo ID: 5g



Photo ID: 5h

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5i



Photo ID: 5j



Photo ID: 5k



Photo ID: 5l



Photo ID: 5m



Photo ID: 5n



Photo ID: 5o



Photo ID: 5p

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5q



Photo ID: 5r



Photo ID: 5s



Photo ID: 5t



Photo ID: 5u



Photo ID: 5v



Photo ID: 5w



Photo ID: 5x

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5y



Photo ID: 5z

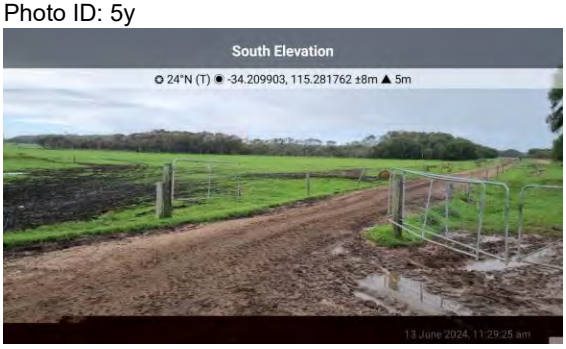

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Photo ID: 5ab



Photo ID: 5ac



Photo ID: 5ad



Photo ID: 5ae



Photo ID: 5af

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 5ag



Photo ID: 5ah

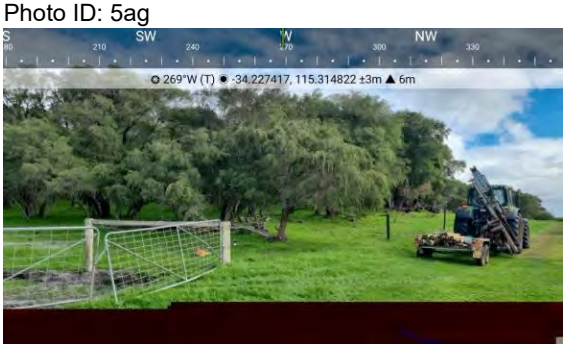


Photo ID: 5ai



Photo ID: 5aj

Plot number	Plot 5
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey



Photo ID: 6a



Photo ID: 6b



Photo ID: 6c



Photo ID: 6d



Photo ID: 6e

Plot number	Plot 6
Vegetation classification	Class B Woodland
Description / justification	Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)



Photo ID: 7a



Photo ID: 7b



Photo ID: 7c



Photo ID: 7d



Photo ID: 7e



Photo ID: 7f



Photo ID: 7g



Photo ID: 7h

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7i



Photo ID: 7j



Photo ID: 7k



Photo ID: 7l



Photo ID: 7m



Photo ID: 7n



Photo ID: 7o



Photo ID: 7p

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Photo ID: 7q



Photo ID: 7r



Photo ID: 7s



Photo ID: 7t



Photo ID: 7u



Photo ID: 7v



Photo ID: 7w



Photo ID: 7x

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads

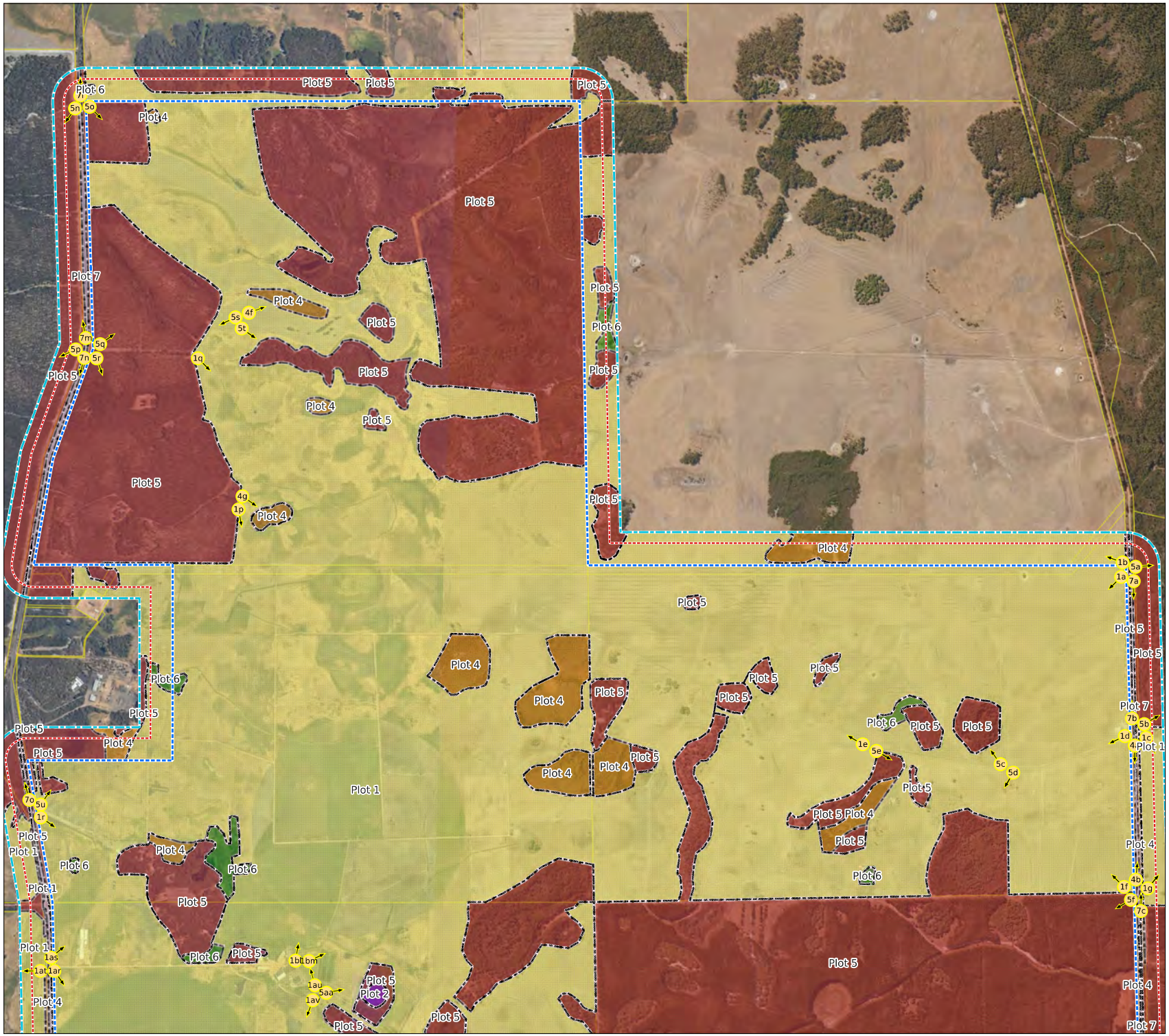


Photo ID: 7y



Photo ID: 7z

Plot number	Plot 7
Vegetation classification	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])
Description / justification	Existing public roads



Legend

- Photo Location
- Wind Farm Development Boundary
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)

Scale 1:20,000

0 200 400 600 Metres

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Synergy Renewable Energy Developments Pty Ltd

Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - North)

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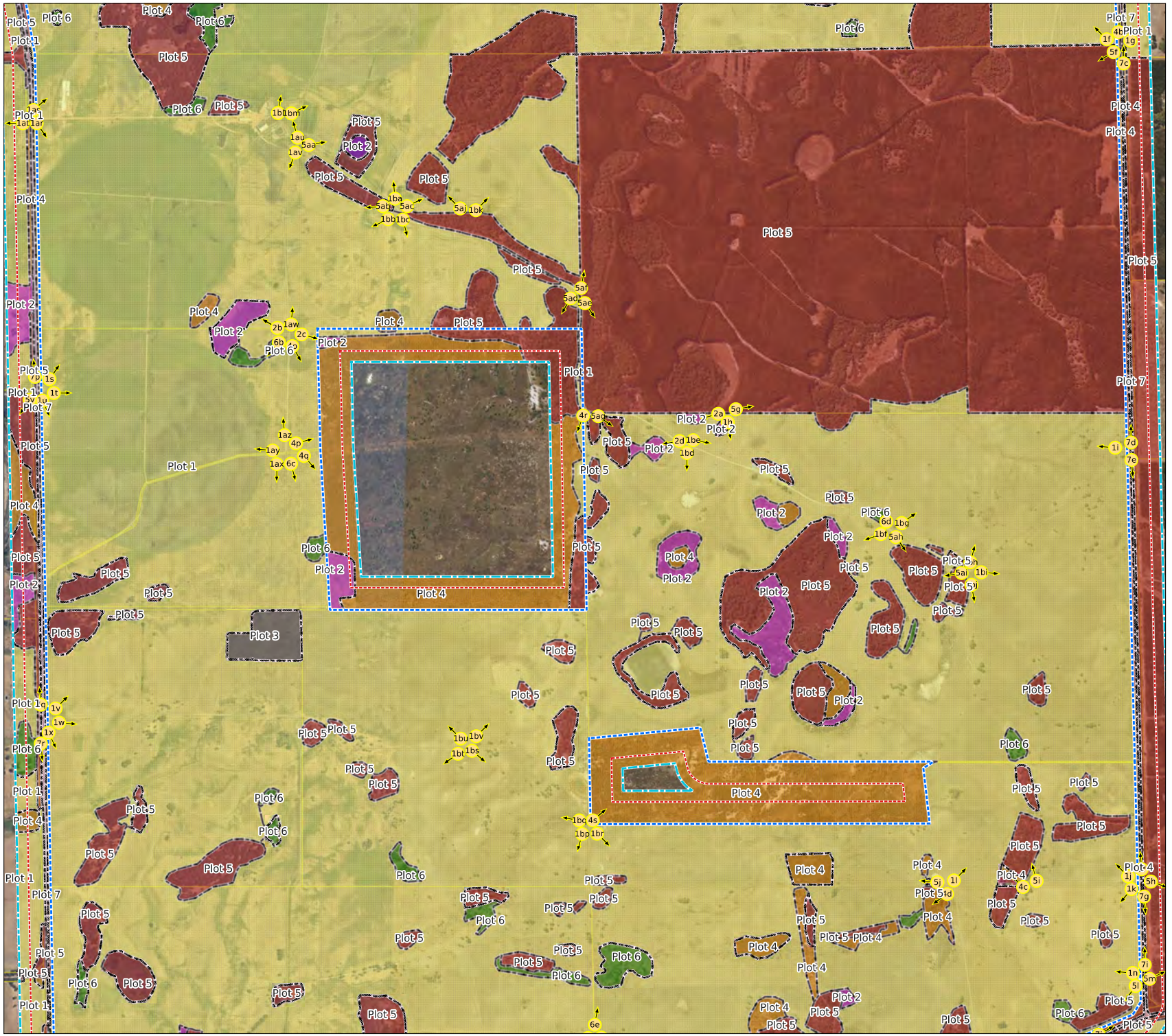

Legend

- Photo Location
- Wind Farm Development Boundary
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,000

0 200 400 600 Metres

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Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - Central)

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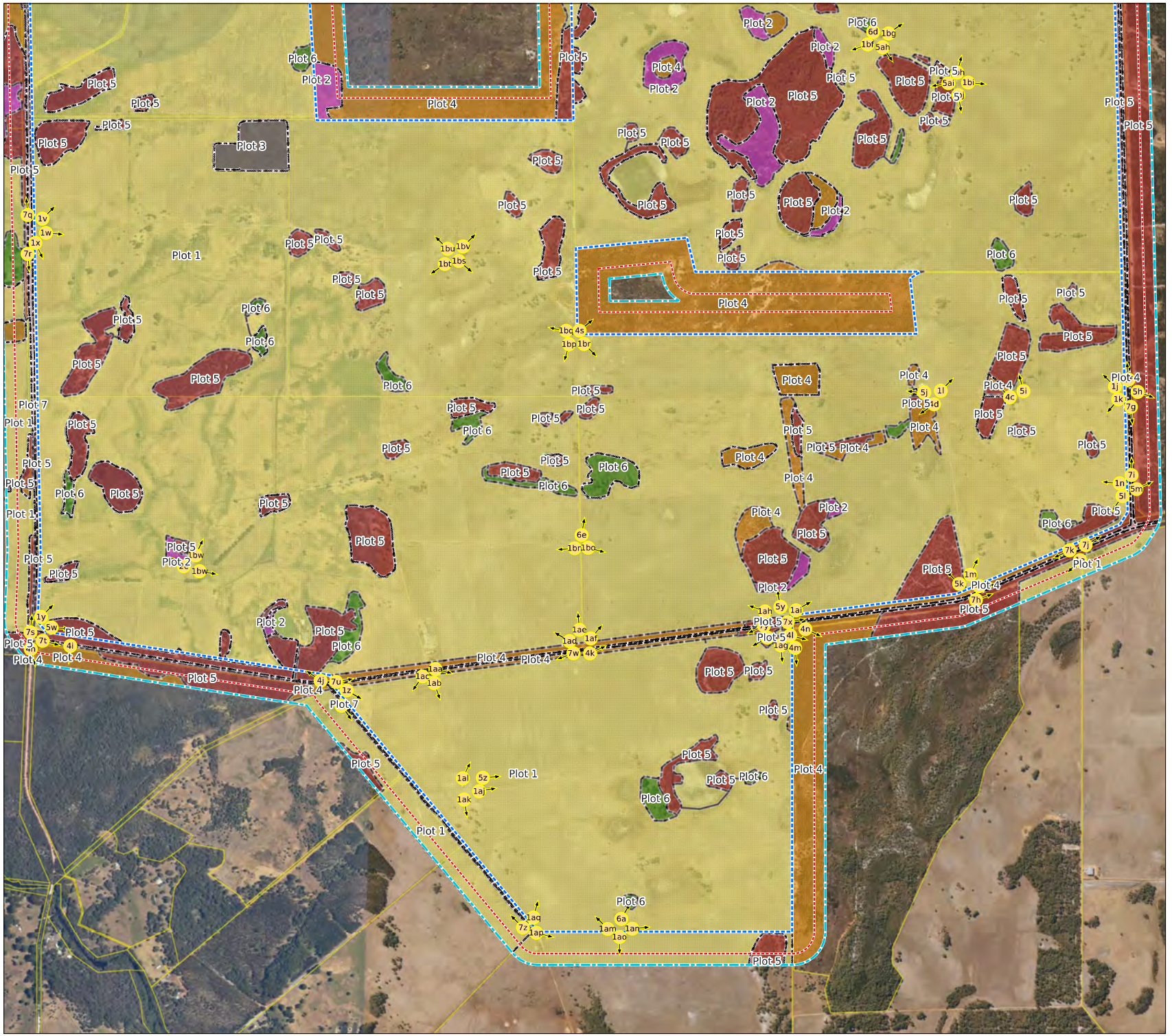

Legend

- Photo Location
- Wind Farm Development Boundary
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot

Classified Vegetation

- A. Forest
- B. Woodland
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

Scale 1:20,000

0 200 400 600 Metres

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Scott River Wind Farm, Scott River Road

Photo Points and Vegetation (Overall Wind Farm - South)

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Scott River Wind Farm

Scott River Road, Scott River

Bushfire Management Plan

Date: 11 March 2026

Prepared For: Synergy Renewable Energy Developments Pty Ltd

Linfire Ref: 20231220334SYN-BMP-001_1

Linfire Consultancy

ABN: 577 930 47299

Revision	Issue Date	Revision Description	Approved By
0	27 Mar 2025	Issued for Approval	Linden Wears (Level 3 BPAD 19809)
1	11 Mar 2026	Issued for Approval	Linden Wears (Level 3 BPAD 19809)

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2. errors or omissions in this report except where grossly negligent; and the proponent expressly acknowledges that they have been made aware of this exclusion and that such exclusion of liability is reasonable in all the circumstances.

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Fire is an unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against bushfire. The mitigation strategies contained in this Bushfire Management Plan (BMP) are considered to be prudent minimum standards only, based on the standards prescribed by relevant authorities. It is expressly stated that Linfire do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged or that lives will not be lost in a bush fire.

Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Linfire has no control. If the proponent becomes concerned about changing factors then either a review of the existing BMP, or a new BMP, should be requested. Linfire accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report and its supporting material by any third party.

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1.0 Proposal details

1.1 Background

Synergy Renewable Energy Developments Pty Ltd (SynergyRED; the Proponent) is seeking to lodge a development application (DA) for a new wind farm across a number of lots (the wind farm development boundary) in Scott River approximately 15 km north-east of Augusta, in the Shire of Augusta-Margaret River (the Shire).

The proposed wind farm development (see Figure 1) will require the installation of the following infrastructure:

- ***New Building/s***
  - At least one Operations and Maintenance (O&M) building
  - Potential for 1 or 2 other smaller buildings
- ***Wind turbine generators***
  - 20 turbines
  - All turbines are to have fire detection, alarm and suppression systems
- ***132 kV transmission line***
  - From proposed substation to existing high-voltage powerlines approximately 4 km north of the substation
  - Consisting of above-ground towers, poles and electrical lines
  - To be designed and constructed to Western Power specifications
- ***33 kV distribution lines***
  - Reticulated from each turbine to substation, preferably through use of underground cables.
  - If ground conditions are unsuitable for underground cables, portions of these 33 kV lines may need to be above-ground.
- ***High voltage substation***
  - To be designed and constructed to relevant Australian Standards
  - Expected to contain infrastructure such as main transformer, STATCOM, switchroom, NSP room, harmonic filters, back-up generator/auxiliary supply.
- ***Internal access driveways***
  - Upgraded internal driveway access to the proposed buildings and substation
  - Internal access driveways throughout the wind farm to all turbines, from various site access points
- ***Firewater tanks***

The make/model of wind turbines has not been finalised (is still under review), however the following information has been provided regarding the anticipated products:

- Maximum tip height of 250 metres (hub height up to164 m with blade length of up to 90 m)
- Turbines are steel tower casings to ground level, with fibreglass/aluminium/steel blades

All of the following buildings and infrastructure for the wind farm, will be sited within a nominated wind farm building envelope:

- O&M building
- Any other required wind farm buildings

- Any firewater tanks required for the buildings

Regarding onsite personnel, once operational, the following is expected:

- Occupant numbers likely to be 2 to 4 staff, 5 days a week (business hours)
- There will be at least one on-call technician allocated to the facility for all other times

During the construction phase, the following is also likely to be required:

- Site Offices
- Concrete Batching Plant
- Laydown Areas

These are currently proposed immediately south of the wind farm building and substation envelopes, and it is assumed that following completion of construction, these will be allowed to return to their current grassland state (in not required to be managed within a nominated Asset Protection Zone).

1.2 Site description

1.2.1 Overall Wind Farm

The proposed wind farm extends over a number of existing lots as follows (see Figure 2 and 3):

- Lot 4269 on Plan 209300, Courtenay
- Lot 6 (No 527) Scott River Road, Courtenay
- Lot 4266 on Plan 208480, Courtenay
- Lot 4152 (No 599) Scott River Road, Scott River
- Lot 4265 (No 598) Dennis Road, Scott River
- Lot 100 on Plan 038071, Scott River
- Lot 4261 on Plan 208478, Scott River
- Lot 4260 (No 119) Governor Broome Road, Scott River
- Lot 4263 on Plan 208478, Scott River
- Lot 1 (No 399) Governor Broome Road, Scott River
- Lot 4154 on Plan 207769, Scott River

All the lots nominated above are currently zoned as “General Agriculture” under the local Shire planning scheme, and have been largely cleared of native vegetation and used by private landholders for agricultural purposes. The only exception to this is Lot 4269 in the north-western part of the wind farm development boundary, which currently contains existing timber plantations, which are relatively mature and while they are expected to be harvested in coming years, the exact timing is not confirmed.

There are several other lots located adjacent to the development boundary worthy of note:

- Lot 2 on Diagram 090280, Courtenay
  - Contains the existing Beenup substation
- Lot 101 on Plan 038071, Scott River
  - Currently identified as a DBCA Lands of Interest (Register No. 2555/700), and potentially a future nature reserve.
- Lot 4924 on Plan 217962, Scott River
  - Crown Reserve 42377
  - Zoned under local Shire planning scheme as “National Parks and Nature Reserves”

- Flora reserve

Surrounding the development boundary:

- To the east is Dennis Road, with
  - Agricultural land and timber plantation further to the east of Lots 1 and 4263, and
  - Pagett Nature Reserve and Chester Nature Reserve further east and north-east of Lot 4266.
- To the north of Lots 4266 and 4269 are existing agricultural lots largely cleared of vegetation, other than isolated forest plots, with Brockman Highway and South Blackwood State Forest further north.
- To the west is Scott River Road, with largely cleared agricultural land further west other than some existing timber plantation in the north-west and the rehabilitated Beenup mineral sands mine between Strucels Road and Payne Road. The Blackwood River located approximately 4-5 km further west of the wind farm.
- To the south is primarily cleared agricultural land, with some forest and scrub vegetation south of Lot 4260 and Governor- Broome Road, which fringes the Scott River.

Public road access to the wind farm is via Brockman Highway to the north, with Scott River Road, Governor Broome Road and Dennis Road forming a loop road arrangement around the perimeter of much of the development boundary (see Figure 2). The only other public road near the wind farm is Coostien Road, which is an existing dead-end public road providing access to lots south of the Governor Broome Road.

Public road access from the wind farm is as follows:

- Brockman Highway extends:
  - west to eventually connect to Bussel Highway at Karridale (17 km west), where travel is possible south to Augusta (15 km south of intersection) and north to Margaret River (30 km north of intersection)
  - east to Nannup (approximately 55 km away)
- Governor Broome Road provides access along the southern boundary and extends 12 km east of the wind farm to connect to Milyennup Coast Road, where travel can be undertaken 13 km north to connect to Stewart Road and Brockman Highway and on to Nannup.
- Scott River Road provides public road access along the western wind farm development boundary and connects to Brockman Highway in the north, and also extends further south past Governor Broome Road, to East Augusta, as a long dead-end road.

Vehicular access within the various lots comprising the wind farm, is currently via existing unsealed farm tracks, which provide access from a number of existing entrance gates along the public road network, into the lots.

There is no known reticulated town main water supply currently provided to any lots within the wind farm development boundary, nor are there any existing street hydrants.

1.2.2 Proposed Buildings

The nominated wind farm development boundary includes the lots detailed previously in Section 1.2.1, however it is noted that it is only the proposed buildings located entirely in the wind farm building and substation envelopes (the wind farm building extent) sited in the north-east corner of Lot 4261 (see Figure 4) that trigger assessment against current bushfire policy as detailed in Section 1.3.

All other buildings associated with the project (e.g. site offices) will be required only for the construction phase, and will be decommissioned following operation of the wind farm.

1.3 Purpose

The entire wind farm development boundary is designated as bushfire prone (Area 2) on the *Map of Bush Fire Prone Areas* (DFES 2024; see Plate 1 and Plate 2). As the proposed building and substation envelopes are surrounded by unmanaged grassland, any pre-development BAL impact would be expected to be BAL-40 or greater without any management measures (i.e. Asset Protection Zones), which triggers the requirement to assess the proposal against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

Given the renewable energy infrastructure (e.g. wind turbines) are not considered "habitable buildings" as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn't triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the WA Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4* (the CFA Guidelines; CFA, 2023) from Victorian fire brigade, currently provides the best design guidance, albeit rationalised for WA context. It is noted that the CFA Guidelines currently has no formal status in WA, however it is understood DFES are currently in the process of drafting their own version of the CFA Guidelines, and while the timing of this is unconfirmed, the content is expected to broadly align with concepts detailed by the CFA.

It is noted that the Shire of Augusta-Margaret River has a Local Planning Policy for renewable energy developments, namely *LPP 23 (Renewable Energy Systems)* dated March 2021, for the expressed purpose of guiding proponents, landowners and the community as to the requirements for such developments. It is noted that there is little guidance provided relating to structural or bushfire risk management for these renewable energy developments, other than stating that a *"fire management plan"* may be required *"where planning approval is sought for large renewable energy systems"*.

Based on the above:

- This BMP demonstrates compliance for the proposed permanent buildings against SPP 3.7 and the WA Guidelines;
- A Bushfire Risk Management Plan (BRMP) that accompanies this BMP, assesses the level of compliance of the proposed renewable infrastructure, against the relevant model requirements of the CFA Guidelines, to demonstrate the bushfire risk has been appropriately managed.
- The preparation of the BMP and BRMP is considered to satisfy the requirements of the Shire LPP 23 regarding preparation of a fire management plan for renewable energy developments.

This Bushfire Management Plan (BMP) has been prepared to address requirements for DA's under SPP 3.7 Policy Measure 7.1 (ii), Section 2.2 the WA Guidelines, in addition to Section 7 relating to Commercial/Industrial developments, including:

- The identification of any environmental, biodiversity or conservation values on the subject site(s).
    - Where relevant, details on how the clearing of native vegetation specifically for bushfire mitigation to achieve the bushfire protection measures, can be avoided through the use of siting and design measures.
    - Where the clearing of native vegetation cannot be avoided, details on how the proposal will minimise the clearing are to be provided.
- A BAL Contour Map or BAL assessment.
- The identification of any bushfire hazard issues arising from the assessment.

- Assessment against Bushfire Protection Criteria 7 (Development – Commercial and Industrial) demonstrating compliance of the following for proposed buildings:
    - Siting of all buildings in BAL-29 or lower, including provision of suitably sized Asset Protection Zones (APZ's; low fuel zones around buildings).
    - Justification of any native vegetation clearing to implement the APZ
    - Siting of all hazardous, flammable and/or combustible materials in BAL-29 or lower, and appropriate protection from radiant heat impact.
    - Provision of compliant vehicular access
    - Provision of suitable firewater supply.
- Summarise the bushfire management measures for the renewable energy infrastructure from the BRMP.

The focus of this BMP is to demonstrate compliance of the proposed buildings contained within the building and substation envelopes, with SPP 3.7 and the WA Guidelines, accompanied by a summary of the bushfire management measures for the renewable energy infrastructure derived from the project BRMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

1.4 Other plans/reports

There are no known bushfire reports or assessments that have been prepared previously for the wind farm development area.

Linfire has prepared a Bushfire Risk Management Plan (Linfire 2026) detailing the level of compliance of the proposed renewable infrastructure, against the CFA Guidelines. The resultant bushfire management measures from the BRMP, have been incorporated into Section 5.2 of the BMP, to provide a collated summary of all risk management measures required for the proposed development. The BRMP should be read in conjunction within this BMP.

The following environmental reports have been prepared for the project:

- *Detailed flora and vegetation survey for a Proposed Wind Farm in Scott* River, prepared by Phoenix Environmental Services dated February 2025.



Plate 1: Map of Bush Fire Prone Areas – Proposed Buildings (DFES 2026)

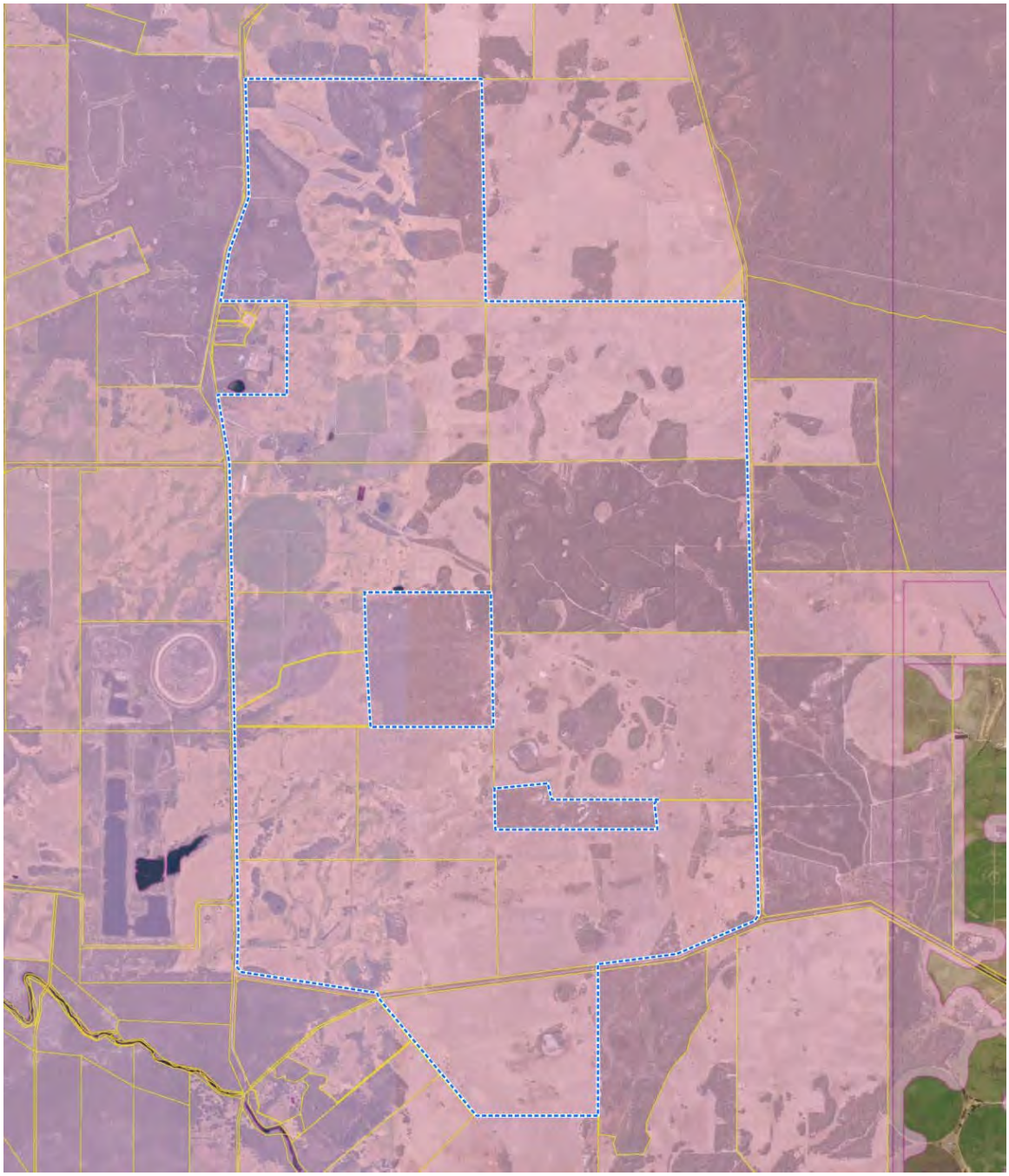

Plate 2: Map of Bush Fire Prone Areas – Overall Wind Farm Development Area (DFES 2026)

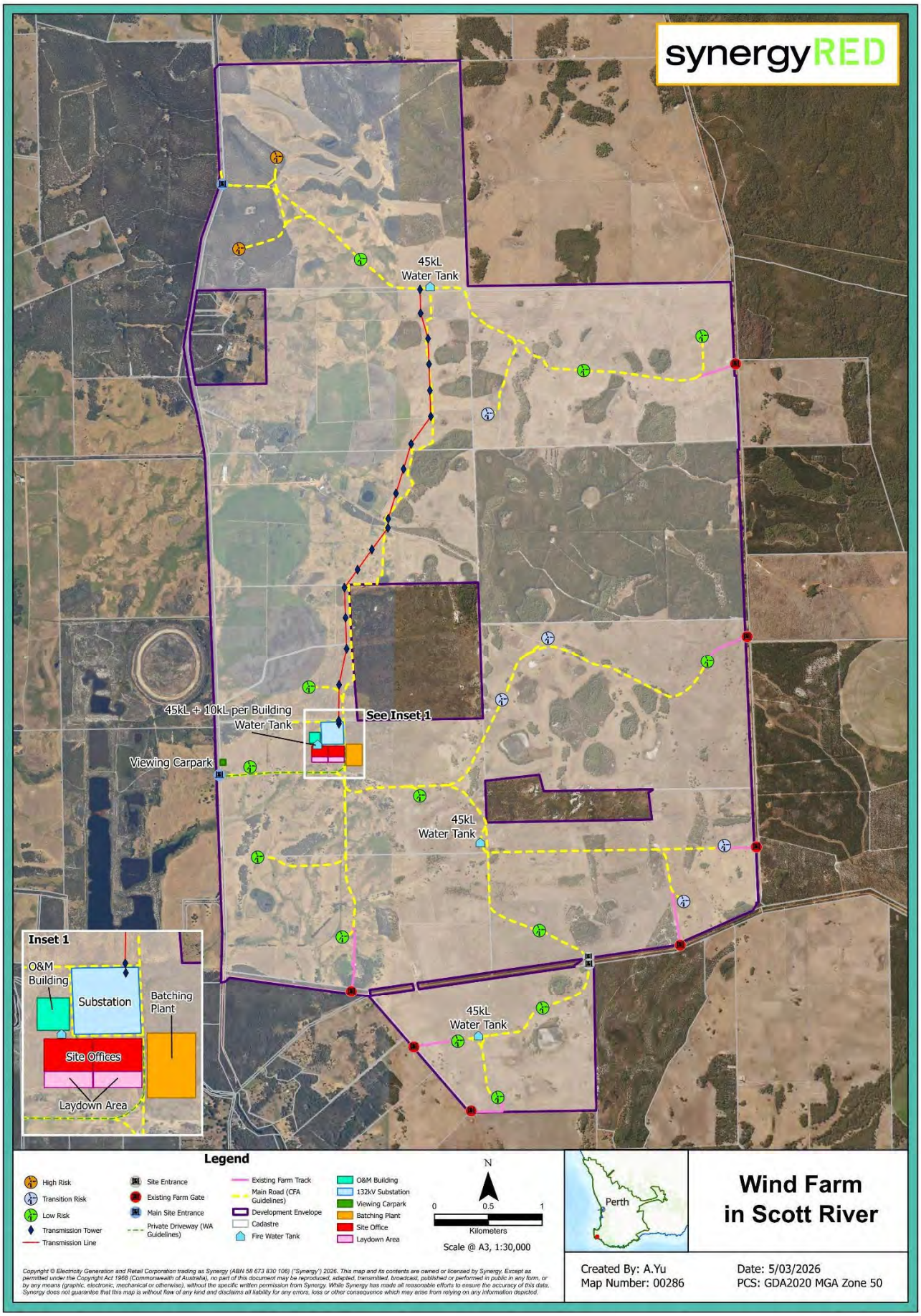

Figure 1: Overall Development Plan

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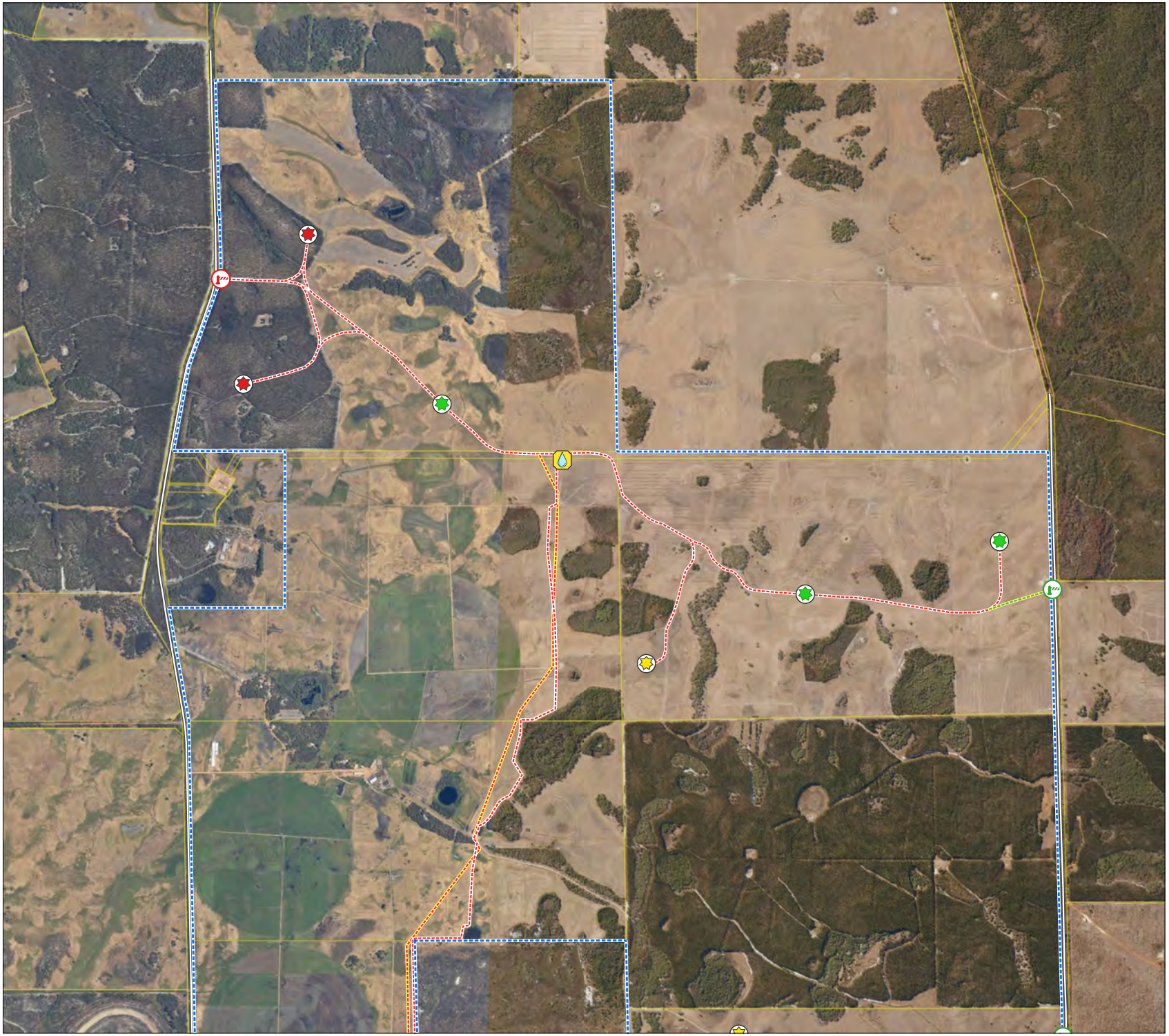

Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Cadastre

Scale 1:25,000

0 300 600 900 Metres

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Figure 2: Site Overview - North (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)

- Transmission Line
- Public Road
- Internal Driveway (WA Guidelines)
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Building and Substation Envelopes
- Wind Farm Development Boundary
- Cadastre

Scale 1:25,000

0 300 600 900 Metres

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Figure 3: Site Overview - South (Overall Wind Farm)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Wind Turbine (Low Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per building)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Wind Farm Building Extent
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre

Scale 1:6,000

0 80 160 240 Metres

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Figure 4: Site Overview (Proposed Building and Substation Envelopes)

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2.0 Environmental considerations

2.1 Native vegetation - modification and clearing

Most of the proposed development is to be sited in existing grassland areas, however there is expected to be some vegetation clearing required to accommodate the proposal.

Linfire assumes that all relevant environmental and heritage studies and all required environmental and heritage approvals will be obtained prior to commencing any on-site vegetation modification or clearing required to construct the development or implement the onsite Asset Protection Zones. Should any constraints be identified as part of the environmental or heritage studies that would prevent vegetation clearing or modification, the design is to be tailored to ensure the implementation of compliant APZs can be achieved.

2.2 Revegetation / Landscape Plans

No revegetation is proposed as part of the proposal.

All nominated Asset Protection Zones are to comply with APZ Standards from the WA Guidelines (refer to Appendix 2), with any other landscaping (if any) and vegetation management (outside of nominated APZs) to be low threat vegetation and managed gardens in accordance with AS 3959—2018 Clause 2.2.3.2 (f) (see Appendix 3).

3.0 Bushfire assessment results

3.1 Assessment inputs

As mentioned in Section 1.2, the overall development includes all the lots included in the proposed wind farm, however it is noted that the proposed buildings that trigger assessment against SPP 3.7 and the WA Guidelines will only be sited within the wind farm building and substation envelopes in the north-east corner of Lot 4261 (see Figure 4). Given the scope of this BMP is limited to the permanent buildings, the vegetation and BAL contour mapping is mostly focussed on that around the proposed building and substation envelopes.

While the renewable infrastructure is not required to achieve target BAL ratings, thus not required to have BAL contour mapping, Linfire has provided high-level vegetation mapping in the project BRMP to inform the discussion regarding the turbine siting and associated vegetation modification and management.

3.1.1 Vegetation classification

Linfire assessed classified vegetation and exclusions within 150 m of the wind farm building extent area through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions following proposed development works, are contained in Appendix 1 and Table 1, and depicted on Figure 5.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed to the south-east of the building and substation envelopes, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state Unless within nominated APZs).

3.1.2 Effective slope

Linfire assessed effective slope under classified vegetation through on-ground verification on 12 & 13 June 2024, and 29 January 2025, in accordance with AS 3959. Results were cross-referenced with Landgate 5 m contour data and are depicted in Table 1 and Figure 5.

Site observations indicate that land is undulating, with elevation decreasing from the north of the wind farm, to the south-west. Effective slope near the building and substation enveloped has been assessed as downslope 0°-5° given the relatively gentle slope.

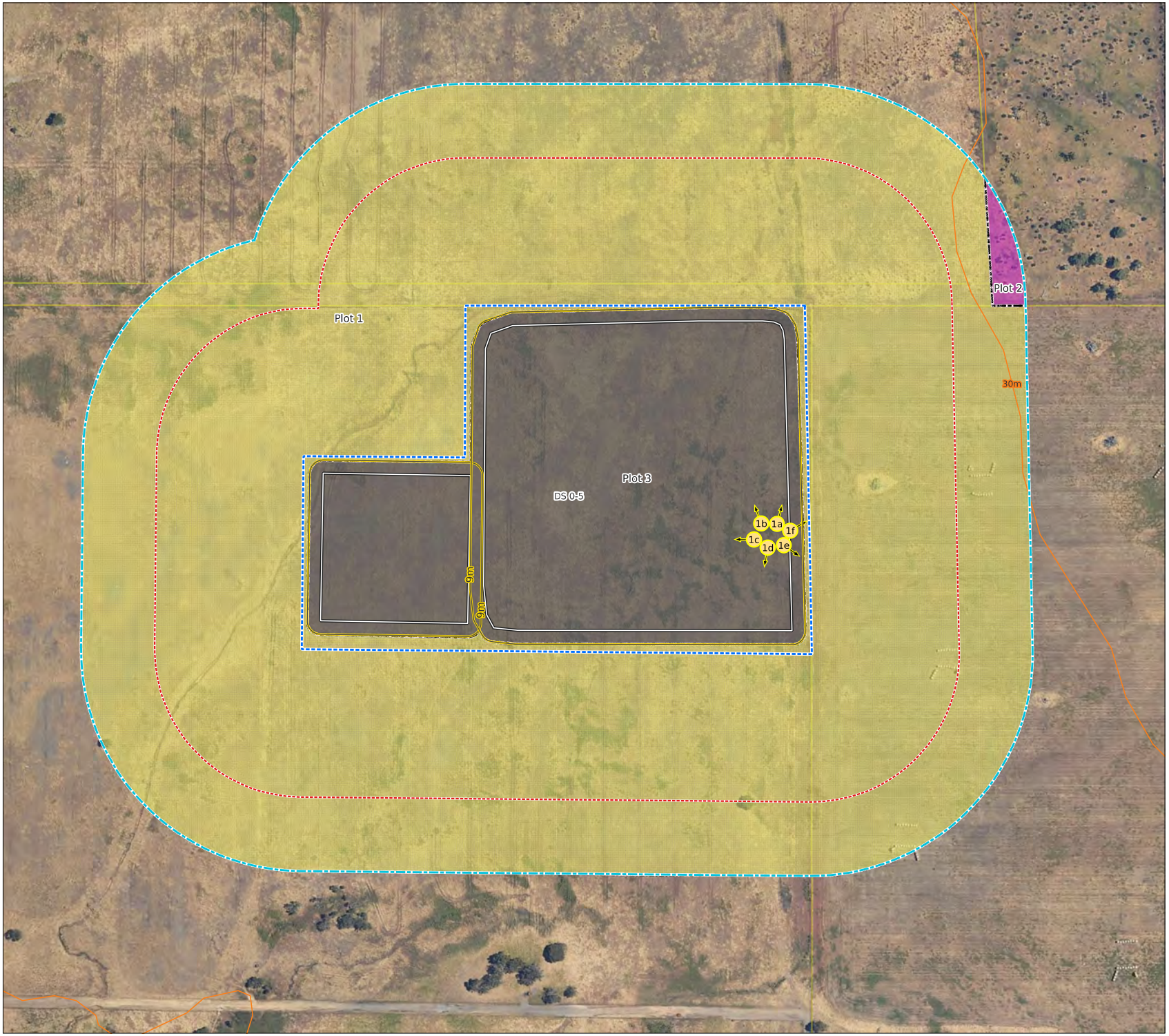
3.1.3 Summary of inputs

Table 1 summarises the anticipated post-development vegetation classifications and exclusions within 150 m of the proposed wind farm building and substation envelopes, following completion of development works and implementation of Asset Protection Zones. The post-development vegetation classifications/exclusions and effective slope are illustrated on Figure 5.

Table 1: Post-development vegetation classifications/exclusions and effective slope (within 150 m of building and substation envelopes only)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height. Included areas of proposed construction infrastructure (site

Vegetation plot	Vegetation classification	Effective slope	Comments
			office, concrete batching plant, laydown area), which are assumed to return to grassland state following decommissioning.
2	Class C Shrubland	Downslope >0–5°	Shrubland vegetation (<2 m high) within Lot 101. This vegetation is further than 100 m from the proposed building and substation envelopes, and could be excluded under Clause 2.2.3.2 (a).
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land to be modified to low threat vegetation as part of proposed development within building and substation envelopes and associated APZs.



Legend

- Photo Location
- Contours
- Building/Substation Envelopes
- Wind Farm Building Extent
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- C. Shrubland
- G. Grassland
- Modified to non vegetated and low threat

Scale 1:3,000

0 40 80 120 Metres

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Figure 5: Post-Development Vegetation and Effective Slope (Proposed Building and Substation Envelopes)

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3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

Linfire has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the wind farm building extent (see Figure 6 and 8). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 rating
- vegetation classification
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed future development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts.

The BAL contours are based on:

- the vegetation classifications and effective slope observed at the time of inspection
- the anticipated post-development vegetation based on proposed on-site clearing extent, and resultant vegetation exclusions and separation distances, achieved to implement the proposed development including APZ's.

The results of the BAL contour assessment are detailed in Table 2 and illustrated in Figure 6, with the highest BAL rating to any proposed buildings being BAL–29.

Table 2: BAL contour assessment results (to proposed buildings and substation envelopes)

Method 1 BAL determination				
Plot	**Vegetation classification**	**Effective slope**	**Separation distance**	**Highest BAL**
1	Class G Grassland	Downslope >0–5°	9 m	BAL–29
2	Class C Shrubland	Downslope >0–5°	>100 m	BAL–Low
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A

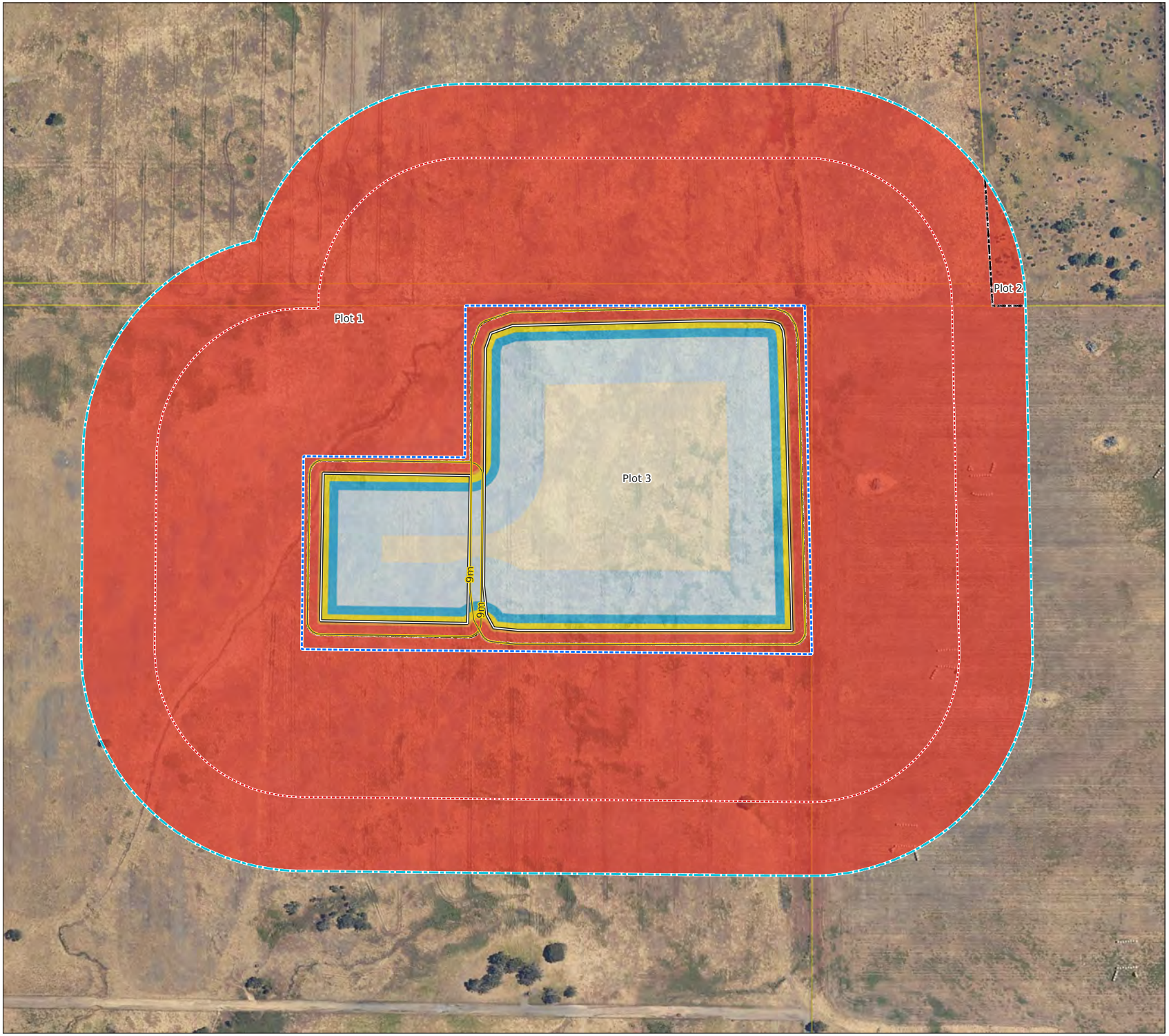
Table 3 lists the BAL applicable to the habitable buildings within the proposed development.

Table 3: BAL applicable to buildings and substation envelope

Building / element	Initial BAL	APZ	Revised BAL
Building Envelope (including O&M building and firewater tank within envelope)	BAL–FZ	9 m wide APZ extending from the external perimeter of the Building Envelope. All land within the Building Envelope is to be non-vegetated land and/or managed low threat vegetation throughout the entire area. Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing	BAL-29 to BAL-12.5

Building / element	Initial BAL	APZ	Revised BAL
		the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.	
Substation Envelope	BAL–FZ	9 m wide APZ extending from the external perimeter of the Building Envelope. All land within the Substation Envelope is to be entirely non-vegetated land. Alternatively, targeted 9 m APZs could be established around all proposed buildings within the substation envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.	BAL-29 to BAL-Low

Should there be any changes in development design or classified vegetation extent that results in a modified BAL outcome, then the BAL contours will need to be reassessed.



Legend

- Building/Substation Envelopes
- Wind Farm Building Extent
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

Scale 1:3,000

0 40 80 120 Metres

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Figure 6: BAL Contour Map (Proposed Building and Substation Envelopes)

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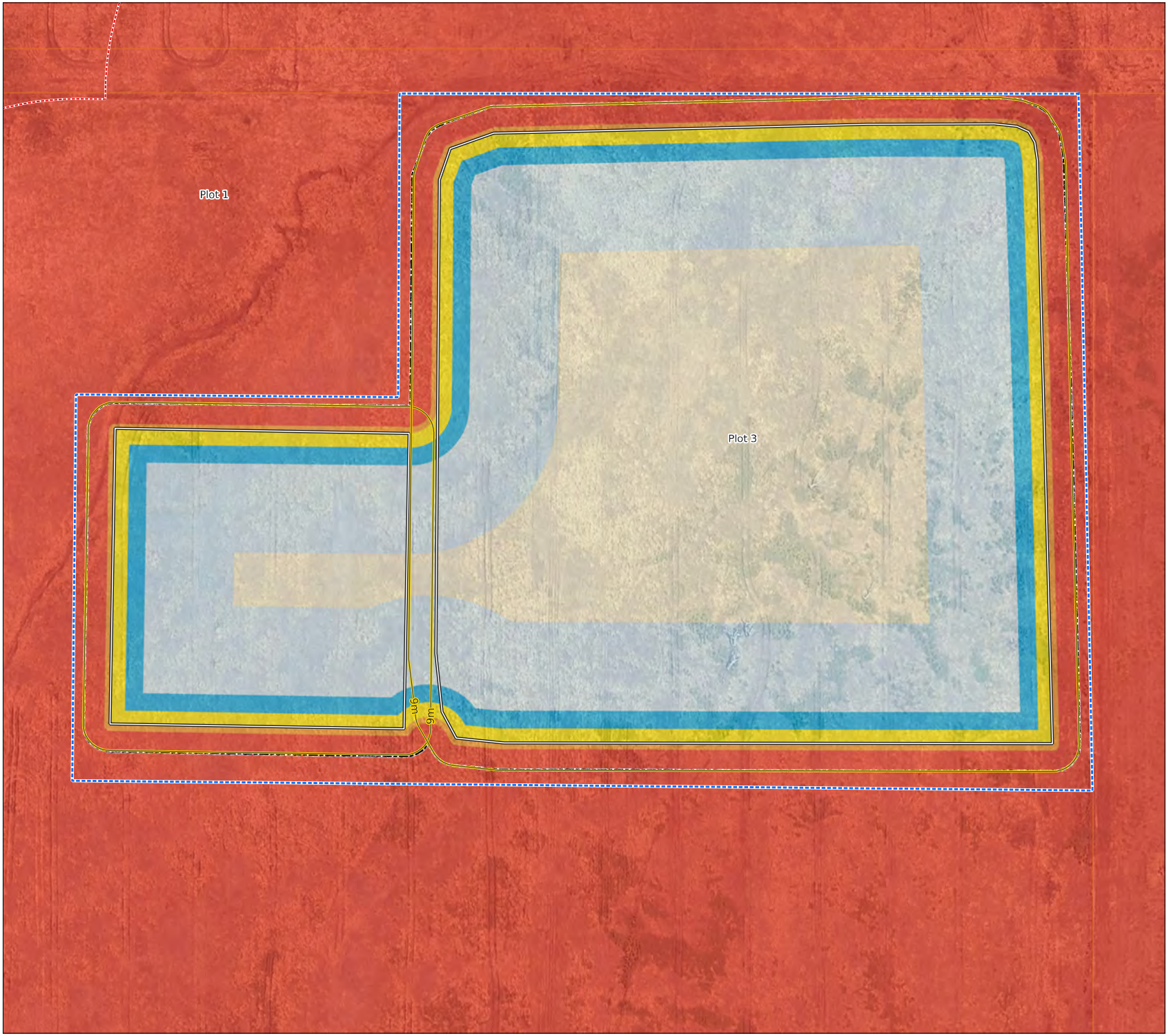

Legend

- Building/Substation Envelopes
- Wind Farm Building Extent
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

Scale 1:1,500

0 20 40 60 Metres

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Figure 6: BAL Contour Map - zoom (Proposed Building and Substation Envelopes)

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4.0 Identification of bushfire hazard issues

4.1 Bushfire context

The overall wind farm development area contains, and is surrounded by, unmanaged vegetation in all directions, with extended fire runs available through mostly grassland vegetation, in addition to more discrete plots of shrubland, scrub and forest vegetation. The potential bushfire impact on the proposed buildings would be primarily from grassland fire, with the nearest non-grassland vegetation located approximately 130 m to the north-east. The fire runs from all directions could be kilometres long, with few natural or man-made features that currently exist near the proposed wind farm which would prevent bushfire behaviour reaching steady-state conditions. On this basis, the potential threat of fully developed bushfires to the proposed buildings could come from any direction.

Further review of the bushfire hazard to the renewable infrastructure is detailed in the BRMP (Linfire, 2026) that accompanies this BMP.

4.2 Bushfire hazard issues

Examination of the environmental considerations (Section 2.0) and the bushfire risk assessment (Section 3.0) has identified the following bushfire hazard issues:

1. Based on the existing extent of vegetation outside proposed buildings and roads, the proposed habitable buildings would have an initial BAL of BAL-FZ. Onsite vegetation modification and management will be required to ensure sufficient separation between proposed buildings and unmanaged vegetation, to limit the impact of bushfires on the development and prevent ignition and spread of a fire from proposed infrastructure.
2. Ensuring sufficient internal vehicular access to the proposed development, to enable egress by onsite staff, but as importantly, providing sufficient access to the infrastructure to enable attending bushfire fighting appliances to control or suppress any fires.
3. Ensuring access to bushfire fighting water supply, to limit the travel time to water supplies for appliance refills.
4. The proposed development contains renewable energy infrastructure, a separate BRMP has been prepared to demonstrate compliance with the CFA Guidelines (refer to Linfire 2026).

4.3 Bushfire safety strategy

The following bushfire safety strategy is proposed to demonstrate compliance with the Bushfire Protection Criteria of the WA Guidelines and address the bushfire hazards identified above:

1. Create sufficient separation between buildings from surrounding classified vegetation by establishing suitably sized APZs to achieve a compliant rating of BAL-29 or less.
2. Provide compliant vehicular access to the proposed building and substation envelopes, from the surrounding public road network, to enable occupant egress and to facilitate firefighter access.
3. Provide a secure bushfire fighting water supply, including use of firewater storage tanks to enable refill of bushfire fighting appliances.
4. Incorporate the bushfire risk management measures for the proposed renewables infrastructure detailed in the project BRMP, including appropriate bushfire emergency management procedures, into this BMP.

Based on the above, Linfire considers the bushfire hazards within and adjacent to wind farm building extent and the associated risks, are manageable through standard management responses outlined in the WA Guidelines and AS 3959. These responses will be factored into proposed development as early as possible to ensure an effective and compliant bushfire management outcome is achieved for protection of future life, property and environmental assets.

5.0 Bushfire management measures

The following bushfire management measures, informed by the compliance assessment in this BMP and the project BRMP for renewable energy infrastructure (Linfire, 2026), and are required to be implemented as part of the development and increase the level of bushfire risk mitigation across the site. Where possible, the management measures have been depicted on Figure 7 for building and substation Envelopes, with Figure 8 and Figure 9 displaying those for the renewable energy infrastructure.

5.1 Vegetation management

In order to manage the bushfire risk to the development, sufficient separation is to be provided between proposed buildings and infrastructure, and unmanaged vegetation, including the following requirements:

- Asset Protection Zones (APZs) around the perimeter of the following:
  - the nominated building envelope
  - the substation envelope (with the envelope to be a non-vegetated zone)
  - each firewater tank
- A non-vegetated zone (NVZ) and APZ around each wind turbine base
- Managed low threat vegetation within nominated building envelope
- Non-vegetated land within substation

Further information on vegetation management is provided in the sections below.

5.1.1 Asset Protection Zones and Non-Vegetated Zones (Building & Substation Envelope)

In order to ensure sufficient separation is maintained between proposed buildings and substation, and surrounding unmanaged vegetation, the following APZs will be required:

- A 9 m wide APZ, is to be established around the perimeter of the nominated building envelope to achieve BAL-29 or lower on all buildings and firewater tanks within the envelope.
- A 9 m wide APZ, is to be established around the perimeter of the substation, to achieve BAL-29 or lower on this infrastructure.
  - In order to limit the chance of electrical faults in the substation from igniting a bushfire, all other land within the nominated substation envelope is to be established as a Non-Vegetated Zone, consisting entirely of non-vegetated elements.

Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy.

All APZs can be either non-vegetated or managed low threat landscaping established in accordance with the APZ standards from the WA Guidelines (see Appendix 2) and AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3), however would preferably be non-vegetated where possible.

The NVZ in the substation envelope is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for “firebreaks” from CFA Guidelines as follows:

- Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
- Free of vegetation and obstructions at all times.
- No combustible plant or equipment.

All nominated APZs and NVZs are to be implemented by the Proponent, who is also responsible for the regular ongoing management to ensure compliance in perpetuity, especially during bushfire season.

5.1.2 Asset Protection Zones and Non-Vegetated Zones (Turbines)

In order to ensure sufficient separation is maintained between proposed renewable energy infrastructure, and surrounding unmanaged vegetation, the following APZs will be required:

- NVZ and APZ is to be established around the perimeter of each of the wind turbine base on the following basis (see turbine risk ratings depicted on Figure 8 and Figure 9):

  Low-Risk Turbine Site

  - ***A turbine is considered to be in a low-risk environment when it is sited further than 300 m from "continuous" non-grassland vegetation.***
  - If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
    - ***10 m NVZ around base of turbine tower***

  Transition Risk Turbine Site

  - ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
    - ***closer than 300 m to "continuous" non-grassland vegetation, (but not within this non-grassland vegetation) or***
    - ***within "non-continuous" non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
  - If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:
    - ***10 m NVZ around base of turbine tower; and***
    - ***20 m APZ outside the 10 m NVZ***

  High-Risk Turbine Site

  - ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within "continuous" non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
  - If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
    - ***10 m NVZ around base of turbine tower***
    - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- Should turbines be relocated:
  - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
  - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of forest and grassland may be both high-risk and transition risk). In these instances, we propose that:
    - The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
    - the NVZ/APZ for the highest risk category is applied entirely around the turbine.

- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for “firebreaks” from CFA Guidelines as follows:
    - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
    - Free of vegetation and obstructions at all times.
    - No combustible plant or equipment.
- The Asset Protection Zone (APZ) is to comply with the APZ standards from the WA bushfire Guidelines (see Appendix 2).

All NVZ and APZs are to be implemented by the Proponent, who is also responsible for the regular ongoing management during bushfire season to ensure compliance for the life of the wind farm.

5.1.3 Asset Protection Zones (Renewable Energy Infrastructure - Firewater Tanks)

In addition to the firewater tank for the future buildings, additional firewater is proposed for the renewable energy infrastructure (see Section 5.3.2 below).

All proposed firewater tanks are to be sited in areas of BAL-29 or lower, to be achieved as follows:

- Sited within the wind farm building envelope within an area of BAL-29 or lower, or
- Have an appropriately sized APZ established and maintained around the perimeter of the tank and suction connection, to achieve BAL-29 or lower.
    - Based on current tank locations in grassland, this would be a 9 m wide APZ

The APZs can be either non-vegetated or managed low threat vegetation, established in accordance with the APZ standards from the WA Guidelines (see Appendix 2) and AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3).

The APZs are to be established and maintained for the life of the project by the Proponent.

5.2 Vehicular access

5.2.1 Vehicular access – Buildings

The internal driveway accessing the future buildings in the nominated building and substation envelopes, is to comply with the requirements of Acceptable Solution A3.1 of the WA Guidelines, including the following:

- Comply with the requirements in Appendix B.3 Table 10, Column 5 (see Appendix 4 requirements for Area 2)
- Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 200m that increase the overall driveway width to no less than 6 m wide.
- Provide compliant turnarounds (see Appendix 4 requirements for Area 2) or loop roads within 30 m of each permanent building
- Provide access to the firewater tanks (or tank suction connection) in accordance with Acceptable Solution A4.1 of the WA Guidelines, to enable attending fire appliances to refill, and provide hardstand adjacent to tank suction connection and sufficient locations for fire appliance turnaround.
- All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m.
    - If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.

The Proponent is responsible for the construction and ongoing management of internal driveways.

5.2.2 Vehicular access – Renewable Energy Infrastructure

The internal driveway network accessing the renewable energy infrastructure is to comply with the requirements of CFA Guidelines as follows:

- The following site entrances are to be established for the facility:
  - Main site entrance from Scott River Road, near the proposed building and substation envelopes
  - Three additional site entrances as follows:
    - One on Scott River Road, approximately 5.5 km north of the main entrance.
    - Two on Governor Broome Road, providing access to turbines to the north and south of the public road.
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
  - Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 600m that increase the overall driveway width to no less than 6 m wide.
  - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
  - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to within 4 m of the tank suction point for each proposed firewater tank.
- All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m.
  - If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.
- Emergency Information Book and Signage (see Section 5.6) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.

The internal wind farm access driveways, site entrances, gates and signage are to be constructed and maintained by the Proponent in perpetuity (or for the life of the wind farm).

5.3 Firewater supply

5.3.1 Firewater – Buildings

Bushfire fighting water supply for proposed buildings in the nominated building and substation envelopes, is to be from static firewater tank/s as follows:

- The tank is to have no less than 10 kL per building (including those within the substation envelope).
- This firewater tank for the buildings, can either be collocated or combined with, the 45 kL firewater tank at the wind farm building envelope, required for the wind turbines (see Section 5.3.2)

The firewater tank within the building envelope is to comply with the relevant technical requirements from the WA Guidelines (see Appendix 5) and the requirements from the CFA Guidelines including:

- Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
- The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (e.g. wind turbines etc.).
- The hard-suction point must be positioned within 4 m to a hardstand area or internal driveway, and protected from mechanical damage where necessary, and provide a clear access for emergency services personnel.

The firewater tank is to be sited within the building envelope to ensure it is an area of BAL-29 or lower.

The firewater tank is to be installed, filled and maintained for the life of the project by the Proponent.

5.3.2 Firewater – Renewable Energy Infrastructure

Bushfire fighting water supply for proposed renewable energy infrastructure, primarily the wind turbines, is to comply with the requirements of CFA Guidelines as follows:

- Installation of the following firewater tanks around the site to provide 180 kL of turbine firewater capacity:
    - One (1No) 45 kL firewater tank in the northern part of the site, at an intersection of the internal driveways and the termination of the transmission line.
    - One (1No) 45 kL firewater tank in the southern part of the site, at an intersection of the internal driveways to a number of turbines.
    - One (1No) 45 kL firewater tank south of Governor Broome Road, at an intersection of the internal driveways to the three turbines in this part of the site.
    - In addition to the three turbine firewater tanks above, either a standalone 45 kL firewater tank is to be installed in the wind farm building envelope, for wind turbine firewater in the local area, or the 45 kL should be added to the building firewater tank.
- While the firewater tank locations above represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- The turbine firewater tanks will comply with the standards from the WA bushfire Guidelines, including the following from the CFA Guidelines:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - Firewater tanks are to be at least 10 m from wind turbines
    - The hard suction point must be within 4 m of a driveway or hardstand
- Emergency Information Book and Signage (see Section 5.6) is to be provided at all site entrances (but not existing farm gates), for attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- All firewater tanks outside the wind farm building envelope, in their currently nominated locations, will have a 9 m wide APZ around the perimeter, to achieve BAL-29 or lower.

The firewater tanks, and associated APZs, are to be constructed, filled and maintained for the life of

the project by the Proponent.

5.3.3 Provision of mobile fire trailer

A mobile fire trailer (or similar approved) is required to enable wind farm staff to:

- have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
- provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire

This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.

As a minimum, the fire trailer (or similar approved) should have:

- No less than 1000 L tank
- Fire pump and hose reel
- Mounted on trailer or ute to enable easy transport around the site.
    - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).

The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

5.4 Renewable Energy Infrastructure Design, Construction, Installation & Commissioning

The following measures are required for the proposed renewable energy infrastructure to manage the risk of fires.

5.4.1 Wind Turbines

5.4.1.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.
- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel onsite, or offsite monitoring, so notification to wind farm personnel (including on-call technician), DFES and local fire brigade, and nearby landowners/farmers can be provided.

5.4.1.2 Operational Status Monitoring and Control of Turbines

- Appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
    - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both onsite and remotely offsite.
- Operational control of turbines should be able to be conducted onsite and offsite, to enable remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.

- It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

5.4.1.3 Turbine Shutdown

- All wind turbines are to be configured to automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely (i.e. offsite).
  - The intent is that in the event of a turbine fire, only the affected turbine would automatically shut-down.
- All wind turbines are to be able to be remotely shut-down in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]), if required.

5.4.1.4 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

5.4.2 Substation

- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards.

5.4.3 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per Western Powers own standards.

5.4.4 Construction and Commissioning Requirements

The proposed facility will need to incorporate these general requirements during the construction and commissioning stages, to manage the risk of onsite fire and bushfire from the development:

- Ensure an emergency communication system is provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for dangerous goods as per relevant Australian Standards.
- Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days

- Ensure tight ignition source control, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the construction management plan (or other relevant document) for the construction and commissioning phase of the facility to address risk of onsite fire and bushfire.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 5.7.

5.5 Renewable Energy Infrastructure Operation and Maintenance

The following shall be conducted as part of ongoing operation and maintenance phases:

- Ensure ongoing compliance with the endorsed BMP is achieved, especially during bushfire season
- Develop, implement and review Emergency Information Book and Signage (see Section 5.6) for attending emergency services personnel.
- Develop, implement and review the emergency management plan (see Section 5.8)
- Regular and ongoing inspection and auditing is to be conducted by the Proponent, with any routine maintenance and any required repair activities to be conducted for all infrastructure, equipment, vehicles and fire detection and suppression systems at the facility.
- Ensure all Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and requirements detailed in Section 5.9.

5.6 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at each nominated site entrance to the wind farm, with any plans or information books provided in a weatherproof container.

The Emergency Information Book and/or signage is intended to provide emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- Details of any emergency equipment, including the type and location of fire and gas detection systems.
- Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.

- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire)

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

5.7 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 5.6) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

5.8 Emergency Management Plan

The Proponent is to develop an emergency management plan for the facility, which comprehensively details the procedures for preparing for, and responding to, hazards to the facility, including the following for off-site bushfire, and on-site fire, emergencies:

- Facility details including key contacts and technical support during an emergency, site plan, details of renewable energy infrastructure, details of fire and emergency systems, and a manifest of dangerous goods.
    - The identified risks and hazards associated with the renewable energy infrastructure, such as onsite fire and bushfires.
    - Detail preparedness and pre-emptive actions to address the above hazards, including the following for onsite infrastructure fires and bushfire:
        - Ongoing compliance with the approved BMP and BRMP.
        - Ensuring ongoing maintenance of all buildings, fire and communication systems.
        - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
        - Modifying Site Activities (based on Forecast FDR and TFB/HVMB).
        - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, and understanding the decision-making triggers.
    - Detail emergency response procedures to address to all identified hazards (including for onsite infrastructure fires and bushfire).
    - For a bushfire emergency, the response should include the following:
        - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
        - Conducting early offsite evacuation of all staff away from the bushfire if safe to

do so (preferred response), ideally to Geraldton, however Dongara, Mingenew or Mullewa may also be considered in order to travel away from approaching bushfire.

- Essential staff should only remain onsite if directed by authorised DFES/local fire brigade personnel.

- Conduct facility shutdown, If safe to do so prior to staff evacuation:
  - Conduct remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
  - Ensure all other buildings and plant are properly secured.
  - Ensure all vehicular access routes are open and available for use.
  - Ensure all fire and communications systems are ready for use.
- If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place in the O&M building.
  - It is noted that this building is not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.

- Response to onsite fire, including turbine fire, is to include:
  - Immediately notify DFES to enable a rapid turnout, and relevant wind farm personnel
  - Immediately shutdown and deenergise any turbine/s on fire, and any other relevant turbines
  - If safe to do so, trained wind farm personnel to conduct first attack response on any spot fires with mobile fire trailer, until DFES arrival.
  - Notify wind farm landowners and relevant neighbouring landowners.

The emergency management plan is to be reviewed regularly, and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

The above is a high-level summary, with further specific detail on the requirements of the emergency management plan relating to bushfire and onsite infrastructure fire is provided in Appendix 7.

5.9 Dangerous Goods

While not currently planned, should the wind farm facility propose significant quantities of dangerous goods onsite such that the storage and use of these could potentially increase the risk of fire ignition at the proposed development, the Proponent will be required to:

- Ensure they are sited in areas of BAL-29 or lower as a minimum, and protected from bushfire impact, with the final siting and bushfire risk management to be reviewed by an accredited bushfire practitioner.
- Ensure there are strict controls on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation, codes, and relevant Australian Standards.
- Restrictions on hot works and electrical equipment within any on-site hazardous areas.

5.10 Building construction standards

Bushfire construction provisions of the National Construction Code require that buildings comply with the A 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building.

The proposed buildings will not be Class 1, 2 or 3, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement for proposed buildings to meet the construction requirements of AS 3959.

5.11 Compliance with annual firebreak notice

The Proponent is to comply with the current Shire of Augusta-Margaret River annual firebreak notice as amended (refer to Appendix 6). The firebreak notice provides requirements for perimeter firebreaks for lots, plantations and vineyard/orchards, APZs, and restricted and prohibited burning periods. The firebreak notice also provides enforcability to the Bushfire Management Plan, as it notes that properties with approved BMPs, must comply with their requirements.

Given the proposed wind farm is sited across small portions of a number of existing lots, most provisions of the firebreak notice will not directly apply to the proposed development, however the following is applicable:

- All proposed wind farm development and bushfire management measures should not interfere with the ability of the landowner/s to comply with the requirements of the firebreak notice, including perimeter firebreaks around lots and plantations.
- APZs and driveway access is to be provided to buildings, and maintained year-round.
- Gutters and rooftops are to be kept free of debris during bushfire season.
- Comply with Restricted and Prohibited Burning Periods, between the dates nominated in the firebreak notice.
- Comply with all Total Fire Ban and Harvest and Vehicle Movement Ban days as declared.



Legend

Mitigation Measures

- Wind Farm Site Entrance
- Wind Turbine (Low Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per building)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Internal Driveway (WA Guidelines)
- Existing Farm Track
- Wind Farm Building Extent
- Cadastre
- Asset Protection Zone

Classified Vegetation

- Modified to non vegetated and low threat

Scale 1:6,000

0 80 160 240 Metres

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Scott River Wind Farm, Scott River Road

Figure 7: Bushfire Management Measures (Proposed Building and Substation Envelopes)

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Legend

Mitigation Measures

- Firewater Tank (45kL)
- Firewater Tank (10kL per building)
- Transmission Line
- Internal Driveway (WA Guidelines)
- Internal Driveway (CFA Guidelines)
- Wind Farm Building Extent
- Cadastre
- Asset Protection Zone

Classified Vegetation

- Modified to non vegetated and low threat

Scale 1:2,000

0 20 40 60 Metres

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Figure 7: Bushfire Management Measures - zoom (Proposed Building and Substation Envelopes)

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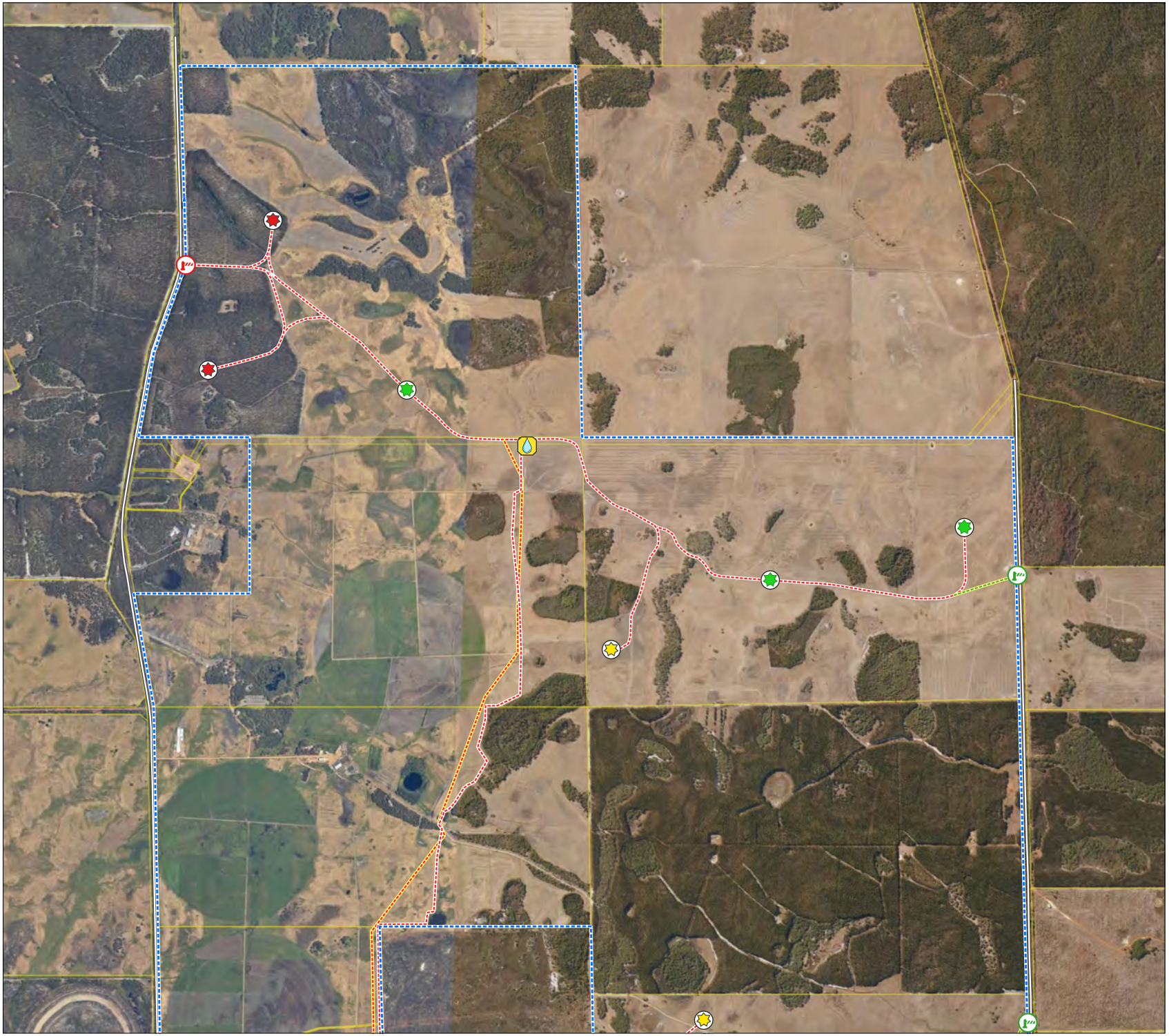

Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Wind Turbine (High Risk)
- Firewater Tank (45kL)
- Transmission Line
- Public Road
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Wind Farm Development Boundary
- Cadastre

Scale 1:25,000

0 300 600 900 Metres

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Figure 8: Bushfire Management Measures - Renewable Energy Infrastructure (North)

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Legend

Mitigation Measures

- Wind Farm Site Entrance
- Existing Farm Gate
- Wind Turbine (Low Risk)
- Wind Turbine (Transition Risk)
- Firewater Tank (45kL)
- Firewater Tank (10kL per buildings)

- Transmission Line
- Public Road
- Internal Driveway (WA Guidelines)
- Internal Driveway (CFA Guidelines)
- Existing Farm Track
- Building and Substation Envelopes
- Wind Farm Development Boundary
- Cadastre
- Asset Protection Zone

Scale 1:25,000

0 300 600 900 Metres

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Scott River Wind Farm, Scott River Road

Figure 9: Bushfire Management Measures - Renewable Energy Infrastructure (South)

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6.0 Assessment against the bushfire protection criteria

6.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 4.

Table 4: Compliance with Bushfire Protection Criteria 7 (Development – Commercial and Industrial) of the WA Guidelines

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
Element 1: Location			
Not Applicable	Area 1: Not Applicable Area 2: Not Applicable	**Not Applicable**	Not Applicable
Element 2: Siting and Design			
Outcome O2 Ensure siting and design solutions: • manage or mitigate the bushfire risk to people, property and infrastructure; and • avoid, or where unavoidable, minimises the clearing of native vegetation	A2.1a Siting and Design Every habitable building achieves radiant heat impact not exceeding 29 kW/m² (BAL-29). A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m² (BAL-40 or BAL-FZ) The siting of a commercial or industrial habitable building, with a radiant heat impact exceeding 29 kW/m2 (BAL-40 or BAL-FZ) should only be considered where: • the lot was created prior to December 2015; and • there are demonstrated site characteristics and/or biodiversity or conservation values that prevent the achievement of a radiant heat impact not exceeding 29 kW/m2 (BAL-29); and • it is demonstrated that the reduction of the building footprint or a redesign to manage or mitigate the risk, is not practical or appropriate. If the provision of an APZ in accordance with Acceptable Solution A2.2 cannot be achieved, then the vegetation immediately surrounding the building is to be managed as defendable space in accordance with Appendix B.2, Table 9 – APZ technical requirements.	**Acceptable Solution** **Not Applicable**	A2.1a Siting and Design The BAL contour map (see Figure 6) demonstrates that following completion of development including implementation of all nominated APZs and low threat vegetation: • The nominated building envelope will be compliantly sited in areas of BAL-29 or less. • The substation envelope will also be sited in areas of BAL-29 or less. Based on the BAL mapping, it has been demonstrated that the site has capacity to ensure all proposed permanent buildings (and the associated firewater tank) can be sited in BAL-29 or lower, and on this basis, compliance with A2.1a is achieved. Should any habitable building be required other than that nominated above, the required siting shall be assessed by an accredited bushfire practitioner. A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m² (BAL-40 or BAL-FZ) Not applicable as all proposed buildings will be sited in BAL-29 or lower.
	A2.2 Asset Protection Zone (APZ) Where a habitable building cannot be wholly within an area with a radiant heat impact not exceeding 29 kW/m² (BAL-29) in its predevelopment state, an APZ is to be provided and meet the following requirements: **Width**: the APZ is to be measured from any external wall or supporting post or column of the building, and of sufficient size to ensure the radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29) to any part of the building, in all circumstances. **Location:** the APZ is to be contained solely within the boundaries of the lot, except in instances where: • the vegetation on the adjoining lot(s) is, and will continue to be, low threat as per Clause 2.2.3.2 of AS 3959 or the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme, on an ongoing basis in perpetuity; or • the adjoining land is and will remain in perpetuity, non-vegetated **Management:** the APZ is managed in accordance with the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme.	**Acceptable Solution**	On completion of development, sufficient separation between habitable buildings and unmanaged post-development vegetation will be provided by: • 9 m wide APZ around the perimeter of the nominated building envelope. ◦ All other land within the nominated envelope is to be either non-vegetated or managed low threat vegetation. The preference is that this area is kept as non-vegetated as possible. ◦ Alternatively, targeted 9 m APZs could be established around all proposed buildings and firewater tanks within the building envelope, so that they are sited in BAL-29 or lower without managing/clearing the entire envelope. This would require review by an accredited bushfire practitioner prior to occupancy. • 9 m wide APZ around the perimeter of the nominated substation envelope. ◦ All other land within the nominated substation envelope is to be non-vegetated elements. The proposed APZs and vegetation management are to be implemented and maintained by the Proponent in accordance with APZ standards from the WA Guidelines (see Appendix 2), AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix 3) and the Shire's firebreak (see Appendix 6). In addition to the requirements above for habitable buildings proposed as part of this development, the BRMP that accompanies this BMP also nominates additional vegetation modification and management requirements for the renewable energy infrastructure, which are

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
			summarised in Section 5.0.
	A2.3 Clearing of native vegetation The development avoids, or where unavoidable, minimises the clearing of native vegetation.	**Acceptable Solution**	The APZs around proposed buildings are limited to BAL-29, which limits any clearing associated with the bushfire risk management. Additionally, the proposed buildings are sited in existing grassland areas (i.e. paddocks), where the implementation of APZs is likely to only require clearing or regular slashing of grassland.
	A2.4 Storage of hazardous, flammable and/or combustible materials Where a proposed land use will include the storage of hazardous, flammable and/or combustible materials as part of its ongoing day to day operations, the materials are to be stored in an area that: • is subject to a radiant heat impact not exceeding 29 kW/m2 (BAL-29); • is non-combustible and shields the materials to reduce their exposure to radiant heat from the bushfire to levels significantly lower than 29 kW/m^2 and prevents the entry of debris and embers; and limits to the degree necessary and practical, the escape of sources of ignition from the stored materials into bushfire prone vegetation.	**Not Applicable**	There are no significant quantities of hazardous, flammable or combustible materials associated with the proposed development. Notwithstanding, if any significant quantities of hazardous, flammable and/or combustible materials are introduced to the development, they should be sited in areas of BAL-29 or lower as a minimum and protected from bushfire impact, with the final siting and bushfire risk management to be reviewed by an accredited bushfire practitioner.
Element 3: Vehicular access			
Outcome O3 Ensure the design and capacity of vehicular access and egress provide: • for efficient and effective evacuation to a suitable destination(s) and/or • as a contingency measure for vulnerable land uses, an on-site shelter, where demonstrated appropriate, as a last resort option.	A3.1 Private Driveway There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).	**Acceptable Solution**	Given there is no existing reticulated town main water supply in the local area, the internal driveway accessing the nominated building envelope is to comply with the requirements of A3.1, including the following: • Comply with the requirements in Appendix B.3 Table 10, Column 5 (see Appendix 4) • Driveways are either to be at least 6 m wide, or if less than 6 m wide, must be at least 4 m wide and require 20 m long passing bays every 200m that increase the overall driveway width to no less than 6 m wide. • Provide compliant turnarounds (see Appendix 4) or loop roads within 30 m of each permanent building • Provide access to the firewater tanks (or tank suction connection) in accordance with A4.1, to enable attending fire appliances to refill, and provide hardstand adjacent to tank suction connection and sufficient locations for fire appliance turnaround. • All wind farm gates, including those at main site entrance but excluding existing farm gates, are to have clear opening of no less than 6 m. The Proponent is responsible for the construction and ongoing management of internal driveways. In addition to the requirements above for access to the building envelope, the project BRMP that accompanies this BMP also nominates additional internal vehicular access arrangement for the renewable energy infrastructure, which are summarised in Section 5.0.
Element 4: Water			
Outcome O4 Ensure that sufficient water is available to enable people, property and infrastructure to be defended from bushfire.	A4.1 Water Supply Where a reticulated water supply is existing or proposed, a hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these specifications cannot be met, a water tank(s) should be provided in accordance with the requirements of Appendix A.4, Table 11 – Water supply dedicated for bushfire firefighting.	**Acceptable Solution**	Given there is no nearby reticulated town main water supply or street hydrants, the bushfire fighting water supply for the future habitable buildings will need to be from static firewater tank/s as follows: • The tank is to have no less than 10 kL per building (including those within the substation envelope). • This firewater tank for the buildings, can either be collocated or combined with, the 45 kL firewater tank at the wind farm building envelope, required for the wind turbines (see Section 5.3.2) The firewater tank within the building envelope is to comply with the relevant technical requirements from the WA Guidelines (see Appendix 5) and the requirements from the CFA Guidelines including:

Bushfire protection criteria		Development response	
Outcomes	**Acceptable Solutions**	**Method of compliance**	**Proposed bushfire management measures**
			• Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (e.g. wind turbines etc.). • The hard-suction point must be positioned within 4 m to a hardstand area or internal driveway, and protected from mechanical damage where necessary, and provide a clear access for emergency services personnel. The firewater tank is to be sited within the building envelope to ensure it is an area of BAL-29 or lower. The firewater tank is to be installed, filled and maintained for the life of the project by the Proponent. In addition to the requirements above for firewater to the building envelope, the project BRMP that accompanies this BMP also nominates additional firewater tanks around the overall wind farm for the renewable energy infrastructure, which are summarised in Section 5.0.

7.0 Responsibilities for implementation and management of the bushfire measures

Implementation of the BMP and BRMP applies to the Proponent to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 5 to drive implementation of all bushfire management works associated with this project.

Table 5: Responsibilities for implementation and management of the bushfire measures

No.	Implementation action
	Proponent (Building & Substation Envelope) - prior to building occupation
1	Establish APZs and NVZ at the building and substation envelopes and the firewater tank, in accordance with the dimensions and standards detailed in Section 5.1.1 of the BMP.
2	Construct the internal driveway from the main site entrance to the wind farm building and substation envelopes, in accordance with the dimensions and standards detailed in Section 5.2.1 of the BMP. Construct the main site entrance gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Install the static firewater tank for the building and substation envelopes in accordance with the requirements detailed in Section 5.3.1 and relevant Australian Standards.
4	Should a significant quantity of Dangerous Goods be proposed as part of development, comply with all relevant Dangerous Goods legislation, codes and relevant Australian Standards, and the additional requirements detailed in Section 5.9 of the BMP.
5	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
	Proponent (Renewable Energy Infrastructure) - prior to commissioning and facility occupation
1	Establish NVZs and APZs around all nominated renewable energy infrastructure (turbines, substation) and associated firewater tanks, in accordance with the dimensions and standards detailed in Sections 5.1.2 and 5.1.3 of the BMP.
2	Construct the internal driveway network to the renewable energy infrastructure (turbines) and associated firewater tanks, in accordance with the dimensions and standards detailed in Section 5.2.2 of the BMP. Construct the site entrance gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Install the nominated static firewater tanks for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3.2 of the BMP and relevant Australian Standards.
4	Provide a mobile fire trailer for the wind farm in accordance with the requirements detailed in Section 5.3.3 of the BMP.
5	Incorporate all the renewable energy infrastructure design, construction, installation and commissioning requirements detailed in Section 5.4 of the BMP for the facility. • Turbine automatic fire detection, alarm and suppression • Operational status monitoring and control of turbines • Turbine shutdown • Aerial Notification and Marking • Substation and Transmission Line design and construction • Construction and Commissioning requirements
6	Prepare and install the Emergency Information Book and signage in accordance with the requirements of Section 5.6 of the BMP.

No.	Implementation action
7	Conduct the emergency services familiarisation site visit, in accordance with the requirements of Section 5.7 of the BMP.
8	Develop and implement the site emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.8 of the BMP
9	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
Proponent (Building & Substation Envelope) – ongoing	
1	Maintain APZs and NVZ at the building and substation envelopes and the firewater tank, in accordance with the dimensions and standards detailed in Section 5.1.1 of the BMP.
2	Maintain the internal driveway from the main site entrance to the wind farm building and substation envelopes, in accordance with the dimensions and standards detailed in Section 5.2.1 of the BMP.
3	Install the static firewater tank for the building and substation envelopes in accordance with the requirements detailed in Section 5.3.1 and relevant Australian Standards. Ensure the firewater tank remains filled at all times, especially during bushfire season.
4	Review whether there are any introduced Dangerous Goods to the wind farm, and comply with all relevant Dangerous Goods legislation, codes and relevant Australian Standards, and the additional requirements detailed in Section 5.9 of the BMP.
5	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.
Proponent (Renewable Energy Infrastructure) – ongoing	
1	Maintain the NVZs and APZs around all nominated renewable energy infrastructure (turbines, substation) and associated firewater tanks, in accordance with the dimensions and standards detailed in Sections 5.1.2 and 5.1.3 of the BMP.
2	Maintain the internal driveway network to the renewable energy infrastructure (turbines) and associated firewater tanks, in accordance with the dimensions and standards detailed in Section 5.2.2 of the BMP.
3	Maintain the static firewater tanks for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3.2 of the BMP and relevant Australian Standards. Ensure the firewater tanks remains filled at all times, especially during bushfire season.
4	Maintain the mobile fire trailer for the wind farm in accordance with the requirements detailed in Section 5.3.3 of the BMP. Ensure the water and fuel tanks remain filled at all times, especially during bushfire season.
5	Undertake the ongoing operation and maintenance requirements for the renewable energy infrastructure as detailed in Section 5.5 of the BMP for the facility, including: • Ongoing compliance with the endorsed BMP • Regular and ongoing inspection and auditing • Conducting routine maintenance and any required repair activities for all infrastructure, equipment, vehicles and fire detection and suppression systems.
6	Review, and if required update, the Emergency Information Book and signage in accordance with the requirements of Section 5.6 of the BMP.
7	Continue the emergency services familiarisation visits, in accordance with the requirements of Section 5.7 of the BMP.
8	Review, and if required updated, the site emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.8 of the BMP
9	Conduct ongoing review of the project Bushfire Risk Management Plan (BRMP), to ensure it still accurately reflects the risks posed by the development.

No.	Implementation action
10	Comply with the Shire of Augusta-Margaret River firebreak notice as it applies to the wind farm facility only, as detailed in Section 5.11 of the BMP.

8.0 References

Country Fire Authority (CFA) 2023, *Renewable Energy Facilities: Design Guidelines and Model Requirements v4,* CFA, Melbourne.

Department of Fire and Emergency Services (DFES) 2024, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: https://maps.slip.wa.gov.au/landgate/bushfireprone/,

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Linfire 2026, *Bushfire Risk Management Plan (Renewable Energy): Scott River Wind Farm*, Linfire Consultancy, Perth.

Western Australian Planning Commission (WAPC) 2024, *State Planning Policy 3.7: Bushfire*, November 2024, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2024, *Planning for Bushfire Guidelines*, November 2024, Western Australian Planning Commission, Perth.

Appendix 1 Vegetation plot photos and description



Photo ID: 1a



Photo ID: 1b



Photo ID: 1c



Photo ID: 1d



Photo ID: 1e



Photo ID: 1f

Plot number	Plot 1 (some in foreground to be modified to Plot 3)
Vegetation classification	Class G Grassland
Description / justification	Grassland greater than 100 mm in height

Appendix 2 APZ standards (from WA Guidelines)

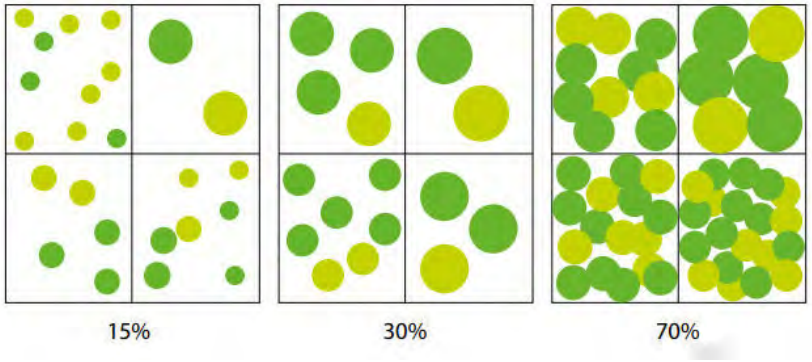
An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defendable space and reducing the potential for direct flame contact, radiant heat exposure and ember attack. The APZ allows emergency services access and provides an area for firefighters and home-owners to defend their property.

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

Vegetation management within an APZ should provide defendable space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined below.

Table 9: Asset Protection Zone Technical Requirements

- **Trees* (> 6 metres in height)**
  - Trunks at maturity should be a minimum distance of six metres from all elevations of the building.
  - Branches at maturity should not touch or overhang a building or powerline.
  - Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation.
  - Canopy cover within the APZ should be <15 per cent of the total APZ area.
  - Tree canopies at maturity should be at least 5 metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.



- **Shrub* and Scrub* (0.5 metres to 6 metres in height)**
  - Should not be located under trees or within three metres of buildings.
  - Should not be planted in clumps >5 square metres in area.
  - Clumps should be separated from each other and any exposed window or door by at least 10 metres.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height)**
  - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load'.
  - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **Grass**
  - Grass should be maintained at a height of 100 millimetres or less, at all times.
  - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.

Table 9: Asset Protection Zone Technical Requirements

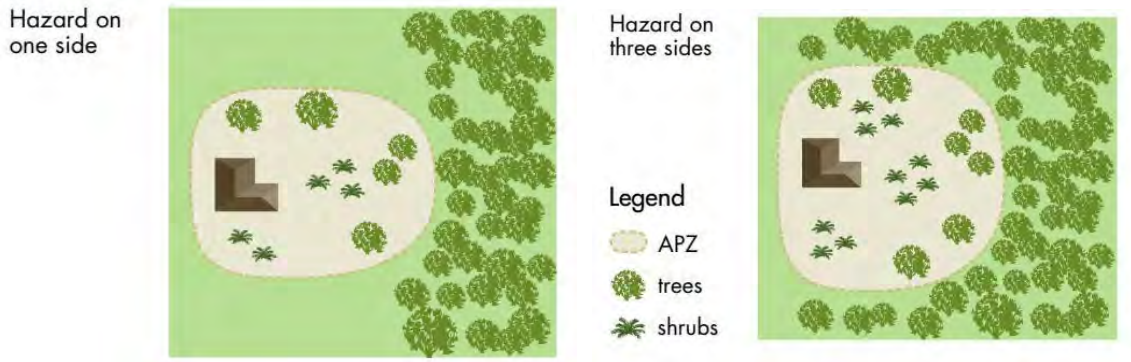
- **Fine Fuel load (combustible dead vegetation mater <6 mm in thickness)****
  - Should be managed and removed on a regular basis to be maintained as low threat vegetation.
  - Should be maintained at <2 tonnes per hectare (on average).
  - Mulches should be non-combustible such as stone, gravel, shells, rock or crushed mineral earth or wood mulch >5 millimetres in thickness.
- **Defendable Space**
  - Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **LPG Cylinders**
  - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.
  - The pressure relief valve should point away from the house.
  - No flammable material within six metres from the front of the valve.
  - Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

*** Fine fuel load:*

- *is the combustible, dead or dry vegetation matter on the ground, near ground, or elevated. Fine fuel includes grass, leaves, bark and twigs less than six millimetres in diameter that ignite readily and are burnt rapidly when dry.*
- *Fine fuel should be maintained at less than 2t/ha (100gm/m^2 equates to 1t/ha).*
  - *To estimate a fuel load (in t/ha), collect the dry fine fuel from a representative one square meter and weigh (in grams using kitchen scales) and multiply the weight by 0.01.*

Figure 25: Design of an Asset Protection Zone



B.2.2 Designing an Asset Protection Zone

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed

space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

An APZ should provide the greatest level of vegetation management within at least three metres of a habitable building, to ensure adequate unobstructed defendable space for emergency services to operate. This area should contain minimal vegetation and be free of combustible materials and obstructions. Within the remainder of the APZ, planting of vegetation can increase as you move farther away from the building.

The placement of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material will break up fuel continuity and reduce the likelihood of vegetation within an APZ supporting a bushfire. It is important to consider the plant density and final structure and form of plants in their mature state.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation to create horizontal and vertical separations between the retained vegetation.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, shells, rock and crushed mineral earth is encouraged. Very fine or light mulch (such as shredded pine bark, pine needles, or poplar woodchips) less than five millimeters in diameter should be avoided. It is recommended that wood mulch is used in garden beds or areas where the moisture level is higher by regular irrigation, and these areas are separated with non-combustible elements, such as pathways and open spaces.

Incorporation of landscaping features, such as masonry feature walls, can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged within an APZ

B2.3 Management of an Asset Protection Zone

Ongoing maintenance of an APZ is usually enforced through a condition of a development approval, which should refer to Table 9 APZ technical requirements within this Appendix.

In addition to regular maintenance of an APZ, further bushfire protection can be provided by:

- ensuring gutters are free from vegetation
- installing gutter guards or plugs
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps
- trimming and removing dead plants or leaf litter
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank
- following the requirements of the relevant local government firebreak notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. Embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building.

Best practice recommends objects within the APZ are moved away from the building prior to any

bushfire event.

Objects may include, but are not limited to:

- door mats
- outdoor furniture
- potted plants
- shade sails or umbrellas
- plastic garbage bins
- firewood stacks
- flammable sculptures
- playground equipment and children's toys.

B2.4 Plant Flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- **Fire resistant** – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- **Fire-retardant** – plants that can absorb more of the heat of the approaching bushfire without burning, compared to more flammable plants.
- **Fire wise** – plants that have been identified and selected based on their low flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire-retardant plant species that suit the environmental characteristics of an area.

When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;
- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Appendix 3 Low Threat Vegetation (AS 3959 Clause 2.2.3.2)

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

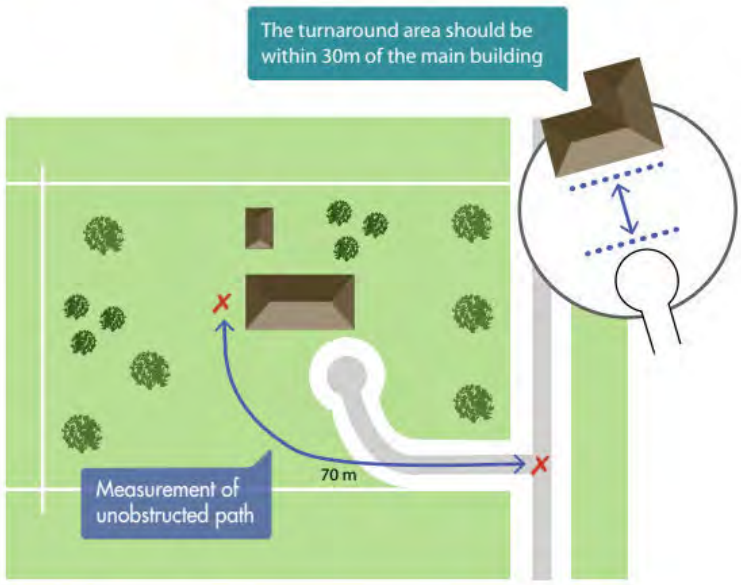
(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

Appendix 4 Vehicular access technical standards of the WA Guidelines

Private driveways
Acceptable Solution A3.1
There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres • (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).
Explanatory note B3.8
Emergency services vehicles typically operate from the street frontage in areas serviced by reticulated water and where the distance from the public road to the farthest part of the habitable building is no greater than 70 metres. In the event the habitable building cannot be reached by hose reel from the public road, emergency services vehicles will need to gain access via the driveway to the property. Emergency services vehicles will also need to gain access to the property where access to water is provided by onsite water tanks. In these situations, the driveway and battle-axe access leg (if applicable) will need to be wide enough for access by an emergency services vehicle and a vehicle to evacuate. It is acceptable for a private driveway to have a carriageway width of four metres with a traversable verge of one metre on either side of the carriageway. Turn-around areas (**Figure 38**) should be available for conventional two-wheel drive vehicles and type 3.4 fire appliances and should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Figure 38: Design requirements for a private driveway where required 

Private driveways

Figure 30: Design requirements for a turn-around area

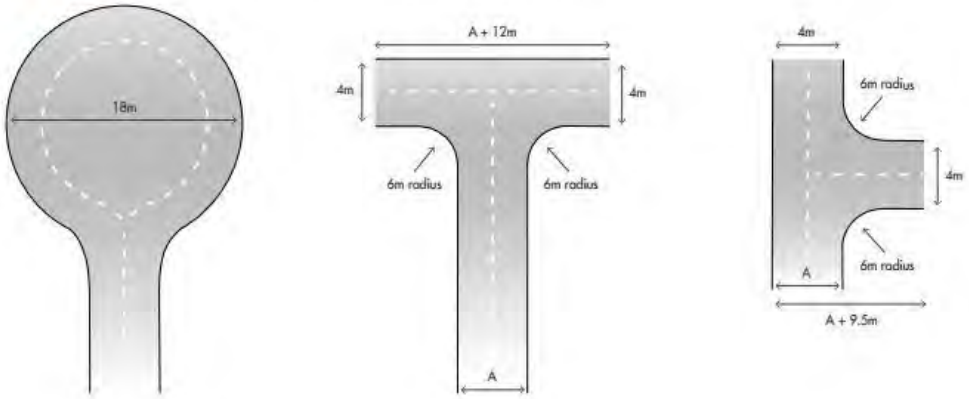


Table 10: Vehicular access technical requirements

	1		2		3		4		5	
TECHNICAL REQUIREMENTS	**PERIMETER ROADS**		**PUBLIC ROADS**		**EMERGENCY ACCESS WAY[3]**		**FIRE SERVICE ACCESS ROUTE[3]**		**BATTLE-AXE & PRIVATE DRIVEWAYS[1]**	
MAP OF BUSH FIRE PRONE AREAS DESIGNATION	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**
Minimum horizontal clearance (metres)	12	8	See note 5		10	6	10	6	6	
Minimum vertical clearance (metres)	4.5									
Minimum weight capacity (tonnes)	15									
Maximum grade unsealed road[2]	See note 5		See note 5		1:10 (10% or 6°)					
Maximum grade sealed road[2,4]					1:7 (14.3% or 8°)					
Maximum average grade sealed road					1:10 (10% or 6°)					
Minimum inner radius of road curves (metres)					8.5					

Notes:

[1] Driveways and battle-axe legs to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision where not required to comply with the widths in this Appendix or the Guidelines.

[2] Dips must have no more than a 1 in 8 (12.5% - 7.1 degrees) entry and exit angle.

[3] To have crossfalls between 3 per cent and 6 per cent.

[4] For sealed roads only the maximum grade of no more than 1 in 5 (20 per cent) (11.3 degrees) for no more than 50 metres is permissible, except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed.

[5] As outlined in the Institute of **Public Works Engineering Australasia (IPWEA) subdivision guidelines, Liveable Neighbourhoods, Austroads Standards** Main Roads standard, supplement, policy or guideline and/or any applicable or relevant local government standard or policy.

Appendix 5 Water technical standards of the WA Guidelines

Appendix B.4 – Water Supply
B4.1 Construction and Design Technical requirements
• An above-ground tank and associated stand should be constructed of non-combustible material. • Below-ground tanks should have a 200 millimetres diameter access hole to allow tankers or emergency services vehicles to refill direct from the tank, with the outlet location clearly marked on the surface. • Above and below ground tanks may need to comply with AS/NZS 3500.1:2018. • An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. • Where an outlet for an emergency services vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply. B4.1.1 Pipes and Fittings All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire hazard and be in accordance with the applicable section below, unless otherwise specified by the local government. B4.1.2 Fittings for above-ground water tanks • Commercial land uses: 125mm Storz fitting; or • Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or • Standalone water tanks: 50mm male camlock coupling with full flow valve; or • Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires. B4.1.3 Remote outlets In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.
B4.2 Use of Water Supply
• The combination of drinking water and water for firefighting purposes is not recommended, as stagnant water may alter the quality of the drinking water and the emergency services, by law, may not be able to take water from the water supply to suppress a bushfire. • Combining drinking water and water for firefighting purposes is contrary to provisions within clause 4.2.3 of AS/ NZS 3500.1:2021
B4.3 Independent Water and Power Supply
• Water tank/s are to be provided in accordance with Table 11, Water supply dedicated for bushfire firefighting purposes.
B4.5 Location of Water Tanks and Hydrants
• Surrounding vegetation should be considered when locating a water tank. • Avoid locations where the tank will be situated underneath existing vegetation or where vegetation will grow against or overhang the tank, (Figure 39). Where a tank is on the bushfire hazard side of a building, sufficient shielding for the protection of firefighters should be provided. In addition to the tank location, the fitting should be positioned and/or shielded from the bushfire hazard to allow access by emergency services.

Appendix B.4 – Water Supply

Figure 39: A good and bad example of landscaping around a water tank



Table 11: Water supply dedicated for bushfire firefighting purposes

SECTIONS FROM THE PLANNING FOR BUSHFIRE GUIDELINES					
SECTION 5[2] STRUCTURE PLANS AND SUBDIVISION APPLICATIONS		**SECTION 6[2] DEVELOPMENT – RESIDENTIAL**	**SECTION 7[2] DEVELOPMENT – COMMERCIAL & INDUSTRIAL**	**SECTION 8[2] – DEVELOPMENT – VULNERABLE LAND USES**	
One additional lot	10,000 litre water tank per lot	10,000 litre water tank per habitable building	For each habitable building - 10,000 litre per 1,500 m^2 of floor space up to 50,000 litre. Provided in a water tank.	Camping ground	At the discretion of the local government
Three to 24 lots	10,000 litre water tank per lot[1] **or** 50,000 litre strategic water tank				
25 lots or more	50,000 litre per 25 lots or part thereof, provided as a strategic water tank(s) **and/or** 10,000 litre water tank per lot			Other vulnerable land uses	For each habitable building - 10,000 litre per 500 m^2 of floor space up to 50,000 litre. Provided in a water tank.

Notes:

[1] Evidence that the identified water supply amounts in either column denoted is to be provided at the relevant planning stage.

[2] where more than one habitable building is proposed, strategic water tanks are to be provided in accordance with Section 5 requirements and at the discretion of the Local Government.

Appendix 6 Shire of Augusta-Margaret River Firebreak Notice

Firebreak Notice 2025-2026

BUSH FIRES ACT 1954

The following Notice is hereby given to all owners and/oroccupiers of land within the Shire of Augusta Margaret River.

PURSUANT to the powers contained in Section 33 of the Bush Fires Act 1954, you are hereby required and therefore ordered by the local government to carry out fire prevention work in accordance with the requirements of this Notice, on or before **30 November 2025** and maintain the requirements up to and including **12 May 2026** except for APZs which must be maintained all year round.

Inspections, appointments, education, and compliance

Owners and occupiers who would like an early inspection by appointment, for reasons including biosecurity, locked gates, and dangerous animals,or for an explanation on the requirements of this Notice, should contact Rangers as soon as possible and by no later than **1 November 2025**. Where inspections by appointment are not requested, Rangers are appointed as Bush Fire Control Officers with the power to enter land under the Bush Fires Act 1954 and will be inspecting properties for compliance without further notice from **1 December 2025**.

People who do not comply with this Notice or a Variation to this Notice may be issued with an infringement Notice ($250) or prosecuted with a penalty up to $5,000. The Shire of Augusta Margaret River may carry out the required work on the land at the cost of the owner/occupier.

Requirements of landowners and occupiers:

1.All landowners/occupiers must comply with the requirements in **Part A** of this Notice.
2.Owners/occupiers of Residential lots 4000m2 and under must comply with the requirements of **Part A** and **Part B**.
3.Owners/occupiersof Residential and Rural/Residential lots 4001m2 and over must comply with the requirements of **Part A** and **Part C**.
4.Owners/occupiers of Rural lots (excluding Plantations, Vineyards, Orchards,and Groves) must comply with the requirements of **Part A** and **Part D**.
5.Owners/occupiers of Plantations, Vineyards, Orchards, and Groves must comply with the requirements of **Part A** and **Part E or F**, depending upon the land use.

Definitions of terms referred to in Parts A, B, C, D, E and F of this Notice

Asset Protection Zone (APZ) - means an area of low fuel load within 20 metres from the external walls of any habitable building.
Habitable Building - means any building people reside in and any other building within 6m of that building, but excludes a water tank.
Flammable Material - means accumulated fuel such as dry grass, leaf litter, twigs, branches, trash, dead trees, firewood, stored fuels, that can be easily ignited or is likely to catch fire and burn. It includes any other thing deemed by an authorised officer to be likely to catch fire but excludes living trees, growing bushes, and plants in gardens and/or lawns under cultivation.
Bushfire Management Plan (BMP) - means a plan prepared specifically for a property in satisfaction of a development approval or subdivision condition.
Driveway/Access Way - means the access route from a road reserve to ahabitable building.
Firebreak - means an area of land that has been cleared of all trees, bushes, grasses, and any other object or thing which may be flammable, leaving a bare surface to a width specified under the requirements in Parts A, B, C or D with a 4 metre high vertical clearance.
Trafficable - means a firm, stable surface capable of allowing a 4WD fire appliance to enter, exit and turn any corner (10 metre radius) without reversing.
Variation - means an individual property-specific Firebreak Notice served by the Shire on an owner under s33(2) of the Bush Fires Act 1954.

Clearing permits and exemptions

Property owners that clear vegetation in compliance with this Notice will be exempt from the requirement to seek approvals or permits. Owners should attempt to minimise environmental impacts as much as possibleand should contactthe Shire if they believe that clearing beyond the requirements in this Notice are necessary to reduce fire risks or if they are aware of any protected flora or fauna. **Owners who clear beyond the requirements in this Notice without approval may be subject to prosecution.**

Firebreak Notice 2025-2026

Variations to the requirements of this Notice

Where compliance with the Noticeis not practical due to environmental considerations or site-specific constraints such as topography, water course or steep gradients, owners may apply to the Shire of Augusta Margaret River for a Variation to the Notice. Variations must provide an alternative means of meeting the objectives of the Notice, including bushfire risk mitigation and property access, considering site-specific constraints and advantages and not all properties will be able to accommodate Variations. Applications must be completed on the approved form, available upon request or downloaded via theShire's website. Applications for a Variation must be submitted **before 1 November 2025 or after 1 May 2026**.

Part A - Requirements applying to all properties in the district of Augusta Margaret River:

1. Asset Protection Zone (APZ) - The fuel loading (flammable material) in the APZ is to be reduced and maintained to less than 2 tonnes per hectare. Trees must not be closer than 2 metres to a building, and trees must not overhang a building within 4 metres of the external roof. **APZ requirements apply to all properties (excluding Vacant lots), regardless of size, and must be maintained all year round.** (Note: Numerous online resources assist in identifying excessive fuel loading and ideal APZ standards. Rangers can also visit outside of inspection periods to provide property-specific advice.)

2.Bushfire Management Plan (BMP) - properties subject to an approved BMP must comply with the requirements of their BMP in addition to the requirements of this Notice. (Note: At the discretion of the Shire, Variations may be issued that exempt some owners from compliance with requirements in this Notice where they are meeting alternate methods and requirements for compliance in an approved Bushfire Management Plan.)

3.Driveway/Access Way - any property with a habitable building must have a driveway/access way that is a minimum of 4 metres wide up to a maximum of 6 metres wide with a minimum 4 metre vertical clearance and a turnaround area to allow emergency vehicles to access buildings on a property and exit. There must be no encroachment into the driveway by any vegetation (living or dead) or any other object, this includes gates, which if installed, must open the entire trafficable width of the driveway.

4.Firebreak - 2 metre wide firebreaks are required around all piles of garden refuse and/or wood stacks, fuel and fodder.

5.Gutters and Rooftops - All gutters and roofs must be free of excessive twigs, leaves, and plant material.

Part B - Additional requirements applying to Vacant lots 4000m^2 and under:

1. Vacant cleared land - grasses maintained by means of slashing/mowing/grazing to less than 10cm in height. Slashed/mowed grasses are to be removed from the lot.

Part C - Additional requirements applying to Residential/Rural Residential lots 4001m^2 and over:

1.Firebreak - 3 metre wide trafficable firebreaks must be maintained within 10 metres of all boundaries.
2.Vacant cleared land - grasses maintained by means of slashing/mowing/grazing to less than 10cm in height.

Part D - Additional requirements applying to Rural lots (excluding Plantations, Vineyards, Orchards, and Groves):

1.Firebreak - 3 metrewide trafficable firebreak must be maintained within 100 metres of a boundary that abuts a road reserve. Where land is actively grazed or maintained to less than 10cm, the firebreak within 100 metres of a boundary that abuts a road reserve may be reduced to 2 metres.
2.Grasses to be maintained – slashed/mowed/grazed to lessthan 10cm in height.

Part E - Additional requirements applying to Plantations:

1.Firebreak - 10 metre wide mineral earth firebreak around each cell or block. 3 metres must be trafficable.
2.Grasses to be maintained - slashed/mowed/grazed to less than 10cm in height.

Part F - Additional requirements applying to Vineyards, Orchards, and Groves:

1.Firebreak - 5 metre wide mineral earth firebreak around each cell or block. 3 metres must be trafficable.
2.Grasses to be maintained - slashed/mowed/grazed to less than 10cm in height.

Appendix 7 Bushfire Emergency Management Plan Requirements

The Proponent is to develop an emergency management plan for the facility, which comprehensively details the procedures for preparing for, and responding to, hazards to the facility, including the following for off-site bushfire, and on-site fire, emergencies:

- Facility details including:
  - Facility description, including infrastructure details, operations, number of personnel, and operating hours.
  - Up-to-date contact details for facility personnel, and any relevant off-site personnel that could provide technical support during an emergency including contact information for 24/7/365 specialist technical support for the renewable energy infrastructure.
  - Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
  - The following wind turbine details and plans are to be provided:
    - Schematics and technical data for wind turbines, including the number installed on-site, and internal fire systems.
    - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
    - The shutdown and/or isolation procedures if the turbines are involved in fire or emergency incident, and appropriate personnel contact details to verify that the turbine has been shutdown and de-energised during emergencies.
  - Details of any emergency resources, including fire detection and suppression systems and equipment; gas detection; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid.
  - A manifest of dangerous goods (if required under the applicable Dangerous Goods legislation and codes, and relevant Australian Standards), including Safety Data Sheets (SDS).
- The identified risks and hazards associated with the renewable energy infrastructure, including but not limited to:
  - Electrical faults and renewable energy infrastructure fire,
  - Bushfire
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:

  - Ongoing compliance with the approved BMP and BRMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
  - Ensuring ongoing maintenance of all buildings, especially the onsite O&M building.
  - Ensuring ongoing maintenance of all fire and communication systems.
  - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
  - Modifying Site Activities (based on Forecast FDR, TFB and/or HVMB)
  - Monitoring DFES Bushfire Emergency Warnings (and/or bushfire activity within 50km of the facility, during bushfire season, and understanding decision-making triggers.
- Detail emergency response procedures to address the nominated hazards, including for:
  - Bushfire and
  - Onsite fire in renewable energy infrastructure

Bushfire preparedness and pre-emptive activities

Year-round (with focus on the month prior to bushfire season)

- Ensure ongoing compliance with endorsed BMP including:
  - Vegetation management must be conducted as per the BMP including maintenance of APZs and NVZs.
  - Gutters, roof surfaces and valleys, kerbs, traps, sumps, bunds, drains, rooves or any other accumulation points for leaf litter, dry vegetation, or any other combustible materials must be cleared, and the debris removed from site.
  - Extraneous or unnecessary materials (fuel loads) must be removed from site (e.g. dilapidated/stored vehicles, plant or equipment; excess fuel/chemicals; any combustible waste materials).
- Bushfire preparedness housekeeping inspections:
  - Ensure all vehicle site access points, including emergency access points, are clear and accessible.
  - Ensure that all fire protection systems and equipment is unobstructed, in service and performing optimally.
- Fire detection, alarm and suppression systems, and any other communication and emergency equipment must be maintained in accordance with relevant codes and standards, and be in effective working order at all times
  - Any defects, faults or matters affecting the performance of systems must be identified through routine testing and servicing, with any maintenance activities and rectifications to be closed-out prior to bushfire season.
- Ensure Emergency Information Book and signage is up to date with the latest information, especially key contact names and phone numbers, as detailed in Section 5.6.
- Ensure local fire brigade is engaged on an ongoing basis, to ensure they are familiar with the site layout, specific hazards and fire detection and suppression systems as detailed in Section 5.7.
- Ensure the wind farm has registered with the Shire of Augusta-Margaret River for SMS

notifications for Harvest Vehicle Movement Bans (HVMB).

During the bushfire season

Monitor Forecast Fire Danger Rating (FDR) and Total Fire Ban Days (TFB)

- A nominated person/role is to be responsible for identifying, responding to and communicating the Fire Danger Rating, ideally four days ahead:
  - http://www.bom.gov.au/wa/forecasts/fire-danger-ratings.shtml [4 day FDR forecast] or
  - https://www.emergency.wa.gov.au/index.html#firedangerratings [current/next day FDR]
  - https://www.emergency.wa.gov.au/#totalfirebans [Total Fire Ban]
- This information must be communicated to everyone likely to be present on-site, and relevant off-site personnel.
- Undertake any modification of site activities based on forecast FDR or TFB (see below).

Modifying Site Activities (based on Forecast FDR and TFB)

- ***Moderate FDR or No Rating***
  - No specific daily monitoring or actions unless conditions change.
- ***High FDR***
  - Alert all site personnel and visitors of bushfire risk
  - No specific daily monitoring but remain vigilant to potential bushfires through visual checks, occasional check of online resources for emergency warnings and bushfires in the local area.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Extreme FDR***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for site shutdown and offsite evacuation, if required.
  - Conduct regularly visual checks throughout the day
  - Regularly check online resources for emergency warnings and bushfires in the local area.
  - Consider minimisation of site personnel and visitation requiring travel to and from the facility, as well as non-essential activities and high-risk maintenance activities.
  - Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Catastrophic FDR and TFB declared days***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for rapid site shutdown and offsite evacuation, if required
  - Conduct hourly visual checks throughout the day

- Conduct hourly check online resources for emergency warnings and bushfires in the local area.
- Postpone non-essential activities or high-risk maintenance activities at the facility.
- Minimise site personnel and visitation to only essential personnel.
- Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
- Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- Comply with all Total Fire Ban requirements including:
  - no fire or flames allowed in the open air
  - no open fires for the purpose of cooking or camping are allowed
  - no 'hot work' such as metal work, grinding, welding, soldering, gas cutting or similar is allowed unless a formal exemption has been obtained
  - no use of chainsaws, plant or grass trimmers or lawn mowers in bushland areas
  - no other activities that may start a fire
  - ensure equipment or machinery is mechanically sound
  - ensure all reasonable precautions are taken to prevent a bushfire igniting, including postponing any activity that could result in a bushfire ignition.

Monitoring and Modifying Site Activities (based on HVMB)

- Nominated personnel are to monitor for SMS warnings from the Shire for declared Harvest Vehicle Movement Bans (HVMB).
- If declared, comply with all HVMB requirements of the Shire, which typically including no:
  - Operation or movement of internal combustion engines (motor bikes, quad bikes, excavators, chain saws, ride on mowers, generators, plant equipment) used off-road in bushland or paddocks.
  - Undertaking 'hot works' such as welding, grinding or activity that may cause a spark or ignition unless an exemption issued by Department of Fire & Emergency Service (DFES) for essential services work on a total fire ban day.
  - Fire or flames allowed in the open air
  - Cooking outside in the open air using an open fire (this includes under verandas and patios)
  - Harvesting

Bushfire Monitoring, Triggers and Decision-Making

Bushfire Monitoring

Bushfire monitoring involves the identification of the DFES Bushfire Emergency Warnings (ADVICE, WATCH & ACT AND EMERGENCY) and/or bushfire activity within 50km of the facility, through the use of the Emergency WA website app (https://www.emergency.wa.gov.au/), or ABC local radio.

- ***If ADVICE warning or bushfire is within 25 km – 50 km of the site***
  - Liaise with the DFES if fire travelling toward the site.

- Consider reducing numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel).
- Make preparations to shutdown facility and conduct offsite evacuation procedures, depending on bushfire location and direction of spread, including:
  - Prepare for potential remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
  - Ensure onsite O&M building is properly prepared for onsite shelter, should it be required.
  - Ensure all other buildings and plant are properly secured.
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire and communications systems are ready for use.
- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

- ***If WATCH & ACT warning or bushfire is within 10 km – 25 km of the site***
  - Liaise with the DFES if fire travelling toward the site.
  - Prepare or commence shutdown facility, depending on bushfire location and direction of spread, including:
    - Prepare for potential remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
    - Ensure onsite O&M building is properly prepared for onsite shelter, should it be required.
    - Ensure all other buildings and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Prepare or commence offsite evacuation procedures depending on bushfire location and direction of spread, including:
    - Early reduction of numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location, if safe to do so, otherwise they are to remain onsite.
      - Ensure relocation of all wind farm personnel to the offsite safer location ahead of any bushfire impact on road network (including smoke impact).
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.
- ***If EMERGENCY warning or if bushfire is <10km or impact is imminent:***
  - Liaise with the DFES.
  - If safe to do so, commence or conduct facility shutdown depending on bushfire location and direction of spread, ideally in consultation with authorised DFES personnel (where possible), including:
    - Prepare to conduct remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
    - Ensure onsite O&M building is properly prepared for onsite shelter,

should it be required.
    - Ensure all other buildings and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Urgently undertake offsite evacuation procedures (if safe to do so) depending on bushfire location and direction of spread, including:
    - Relocate all site personnel and visitors to nominated offsite safer location ahead of any bushfire impact on road network.
  - If unsafe to evacuate offsite, urgently commence onsite shelter in place procedures including:
    - Prepare onsite O&M building for onsite shelter
    - Relocate all site personnel and visitors to the O&M building on conduct all shelter in place actions.
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

Offsite Evacuation and Onsite Shelter-in-Place Procedures

Ahead of deciding to evacuate offsite or remain onsite to shelter-in-place (which is the last resort response if unsafe to evacuate offsite), the following should be conducted:

- Assess the bushfire situation:
  - Review available information to determine bushfire location, direction and speed of travel
  - Determine if there are any DFES Bushfire Warnings issued
  - Contact and liaise with DFES for further information and guidance
  - Make a decision whether it is safe to evacuate to nominated offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel), or whether it is safer to shelter onsite in the O&M building (which should be a last resort action only).
  - Advise DFES of the decision, if possible.

Offsite Evacuation (and Facility Shutdown)

- Assemble all site personnel and visitors at the O&M control building
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) and evacuate to nominated offsite safer location.
  - Ensure sufficient transport is available for all personnel to travel to nominated offsite safer location with sufficient fuel to travel 100 km, water, fire extinguishers (if possible)
- Conduct facility shutdown actions (if sufficient time) including
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other buildings and plant are properly secured.
- Brief evacuees on offsite evacuation particulars including:
  - Confirm the offsite safer location (e.g. Margaret River, Augusta, Nannup or Busselton townsites depending on direction of fire travel)
  - The evacuation route to travel to the off-site safer location
  - The need to travel in convoys in case of vehicle failure

    - Where possible, the final evacuating personnel should leave in 2 vehicles.
- Monitor the leaving of site and arrival at nominated offsite safer location, and if anyone is missing, notify DFES immediately.

Onsite Shelter-in-place (and Facility Shutdown) – Last Resort Action Only

- Assemble all site personnel and visitors at the onsite O&M building
    - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) but remain onsite to shelter in place.
- Prepare onsite O&M building for shelter
    - Check the perimeter of building and put away all external combustible items and any loose items that could be projectiles
    - Close all doors and windows
    - Ensure all firefighting, emergency communication equipment and first aid supplies are available and ready for use, including positioning the mobile fire trailer in an accessible location adjacent to the O&M building.
    - Ensure all internal access routes within the building are open to enable people move to the available spaces
    - If installed, ensure any evaporative air-conditioning (HVAC) can be easily shutdown ahead of the fire impact. If possible, keep the water running and turn off the fan, otherwise shutdown completely.
    - Begin storing water for drinking (in containers) and review food stores
    - Consider collecting any blankets and fire extinguishers from other buildings
    - Soak towels and rugs in water and lay them along the inside of external doorways or block any other gaps for embers or smoke
- Conduct facility shutdown actions (if sufficient time and safe to do so) including
    - Ensure all vehicular access routes are open and available for use.
    - Ensure all fire systems are ready for use.
    - Ensure all other buildings and plant are properly secured.
- As bushfire impacts the facility:
    - All occupants are to be at the O&M building
    - Immediately before the fire arrives, wet down building, decks and landscaping close to the building. Turn off evaporative air-conditioning if not already done.
    - Ensure occupants get down low to limit exposure to smoke and drink plenty of water to avoid becoming dehydrated.
    - Regularly inspect the condition of the building including:
        - Regular inspection of the inside of the building, including the roof space for sparks and embers, and extinguish where possible and safe to do so.
        - If safe to do so, organise for regular patrols of the outside of the building to check for any signs of bushfire ignition and extinguish where possible and safe to do so. Those conducting the patrols are to wear appropriate PPE.
- Stay inside while the fire front is passing and don't leave until advised by DFES or local fire brigade (or decided by Chief Fire Warden) that the fire is no longer a threat or offsite evacuation can be safely conducted.
- If the building catches fire and/or conditions inside become unbearable:

    - Leave through the door furthest from the approaching fire
    - Relocate all occupants away from the fire or previously burned land.
- Once the fire has passed, and approval is provided to leave the building:
    - Go outside and extinguish any fires on the building or in adjacent landscaping.
    - Regularly inspect the inside and outside of the building for several hours.
    - Do not approach the renewable energy infrastructure (turbines, substation, transmission lines) until advised by DFES.

Onsite Renewable Energy Infrastructure Fire Response

The emergency response to any onsite fire in renewable energy infrastructure (especially turbines), is to include the following:

- Immediately notify of onsite fire, including location:
    - DFES and local fire brigade to enable rapid onsite turnout.
    - Relevant wind farm personnel
    - Landowners
- Immediately shutdown and deenergise any turbine/s on fire, and any other relevant turbines
- If possible, ensure relevant vehicular access routes are open and available, to enable attending firefighters to gain access to the O&M building and relevant turbine/s.
- Ensure all fire and communications systems are ready for use.
- If safe to do so, conduct first attack response on any spot fires with mobile fire trailer, until DFES arrival.
- Ensure attending firefighters have access to any relevant wind farm personnel (onsite or offsite) for specialist technical advice.

Emergency Management Plan Review, Training and Exercises

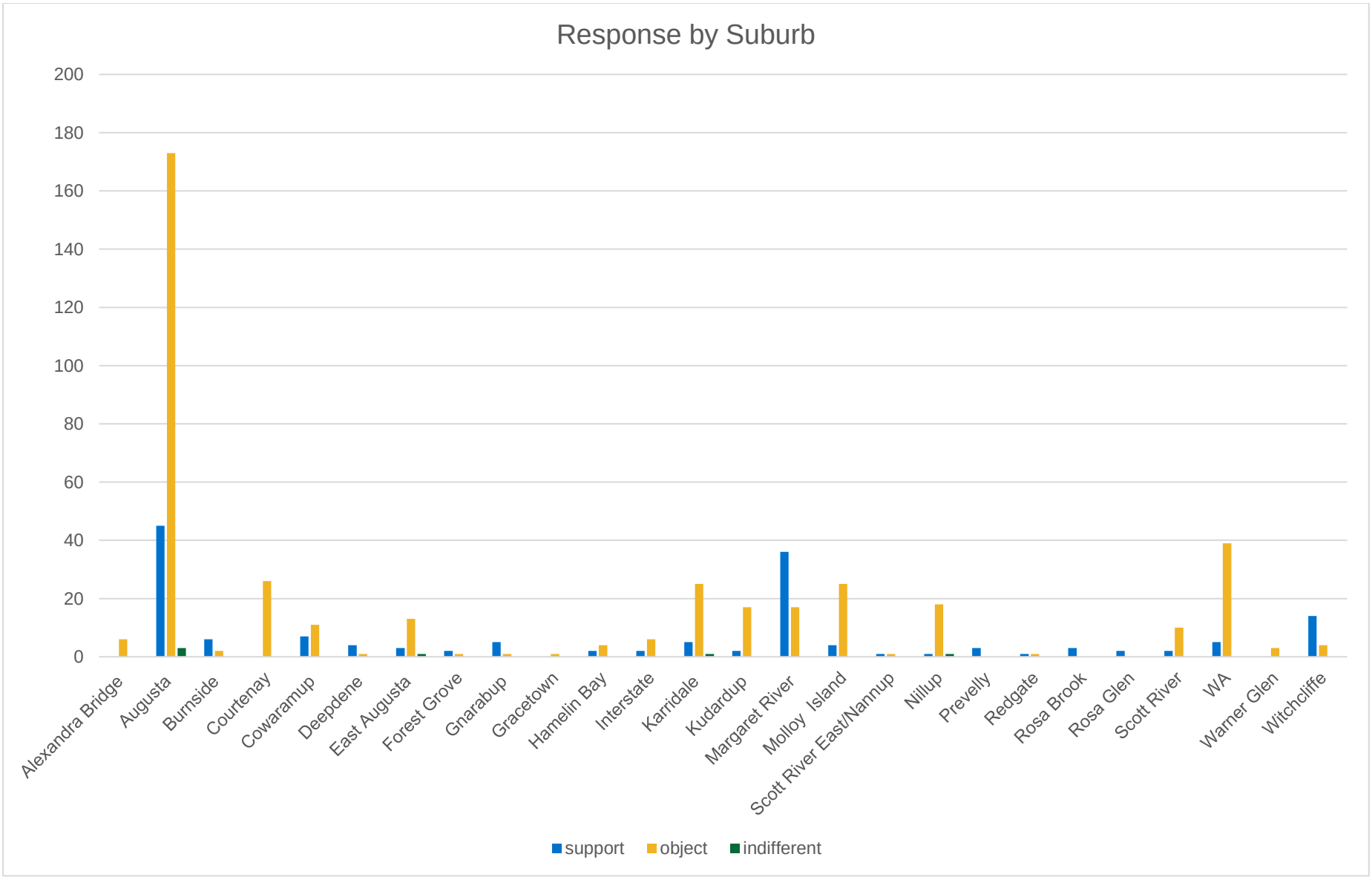
The emergency management plan is to be reviewed regularly as follows:

- At least annually to ensure currency and effectiveness
- Following any changes to the risk on-site pertaining to site infrastructure and operations
- After any activation of the plan or incident involving notification to the emergency services.
- After emergency exercises.

In addition to the review of the emergency management plan, it is critical to regularly train relevant staff and conduct exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. It also presents an opportunity to test the effectiveness of the plan and refine as required.

- Training should be conducted annually prior to bushfire season, as a minimum, and also at the commencement of employment.
- Exercises should be conducted annually prior to bushfire season, as a minimum, but ideally on a regular basis.

Attachment 5 – Summary of Submissions



Attachment 5 – Summary of Submissions

Theme	Number of mentions in submissions	Reasons
Visual Impact	218	• Excessive scale described as industrial and incompatible with the landscape. • Turbines of the proposed height would be highly visible over long distances and have dominance in views from Augusta. • Permanent, irreversible landscape change which would significantly change the existing rural and coastal landscape. • Concerns were raised about the loss of scenic views, dark-sky conditions and the open, undeveloped character of the area. • Visual assessment material was considered not to clearly demonstrate worst-case or cumulative impacts from multiple viewpoints.
Lack of certainty/not enough detail in application	218	• Key project details, including turbine numbers, locations and specifications, have not been finalised, preventing full scrutiny of the impact. • Reliance on management plans that will be worked out later. • The uncertainty undermines all the impact assessment/technical reports provided with the application. • Approval was perceived to be sought before all impacts were fully defined and assessed. • Insufficient detail means noise and health impacts cannot be verified. • Environmental risk is heightened by the lack of detail. • Community cannot meaningfully respond to an undefined proposal.
Acid Sulphate Soil risk	131	• Site described as high risk and well known for Acid Sulphate soils • Concern regarding disturbance for foundations, trenching, access road, dewatering and groundwater drawdown, and the exposure to ASS risk. • Contamination to groundwater, wetlands and water ways from ASS • Risk to agriculture use of the land • Inadequate investigation and site specific data
Noise	123	• Noise will be persistent and inescapable, setbacks considered inadequate. • In a quiet rural environment even small noise levels are intrusive

Attachment 5 – Summary of Submissions

		• Concerns particularly for night time impacts from noise, with noise perceived to be worse at night due to low background levels. • Noise modelling viewed as unreliable, calls for independent assessment/monitoring • Calls for commitments to independent and continuous monitoring after construction.
General environmental Impact	91	• The project was seen as introducing industrial activity into a sensitive natural environment. • Cumulative environmental impacts
Impact on Waterways and groundwater	76	• Excavation and dewatering may affect groundwater levels and connected rivers and wetlands. • Insufficient baseline data, seasonal surveys, groundwater modelling to define risks/impacts to waterways, TECs and wetlands. • Impact of ASS on waterways, wetlands and groundwater.
Impact on agriculture (loss of land)	70	• Turbine infrastructure, access roads and buffers could reduce flexibility in agricultural land use and future farm operations. • Risks to soil and water quality were highlighted, particularly in relation to acid sulphate soils and shallow groundwater systems. • Potential impacts on livestock wellbeing and normal farm management practices were raised.
Concerns from Beenup Mine	69	• The Beenup mine was cited as a local example of environmental harm caused by disturbing acid sulphate soils. • Long-term remediation at Beenup was referenced as evidence that impacts can be difficult to reverse. • The proximity of the proposed wind farm to the former mine raised concern about cumulative risk.
Not listening to locals / Insufficient consultation	64	• Some directly affected landowners indicated limited or no direct engagement. • Consultation timeframes were viewed as short for a project of this scale and longevity. • It was unclear how community feedback had influenced project design or assessment.

Attachment 5 – Summary of Submissions

Impact on biodiversity / TECs	61	• The project area was identified as environmentally sensitive, supporting important habitats and threatened ecological communities. • Potential impacts include bird and bat strike, habitat loss and fragmentation during construction and operation. • Existing environmental studies were considered to lack sufficient site-specific and seasonal data.
Impact on agriculture (environmental/animal health)	58	• Risk to soil, water and farm viability from acid sulfate soils • Impacts on groundwater levels affecting irrigation water, dams and bore water for agricultural use • Impacts on livestock health from infrasound/low-frequency noise and vibration.
Birds and Bats	57	• High risk of bird and bat mortality from turbine strike particularly raptors and migrating species. • Location in a major bird movement corridor with movement between wetlands and coastal areas. • Habitat disturbance and avoidance behaviour may reduce local bird populations over time.
Health/Wellbeing impacts from turbines	56	• Sleep disruption from night time turbine noise • Mental health impacts and stress from exposure to noise. • Impacts on vulnerable or sensitive individuals.
Impact on tourism	54	• The local tourism industry relies on a natural, non-industrial setting which may be affected by large-scale wind turbines. • The presence of turbines was seen as having potential to reduce visitor numbers and affect tourism-related businesses and investment. • Industrial development was viewed as inconsistent with current tourism branding focused on nature and tranquillity.
Infrasound	51	• Noise assessments were seen as not adequately addressing low-frequency noise, infrasound. • Health impacts from infrasound and vibrations.
Bushfire	42	• The project was seen as introducing additional bushfire risks in an already high-risk area. • Turbines were considered likely to restrict aerial firefighting due to no-fly zones.

Attachment 5 – Summary of Submissions

		• Emergency response and evacuation arrangements were not clearly demonstrated.
Blades cannot be recycled/impact of decommissioning	41	• There was limited clarity about turbine removal and site restoration at the end of the project life. • Concerns were raised about recycling and disposal of turbine blades and other materials. • Long-term responsibility for rehabilitation and funding arrangements was unclear.
General negative economic impacts for locals / no evidence of positive impacts	33	• The extent of long-term economic benefit for the local community was questioned. • Potential impacts on property values and existing local businesses were raised. • Community benefit contributions were seen as limited compared to the scale and duration of impacts.
Too close to neighbouring properties	28	• Turbines were considered too close to some neighbouring homes and properties. • Loss of quiet rural amenity, including visual dominance and noise intrusion, was identified. Existing setback distances were viewed as inadequate for turbines of the proposed size.
Plastic/shedding from blades	23	• Turbine blade erosion was raised as a source of microplastics entering soil and waterways. • Concerns were raised about contamination risks to farmland, livestock and ecosystems.
construction/traffic and Road impacts	20	• Increased heavy vehicle movements during construction were identified as a safety concern on rural roads. • Anticipated impacts include dust, noise, road damage and disruption for local residents.
Shadow flicker	17	• Moving shadows from turbine blades may affect nearby homes and outdoor areas. • Shadow flicker was associated with reduced amenity and possible health effects for some people.
Negative Personal Economic impacts	15	• Concerns about effects on individual property values. • Impacts on ability to sell, rent or develop property. • Financial impacts were seen as falling unevenly on nearby non-host landowners.

Attachment 5 – Summary of Submissions

Impact on planes/aerial firefighting	10	• Turbines could restrict aerial firefighting due to no-fly or exclusion zones. • Reduced effectiveness of water bombing during bushfire events was a concern. • Flight safety impacts for helicopters and emergency aircraft were raised.
Query impact on power supply and prices	9	• There was uncertainty about impacts on electricity prices for residents. • Some concerns related to intermittency and lack of storage capacity.
Dark Sky impacts	2	• Turbine aviation lighting may affect dark-sky conditions valued in the region. • Potential impacts on nocturnal wildlife.
Financial Risks / Cost	2	• Concerns were raised about who would bear costs if the project fails or is decommissioned early.
Electromagnetic interference	1	• Potential interference with telecommunications, radio and navigation systems • Rural areas with already limited mobile coverage

Attachment 6 – Schedule of Submissions

Submitter ID	Response	Comments
1	Object	Purchased in 2022. If i had know a windfarm was planned we would never have purchased here. Too many risks for me and the environment. I wish to lodge an objection to the proposed Scott River wind farm development from the perspective of a primary producer , with a strong interest in the long-term protection of productive agricultural land and national food security. Across Australia, high-quality farming land is increasingly under pressure from non-agricultural development. Once productive land is industrialised, fragmented, or contaminated, it is rarely returned to full agricultural use. This proposal represents another step in the cumulative loss of land capable of supporting food production, at a time when climate variability, biosecurity threats and global instability make domestic food security more important than ever. Of particular concern are the risks to soil and water quality, especially in an area acknowledged to have a high water table and acid sulfate soils. Any failure in managing excavation, dewatering, foundations or runoff could result in long-term land contamination, with consequences extending well beyond the project footprint. The implications of stock loss, reduced carrying capacity, and compromised pasture quality would be severe and irreversible for affected landholders, and would contribute to broader national impacts on food production. Farming depends on clean water, stable soils, and predictable land conditions. Industrial-scale infrastructure of this nature introduces risks that are incompatible with those requirements, particularly where final designs and management plans remain unresolved. These risks are borne not only by individual farmers, but by the wider community that depends on Australian agriculture. In addition to my concernsmy family has a long-standing personal connection to Augusta as a holiday destination. The region's natural landscapes, rural character and sense of remoteness are central to its appeal. Large-scale industrial development of this nature would fundamentally alter those qualities, with flow-on effects for tourism and the many small businesses that rely on visitors seeking an unspoilt environment. For these reasons, I do not consider the Scott River wind farm proposal to represent an appropriate or balanced use of this landscape. The loss of productive land, the risks to soil and water integrity, and the permanent change to the character of the region outweigh any claimed benefits. I urge the decision-maker to give serious consideration to the long-term national implications for agriculture and food security, and to refuse the Development Application in its current form.
2	Object	Objection to Synergy's Proposed Scott River Wind Farm We object to Synergy's proposed wind farm at Scott River for the following reasons: Potential health impacts associated with turbine infrasound, which we believe have not been adequately assessed.

		Risk to the delicate and biodiverse Scott River ecosystem, with insufficient understanding of the impacts during construction and operation. Negative impacts on tourism, as visitors value the area's pristine natural landscape and specifically seek environments free from large industrial structures. Inadequate and incomplete research, particularly regarding infrasound and health impacts, with concerns that financial and timing pressures are driving the project forward prematurely. The absence of further EPA investigation, despite unresolved concerns and contradictory evidence. We believe the information provided in Synergy's proposal does not adequately address these issues. Once constructed, the environmental, social, and financial consequences will be irreversible. There is no justification for rushing this project when more thorough investigation could prevent long-term harm and unnecessary expenditure. Concerns Regarding Infrasound Measurement and Health Impacts Evidence provided by Professor Ken Mattson, who has over 25 years' experience assessing infrasound from modern wind turbines, raises serious concerns about the methods currently used by Australian regulators to measure turbine noise. Professor Mattson's team uses specialised low-frequency microphones and advanced modelling techniques that accurately track how infrasound travels over land, through hills, and across water. In contrast, Australian regulatory assessments rely on standard noise meters designed to measure audible sound, which largely filter out or ignore very low-frequency infrasound. This can significantly underestimate the level of infrasound reaching homes and communities. While Synergy's report states that noise levels comply with Australian and South Australian guidelines, Professor Mattson argues that these conclusions are based on outdated measurement methods and inappropriate equipment. His modelling shows substantial discrepancies when true low-frequency sound is measured accurately. Health and Community Impacts Research into prolonged exposure to very low-frequency sound from large wind turbines indicates potential impacts on the body's balance and stress systems. Reported effects include poor sleep, chronic fatigue, headaches, anxiety, and difficulty concentrating—particularly among sensitive individuals, including those with ADHD, autism, or existing mental health conditions. A Finnish pilot study involving over 200 participants found higher rates of sleep disturbance, fatigue, and stress-related symptoms among people living within 15 kilometres of wind farms compared to those living further away. Based on this research and infrasound measurements, Professor Mattson identifies a primary risk zone extending approximately 15–20 kilometres from large wind turbines.

		The proposed Scott River Wind Farm is located: Approximately 5 km from the Molloy Island community About 8 km from East Augusta Less than 10 km from Augusta and Kudardup These distances fall well within the identified risk zone. Marine Environment and Tourism Infrasound is known to travel more efficiently through water than land, raising concerns about potential impacts on marine life, including whales. Whale migration and viewing are a significant ecological and tourism asset for Augusta, and any disruption to marine ecosystems would have serious environmental and economic consequences. Conclusion The proposed wind farm should not proceed without comprehensive, independent investigation into infrasound, health impacts, ecological risks, and tourism effects. We strongly urge that the approval process be slowed to allow detailed studies involving recognised experts, such as Professor Ken Mattson, working collaboratively with Synergy. A truly informed decision must be made before construction begins, not after irreversible damage has occurred.
3	Object	As a tourism operator in Augusta I strongly object. The Western Australian government pushes the SW particularly Margaret River/Augusta worldwide to attract tourism. In their words this region offers world class natural environments and landscapes. Augusta a small town that relies on tourists particularly trades on is amazing wild landscapes. To sit an industrial development of this size in this spot totally undermines and contradicts gov tourism policy's. The government is heading for a class action against them by residents, buisness owners, tourism development companies and a couple of billionaires who seek to keep this relatively untouched area just that. Short sighted and irresponsible government policy decisions are not above the law.. Best not push this through without proper procedures as the quiet powerful deep pockets friends of Augusta are watching very closely and taking meticulous notes.
4	Object	Adverse impact expected from Noise and visual. No proper consultation, impact of soil and water in the scott River due to the senstive nature of the site based on knowledgeable farmers prosepectives also based on the failed mine site area which is very close to the area.
5	Object	I agree with alternative energy producing options such as solar and wind farms but this wind farm is positioned too close to the spectacular views residents of Augusta have bought in the location for. How would you feel if you were in their position? Not happy I'm most certain. Why not locate the turbines further east so they can't be seen from Augusta's hillside? Please.

6	Object	We are long term owners of the above property. We purchased the property for its lifestyle and very unique surroundings. We are not against development but we are very concerned that unrestrained development without checks and balances will be a long term disaster for our pristine land. We are (as you are) custodions for future generations. The development application is nowhere near detailed enough to enable a clear picture on what is to transpire. The visual impact on the landscape is of major concern particularly as the proposal indicates a 250 metre blot on the landscape. Primarily because of the lack of detail, I request that the Shire defer the development application (or refuse the application) until all stake holders are in a better position to evaluate.
7	Object	We make this submission to formally and unequivocally object to the Scott River Wind Farm Development Application on environmental, ecological, and precautionary planning grounds. While renewable energy development has an important role in reducing greenhouse gas emissions, this does not diminish the obligation to ensure that projects are appropriately sited, thoroughly assessed, and demonstrably capable of avoiding unacceptable environmental harm. In this case, the proposal fails to meet those standards. The Scott River area is an environmentally sensitive landscape characterised by floodplains, wetlands, shallow groundwater systems, high biodiversity values, and a rural landscape of significant ecological and environmental function. Development of this scale and permanence demands an exceptionally high standard of environmental assessment. That standard has not been met. 1. Fundamental Deficiency of Information and Reliance on Deferred Assessment The Development Application does not provide sufficient detail to allow a complete, transparent, and scientifically defensible assessment of environmental impacts. Instead, it relies on future management plans, post-approval studies, and compliance mechanisms after construction has commenced. From an environmental protection perspective, this approach is fundamentally flawed. Environmental impacts must be understood and assessed before approval is granted, not managed reactively once harm has occurred. Where impacts cannot be confidently predicted or mitigated in advance, the precautionary principle requires that approval be withheld. 2. Noise, Low-Frequency Noise and Infrasound – Long-Term Environmental Exposure The noise assessment is largely theoretical and model-based, with limited site-specific validation. Of particular concern is the insufficient consideration of low-frequency noise and infrasound propagation, atmospheric conditions that may amplify sound transmission, and continuous long-term exposure over the operational life of the project. Noise represents a persistent environmental stressor with potential impacts on wildlife behaviour and ecological systems. The proposal does not demonstrate that such impacts have been adequately assessed or mitigated. 3. Proximity Impacts and Fragmentation of the Rural Environment The proposal relies on minimal separation distances and treats cadastral boundaries as effective environmental buffers. This fails to recognise that ecological processes do not align with property boundaries and that rural landscapes provide essential environmental function. The cumulative effect is increased fragmentation and gradual industrialisation of a functioning rural and ecological landscape. 4. Visual Impact and Irreversible Landscape Transformation The wind turbines constitute large-scale, visually dominant industrial structures that will permanently alter the character of the Scott River

		landscape. The assessment does not adequately account for cumulative impacts, night-time aviation lighting, or the permanent loss of dark-sky and landscape values. Once constructed, these impacts are irreversible. 5. Floodplain, Acid Sulfate Soils and Shallow Groundwater – High-Consequence Risk The Scott River area is characterised by complex hydrology, including floodplain processes, acid sulfate soils, and shallow groundwater systems. The application does not adequately demonstrate that excavation, foundations, and associated infrastructure will avoid long-term impacts on soil chemistry, groundwater quality, or floodplain function. In such an environmentally sensitive setting, uncertainty equates to high risk. 6. Bushfire Risk and Environmental Emergency Impacts The proposal inadequately addresses bushfire-related risks, including restrictions on aerial firefighting, increased suppression complexity, and the potential for delayed response during extreme fire events. These risks have direct implications for ecosystem protection and recovery. 7. Construction Impacts on Land, Roads and Waterways Construction will involve extensive earthworks, heavy vehicle movements, and prolonged disturbance. Local roads are not designed for industrial-scale traffic, and construction impacts pose risks of erosion, sedimentation, and long-term environmental degradation. 8. Wildlife and Biodiversity The environmental assessment does not provide sufficient baseline data or analysis to confidently conclude that unacceptable impacts on birds, bats, threatened species, or habitat connectivity will be avoided. In a high-risk ecological setting, a precautionary approach is essential. Conclusion The Scott River Wind Farm Development Application fails to demonstrate that environmental values will be protected or that risks can be effectively mitigated. The reliance on uncertainty, deferred assessment, and post-approval management is inconsistent with responsible environmental planning. For these reasons, we respectfully submit that the Shire of Augusta Margaret River should refuse the Development Application, or at minimum require a substantially revised proposal supported by comprehensive, independent, site-specific environmental studies. Thank you for the opportunity to make this submission.
8	Support	Renewable energy projects are critical not just for the future of our region but for the world. It’s time to start moving away from fossil fuels.
9	Support	Please approve the wind farm. We need green renewable energy! I am 100% for this proposal, and more like it. We need to act now for climate change. This project is a great environmental outcome. Let’s give it the green light!
10	Object	Scale of the wind infrastructure is too visually dominant for the scale of this remote town.
11	Object	You still don't know how to dispose of turbine blades. Blades leach BPAs and micro/nano plastics that are polluting our farms, food and water. We still don't know the affect of these on our bodies (BPSs are carcinogenic) So I don't support these turbines anywhere in Australia as the pollute the atmosphere and our bodies
12	Support	I'd suggest that farming and land clearing has had more impact on the natural environment of the Scott River locality than the proposed wind towers will. Not that I am suggesting that the farming area be returned to bush, but it's a bit rich for those with a vested interest to be touting environmental concerns over a development that will help us to move away from reliance on fossil fuel energy. 30-50 years from now it is likely the wind towers will have done their job and been removed as we have the benefit of a fully renewable, zero carbon energy system.

13	Object	This proposal is sited in a very envirionmental sensitive site and could be much beeter positioned. The envirionmental impact on Both the town of Augusta and the rural land as well as the land is extreme. Please listen to the community and do your upmost to have this proposal rejected for this site but reassessed for a site more acceptable. I object very strongly to the siting of this proposal.
14	Support	These turbines are in the right place for energy production and distribution. They have been successfully used all over the world and are one of the cheapest form of energy production. None of the naysayers objections have proved to be true.
15	Object	First and foremost I would like to say the proposal notification arrived 4 days ago which is not nearly sufficient time to educate myself with the matter let alone respond to your survey, particularly given how busy this time of year is. Like anything, it is impossible to make an informed decision without all the information provided. It is for this reason I oppose the initial plan. At present Augusta has a sub standard power supply which is regularly interrupted. I would like to know if the large amount of power generated by the wind farm is going to utilise the current infrastructure and also if it will improve the current power standards. My expectation, moving forward, would be, those affected to be privy to all the information the government has access to so we can also make the same informed decisions.
16	Object	The EPA should have assessed the proposed SynergyRED Scott River Wind Farm. There must be a Public Environmental Review (PER) by EXPERTS from a diverse range of backgrounds (specialising in infrasound, health risks, water pollution, air quality, forestry & conservation, biodiversity, birdlife, marine mammals, reptile species etc.) Research data & evidence from existing projects both nationally and internationally as it is a well known fact these are outdated and extremely destructive to the environment with an extensive carbon footprint!! Augusta and The Scott River is a biodiversity hotspot and pristine coastline that must be protected as a wildlife sanctuary and heritage site for future generations. Swedish research led by Professor Ken Mattsson at Uppsala University indicates that infrasound from modern wind turbines is significantly underestimated, travels much farther (50-90 km), and can cause health issues like headaches, sleep loss, and dizziness in sensitive individuals, challenging current noise assessments and highlighting a need for honest discussion about wind power's negative health impacts, even at levels below human hearing. Mattsson's team developed advanced modeling (SoundSim 360) to show higher levels than previously thought. This is most concerning and the SHIRE must take potential risks & health implications seriously!! It is the SHIRES responsibility, obligation & duty of care to protect the rate payers and community. Everyone is at risk!!! The Scott River floodplain is one of Western Australia’s most sensitive and ecologically valuable landscapes — a living wetland system that floods for much of the year and links the Scott and Blackwood Rivers.

		Destroying the environment is not protecting the environment!!! This area includes ecological communities protected under the EPBC Act, such as the Scott Coastal Plain Ironstone and Seasonal Wetland Communities, which support endangered species like the white-bellied frog, snake-neck turtle, black swans, and Baudin's and Carnaby's black cockatoos. This area is home to numerous raptors, including coastal species like the Eastern Osprey, and terrestrial species such as the Australian Hobby, Nankeen Kestrel, Wedge-Tail Eagles, Brown Goshawk and Owls & Falcons. There is Substantial documentation and evidence from existing projects that wind turbines significantly impact bird life: The 2023 Annual Compliance Report reveals that Kaban wind farm in Far North Queensland is killing more birds and bats than anticipated. The loss of bird species at Kaban wind farm site is at least partially due to the recent increase in human activity to construct the wind farm, the heavy vehicles, habitat destruction, then colonisation of aerial space by large turbines and maybe sound of turbines themselves. The sheer number of bird species observed in 2018 was huge: 85 species! But by 2023, 1 year after Kaban wind farm became operational, the number of species surveyed was only 39. It is well documented that birdlife simply disappear from wind turbines areas as they are affected by the sound and emf emitted. The construction and operation of wind farms create visual, noise, and vibration disturbances that can cause birds to leave the area. Even if birds aren't killed by collisions, they may avoid the area around turbines, leading to a reduction in available habitat. The devastating carnage of bird life has been well documented in the United States also, from turning blades and in particular raptors caught in currents created by moving blades as they mistake these for natural air thermals. These outdated structures are ecological & environmental disasters from their initial construction and devastation of the natural landscape, through to their installation and operation. Their short life span is well documented, 20 years as they deteriorate and disintegrate, spreading micro-plastics throughout this pristine coastal environment. The sheer amount of steel used per 250m turbine is the equivalent of 220 cars. How much coal does that use?? Not to mention tonnes of concrete! They are unstable, unreliable and hazardous! The long term consequences and disposal of deteriorated blades & decommissioned turbines become Landfill. Serious concerns of airborne contamination from asbestos as found in eastern states turbines. How can you guarantee the proposed ones are asbestos free??? The severe impact from infrasound, emf, noise, vibration and reverberation pre-construction, during and once erected to ocean dwelling creatures is less documented worldwide, but extremely obvious as the diverse populations of sea mammals and creatures including migrating and breeding whales which pass through this South West coastline including Southern Right and Humpback Whales, dolphins all use complex sonar communication and are extremely sensitive to noise and artificial changes to their environment. AUGUSTA HOSTS A WHALESONG PROJECT BI ANNUALLY honouring the migrating whales and the whales and their young must be

		protected by the infrasound which will drive them away from this area!! *READ THIS: https://capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/dcpc/Whales_and_Sound_KS_PCCS.pdf To pretend Turbines are environmentally friendly is 'green washing' - these projects are irresponsible and life threatening to an extremely diverse population of wildlife, wetlands and landscape. Not to mention the harmful affects wind turbines have on humans from migraines, tinnitus, emf, nausea, dizziness and numerous other health conditions & consequences. The site lies on acid-sulfate soils and an active pressurised superficial aquifer, connected to the Beenup and Jangardup mine sites, both declared Contaminated Sites by DWER. Disturbing these soils or groundwater could trigger contamination and irreversible damage. SynergyRED's referral relies on desktop data, lacks proper seasonal surveys and groundwater modelling, and fails to consider human health — ignoring risks from PFAS/BPA blade materials, vibration, and groundwater contamination. The Scott River floodplain is simply the wrong location for industrial infrastructure of this size and scale. Once disturbed, the wetlands, waterways and habitat cannot be restored. This pristine coastal region is untouched and should be retained as an environment ecosystem. The wildlife is incredibly diverse and should be protected at all costs for the future. I strongly urge the SHIRE to REJECT THIS PROJECT. IT IS DETRIMENTAL to the people, environment and wildlife and is most irresponsible and negligent to even consider approving it.
17	Object	I strongly oppose the application. The development application lacks sufficient detail to be lawfully assessed. The proposal seeks approval for a concept rather than a defined development. Final turbine models, heights, operating modes and exact locations are not confirmed and may be altered at the proponent's discretion. As a result, impacts on noise, shadow flicker, visual dominance, construction disturbance and environmental risk cannot be reliably assessed. Approving a "maximum case scenario" with key details deferred to later stages is not consistent with sound planning practice for a development that will operate for 30–60 years and permanently reshape the region. Approval should not proceed on a "work it out later" basis. In addition the noise assessment is hypothetical and does not provide adequate protection for neighbouring landholders. The proposal relies on outdated setback concepts that do not reflect the size and dominance of modern turbines. Locating turbines close to property boundaries shifts impacts onto neighbouring land, effectively treating private land as a buffer. Industrial wind facilities should contain their impacts within their own footprint. Rural homes and boundaries should not be treated as sacrifice zones.

		Turbines up to 250 metres high are skyscraper-scale structures that will dominate the landscape for kilometres and for decades. The Scott River / Augusta region is valued for its open rural character, natural horizons and tourism appeal. This proposal represents a permanent change of place, not a minor or reversible impact. Visual assessments and photomontages do not convincingly demonstrate worst-case impacts from key receptors. This application should be refused, or at minimum deferred, because it lacks the certainty, safeguards and evidence required to responsibly approve an industrial-scale wind facility in a sensitive rural and environmental setting. Approving this proposal would shift risk from the developer onto the community, the environment and future generations.
18	Object	I strongly object to this Development Application and request that: The application be refused, or At minimum, deferred until: Final turbine models and exact locations are known Comprehensive reassessment of visual, environmental and social impacts is undertaken Genuine community consultation occurs on a defined, not hypothetical, proposal The Scott River / Augusta region is a unique and irreplaceable landscape. Once industrialised at this scale, it cannot be restored.
19	Object	If the farmers don't support the wind turbines on their land this should be respected. These are so much bigger than other wind turbines creating more of an environment disruption - size of trucks to transport, larger foundations etc. also can it be guaranteed that the turbines don't contain asbestos. And given they can't be recycled & the size of the turbine it is an environmental hazard when at the end of life or when a fault occurs ie fire in the turbine. They still use fossil fuels for maintenance & daily running.
20	Object	I am not against wind farms but this one is too close to residental areas and farms
21	Object	Too close to farms and to Augusta and Kudardup
22	Support	
23	Support	I strongly support the Wind Farm renewable energy project in Scott River, as proposed by the MRCCE, Synergy and other groups. I is an excellent chance to push forward renewable energy generation and move away from fossil fuel dependency. As I see it, thro my eyes as a researcher with a PhD in sustainable economics and accounting policy, this project ticks all the boxes: renewable energy, community driven, utilising existing (abandoned) resources, and so on. And as I see it, the arguments against this proposal are short sighted, extremely self centred, and, from the tone of their arguments, based more at the disruptive conspiracy theory end of reality, rather than respecting the enormous amount of effort and good will that has gone

		into getting this viable project established. In my view the Scott River area has significant and valuable ecological values that will not be damaged by the wind farm. On the contrary, ending farming of hoofed animals in this region would be a significant step to protecting these environmental values. I am not advocating this, just offering a perspective that wind farm and conventional farming can be managed to ensure ongoing ecological and economic sustainability.
24	Object	I wish to lodge an objection to the proposed Scott River wind farm development from the perspective of a farmer operating outside the immediate region, with a strong interest in the long-term protection of productive agricultural land and national food security. Across Australia, high-quality farming land is increasingly under pressure from non-agricultural development. Once productive land is industrialised, fragmented, or contaminated, it is rarely returned to full agricultural use. This proposal represents another step in the cumulative loss of land capable of supporting food production, at a time when climate variability, biosecurity threats and global instability make domestic food security more important than ever. Of particular concern are the risks to soil and water quality, especially in an area acknowledged to have a high water table and acid sulfate soils. Any failure in managing excavation, dewatering, foundations or runoff could result in long-term land contamination, with consequences extending well beyond the project footprint. The implications of stock loss, reduced carrying capacity, and compromised pasture quality would be severe and irreversible for affected landholders, and would contribute to broader national impacts on food production. Farming depends on clean water, stable soils, and predictable land conditions. Industrial-scale infrastructure of this nature introduces risks that are incompatible with those requirements, particularly where final designs and management plans remain unresolved. These risks are borne not only by individual farmers, but by the wider community that depends on Australian agriculture. In addition to my concerns as a farmer, I also have a long-standing personal connection to Augusta as a holiday destination. The region's natural landscapes, rural character and sense of remoteness are central to its appeal. Large-scale industrial development of this nature would fundamentally alter those qualities, with flow-on effects for tourism and the many small businesses that rely on visitors seeking an unspoilt environment. For these reasons, I do not consider the Scott River wind farm proposal to represent an appropriate or balanced use of this landscape. The loss of productive land, the risks to soil and water integrity, and the permanent change to the character of the region outweigh any claimed benefits. I urge the decision-maker to give serious consideration to the long-term national implications for agriculture and food security, and to refuse the Development Application in its current form. The shire must reject this application.
25	Support	I support the development but maintain that the benefits of renewably wind generated power be made available to the community of Augusta and surrounds first as we are to be affected by landscape changes and infrastructure development. We are currently at the end

		of the power grid and with regularity, we have power outages due to development or damage which effects the power grid and cuts off power to Augusta.
26	Object	Re: Proposal for Scott River Wind Farm I strongly oppose the proposal by Synergy Renewable Energy Developments Pty Ltd for construction of a wind farm 15km northeast of Augusta in the South-West region of Western Australia for the following reasons: • The visual impact is significant. The findings of the Visual Impact Assessment for Augusta in the referral says: the landscape is of high quality with consistent, intact, well-defined attributes. The proposed development would be incompatible with the existing characteristics of the area and mitigation measures are unlikely to reduce the impacts of the change. . • The proposed 250m high turbines will tower over the landscape, will be visible from the town of Augusta, and impact the character of the town forever. The reason people choose to take up residence in, or visit, is to enjoy the peaceful, largely underdeveloped area of the prized southwestern corner of the state which offers a unique environment. • This construction would include a total disturbance of 107 ha and include up to clearing of 1 ha of remnant native vegetation within a 3,597ha development envelope. .There is a high environmental threat in relation to the flora and fauna of the area. The Scott River Ironstone Association Threatened Ecological Community is part of the catchment area which supports almost 60 listed species of flora of which five are threatened, as are twenty-six species of fauna. • The direct environmental threat posed to the Scott and Blackwood Rivers and Flinders Bay as when disturbed, sulphuric acid releases heavy metals into the waterway resulting in the destruction of both vegetation and aquatic life. The failed Beenup mine offers an example. • The risk of bushfire in this area is extremely high. The fact that no aerial firefighting is allowed over turbines and that there is limited ground access due to protected ecological zones results in a high risk to homes, farms and communities. • Very strong easterly winds are experienced in Augusta during the summer months. The fact that this site is prosed15km to the northeast of the township exposes the population, livestock and the environment to the contamination of microplastics shed by the turbine blades and carried over the town. • Health risks caused by infrasound which can travel up to 20k. and cause health problems for both humans and livestock and those caused by the electromagnetic emissions pose a serious threat to both humans and livestock. I ask that the level of assessment for the proposal be set at Public Environmental Review based on the significant impact on the environment and the high level of public interest and opposition.
27	Object	Having reviewed the information currently available, I do not support the proposal at this date, December 2025, because some of the studies mentioned have not yet been completed &/or made public. Consequently there is not sufficient information available to enable a fully informed decision about all aspects of the proposal.
28	Support	I support the project in principle from a holistic perspective but do have concerns about the perceived negative community impacts around the Augusta area especially in relation to the visual impacts to a tourism town. I would also like to be a bit more certain that there will be real benefits to the community going forward - not just in construction jobs or operational jobs but also some possible economic offsets for parts of the community that may be impacted the most.

29	Object	I have lived on a rural farming property on the Blackwood River on Hardy Inlet (Sussex Location 1704) all my life and very much appreciate the tranquil beauty and scenic attraction of the river and its utmost importance to the appeal of Augusta and its surrounding areas. My objections to the Wind Farm proposal are, 1) Consider the location highly incompatible given the inherent dangers from sulphate acid soils and the risks it impose on the future health of the Blackwood and Scott Rivers. 2) Visual amenity created by Turbines industrialises the appearance of Augusta in lieu of one of pristine wilderness and scenic natural beauty. 3) INFRASOUND and low frequency noise has as yet undetermined consequences. There are many other good reasons for more informed discussion on the need for an alternative site.
30	Object	I am utterly opposed to this Wind Farm proposal. The Scott River area is a designated Biodiverse Heritage area and as such, the noxious elements of wind turbines should not be contemplated. There are various noxious elements, which will affect the wildlife in the area. The noxious elements being Infrasound, which animals are very sensitive to; noise from the turbines; Flicker from the turbines. The Scott River is a breeding for the Black Swans, our state elblem. The swans will be decimated by the turbines. There are 3 aquifers under ground and the superficial aquifer is at great risk of being contaminated by the Acis Sulphate soils. This could be an environmental disaster and cause the whole area to turn into a desert. The BPA from the blades, over time, is released. another pollutant. This proposal should not go ahead.
31	Object	I write to formally object to the proposed wind farm development at Scott River. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant and long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing, and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Critical elements—including the number, location, height and specification of turbines, construction methodology, dewatering and water management arrangements, and environmental safeguards—have not been finalised. Without these details, it is not possible to assess worst-case impacts or impose effective and enforceable conditions on a development that would operate for decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and dewatering have the potential to alter groundwater flow paths and water table levels in a known sensitive area. Disturbance of acid sulfate soils through excavation or groundwater drawdown could lead to acidification of soils and waterways, vegetation loss, contamination of agricultural water supplies and long-term environmental damage. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan. The scale of earthworks proposed is substantial, including extensive access roads, cable trenching and deep turbine foundations involving thousands of tonnes of excavation per turbine. Despite this, no clear method is identified for managing dewatering volumes or cumulative

		impacts across the site. Visual impact is also a major concern. The turbines and their blades would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and public spaces, and result in a permanent loss of rural amenity. The photomontages provided do not adequately convey the true scale, worst-case or cumulative visual impacts. Noise, shadow flicker and disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. Risks to wildlife from strike, habitat disruption and indirect impacts from noise and vibration are insufficiently addressed. Construction traffic impacts on rural roads and inadequate community consultation further compound concerns. The application also fails to demonstrate clear economic or environmental benefit sufficient to offset these impacts. Claims of significant CO_2 savings are unsubstantiated, with no evidence provided as to how or where such reductions would occur. The shire needs to recommend to JDAP that they reject this proposal forever.
32	Object	I write to lodge a formal submission on Synergy Renewable Energy Developments Pty Ltd's (SynergyRED) Development Application (DAP pathway) for the proposed Scott River Wind Farm. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, including groundwater and impact of acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. Structures of this magnitude do not "blend in" to a natural rural landscape. They fundamentally industrialise it. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades.

		The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. The first direct correspondence I received from the Shire was a one page letter sent less than a month ago. Why is the community consultation period for major infrastructure in such an environmentally sensitive area so short?? Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values as well as any planning or response plans for potential flow of acidic water into the Scott River and ultimately into the Blackwood river mouth at Augusta. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the application.
33	Object	I write to formally object to the proposed wind farm development at Scott River. I am a long-term resident of the Shire of Augusta Margaret River, with a background in farming and longstanding involvement in local community committees. Through this involvement, I have seen firsthand how carefully this region must be managed to protect its environmental, agricultural and social values. I am deeply concerned that the proposed wind farm would irreversibly damage what makes Augusta and the surrounding region special. This area is valued for its natural beauty, productive farmland, quiet rural character and environmental sensitivity. Introducing industrial-scale turbines of this height and scale into this landscape would permanently alter its character and diminish its appeal for residents, farmers and visitors alike. Of particular concern is the acknowledged presence of acid sulfate soils in the Scott River area. This is not a theoretical risk. Many in the community, myself included, were here during the BHP period when inadequate understanding and management of acid sulfate soils nearly resulted in serious environmental damage. That experience demonstrated how quickly groundwater disturbance and soil excavation can escalate into a major environmental incident if not handled with extreme caution. Despite this known history, the current Development Application lacks a detailed, site-specific acid sulfate soil investigation, a comprehensive dewatering and groundwater management plan, and clear emergency response measures. Approving a project of this scale without these safeguards exposes the region to unacceptable environmental risk. The proposal also threatens productive agricultural land and places additional stress on an already sensitive landscape. Once constructed, the turbines, foundations, roads and underground infrastructure will remain for decades, constraining future land use and leaving long-term impacts that cannot be reversed. Augusta and the Scott River region are not appropriate locations for industrial development of this scale. This place is too special to

		destroy. It must be protected, not only for those who live and farm here now, but for future generations who deserve to inherit a healthy environment, viable farmland and a community that retains its unique character. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm. (I have used a friends email)
34	Object	I feel the visual impact will detract from one of Augusta and it's hinterlands unique aspects. An unspoilt natural environment. As more areas have windfarms, the unspoilt, coastal views that are a feature of this coastline will be spoilt. This impact will detract from tourism as an important, and increasing economic benefit, to the town and community.
35	Object	I write to formally object to the proposed wind farm development at Scott River. Augusta is valued for its natural beauty, rural landscape, wildlife and sense of peace. These qualities are not incidental — they are the foundation of the town's identity, its tourism economy, and the reason people choose to live here, visit here and invest in the region. The proposed wind turbines would introduce large-scale industrial infrastructure into a landscape that is currently quiet, scenic and environmentally sensitive. Turbines of this height and scale would dominate views, permanently alter the character of the area and fundamentally change the experience of Augusta and its surrounds. Once built, this change cannot be undone. The proximity of the turbines to Augusta and key natural assets raises serious concerns about noise, low-frequency noise and infrasound, visual intrusion, and the cumulative loss of amenity. These impacts would not be confined to the immediate turbine footprint — they would affect the wider region, including residents, visitors, recreational users and the tourism sector. People come to Augusta for its unspoilt environment, its connection to nature and its sense of escape. Industrialising the surrounding landscape places these values at risk and threatens to undermine the long-term appeal and reputation of the town. Approving a development of this scale would signal that Augusta's unique character is expendable. This place is simply too special to destroy. It should be protected, not industrialised, for the benefit of current residents and for future generations. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm. (I am using a friends email)
36	Support	As a concerned resident of the AMR Shire, I support this proposal because it is one of the most effective ways our community can reduce our contribution to the overwhelmingly serious repercussions of pollution from use of fossil fuels causing climate change. There is nowhere that renewables can be installed at thew scale required to replace coal and gas energy that will not effect locals. So there will always be a 'not in my backyard understandable local resistance to change. At the last election we were told by the opposition leader that nuclear power plants would be installed where government determined regardless of local opinion. That is not the case wrt the Scott River proposal. There has been a very long period of consultation and investigation. If the results of the feasibility studies and the impact assessment conclude that this is a suitable site, I am in favour of proceeding. elsewhere in Australia we have equivalent wind farms that

		are compatible with ongoing agriculture and provide additional, alternative income to land owners. The EPA has determined that the proposal does not warrant review. If the details of the potential environmental impact studies show impacts to be acceptable, manageable, and that any unforseen issues that arise can be addressed, we as a community will be proud to be contributing to a better future than our current trajectory, and proud that we showed leadership.
37	Object	I am writing to formally object to the proposed wind farm development at Scott River. on the specific grounds of environmental harm, disturbance of acid sulfate soils, and adverse impacts on the local water table and groundwater-dependent ecosystems. The developer (Synergy) has provided some generic information on the proposed devolvement however with the design not being completed it is unclear where the turbines will be going, how many there are, how they will be constructed and how water will be managed at the site. Environmental Impacts The project's likely effects on groundwater and connected ecosystems is not adequately assessed. Large-scale excavations will be required for these turbines, and piling and dewatering during the construction phase can change groundwater flow paths and levels, with potential long-term impacts on aquifers and groundwater-dependent ecosystems in the area. These impacts require a thorough, independent hydrogeological assessment that demonstrates the impacts on the local ecosystem. Acid sulfate soils (ASS) are a serious concern for this area. When ASS are exposed to air through excavation or lowered water tables they can generate sulfuric acid and mobilise iron, aluminium and heavy metals, causing severe acidification of soils and surface waters, vegetation loss, and infrastructure damage. Dewatering and earthworks can trigger ASS risks unless strict, site-specific controls are implemented. The application before the council lacks a clear, site-specific ASS investigation and a robust dewatering management plan that commits to monitoring, trigger levels, and emergency responses. There is also no information about how construction and operations will affect the local water table and surface–groundwater interactions. While there is a lack of detailed information in the Development Application we note that the project has: • Approximately 30km of onsite roads, • 30km of trenching for underground cables, • Foundations that would be a minimum 5m deep circa 2000 tonnes of excavation, for each turbine • Additional soil remediation if required could increase this by an additional 500 tonnes per site and the depth to in excess of 7m, • Significant dewatering requirements, and • No dam or other method identified of managing the dewatering volumes. Economic and Environmental Benefit The developer has not identified any economic benefit that will be brought to the region. The developer claims that up to 200,000 tonnes per annum of CO2 emission will be saved, but does not provide any evidence as to how and where these saving will be realised. The developer must disclose what facility in what location will now reduce its emissions by 200,000 tonnes per annum. If no information is provided then the Council is left weighing the detriment to the environment against no economic or environmental benefit and therefor the proposal should not be supported.
38	Object	I write to lodge a formal submission on Synergy Renewable Energy Developments Pty Ltd's (SynergyRED) Development Application (DAP pathway) for the proposed Scott River Wind Farm.

		My husband and I are currently considering both commercial and residential developments in the town centre and on Turner Street and this major windfarm development would have a significant impact on the amenity and value of these developments to the point where we are re-considering our investments given the substantial costs involved in completing our projects. In particular, we are looking to invest in creating an arts studio and cultural centre which we believe will become an important cultural hub and drawcard to the town which is currently lacking in this regard. Our objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, including groundwater and impact of acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. Structures of this magnitude do not "blend in" to a natural rural landscape. They fundamentally industrialise it. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. The first direct correspondence I received from the Shire about the proposal in its current form was a one-page letter sent less than a month ago. Why has the community consultation period for such a major infrastructure proposal in such an environmentally sensitive area been so short?? Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values as well as any planning or response plans for potential flow of acidic water into the Scott

		River and ultimately into the Blackwood river mouth at Augusta. What significant benefits and assurances will Augusta get for the environmental risks and loss of amenity. Will this windfarm grow in the future and what other alternative sites in the Shire have been seriously considered? Will the development alleviate the constant power outages in the Augusta? For these reasons and queries, I respectfully request that the Shire of Augusta Margaret River recommend that RDAP refuse the application, or at minimum return it for major further information and re-advertising before any Responsible Authority Report (RAR) is finalised.
39	Object	I write to formally object to the proposed wind farm development at Scott River. I am a business owner in Augusta and, through my shop, I speak daily with local residents, farmers, and visitors to the region, including interstate and international tourists. From my shop window, people regularly stop to admire the surrounding landscape and comment on the exceptional natural beauty of the area. This view is central to why people come to Augusta and underpins the town's identity as a quiet, unspoilt destination. Since details of the proposal became known, the response from these conversations has been one of widespread shock and disbelief at the scale and proximity of the proposed wind farm. When visitors are told that industrial-scale turbines are proposed for the Scott River area, many cannot comprehend how infrastructure of this magnitude could be contemplated in such a visually and environmentally significant setting. In particular, European holidaymakers frequently express concern based on their lived experience with wind turbine developments overseas. They describe long-term changes to rural environments following turbine installation, including reduced wildlife presence, altered animal behaviour, and the loss of the quiet rural character that originally attracted them. These concerns are not ideological; they are grounded in direct personal experience. There is growing international recognition that infrasound and low-frequency noise associated with large-scale turbines can affect wildlife movement and behaviour. Given Scott River's recognised biodiversity and ecological sensitivity, there is a reasonable concern that similar wildlife displacement could occur here, resulting in permanent and irreversible changes to the character and environmental values of the region. Equally concerning is the lack of consideration given to farm animals that will remain permanently confined to paddocks near turbines. Unlike wildlife, livestock cannot relocate away from noise, vibration, shadow flicker or infrasound exposure. The potential impacts on animal welfare, behaviour and productivity have not been adequately addressed in the Development Application. People come to Augusta and the Scott River region for its natural beauty, open landscapes, wildlife and sense of peace. Tourism is fundamentally linked to these values. The consistent view expressed by locals and visitors alike is that a development of this scale would permanently diminish what makes the region special and irreversibly alter its identity for generations. My objection is therefore based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to enable proper assessment, and the significant and long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing, and future land use in the Scott River and Augusta region.

		The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, dewatering and water management arrangements, and environmental safeguards—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. I am also concerned about the cumulative effects of this proposal on the natural landscape, biodiversity, rural amenity, tourism values, and the long-term viability and use of surrounding land. The scale of the turbines proposed is unprecedented in this setting and would fundamentally alter the character of the area. Further, the consultation process to date has not provided affected landowners or the wider community with clear, complete and accessible information about the proposal or its consequences. Without a detailed and transparent design, the community cannot meaningfully assess or respond to a development that has the potential to permanently change the region. For these reasons, and for the detailed concerns set out below, I request that the Shire of Augusta Margaret River does not support the proposed wind farm in its current form.  2. Incomplete and Conceptual Nature of the Development Application The Development Application is lengthy but lacks sufficient detail to be properly assessed. The developer (Synergy) has not finalised: • the number of turbines; • turbine locations; • turbine height, model, operating parameters or colour; • construction methodology; • foundation design and excavation depth; • dewatering volumes or management methods; or • environmental management and rehabilitation measures. The developer advises that these matters will be resolved at a later stage. This approach is wholly inadequate for a development of this scale, duration and consequence. Council would not approve even modest commercial or residential developments without detailed and finalised design information, and this proposal should not be treated differently.  3. Groundwater, Water Table and Hydrogeological Impacts

		The likely effects of the project on groundwater systems and groundwater-dependent ecosystems have not been adequately assessed. Large-scale excavation, piling and trenching will be required, with associated dewatering. These activities have the potential to alter groundwater flow paths and water table levels, with long-term impacts on aquifers, surface waters, wetlands, drains, dams, bores and groundwater-dependent vegetation. The Development Application does not include a thorough, independent hydrogeological assessment demonstrating baseline conditions, surface–groundwater interactions, predicted impacts, cumulative impacts, and enforceable monitoring and response measures. Without this information, Council cannot responsibly assess environmental risk. 3M 4. Acid Sulfate Soils – High-Consequence Environmental Risk Acid sulfate soils are a known and serious risk in the Scott River area. Excavation or groundwater drawdown can release sulfuric acid and heavy metals, causing acidification of soils and waterways, vegetation loss, contamination of agricultural water supplies, and long-term environmental damage. The application lacks a site-specific ASS investigation, a detailed dewatering and ASS management plan, defined trigger levels, and a credible emergency response framework. Reliance on generic mitigation measures or post-approval plans is unacceptable given the high-consequence nature of ASS disturbance. One turbine host Ross Woodhouse quotes ‘we will throw a it of lime about” is a criminal statement. How much lime did BHP use? Where are you going to get the lime from? The shire disagreed with the possible lime pit at cosy corner. 3M 5. Scale of Earthworks and Dewatering Despite the absence of final design detail, the proposal indicates approximately 30 km of onsite roads, 30 km of trenching, turbine foundations involving around 2,000 tonnes of excavation per turbine (potentially exceeding 7 metres in depth), significant dewatering requirements, and no identified method for managing dewatering volumes. This represents a substantial disturbance of soils and groundwater in a sensitive environment, without adequate assessment or safeguards. 3M

		6. Visual Impact, Planning Scheme Conflict and Loss of Rural Character The visual impact of the proposal would be severe, long-lasting and unacceptable. The turbines and their blades would exceed the height of Perth's tallest buildings, introducing multiple skyscraper-scale structures into a rural landscape. The proposal does not comply with the intent of the Shire's Town Planning Scheme, which permits wind turbines only where they do not detract from visual amenity. The turbines would be dominant, intrusive and visually overwhelming, a detriment acknowledged by the developer. Approval would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. 3M 7. Noise, Shadow Flicker, Wildlife, Traffic and Consultation The application does not demonstrate that noise and shadow flicker impacts will be acceptable or enforceably managed, particularly given the absence of final turbine specifications. Risks to wildlife from strike, habitat disruption and indirect disturbance are inadequately addressed. Construction impacts from heavy vehicles on rural roads are insufficiently detailed, and consultation has been inadequate, with many affected landowners not directly engaged and no transparent account of community feedback. 3M 8. Economic and Environmental Benefit Not Demonstrated The proposal does not identify any clear economic benefit to the region and is silent on impacts to tourism and land values. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no evidence provided as to how or where such reductions would occur. 3M Request For all of the reasons outlined above, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm.

		We employed an expert to go through the Synergy DA. We would like to go over these findings with you before you go to JDAP please. We also still have a petition in my shop. Signatures are growing as people horrified at the thought.
40	Object	I am one of the registered proprietors of Lot 1184 Scott River Rd, Karridale. The property has a farm style house and a donga that can be used for accommodation. These buildings are amongst the closest dwellings to the proposed windfarm. The farm house is currently rented. The property is used for beef production. The property is surrounded on 2 sides by national park (west and south), river reserve (north) and Scott River Rd (east). Impact on my investment: The wind farm will have an adverse effect on the rental I can charge and the capital value of the property as currently used. From past experience, it is difficult to rent the farm house to a residential tenant. The visual impact of a wind farm and potential noise will greatly reduce my prospects of leasing the farm house. I am also concerned about the possible impact on the road reserve of Scott River Road near my property and in particular immediately adjacent to my eastern boundary. The length of road reserve from the bridge crossing the Scott River to bout 400m south of that point is one of the best stands of mature karri to be found in the area. If traffic flows increase then these trees may be at risk if road improvements are required. The Beenup mine has resulted in an acid plume spreading in the ground in a south west direction but is not affecting Lot 1184. I am concerned that the massive footings required for these turbines will, as a result of deep soil disturbance, collectively result is another acid plume but this time on a trajectory to my property. Effect on my future plans: I have for some time had in mind investing further on the property including converting the donga accommodation into a modern short stay venue with a farm stay theme. The area around my property is underdeveloped for tourism. The presence of a wind farm of any scale will impact on the attractiveness of the area for short stays. For example, the bitumen roads to the north of the property are well suited for road cycling events (which are becoming more difficult on rural roads in the Busselton and Margaret River regions) and the unsealed roads have, in the longer term, the potential to become a destination for gravel riding events such as “Backroads” in Geraldton and “Bike it at Ballidue” which attract a significant number of particpants and tourist dollars to those areas. The Scott River region has enormous potential for bushwalking, beach walking from East Augusta to Black Point and beyond, camping, birdwatching, and other low-impact tourism. It is difficult to comprehend why anyone would want to place a wind farm at the door step to such a pristine region. I will definitely not invest further in my property if there is a risk of a wind farm close by. Impacts of a Windfarm on the Environment: The Scott River area is environmentally sensitive, with rare flora, unique wetlands, and rare wildlife. It is also a harsh environment. I cycle 55km a day on most days along the Swan River commuting to and from work and see a significant amount of bird life. I can say from my own experience that the bird life along Scott River Road and on the adjacent farms is more diverse and the birds are in far greater numbers than my daily commute. Large turbines, access roads, and transmission lines will disturb the delicate balance of the ecosystem threatening this birdlife. The noise from the turbines may also impact the many magpies in the area. See for instance the article “Climate impact black and white for iconic maggies” on the UWA School of Biological Sciences website relating to the effect of noise and climate change on this bird. I do not see this addressed in Synergy’s documents. The area around my property has at least one endangered species, the ringtail possum. Again, I am not aware of any definitive study on

		the effect of windfarm noise on these delicate creatures. I assisted a program to assess the suitability of the Scott River National Park as a refuge for the endangered short neck tortoise. I do not know whether these creatures have gained a foothold or not. My concern is that an acid plume and the noise will have an impact on these reptiles and other creatures in the future that need a refuge from the effects of climate. Environment v Windfarm: It is generally accepted that the environment defeated BHP at the Beenup mine. Of particular concern to me is that I do not see any consideration in Synergy's documents of the effect of wind forces like tornados that have on two occasions damaged my property during my ownership. The first effortlessly plucked 3 very large Karri trees out of the ground. The second demolished my hay shed. My impression is that the impact of these types of forces in the area have not been fully considered by Synergy Summary: In my opinion, Synergy's proposal is unacceptable and will be environmentally destructive on a scale never experienced in the Shire of Augusta Margaret River. I cannot think of a single real benefit to the project. As regards the claimed benefits, they can all be achieved by other means. To approve the development application would be a mistake and a great disappointment to ratepayers, residents and regular holiday makers to East Augusta.
41	Object	I write to lodge a formal submission on Synergy Renewable Energy Developments Pty Ltd's (SynergyRED) Development Application (DAP pathway) for the proposed Scott River Wind Farm. My wife and I are currently considering both commercial and residential developments in the town centre and on Turner Street and this major windfarm development would have a significant impact on the amenity and value of these developments to the point where we are re-considering our significant investments given the substantial costs involved in completing our projects. In particular, we are looking to invest in creating an arts studio and cultural centre which we believe will become an important cultural hub and drawcard to the town which is currently lacking in this regard. Our objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, including groundwater and impact of acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple

		skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. Structures of this magnitude do not “blend in” to a natural rural landscape. They fundamentally industrialise it. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire’s Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. The first direct correspondence I received from the Shire about the proposal in its current form was a one-page letter sent less than a month ago. Why has the community consultation period for such a major infrastructure proposal in such an environmentally sensitive area been so short?? Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values as well as any planning or response plans for potential flow of acidic water into the Scott River and ultimately into the Blackwood river mouth at Augusta. What significant benefits and assurances will Augusta get for the environmental risks and loss of amenity. Will this windfarm grow in the future and what other alternative sites in the Shire have been seriously considered? Will the development alleviate the constant power outages in the Augusta? For these reasons and queries, I respectfully request that the Shire of Augusta Margaret River recommend that RDAP refuse the application, or at minimum return it for major further information and re-advertising before any Responsible Authority Report (RAR) is finalised.
42	Object	I write on behalf of Grevillea Blackwood Pty Ltd t/as the Augusta Hotel whose new owner has been engaged in developing a strategic vision for the property in order to create a high-quality tourism establishment that leverages Augusta’s unique natural beauty and coastal appeal. It has come to our attention that a large-scale wind farm is proposed for the Scott River/ East Augusta area, involving turbines up to 250 metres in height. While we recognise the importance of renewable energy and support Western Australia’s sustainability goals, we have serious concerns regarding the potential impact of this project on the area’s tourism economy and community character. Our key objections and concerns are as follows: Visual and Landscape Impact The proposed turbines, among the tallest globally, will significantly alter the iconic coastal vistas that attract visitors to Augusta. This visual intrusion is incompatible with the premium tourism experience we and other stakeholders aim to deliver. Tourism and Economic Consequences Augusta’s economy relies heavily on tourism. Any development that diminishes the area’s natural appeal risks undermining local businesses, employment, and long-term economic growth. Community and Investor Confidence This project is causing significant concern for the local community and for us as an investor in the region given the many millions of dollars envisaged for the Augusta Hotel development and construction.

		We respectfully request that the decision-making process fully considers these concerns and that the adverse visual, economic, and environmental impacts determine that the Wind Farm project is in fact proposed in the wrong location. At present our commitment to Augusta remains strong, and we hope to continue developing projects that enhance the region's appeal. To achieve this, it is important that future developments complement Augusta's unique character and support its long-term tourism potential. We would welcome the opportunity to participate in further consultations and provide detailed input on this matter.
43	Support	I support the DAP as a member of AMRCCE.
44	Object	I wish to lodge an objection to the Scott River Wind Farm Development Application. I am concerned this application is lacking the appropriate details required for a correct assessment. I am especially worried about any noise impacts on my health. I'm particularly concerned the application does not adequately address low-frequency noise and sub-audible infrasound impacts, despite growing worldwide evidence that large turbines are causing some people to report new adverse reactions, while others report the exacerbation of pre-existing health issues. There is overwhelming evidence that noise and vibration from large turbines can trigger pre-existing PTSD symptoms, cause sleep disturbances, sleep deprivation, fatigue, headaches, migraines, vertigo and memory loss, to name a few. Presently I am trying to manage the above health issues and this was the main reason for choosing to buy and live on Molloy Island as it provides the quiet and peaceful environment I require to best manage my symptoms. I am very concerned as Molloy Island is less than 6 kms from the proposed wind turbines and I do not want to abandon my home because of intense emotional and physical reactions due to the noise from large operating wind turbines exacerbating my pre-existing health issues. Also, there appears to be no plans for monitoring noise levels at any homes, nor any arrangements for shutdown if limits are exceeded. Furthermore, an avoidance-first design should be a priority for wildlife. In my opinion the Development Application does not provide adequate details to permit a true assessment of a project of this size and importance. For the above reasons I request that the Shire of Augusta Margaret River refuse, or at least defer the Development Application until noise plans are provided and an avoidance-first design supplied, and independently reviewed.
45	Support	Comprehensive and thorough studies have been completed on potential impacts (including environmental) of a Synergy windfarm at Scott River utilising experts in these fields including. Mitigation measures have been suggested and accepted by Synergy as appropriate and where required, detailed management plans have been provided from pre-construction, construction, commissioning, operation and decommissioning. All my concerns have been allayed or addressed by these thorough studies and plans. I also note that the EPA requested only minor amendment to one of these plans. The windfarm makes sense both economically and environmentally for local farmers as farming and renewable infrastructure can not only co-exit, but support each other.

		The windfarm would be good for the local community & the Shire both economically and environmentally, with the community benefit fund and local jobs plus the potential bonus of eco-tourism. It should also support ensuring a more stable power system locally. The windfarm would be good for our state both economically and environmentally, by utilising exisiting infrastructure eg the transmission line, the substation & the roads; by supporting the SWIS as old coal power stations are retired; and by reducing carbon emissions. AMR Shire has a wonderful opportunity to be part of the solution through the Synergy's proposed Scott River windfarm.
46	Object	As a farmer there will be a loss of agricultural land to go towards this new industry. farmers whether they know it or not, they will lose autonomy over their own land. One just has to look at the experiences of an eastern state famer who has been served with a trespassing infringement on his own property. (see Weekend Australian Dec 28/2024) He has lost the control over his own land, farming practices, his biosecurity, who goes on and where, and in the end he is responsible for its decommission at the end of its life span. sounds fair !!!!? Big companies and mostly overseas ones at that will win leaving this area bankrupt taking with them any gains and profits that maybe made. The size of these turbines make them an eyesore and no one will be able to escape their overbearing presence Please keep agricultural land for agricultural purposes
47	Object	We own property along the Hardy Inlet on the Blackwood River. We are concerned about the impact of the 250-meter wind turbines on this natural area. The Blackwood and Scott River regions are some of the most unspoilt areas in WA and should remain free from industrial development so future generations can enjoy them. The turbines may harm local wildlife, especially birdlife, and negatively affect biodiversity.
48	Object	I am writing to object to this proposal regarding the environmental, and ecological impact; the risks to energy security; and to oppose the fraud of wind turbines. Scott River is home to numerous native special of birds and animals that will be affected by the turbine blades directly, the noise of the turbines, the noise of the transmission lines, and the environmental devastation of transmission line corridors installed into bush lands and forests. Bird and bat populations will be at particularly high risk, and as Scott River is a green corridor for avian populations, there is particularly high risk of excess mortality for at risk native bird populations, and migratory bird populations. The assumptions made in the proposal need scrutiny as there is high risk of fraudulent statements in the report given regarding the risks to wildlife and human safety. Wind turbines are also a threat not just to human safety through exposure to high voltage emf and low frequency sound, but upon livestock in proximity to this turbine battery and transmission line corridor. Wind turbine blades are also manufactured in asia with high risks of contamination of asbestos and other hazardous products, such as fluorine based atmospheres writhing gearboxes, and risks of shedding of glass fibres and plastic resins from blades - particularly from blades exposed to salted air. Wind turbines themselves are a fraudulent industry with whistleblowers declaring that the energy generation on an annual basis is Net zero - as in zero net power generated on an annual basis, with the added cost of more than $750,000 licence fee per turbine per year, to foreign entities. This is largely due to shutdown in high wind conditions, and grid draw to spin blades up to speed prior to wind being able to turn wind turbines. The unstable energy generated risks the grid and consumers alike, with high risks of blackout in difficult conditions, plus risks of damage and destruction, including that if secondary bushfire and forest fires.

		The large size of turbines is a nauseous aesthetic abnormality to the South West landscape, with risks to tourism in the locale of Augusta, not to mention the possible risks to real estate prices, and insurance costs (or even insurance denial) for properties within bushfire range if a turbine failure event or accident. The shire has a long history of having to address bushfires in the region and locale of Augusta and Margaret River, with risks to properties, livestock, and families in the region. There is no good case for the installation if a turbine farm with such drastic consequences for the state, region, and locale of Augusta.
49	Object	I have lived in this shire for 29 years (Margaret River 23 years, Augusta 4 years and now Molloy Island) and have done considerable research with this attempt and the previous unsuccessful attempts for a wind farm at Scott River. I worked for the BHP Beenup Mine Manager and have done extensive wildlife surveys in the Scott River region, so I know the area and its farmers very well. This is the first time we have seen a Shire Council not make an effort to be accessible to listen to views of ratepayers in person, ones who will be affected most by this. The CEO I think was at one of our local meetings where I was a speaker, but did not make herself known to us. Most of us weren't impressed. When I hear comments that the President wants this wind farm. Is it for the right reasons or just kudos for the shire? As residents of Augusta, Molloy Island and Scott River, we are a small voice within the shire. I am aware that at least 50 percent of ratepayers in the Augusta region of our shire come under the heading of absentees (holiday homes) or AirBNBs. I have lived with that situation in all three parts of the shire. People I have spoken to in Margaret River aren't even interested in knowing about the wind farm at all. Some don't even know of one. As residents of our shire we are all well aware of 'net zero', but not to the detriment of residents health and safety. We were even unable to give an opposing view in the Pelican Post, when the proponent was able to advertise repeatedly in that publication. Rather than speak about the multitude of issues with the feasibility assessments, which I spent hours reading in the Augusta shire offices, and which are by no means an indicator this wind farm is viable, I will speak about only a small portion. I was a volunteer on one of the first panels for community mental health which did not provide me with any results as promised. We have seen other shires in WA that have proposed wind farms in their jurisdictions, standing by their ratepayers first, to ensure that proponents get it right and do not endanger the residents who are not part of actual wind farms. Safety and mental health is a priority as we live in a very pristine environment as shown in our recent Molloy Island Shire Draft Management Plan. So of course visual from high turbines, lack of silence, light infringement, shadow flicker, pulsating from turbines, possibility of infrasound should not be entertained at any cost. The generic pat on the head - "we will work it out later ..." is unacceptable. Environmentally there are numerous issues which have not been dealt with at all at this stage. First of all do we want to see the clearing of habitat (for turbine access), habitat sterilisation if there is a problem with acid sulphate leaching into the soil and surrounding rivers and wetlands. Where is the shire safety plan for any likely event? Also where is all the soil which will be needed for each turbine foundations coming from? Where is the concrete (which is not eco friendly) coming from? Where will the enormous amount of oil (which for net zero will be unavailable) for the smooth running of turbines come from and how will it be transported up such high turbines? Will the turbine brakes contain asbestos? Nothing has been addressed by the shire. One of the most important issues for me is the treatment of our prime producers in Scott River region. It has been appalling. This should not be a "them and us" situation. We should all be working together for the benefit of our capes region. The one thing I would have loved to have seen, was a co-operative arrangement where our towns reap the benefits of a wind farm as has been done in other parts of Australia and Scotland etc. I am not opposed to a wind farm as such, but all the electricity generated by this one will go off to Perth on the Transmission line which is already travelling east or south, not near us at all. And our outages will continue. I really do not have hours to go into more issues - I have only touched the surface. I am sure other residents I know here will touch on many other points. Why did the councillors over many years vote unanimously against any wind farm in Scott River? No-one has ever

		commented why? We have been researching for a long time and found out a lot about wind farms globally over the course of the number of wind farm proposals here.
50	Object	Family have property in Augusta. Been enjoying this special town for more than 15 years. Horrified by the plans that will destroy this natural unique town. It's a hidden gem , should not be destroyed. Concerns for the impact on birdlife.
51	Object	Wind farms look to be green and clean on the outside. but are infact anything but They have a limited lifespan, they are unrecyclable, they rely on fossil fuel to keep the cogs turning. they destroy the environment with all the 1000s tons of cement needed to just erect just one turbine, they need extra infrastructure to return this power to the people. roads buildings etc I have two German backpackers staying with me at the moment and they can't believe the quiet and tranquillity of the area with no whirring sound constantly day and night. This is what you will lose in our nice little place of paradise. They are ugly and a visual pollution, the Scott River area is known for its pristine environment seemingly untouched by the modern world It is important to keep this area significant for this reason Anne Patterson aug
52	Object	Introduction I write to formally object to the proposed wind farm development at Scott River. I am a farmer within the Shire of Augusta Margaret River, located approximately 15 kilometres from the proposed turbine area. While my property is not immediately adjacent to the turbines, my objection is based on the broader impacts of this development on agricultural land, livestock welfare, environmental systems, rural character, and the long-term viability of farming within the Shire. Large-scale industrial infrastructure of this nature has impacts well beyond its immediate footprint. For a farming region such as Scott River, those impacts must be considered in a cumulative and precautionary manner.

		3M 2. Loss and Fragmentation of Agricultural Land The proposed development would permanently industrialise productive agricultural land. Turbine foundations, access roads, underground cabling, hardstand areas and exclusion zones will fragment farmland and reduce flexibility in how land can be managed and used. Farming depends on adaptability—rotational grazing, crop changes, fencing, water infrastructure and future diversification. The introduction of turbines and associated constraints limits these options not only on host land but across surrounding farms due to access, amenity and operational impacts. Once agricultural land is industrialised in this way, it is effectively removed from productive use for generations. 3M 3. Livestock Welfare and Infrasound A significant concern is the effect of infrasound and low-frequency noise generated by large-scale wind turbines on livestock. Unlike people, farm animals are permanently confined to paddocks and cannot relocate away from sources of ongoing noise, vibration or shadow flicker. International experience and emerging research indicate that infrasound and low-frequency noise can influence animal behaviour, stress levels, feeding patterns and movement. The Development Application does not adequately address: • the potential impacts of infrasound on livestock welfare, • long-term exposure for animals confined within the broader infrasound zone, or • how any observed impacts would be monitored, mitigated or remedied. The risk to livestock health, productivity and welfare cannot be dismissed simply because turbines are not immediately adjacent to all farms. 3M 4. Impacts on Native Flora and Fauna The Scott River area supports significant native flora and fauna and forms part of a broader ecological system. There is increasing recognition that infrasound and turbine operation can influence wildlife movement, breeding behaviour and habitat use.

		The proposal does not adequately consider: • displacement of wildlife beyond the turbine footprint, • cumulative effects on ecological corridors and farm-adjacent bushland, or • indirect impacts from noise, vibration, lighting and altered groundwater conditions. The loss or displacement of wildlife would diminish both environmental values and the rural character that underpins farming and tourism in the region.  5. Groundwater and Acid Sulfate Soil Risk The Scott River area is known to have shallow groundwater systems and acid sulfate soils. Large-scale excavation, deep foundations, trenching and dewatering pose a high environmental risk. Disturbance of acid sulfate soils can result in: • acidification of soils and waterways, • mobilisation of heavy metals, • impacts on stock water, dams and bores, and • long-term degradation of agricultural land. The Development Application lacks a detailed, site-specific hydrogeological assessment and a robust acid sulfate soil management plan with enforceable monitoring, trigger levels and contingency responses. These risks extend beyond the turbine site and into surrounding agricultural systems.  6. Visual Impact and Rural Character While my property is some distance from the turbine locations, the scale of the proposed turbines means they will dominate the broader landscape. Turbines of this height exceed Perth's tallest buildings and are entirely out of scale with a rural farming environment. The industrialisation of the landscape affects: • the sense of place that supports rural communities, • the appeal of farming areas for future generations, and • the viability of diversification such as agritourism.

		Once rural character is lost, it cannot be restored.  7. Inadequate Detail and Conceptual Approval The Development Application seeks approval of a largely conceptual proposal. Key details—including turbine numbers, locations, final specifications, construction methodology, and environmental management measures—are not finalised. Council would not approve even modest agricultural or commercial developments without this level of detail. Approving a project of this scale on a “work it out later” basis is inappropriate and places unacceptable risk on landholders and the environment.  8. Consultation and Cumulative Impacts Consultation to date has been inadequate, particularly for landholders who may not be immediately adjacent to turbines but fall within broader impact zones. The cumulative effect of this development—on agriculture, wildlife, groundwater, amenity and rural character—has not been properly assessed. These impacts extend well beyond property boundaries and must be considered at a regional scale.  9. Economic and Community Considerations The application does not demonstrate clear, tangible benefits to the local farming community. Claims of emissions reductions are not supported by evidence identifying where or how such reductions will occur. There is also no meaningful assessment of the potential long-term economic cost to agriculture, land values, and the reputation of the Scott River region as a productive and environmentally sensitive farming area.  10. Conclusion The Scott River region is a highly valued agricultural and environmental landscape. Introducing industrial-scale wind turbines into this setting poses unacceptable risks to farming, livestock welfare, wildlife, groundwater systems and rural character.

		For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm.
53	Support	
54	Object	1) Position and request I object to the proposed Scott River Wind Farm and request that the DAP refuse the Development Application. In the alternative, I request the application be deferred unless and until it is subject to appropriate environmental assessment and the proponent provides credible, independently peer-reviewed technical work demonstrating compliance with all applicable requirements (including noise). 2) Proposal overview (as advertised) The proposal is described as an onshore wind farm in the Scott River area, involving up to 20 wind turbines generating up to 100MW, with associated infrastructure (substation, transmission infrastructure, masts/towers, O&M buildings and roads). Public materials indicate turbine height up to ~250m, which is an industrial scale that is incompatible with the receiving environment and surrounding rural-residential uses. 3) Key grounds of objection A. Unacceptable visual / landscape impact and loss of rural character Turbines of this scale (up to ~250m) will permanently industrialise a currently rural landscape and materially alter views across the locality, including day and night (aviation lighting). This is inconsistent with protecting the amenity and landscape character values that underpin the wider Augusta–Margaret River identity and visitor economy. Request: Refuse the proposal due to unacceptable landscape and visual impact; alternatively require materially increased setbacks, reduced turbine number/height, and strict lighting controls supported by independent visual simulations from sensitive viewpoints (homes, roads, lookouts, tourism nodes). B. Residential amenity impacts: noise, low-frequency noise and tonality Noise impacts are a primary concern for residents and rural landholders. Given the scale of the proposal, the assessment must demonstrate compliance with the Environmental Protection (Noise) Regulations 1997 and must be robust to real-world operating conditions (wind shear, multiple turbines, cumulative effects). I am not satisfied, on the material presently available, that the risk of ongoing amenity impacts has been eliminated. Request: Refuse or defer pending (1) independent peer review of the noise assessment, (2) enforceable limits/conditions, (3) transparent complaint investigation and compliance monitoring regime funded by the proponent, and (4) conservative setbacks where any modelled uncertainty exists.

		C. Shadow flicker, blade glint and night lighting impacts Shadow flicker and blade glint can cause repeated nuisance impacts and reduce the reasonable enjoyment of homes and outdoor areas. Night lighting can also materially affect rural darkness values. Request: Refuse or require strict, enforceable flicker limits, conservative modelling assumptions, and legally binding curtailment (shutdown) protocols, with monitoring and reporting. D. Environmental risk and need for appropriate environmental assessment The Environmental Protection Authority is involved in the proposal pathway and (at minimum) the project is of a nature that warrants careful assessment of fauna (including birds/bats), vegetation, habitat connectivity, waterways/wetland systems, and construction impacts. Given the community concern and the scale of the infrastructure footprint, the precautionary approach should apply where information is incomplete. Request: Refuse or defer until environmental impacts are assessed to a standard that is transparent, independently verifiable, and addressable through enforceable conditions (including offset claims, if any, being clearly justified). E. Traffic, road safety, construction impacts and ongoing servicing Construction of turbines and associated infrastructure brings heavy vehicle movements, road upgrades, dust, vibration, drainage changes, and increased bushfire ignition sources. These impacts can be significant for local roads and rural residents. Request: Refuse or impose conditions requiring a detailed Construction Traffic Management Plan, road condition surveys and make-good obligations, limits on haulage times/routes, and binding dust/noise controls during construction. F. Bushfire and emergency management risk Wind turbines and electrical infrastructure in a bushfire-prone region introduce operational and emergency response issues (access, shutdown, asset protection, and the practical ability to fight fire safely near turbines). Request: Refuse or require comprehensive bushfire risk assessment and an enforceable emergency management framework (including clear shutdown triggers and communications protocols). G. Inadequate community benefit relative to scale of impact Public project information refers to a community benefit fund (e.g., $100,000 annually) and construction jobs. However, these benefits do not offset permanent amenity impacts borne by nearby residents and the long-term industrialisation of the landscape. Request: Give significant weight to the disproportionate local impacts versus proposed benefits. H. Decommissioning, rehabilitation and financial security

		Any approval must ensure that turbines and all associated infrastructure are fully removed at end of life and land is rehabilitated, backed by adequate financial security (bond) to prevent the burden falling on landholders or the community. Request: If not refused, impose conditions requiring a funded decommissioning plan, indexed costings, and a bond/financial security mechanism. 4) Conclusion For the reasons above—particularly unacceptable landscape/amenity impacts, unresolved noise and flicker risks, and the need for rigorous environmental assessment—I request the DAP refuse the application.
55	Object	Visually damaging to the vista. Harmfull to wildlife. Per MW/hr wind turbines are not efficient and cost effective. Baseload is what we need to invest in. The cost to destroy prime country and bushland, along with the beautiful scenery, and wildlife would be devistating. Wind turbines are not the solution.
56	Object	I object to the Scott River Wind Farm DA because it lacks detail needed for a proper assessment. The proponent has not fixed turbine locations, turbine specifications or a final design, yet seeks approval now and says details will be worked out later. This is not acceptable to me. This makes noise, shadow flicker and visual impacts impossible to properly assess, and it shifts risks onto neighbours. The noise assessment is desktop-based and relies on assumptions suited to older turbines, not modern 250 metre turbines. Actually aren't these the highest in the world? Therefore there can be no physical tests that have been done. It does not provide real time monitoring, independent verification or enforceable protections if limits are exceeded. The floodplain location, acid sulphate soils and shallow groundwater create high consequence risks to water quality and farming. There has been no proper research on the wildlife impact. This really distresses me. Australia has a lousy track record for allowing animals to become endangered and then extinct. The carnaby's being just one. Scott River is a major flora and fauna diversity location. It is home to the endangered ringtail possums. The disruption of construction and then the infrasound will drive these precious animals away and many of the migratory and resident birds will be killed by the turbines themselves. We attempted to have a pathway built to the lighthouse from Dead Finish approximately 15 years ago. We paid several thousand dollars for a feasibility study. It was not allowed to go ahead due to a rare frog that might have been negatively affected. So I know that the Shire used to care about our wildlife. This appears to not be the case anymore. I am very very distressed by the potential loss of bird and animal life due to these proposed turbines. I implore the shire to refuse or at the very least, defer the DA until a final design, verified noise framework, and ROBUST environmental and emergency plans are provided and independently reviewed. This proposal is not suitable for the Scott River floodplain, and the risks to community amenity, farming, water security, environment and

		landscape character are unacceptable. Karen Basford
57	Object	I am writing to express my objection to the Scott River wind farm development application, currently before the shire of Augusta Margaret River. The development application lacks sufficient details and is acting on a 'work it out later' strategy. No final turbine layout has been provided and can be changed upon the developers discretion, changing greatly who will be affected and what. Pulsating infrasound is becoming known internationally, with evidence suggesting that wind turbines of this size and capacity are an unaddressed risk for some people. Implementing a development like this can greatly affect not only people's health but also Augusta tourism and the pristine environment of proposed location. Another major concern is the possible and likely disturbance to the acid Sulfate soil which has already happened once before with the BHP sand mine which required a big clean up. This DA is in a pristine and sensitive ecological area. 26 species of flora and fauna are listed as either threatened, rare or at risk already within the Scott River area. This is only one small part of the ecological concern for this location and insufficient details have been provided to the community for such a high risk setting, there is NO evidence on long term effects. We require more transparent, independent and stronger research into these issues from the shire of Augusta Margaret River.l before this project commences.
58	Support	The site chosen is an ideal place for the residents of this Shire to contribute to lowering our own emissions using the most efficient power generation method we have access to - wind. The Shire residents and their representatives need to take responsibility to lower emissions and reduce the draw on the grid from energy generated outside our area. The Shire should base its decision on scientific evidence. SynergyRED has undertaken thorough research to address concerns with the impact of power generation at Scott River. The site is ideal, with minimal clearing, access to grid and transmission lines, and transport access all in place. Please base your decision on our responsibilities to future generations.
59	Object	The Blackwood River, along with Flinders Bay are icons of Western Australia and unique to the world, only one of two locations where a river flows into two oceans. The backdrop of 20 wind turbines up to a height of 250m will scar what is a truly a magnificent outlook. The decision to place the wind farm in the proposed position, appears to be based primarily on financial grounds i.e. by utilizing the existing Beenyup Mine infrastructure to connect to the South West Interconnected System (SWIS). The wind farm could be located further East, out of sight of the Augusta townsite and Flinders Bay, with connection to the South West Interconnected System (SWIS) at a point further East on the existing 132 kV Beenup to Manjimup transmission line. The wind farm, in the proposed position, will have a negative impact on the physical and visual environment. Residents and visitors alike come to Augusta because of its natural beauty and relaxed idyllic lifestyle, THIS WILL BE LOST!

		The added cost of moving the farm further east will be money well spent, to retain the unique place Augusta holds in the Augusta Margaret River region, as one of the worlds most beautiful places to visit.
60	Object	I am writing to lodge my objection to the proposed Synergy Scott River Wind Farm proposal. My view is that the Development Application does not contain the specifics required for any person to make an informed decision. The final number of turbines, their exact final location, the proposed height of the turbines or a detailed construction and operational plan, is missing the detail required to assess the validity of the proposal. If I am to understand the impact of turbine noise, the impact of infrasound on the fragile biodiversity that calls the proposed site home, the negative visual impact on the township and surrounding community or the impact of the turbines on natural ground water sustainability, or increased bush fire risk, then the proposal falls a long way short of providing me the information I need or the confidence that the developer has taken "all reasonable steps' to address these issues in their proposal. One of many other concerns I have is that these turbines, wherever they are proposed to be erected, will permanently alter the viability of the rich and fragile biodiversity of the Scott River area. To say that these details will be worked out later, leaves me with a feeling of dread that the project will forever alter the fundamental premise of Augusta's natural gifts, being its biodiversity and natural beautiful uninterrupted views to the horizon. How can these things be so easily dismissed and disregarded in the development application? I have also found more evidence to be concerned about the impact that these turbines will have on noise levels. The application doesn't address the growing concern of low frequency noise or infrasound on the community surrounding the structures despite growing international evidence that pulsating infrasound from turbines presents unaddressed health risks. The visual impact of the proposal is also a matter for my objection. Scott River is highly valued for its natural landscape and agricultural character. Industrialising this pristine landscape would result in a permanent loss of character that will undermine the eco-tourism appeal of the district. The sites floodplain location also raises further concerns. The Superficial shallow aquifer linked to the river system will be severely compromised by the digging of deep foundations and trenching. Farmers will most likely be negatively affected by dewatering and soil stability as well as ground water quality available to their bores and dams. I feel that Bushfire risk and Emergency response are also inadequately addressed in the proposal. The creation of Wind Turbines will create "no fly" zones which will restrict aerial firefighting and the internal access roads do not provide sufficient evacuation routes in the event of fire. It appears to me that Construction Impacts are also severely underdeveloped. The application lacks the detail on access routes, heavy vehicle movements, timing and duration of works, dust and noise management and protection for the local residence, road users and business effected by the construction. Finally, I've been concerned by the inadequate level of community consolation. Many effected landowners have reported no direct engagement. The Development Application, in my view, fails to clearly summaries community feedback or concerns. Given the

		magnitude and permanence of this proposal, the consultative process is seriously inadequate. For the reasons I've shared with you in my response, I strongly request that the Shire of Augusta Margaret River refuse or, at a minimum, defer the Development Application until: 1. A final Turbine layout be provided, 2. The Turbine specifications be confirmed, 3. The noise impact be adequately researched and results be provided, 4. A detailed environmental, bushfire and construction management plan be provided which has been independently reviewed. In conclusion, believe that the proposal is completely unsuitable for the Scott River floodplain, and the associated risks to community amenity, farming, water security, adverse impact to biodiversity and environment are just some of the contributory factors to my decision.
61	Object	The primary reason this proposal should not proceed is the unacceptable level of uncertainty regarding its environmental impacts, particularly in relation to protected wildlife and sensitive ecosystems. The Scott River and Augusta region contains significant ecological values, including remnant vegetation, waterways, wildlife corridors and proximity to coastal environments that form part of the annual migration route for protected whale species. These environmental assets are vulnerable to disturbance from large-scale infrastructure. The application seeks approval based on a “maximum case scenario” without confirmation of final turbine models, dimensions or precise locations. As a result, the potential impacts on fauna, including birds and marine mammals, cannot be accurately assessed. Given the scale of the proposed turbines and associated infrastructure, there is a real risk of irreversible environmental harm. In such circumstances, the precautionary principle applies. Where there is a threat of serious or irreversible damage, the absence of full scientific certainty should not be used as a reason to proceed. In the absence of clearly defined project details and robust, site-specific evidence demonstrating that environmental impacts can be avoided or adequately managed, the proposal should be refused or deferred.
62	Object	As owners of a property fronting Hardy Inlet on the Blackwood River and a commercial premises in the main street of Augusta we are very concerned about the aesthetics of 250 metre turbines on the natural beauty of the area. We consider the Blackwood and Scott river areas are some of the most pristine wilderness that we have left in Western Australia and do not want to see the visual pollution on this landscape that will come from the highly visible nature of these towers. We do not feel it is an area that should be industrialised. We would like future generations to be able enjoy the beautiful views and quiet solitude of the area as we have done over many years. The wildlife especially the prolific bird life on the rivers which form such an integral part of this environment will most definitely be affected by turbine damage causing issues to the biodiversity of the whole area. The effect on the water table and water dependent ecosystems especially during the construction phase concern us. The high acid sulphate soils in this area are also of concern. We remember that a mineral sands mine in this area was closed about 25years ago and has undergone rehabilitation ever since due to the high acid content of the soil and the detrimental effect on the water table. We

		understand that the proposed wind farm is adjacent to this former mine site. We feel these turbines are out of place in this area and urge the Shire to reject this proposal. Thank you for your consideration of our point of view.
63	Object	I STRONGLY object to Synergy Renewable Energy Developments' proposed Scott River wind farm. I support renewable energy, but this proposal is in the wrong place and is not defined clearly enough for the community to properly assess. The Scott River and Augusta area is valued for its natural, largely untouched landscape, quiet rural character and strong appeal to residents and visitors. A development of this scale is NOT compatible with those qualities. Approval is being sought for a "maximum case scenario" without final turbine models, heights or exact locations confirmed. This makes it difficult for the community to understand the real impacts, particularly in relation to visual impact, noise, shadow flicker and overall amenity. Turbines up to 250 metres high would dominate the landscape and permanently change the character of the area. Once built, this impact cannot be reversed and would undermine tourism, lifestyle properties and the natural appeal that defines the region. The proposal also involves extensive supporting infrastructure, including roads, foundations, substations and transmission lines, within an environmentally sensitive area that includes waterways, remnant vegetation and wildlife corridors. The cumulative impacts of this have not been adequately addressed. Using the DAP pathway for a development of this scale limits meaningful local input, despite the long-term consequences for the community. Renewable energy targets do not justify poor siting. There are more suitable locations for industrial-scale wind farms that would not permanently damage a unique and valued landscape. For these reasons, I ask that this application be REFUSED, or at least deferred until final details are known and the community can be properly consulted.
64	Object	I strongly object to the proposed Scott river wind farm due to the lack of details needed for an accurate assessment. The proposed location is a highly sensitive environment, which has not been given serious consideration. The location of the flood plane, the acid sulphate soil and shallow ground water create too much of a risk to water quality surrounding farm land and to tourism in Augusta. Synergy do not have a plan when it comes to emergency and acid sulphate contamination, adding lime from a limited resource isn't sustainable due to it's scarcity. Another very worrying concern is that infrasound has not been sufficiently addressed, emerging international evidence strongly suggests that large turbines are a risk when positioned too close to housing, and for some people creates sleep disturbances and physiological stress, which are much more common than acknowledged by synergy.

		I request the shire to refuse or defer the DA until a final design and a strong environmental and emergency management plan are provided INDEPENDENTLY assessed apart from Synergy.
65	Object	I object to the proposed Scott River Wind Farm due to environmental, procedural, and transparency concerns. The project has not undergone a full EPA assessment, leaving ecological risks insufficiently evaluated. The area contains remnant native vegetation and wildlife habitats, and turbine operations could harm birds and bats, as observed in similar projects like Tasmania's Robbins Island wind farm. Community consultation has also been limited, with many local residents becoming aware of the proposal late. all of my family live in Margaret River and Cowaramup and are completely unaware of the scale of the project. Adequate disclosure of environmental assessments, operational impacts, and monitoring plans is essential. While I support renewable energy, this development should not proceed without rigorous, independent environmental evaluation and proper community engagement. I request a formal EPA assessment and full public disclosure of ecological data prior to any approval. Thank you for considering my submission.
66	Support	Love clean energy! More please
67	Object	Will negatively affect the wildlife and they are very intrusive to the landscape.
68	Object	This will be a blight on the beautiful landscape & negatively impact local wildlife
69	Object	These wind turbines would be a blight on the beautiful landscape and would negatively impact local wildlife. Invest our resources into baseload power instead!
70	Object	I strongly wish to lodge with the Shire ,my objection to the Scott River Wind Farm Development Application submitted by Synergy . The Development Application lacks specific detail for an assessment to be made, especially when taking into consideration the size, scale and the immense impact such a project may have on the environment if errors of planning and judgement are made. Statements directing that issues will be , " worked out later ", are completely unacceptable and intolerable . If this development is accepted and the worst scenario should eventuate it will alter the ecological environment of the Scott River permanently and ruin lives and livelihoods of residents all along the Blackwood and Scott rivers. How do you 'work out later' an ecological disaster? Nothing has been confirmed. If the Shire agrees to this DA they are in effect giving the developers a ' blank cheque '. What will be the final number of windfarms , their location, final height, turbine model, how will they be constructed and what will be the operation methodology? Without this information how can assessments be made on the impact of noise, infra sound, shadow flicker, visual dominance, bushfire risk , groundwater impacts and the over all amenity ? The impact on an area well known for the sensitivity of the acid soil is one of my main concerns. BHP's failed Beenup Mineral Sands Mine , renowned for an ecological environment disaster in 1999 is on the same geophysical land as this proposed Windfarm. My home is on the banks of the Blackwood River (flood plain) at Seine Bay in Augusta . Mis-management of this major development will have long term life altering results for home owners, tourism, farmers, cattle, wineries,

		crops, orchards, native fauna ,flora and the fishing industry . If the acid soils and affected ground water from the site were to link with the superficial aquifer and the river systems, water quality in and around Witchcliffe , Karridale, Hamlin Bay and Augusta will be affected . As after the release of heavy metals the PH will lower to lethal levels . It Is a direct threat to the Blackwood and Scott Rivers , Flinders Bay, and over 26 listed threatened species. If the DA is accepted by the Shire and the worst should happen , that the disturbance of the soil in the development envelope results in the creation of acid sulfate soil, with the run off entering the shallow groundwater and aquifer flowing into the river system then .... a plan to counteract the disaster is essential ....Synergy do not have a plan when it comes to emergency acid sulfate soil mitigation . WHY? Synergies action plan .... "work it out later"! Too late when faced with an irreversible disaster example Beenup Mine ! Without a final design and dewatering plan there is NO credible risk assessment for volumes , disposal, treatment, monitoring and contingencies for managing water. The DA doesn't provide a credible , site-specific hydrogeological assessment or a believable acid sulfate soil and dewatering management plan. Indicating that lime will neutralise the problem of acid soil / water is not being realistic as it is not sustainable , economical or responsible. Who will pay to import the lime from Africa and compete with BHP and farmers ? Synergy the developer (taxpayers) .... Scott River farmers .... one of the Greenwinds Renewable Company's (Macquarie Bank)! Find another site where the soil is not sensitive acid sulfate and the impact on the local community is negligible. Bushfire Risk and Emergency response are further areas of concern. The DA doesn't address how fire ignition risk ,emergency response or rare flora protection would be managed in extreme fire conditions. Wind turbines create no-fly zones that may restrict aerial firefighting . Internal access roads are not necessarily safe evacuation routes . Construction impacts are not adequately planned. Little detail on access routes, heavy vehicle haulage issues on farm roads, dust , noise and duration of works ,protection of local residents, road users and businesses . Tourists and tourist coaches frequent Brockman Hwy . Movement of heavy haulage vehicles carrying turbine blades etc will be a constant danger for traffic in this area . These issues are not a short -term inconvenience . Windfarms in Sth East Queensland Macintyre project that commenced construction 3 years ago are still moving blades and turbine parts too and from the sites while battling through the commissioning process Some for repair others first installation after years have of disruption for the community. Finally, the consultation process is inadequate when the size , impact and permanence .of this proposal is taken into account. I have spoken with many affected land owners who have had NO direct contact with Synergy. The DA doesn't summarise with any clarity the community feedback process or outline how the many concerns raised have been meaningfully addressed. I request that the Shire of Augusta Margaret River refuse the Synergy Development Application and suggest another site be selected where sensitive acid sulfate soil will not cause major long term irreparable issues as is the case in the Scott River area. This proposal is not suitable for the Scott River floodplain , the risk to community amenity, farming, water security and quality , environment , ecology and landscape character are intolerable. .

71	Object	My main objection to the proposal is the potential impact on the hydrology of the 4 aquifers located in this area arising from acid sulphate soil (ASS) development during construction of the project. I believe there is a significant risk of the project negatively impacting these aquifers. This damage may require substantial mitigation or even be irreversible. One of the aquifers, the Yarragadee, is a substantial source of underground water for the south west of WA. It is likely this aquifer will play an increasing role in water supply and there limited or no alternatives available. Ecologically and strategically, this system is of much higher priority than another renewable energy project such as a wind farm, which could be located in another less environmentally sensitive area. Previous mining activity at Beenyup has highlighted the difficulties in managing ASS and the fragility of the aquifer system. I do not believe that Synergy, an electrical energy provider, will have the skills or resources to manage this risk. The operator of Beenyup, BHP, one of Australia's largest mining companies, was challenged to control the ASS developed by the project. This project should not proceed in this location.
72	Object	I would like to see a workable solution to the wind farm proposal and the environmental impact. I am not a scientist, however neither are politicians and businessmen experts particularly when it comes to innovation a d new technology. Surely the environment deserves respect and protection over quick solutions and making a fast buck. Bad decisions can cause destruction to the harmony of our environment. Where are the guarantees that this won't happen.? Will digging down 5 metres bring minerals to the surface once again causing algal blooms killing the waterways? Lessons must be learnt from past mistakes. SA has recently experienced a catastrophic algal bloom!! Has anyone considered the French design Vortex Wind Generator. There are no moving blades, they oscillate silently to create electricity and require little maintenance, are safe for birdlife and are less visually intrusive. All of these factors have been raised as grounds to object the proposed wind farm. An article from the EU Corner's post explains they are compact and easy to transport and install. I ask that serious consideration be made into the above alternative. Should this design not be implemented i strongly object to the current proposal. At what point will notice be taken of individuals speaking with one voice.
73	Object	This area is a high-value tourism, nature and cultural landscape. The DA and supporting LVIA/Social Values materials currently fail to demonstrate that local social and visual values have been rigorously and independently assessed and that residual harms will be prevented or appropriately mitigated. The EPA referral public submissions (321 requesting PER) show significant public concern; ignoring that concern risks long-term damage to local amenity and community trust. The responsible course is independent reassessment and stronger, enforceable conditions — not a simple tick-off based on the proponent’s current reports.
74	Object	The Landscape and Visual Impact Assessment acknowledges high to moderate visual impacts across a majority of assessed viewpoints, based on a limited number of visual receptors - this is not acceptable. The Social Values Assessment reports that only two neighbouring property holders participated directly, which is insufficient to represent affected residents. Further independent assessment and precautionary conditions have to be considered.
75	Object	Taken together, the visual, social and noise evidence demonstrates that the DA does not adequately characterise residual risk or demonstrate that impacts can be avoided or acceptably mitigated. In a high-value landscape with significant community & visitor concern, this represents a material deficiency.

76	Object	My property is 5km from the project. We are going to be significantly impacted by noise, flashing lights and infrasound. Who is going to compensate us for loss of ammenity.? I am concerned about the carbon fibre shedding from turbine blades and contamination into the soil of the farming host and neighbouring land. This is disgraceful.
77	Object	I strongly object to the Scott River wind farm. It ruins the visual amenity of the Leeuwin Naturaliste Ridge. And places the whole waterway system of the Scott and Blackwood Rivers at risk.
78	Object	I own and rent a property close to the proposed site for the wind turbines. If this proposal is implemented, it will clearly impact the property's rental viability, tenant interest, and long-term value. Also, only some parts of wind farm units (wind turbines) are recyclable when they break down or reach the end of their life. However other components are much harder to recycle. My other related concerns are numerous. a) Biodiversity impacts: The Scott River area is environmentally sensitive, with rare flora, wetlands, and wildlife. Large turbines, access roads, and transmission lines will fragment habitats and disturb ecosystems. b) Wind farms pose collision risks, particularly for migratory birds and bats that use river corridors and coastal–forest systems. c) Construction of a wind farm in Scott River will affect fragile soils, wetlands, and water flows that support the river system and surrounding park. d) The Scott River National Park is protected for conservation, recreation, and nature connection. Nearby industrial-scale infrastructure may be seen as undermining the purpose of the park. Even if turbines are technically outside the park boundary, their visual and white noise pollution, and ecological effects will extend into protected areas. e) Wind turbines are tall and highly visible. I believe that they will significantly alter the natural, and aesthetically pleasing landscape surrounding the park- that presently makes this area so unique and should be preserved without disruptions. f) While noise and shadow flicker may be regulated, these will still impact nearby residents and visitors seeking quiet and solitude. The region is valued for bushwalking, camping, birdwatching, and low-impact tourism. There are concerns that industrial infrastructure will affect visitor experience and local tourism economies. g) The Scott River area holds deep cultural significance for Traditional Owners. Inadequate consultation or perceived risks to cultural sites is perceived as a major concern for emerging elders. h) In 1999, BHP prematurely closed its Beenup titanium mine in Scott River due to environmental issues regarding the exposure of acid sulphate soils. When disturbed or exposed to air, acid sulphate soils can release sulphuric acid and other heavy metals into surrounding water bodies and groundwater. While Synergy's EPA submission includes plans to neutralise the exposed acidic soil with lime treatment during construction to avoid contamination, the management plan has not allayed the serious concerns of some nearby farmers and landowners living close to the closed titanium mine in Scott River. FIND ANOTHER LOCATION NOT AT THIS FRAGILE ENVIRONMENT!!

79	Object	1. This is an inappropriate site to place wind turbines , an industrial project in full sight of such an iconic , historical town such as Augusta. WA has few beautiful tourism towns , compared to the rest of Australia . Trashing one of the few we have is not ideal. Is it because it is far away enough from the gaze of Perth Citizens ? Out of sight , don't look over there. 2. Noticeably , wind turbine projects are "falling over" Australia & world wide , before they even get to preliminary construction phase ,reason being , they are not economically feasible. Even with the massive subsidies thrown by government at prospective developers. I'm an experienced business consultant , I've seen companies walk away from projects that have failed or are failing without having to clean up their mess and remediate. What happens to these turbines then ? 3. Considering the number or power brown outs we suffer in Augusta , it is more than likely that forcing out base load power supply and relying on renewables is NOT going to improve reliability . We are already being advised by Synergy (State Government) that we need to turn down our air conditioners. The grid obviously can't handle it when the sun goes down. 4. What reason was given for the failure to proceed of the Bunbury offshore wind turbines? Too much "in your face " for the local electorate ? As long as they are not in the face of the locals at Gnarabup , then it's all good for the plant ! 5. This proposal and its lack of detail is contempt for the residents of Augusta and their visitors.
80	Object	Please do not let this project go ahead. The adverse impact on Augusta is enormous. I am totally against this unsubstantiated project.
81	Object	A wind farm positioned in direct view of Augusta must not go ahead. Visual pollution, effect on wild life, financial justification is based on risky assumption which would make the project totally unviable amongst other detrimental impacts.
82	Object	I write to formally object to the proposed wind farm development at Scott River. I am a resident of the Shire of Augusta Margaret River, although I do not live in close proximity to the proposed turbine locations. I regularly holiday in Augusta and the surrounding region and have long considered relocating permanently to Augusta in the future. The natural beauty, rural character, sense of space and peaceful environment are the primary reasons this area is so highly valued by both residents and visitors. My objection is based on the scale and industrial nature of the proposal and the significant impacts it would have on visual amenity, landscape character and community wellbeing. The proposed turbines are of a scale that would dominate the surrounding landscape and permanently alter the character of the Scott River and greater Augusta region. Turbines of this height and prominence are not compatible with the quiet rural and coastal environment that defines the area and attracts people to live, visit and invest here. Visual amenity is a key concern. The presence of multiple skyscraper-scale turbines would fundamentally change views from roads, rural properties and public spaces. Once erected, this visual impact would be permanent and irreversible. The loss of open horizons and natural landscapes would significantly diminish the enjoyment of the area for residents, visitors and future generations. I am also concerned about the potential health and wellbeing impacts associated with large-scale wind turbines, particularly in relation to noise, low-frequency noise and infrasound. While I do not live immediately adjacent to the site, I am concerned about the broader impacts on the community and the uncertainty surrounding long-term exposure. These concerns would directly influence my decision to ever

		relocate permanently to Augusta if the turbines were constructed. The Development Application seeks approval of a proposal that is not fully defined. Key details such as turbine numbers, locations, specifications and final impact assessments are yet to be confirmed. Approving a development of this scale without clear and finalised information does not provide confidence that impacts have been properly assessed or that the values of the region will be protected. Augusta and the Scott River region are special places. They are valued for their natural beauty, rural character, sense of peace and strong connection to the environment. Approving industrial infrastructure of this scale would undermine those values and change the identity of the area forever. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm and protect the unique character, amenity and wellbeing of the region for current and future generations.
83	Object	I write to formally object to the proposed wind farm development at Scott River. I am a resident of the Shire of Augusta Margaret River, although I do not live immediately adjacent to the proposed turbine locations. I regularly use the Scott River area for recreation, including boating, camping and enjoying the natural environment, and I am concerned about the impact this proposal would have on the amenity and character of the area. The Scott River is valued for its quiet, natural setting. The introduction of large-scale wind turbines so close to the river and surrounding recreational areas raises serious concerns about ongoing noise, low-frequency noise and visual intrusion. Even where turbines comply with standard audible noise limits, experience elsewhere indicates that turbine noise can carry over long distances, particularly at night and in rural environments, diminishing the peaceful character of natural areas. The presence of turbines of this scale would also alter the experience of using the river and surrounding campsites. The constant movement of blades, aviation lighting and industrial character of the infrastructure would detract from the sense of remoteness and tranquillity that draws residents and visitors to the area for recreation. The application does not adequately demonstrate that noise and amenity impacts on recreational users and river-based activities have been properly assessed or will be effectively managed, particularly given that turbine locations and specifications are not finalised. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm, or at a minimum ensure that the Scott River and surrounding recreational areas are protected from noise, visual and amenity impacts.
84	Object	Wind farms are a great source of renewal energy but need to be located in areas that are not home to native species and wildlife. The location needs to take our irreplaceable native plants and animals into consideration and be situated where it will no little or no impact. The noise level and height of the turbines also should be modified to decrease the noise produced by the turbine activity. It should have little or no impact on the people, wildlife and buildings in the area. All negative factors should be taken into account prior to building the wind farm and not just decided during the process. We need a full breakdown of position, height, noise levels, impact on people and wildlife prior to the final decision about this

85	Object	I write to formally object to the proposed wind farm development at Scott River. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant and long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing, and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, dewatering and water management arrangements, and environmental safeguards—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. I am also concerned about the cumulative effects of this proposal on the natural landscape, biodiversity, rural amenity, tourism values, and the long-term viability and use of surrounding land. The scale of the turbines proposed is unprecedented in this setting and would fundamentally alter the character of the area. Further, the consultation process to date has not provided affected landowners or the wider community with clear, complete and accessible information about the proposal or its consequences. Without a detailed and transparent design, the community cannot meaningfully assess or respond to a development that has the potential to permanently change the region. For these reasons, and for the detailed concerns set out below, I request that the Shire of Augusta Margaret River does not support the proposed wind farm in its current form.  2. Incomplete and Conceptual Nature of the Development Application The Development Application is lengthy but lacks sufficient detail to be properly assessed. The developer (Synergy) has not finalised: • the number of turbines, • turbine locations, • turbine height, model, operating parameters or colour, • construction methodology, • foundation design and excavation depth, • dewatering volumes or management methods, or • environmental management and rehabilitation measures. The developer advises that these matters will be resolved at a later stage. This approach is wholly inadequate for a development of this scale and longevity. Council would not approve even modest commercial or residential developments without detailed and finalised design information, and this proposal should not be treated differently.

		 3. Groundwater, Water Table and Hydrogeological Impacts The likely effects of the project on groundwater systems and groundwater-dependent ecosystems are not adequately assessed. Large-scale excavation, piling and trenching will be required, with associated dewatering. These activities have the potential to alter groundwater flow paths and water table levels, with long-term impacts on aquifers, surface waters, wetlands, drains, dams, bores and groundwater-dependent vegetation. The Development Application does not include a thorough, independent hydrogeological assessment demonstrating: • baseline groundwater conditions, • surface–groundwater interactions, • predicted impacts from excavation and dewatering, • cumulative impacts across the site, or • enforceable monitoring, trigger levels and response measures. Without this information, Council cannot responsibly assess environmental risk.  4. Acid Sulfate Soils – High Consequence Environmental Risk Acid sulfate soils (ASS) are a known and serious risk in the Scott River area. When ASS are exposed through excavation or groundwater drawdown, sulfuric acid and heavy metals can be released, causing: • acidification of soils and surface waters, • vegetation loss, • contamination of waterways and agricultural water supplies, and • long-term environmental damage. The application lacks: • a site-specific ASS investigation, • a detailed dewatering and ASS management plan, • defined monitoring and trigger levels, and • a credible emergency response framework. Reliance on generic mitigation measures or post-approval plans is unacceptable given the high-consequence nature of ASS disturbance.

		 5. Scale of Earthworks and Dewatering Despite the absence of final design detail, the proposal indicates: • approximately 30 km of onsite access roads, • approximately 30 km of trenching for underground cables, • turbine foundations requiring excavation of approximately 2,000 tonnes per turbine to depths of at least 5 metres, • potential remediation increasing excavation by ~500 tonnes per turbine and depths exceeding 7 metres, • significant dewatering requirements, and • no identified dam or method for managing dewatering volumes. This represents a substantial disturbance of soils and groundwater in a sensitive environment, without adequate assessment or safeguards.  6. Visual Impact and Loss of Rural Character The visual impact of the proposed development would be severe, long-lasting and unacceptable. The turbines and their blades will exceed the height of Perth's tallest buildings, including QV1 and Central Park. The presence of multiple skyscraper-scale structures in a rural landscape would devastate visual amenity, property enjoyment and rural character for decades. The scale and siting of the turbines will dominate views from private properties, roads and public spaces, fundamentally altering the character of the area and reducing enjoyment and privacy. 6.1 Inadequate Visual Assessment It is extremely difficult to comprehend the true scale of 220–230 metre turbines. The photomontages provided are limited, selective and oriented to depict best-case scenarios. They do not show key viewpoints from private properties, approach roads or public vantage points, nor do they adequately assess worst-case or cumulative impacts. 6.2 Sterilisation of Surrounding Land Approval of this development would effectively sterilise neighbouring land uses for the remainder of the century. The presence of turbines would constrain future rural, tourism and residential development on surrounding properties. I cannot identify any other development in the Shire with such a significant offsite sterilising effect.

		7. Planning Scheme and Visual Amenity The proposal does not comply with the intent of the Shire's Town Planning Scheme. Clause 5.13.3 allows wind turbines only where they are designed and sited so as not to detract from the visual amenity of the locality. The proposed turbines will be dominant, intrusive and visually overwhelming. Even the developer acknowledges visual detriment in its documentation. On this basis alone, the proposal fails the Scheme's visual amenity test. 8. Noise, Disturbance and Shadow Flicker I am concerned about continuous turbine noise, particularly at night, and the risk of sleep disturbance and reduced amenity for nearby residents. The application does not demonstrate that noise impacts will be acceptable, particularly given that turbine specifications and operating parameters are not finalised. The proposal also lacks a robust, site-specific assessment of shadow flicker impacts and enforceable mitigation measures. Experience elsewhere in Australia demonstrates that assurances of "no offsite impacts" are often not realised once projects are operational. 9. Wildlife and Environmental Values The proposal is located near habitats used by birds, bats and other wildlife. The environmental assessment does not adequately address strike risk, habitat disruption, cumulative impacts, or the potential effects of noise, vibration and groundwater disturbance on fauna and flora. Given the ecological sensitivity of the area, a precautionary approach is required. 10. Traffic, Access and Construction Impacts

		Construction will involve heavy vehicles and oversized loads on rural roads not designed for such traffic. The application lacks sufficient detail on access routes, timing, staging, dust control, noise mitigation and road safety measures. These impacts will significantly affect residents, farmers, local businesses and visitors.  11. Consultation and Community Concerns The developer claims that consultation has occurred and has been adequate. As an affected landowner, I have not been consulted directly. The Development Application does not clearly document community feedback or demonstrate how concerns have been addressed. Consultation must be meaningful, transparent and responsive. This has not occurred, and the deficiencies are compounded by the absence of final design information.  12. Economic and Environmental Benefit Not Demonstrated The application does not identify any clear economic benefit to the region and is silent on potential impacts to tourism and land values. Claims of up to 200,000 tonnes per annum of CO_2 savings are not substantiated. No evidence is provided as to what facility, in what location, will reduce emissions by this amount. Without this information, Council is being asked to accept environmental harm without demonstrated benefit. There is too much documented evidence that the site at the Scott River is not suitable for such a project. I request the shire rejects the application and recommends that the RDAP reuse the application
86	Object	I write to formally object to the proposed wind farm development at Scott River. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing

		effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse thisapplication and recommend the RDAP refuse the application.
87	Object	I am writing to formally object to the proposed wind farm at Scott River. I request that the Shire of Augusta Margaret River rejects the project, and I have detailed my concerns below. My main objection is the visual amenity and the significant, adverse effect this development would have on the area if it is supported.

		It is extremely hard to perceive what a 220-230 meter high turbine would look like, and I note that all of the photomontages attached to the Development Application seem to have an incorrect scale, and are deliberately oriented to show a best case scenario. I am also concerned that the Town Planning scheme at Section 5.13 and other areas does not provide for this type of development and rightly so. Structures are generally limited to height of between 6-11 meters in the Shire, under the Town Planning Scheme and exemptions to the height restrictions are provided for in limited circumstances. However, clause 5.13.3 states: 'For the purpose of clause 5.13.1 above, a building or structure does not include reference to a chimney, mast, satellite dish (not exceeding a diameter of 4 metres), pole, wind turbine or signal receiving or transmitting tower provided that the structure or facility is designed, sited and/or treated so as not to detract from the visual amenity of the locality'. The proposed turbines height, scale, and siting, will be a dominant and intrusive feature in views from my home, business and the town, and fails the test above. Synergy as the developer also admits it will detract from the visual amenity in their submission. The development will substantially alter the rural character of the area, replacing open countryside and skyline with large industrial structures that are out of scale and out of place with the surrounding built and natural environment. The application documents do not demonstrate that the visual impact has been minimised., in fact they recognise there will be significant and long lasting impacts to the environment, and this comes with no economic benefit what so ever. The photomontages and visualisations provided are limited in number, and selective in viewpoint, and do not show key vantage points from my property, the main approach roads, or public vantage points used by local residents. The cumulative visual impact has not been properly assessed and is overwhelming to the surrounding landscape. Turbines visible from private properties and living spaces will diminish the amenity and value of outdoor areas and the enjoyment of views that residents have relied upon for many years. This visual pollution is a permanent change to the landscape that cannot be supported. I am concerned that the developer has not even provided us with the full picture, they have not finalised the number of turbines, the locations, the height, or even the colour. How can a development this large be allowed to go ahead with so little detail ? The council would not support the most basic of commercial or large residential properties unless sufficient design, colour and amenity was addressed. Why do these big developers think they can get away with it, and they should be told to go away and do their homework first. The application does mention any economic benefit to the area, and is silent on the detriment to land values and the regions from a tourism perspective. I therefore request that the Shire reject the proposal entirely. Please confirm receipt of this objection and ensure it is placed on the public record and considered in the planning determination. I wish to be notified of any hearings or decisions relating to this application.
88	Object	I am writing to formally object to the proposed wind farm at Scott River, which is located approximately (900meters) from my home at (address). I request that the Shire of Augusta Margaret River reject any support for the project in its current form, and I have detailed my concerns below.

		1 General Nature of the Development Application The Development Application is very long however it lacks sufficient detail to assess properly. The developer Synergy does not currently know the number of turbines, the location of the turbines, the height of the turbines, or have a detailed construction and operations plan in place. Instead, they advise the public that this will all be worked out later. This appears to be wholly inadequate for a development like this which will have such a profound and long lasting impact on the region. Council should not support an application with a full detailed design first taking place. 2. Visual impact The proposed wind turbines will be highly visible from my property and the surrounding locality. Is the council aware that the wind turbines and their blades will exceed the height of Perth's tallest buildings such as QV1 and Central Park? Having, up to 20 skyscraper sized structures so close to my property would have a devasting impact on the value, amenity and enjoyment of my property. The rural character of the area would be devastated for 60 years. The scale and siting of the turbines will dominate views from my property, reducing the enjoyment and privacy I and other residents currently enjoy. Further while the development appears to be getting assessed on current land use and density, approving any such development will effectively 'sterilise' adjoining and neighbouring properties land use for the rest of this century. How can I or anyone else further develop our properties in the shadow of such significant and imposing assets. 3. Noise and disturbance I am concerned about the potential for continuous noise and sounds from the turbines, particularly during the night. The proximity of the development raises the risk of disturbing sleep and daily life for nearby residents. The application does not provide sufficient evidence that noise impacts will be within acceptable for homes this close to the site, especially given that they design has not yet been finalised. In addition, the application does not address the growing evidence and community concerns across Australia. There appears to be a number of projects in the eastern states where developers have assured the public there will be no offsite impacts, only for the community to realise these were false promises post construction. 4. Shadow flicker Given the orientation and distance of the nearest proposed turbines, there is a risk of shadow flicker affecting my property at certain times of year. The application lacks a clear, site-specific assessment and effective mitigation measures to prevent or minimise this effect. 5. Impact on wildlife and local environment The proposed development is close to habitats used by local wildlife. I am concerned about potential impacts on birds, bats, and other species, and I believe the environmental assessment submitted is insufficiently detailed for a development of this scale. 6. Restrictions on future development The application does not adequately consider cumulative impacts with other future developments in the area. The combined effect on the landscape, and local character has not been properly assessed. How would the council deal with any further developments adjacent to the proposed wind farm – I suspect by not approving further land uses due to the turbines being in place. I cannot think of any developments in the Shire that would have such a 'sterilising' effect on future offsite developments. 7. Access, traffic and construction impacts Construction will require heavy vehicle movements and temporary works that will affect local roads, safety, and amenity. The application

		provides no detail on the proposed access routes, timing of works, and measures to protect residents from dust, noise, and disruption during construction. 8. Consultation and community concerns Synergy advises that there has been community consultation, rubbish. There has been very little and for such a large scale development the shire needed to have enforced synergy to have contact with all residents not just a casual drop in session. The application does not address what the community feedback has been – which we understand to be mainly against the development, and is inadequate. There is no evidence that the concerns of the community have been addressed. I request that the council refuse the application.
89	Object	Subject: Formal objection to planning application (reference number) for the proposed Wind Farm in Scott River. Dear Tessa I am writing to formally object to the proposed wind farm development at Scott River. on the specific grounds of environmental harm, disturbance of acid sulfate soils, and adverse impacts on the local water table and groundwater-dependent ecosystems. The developer (Synergy) has provided some generic information on the proposed devolvement however with the design not being completed it is unclear where the turbines will be going, how many there are, how they will be constructed and how water will be managed at the site. Environmental Impacts The project's likely effects on groundwater and connected ecosystems is not adequately assessed. Large-scale excavations will be required for these turbines, and piling and dewatering during the construction phase can change groundwater flow paths and levels, with potential long-term impacts on aquifers and groundwater-dependent ecosystems in the area. These impacts require a thorough, independent hydrogeological assessment that demonstrates the impacts on the local ecosystem. Acid sulfate soils (ASS) are a serious concern for this area. When ASS are exposed to air through excavation or lowered water tables they can generate sulfuric acid and mobilise iron, aluminium and heavy metals, causing severe acidification of soils and surface waters, vegetation loss, and infrastructure damage. Dewatering and earthworks can trigger ASS risks unless strict, site-specific controls are implemented. The application before the council lacks a clear, site-specific ASS investigation and a robust dewatering management plan that commits to monitoring, trigger levels, and emergency responses. There is also no information about how construction and operations will affect the local water table and surface–groundwater interactions. While there is a lack of detailed information in the Development Application we note that the project has: • Approximately 30km of onsite roads, • 30km of trenching for underground cables, • Foundations that would be a minimum 5m deep circa 2000 tonnes of excavation, for each turbine • Additional soil remediation if required could increase this by an additional 500 tonnes per site and the depth to in excess of 7m, • Significant dewatering requirements, and • No dam or other method identified of managing the dewatering volumes.

		Economic and Environmental Benefit The developer has not identified any economic benefit that will be brought to the region. The developer claims that up to 200,000 tonnes per annum of CO2 emission will be saved, but does not provide any evidence as to how and where these saving will be realised. The developer must disclose what facility in what location will now reduce its emissions by 200,000 tonnes per annum. If no information is provided then the Council is left weighing the detriment to the environment against no economic or environmental benefit and therefor the proposal should not be supported. I request the shire listen to concerns and recommend the RDAP refuse the application.
90	Object	I write to formally oppose the proposed wind farm at Scott River. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to enable proper assessment, and the significant and long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing, and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, dewatering and water management arrangements, and environmental safeguards—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. I am also concerned about the cumulative effects of this proposal on the natural landscape, biodiversity, rural amenity, tourism values, and the long-term viability and use of surrounding land. The scale of the turbines proposed is unprecedented in this setting and would fundamentally alter the character of the area. Further, the consultation process to date has not provided affected landowners or the wider community with clear, complete and accessible information about the proposal or its consequences. Without a detailed and transparent design, the community cannot meaningfully assess or respond to a development that has the potential to permanently change the region. For these reasons, and for the detailed concerns set out below, I request that the Shire of Augusta Margaret River does not support the proposed wind farm in its current form.  2. Incomplete and Conceptual Nature of the Development Application

		The Development Application is lengthy but lacks sufficient detail to be properly assessed. The developer (Synergy) has not finalised: • the number of turbines; • turbine locations; • turbine height, model, operating parameters or colour; • construction methodology; • foundation design and excavation depth; • dewatering volumes or management methods; or • environmental management and rehabilitation measures. The developer advises that these matters will be resolved at a later stage. This approach is wholly inadequate for a development of this scale, duration and consequence. Council would not approve even modest commercial or residential developments without detailed and finalised design information, and this proposal should not be treated differently.  3. Groundwater, Water Table and Hydrogeological Impacts The likely effects of the project on groundwater systems and groundwater-dependent ecosystems have not been adequately assessed. Large-scale excavation, piling and trenching will be required, with associated dewatering. These activities have the potential to alter groundwater flow paths and water table levels, with long-term impacts on aquifers, surface waters, wetlands, drains, dams, bores and groundwater-dependent vegetation. The Development Application does not include a thorough, independent hydrogeological assessment demonstrating: • baseline groundwater conditions; • surface–groundwater interactions; • predicted impacts from excavation and dewatering; • cumulative impacts across the site; or • enforceable monitoring, trigger levels and response measures. Without this information, Council cannot responsibly assess environmental risk.  4. Acid Sulfate Soils – High-Consequence Environmental Risk Acid sulfate soils (ASS) are a known and serious risk in the Scott River area. When ASS are exposed through excavation or groundwater drawdown, sulfuric acid and heavy metals can be released, causing:

		• acidification of soils and surface waters; • vegetation loss; • contamination of waterways and agricultural water supplies; and • long-term environmental damage. The application lacks: • a site-specific ASS investigation; • a detailed dewatering and ASS management plan; • defined monitoring and trigger levels; and • a credible emergency response framework. Reliance on generic mitigation measures or post-approval plans is unacceptable given the high-consequence nature of ASS disturbance.  5. Scale of Earthworks and Dewatering Despite the absence of final design detail, the proposal indicates: • approximately 30 km of onsite access roads; • approximately 30 km of trenching for underground cables; • turbine foundations requiring excavation of approximately 2,000 tonnes per turbine to depths of at least 5 metres; • potential remediation increasing excavation by approximately 500 tonnes per turbine and depths exceeding 7 metres; • significant dewatering requirements; and • no identified dam or method for managing dewatering volumes. This represents a substantial disturbance of soils and groundwater in a sensitive environment, without adequate assessment or safeguards.  6. Visual Impact and Loss of Rural Character The visual impact of the proposed development would be severe, long-lasting and unacceptable. The turbines and their blades will exceed the height of Perth’s tallest buildings, including QV1 and Central Park. The introduction of multiple skyscraper-scale structures into a rural landscape would devastate visual amenity, property enjoyment and rural character for decades.

		The scale and siting of the turbines will dominate views from private properties, roads and public spaces, fundamentally altering the character of the area and reducing enjoyment and privacy. 6.1 Inadequate Visual Assessment It is extremely difficult to comprehend the true scale of 220–230-metre turbines. The photomontages provided are limited, selective and oriented to depict best-case scenarios. They do not show key viewpoints from private properties, approach roads or public vantage points, nor do they adequately assess worst-case or cumulative impacts. 6.2 Sterilisation of Surrounding Land Approval of this development would effectively sterilise neighbouring land uses for the remainder of the century. The presence of turbines would constrain future rural, tourism and residential development on surrounding properties. I cannot identify any other development in the Shire with such a significant offsite sterilising effect. 7. Planning Scheme and Visual Amenity The proposal does not comply with the intent of the Shire's Town Planning Scheme. Clause 5.13.3 permits wind turbines only where they are designed and sited so as not to detract from the visual amenity of the locality. The proposed turbines will be dominant, intrusive and visually overwhelming. Even the developer acknowledges visual detriment in its documentation. On this basis alone, the proposal fails the Scheme's visual amenity test. 8. Noise, Disturbance and Shadow Flicker There is a significant risk of continuous turbine noise, particularly at night, resulting in sleep disturbance and loss of amenity for nearby residents. The application does not demonstrate that noise impacts will be acceptable, especially given that turbine specifications and operating parameters are not finalised. The proposal also lacks a robust, site-specific assessment of shadow flicker impacts and enforceable mitigation measures. Experience elsewhere in Australia demonstrates that assurances of "no offsite impacts" are often not realised once projects are operational.

		9. Wildlife and Environmental Values The proposal is located near habitats used by birds, bats and other wildlife. The environmental assessment does not adequately address strike risk, habitat disruption, cumulative impacts, or the potential effects of noise, vibration and groundwater disturbance on fauna and flora. Given the ecological sensitivity of the area, a precautionary approach is required.  10. Traffic, Access and Construction Impacts Construction will involve heavy vehicles and oversized loads on rural roads not designed for such traffic. The application lacks sufficient detail on access routes, timing, staging, dust control, noise mitigation and road safety measures. These impacts will significantly affect residents, farmers, local businesses and visitors.  11. Consultation and Community Concerns The developer claims that consultation has occurred and has been adequate. As an affected landowner, I have not been consulted directly. The Development Application does not clearly document community feedback or demonstrate how concerns have been addressed. Consultation must be meaningful, transparent and responsive. This has not occurred, and the deficiencies are compounded by the absence of final design information.  12. Economic and Environmental Benefit Not Demonstrated The application does not identify any clear economic benefit to the region and is silent on potential impacts to tourism and land values. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated. No evidence is provided identifying what facility, in what location, will reduce emissions by this amount. Without this information, Council is being asked to accept environmental harm without demonstrated benefit.

		I did not purchase in Augusta to be looking at wind turbines. A project that has such visual affects needed consultation from this shire. There has been none. I expect the shire to listen to the affected residents with all the concerns and not residents in the centre of Margaret River with their ideologies. Turbines can be placed on Gnarabup Hill for those that want it. Could this submission be made publicly available with personal details redacted. Please confirm receipt
91	Support	
92	Object	I've been a landholder at the Scott River for over 40 years. I've been visiting or working on the Scott River area for 58 years. I hosted a wind monitoring tower for 8 years from early 2000 on. My acquired knowledge of the potential harm turbines could do to the Scott River eco system has prevented me from accepting Synergy's offer to host turbines for them. This was worth approx. $170,000/ yr. From the outset Synergy have been elusive and deceptive about their plans. Anyone with half an ounce of common sense could see the flimsy detail in the Development Plan they submitted. So little detail- where are the turbines being sited exactly- not yet decided. What type of footings are to be used - we might use 1 of the 3 models listed. So few exploratory holes drilled. Most less the 2m. What are they playing at? A building permit requires detail down to almost the last tec screw, yet Synergy's DA is so loose it fails to define exactly what they propose to do despite the fact it is a project on a scale this Shire has never seen before, that is likely to affect businesses, the environment, wetlands and people's health. BHP drilled 100's of exploratory holes and even then didn't discover what beat them. BHP had the best geologists money could buy and expert engineers yet despite all their knowledge and skills Mother Nature beat them, forcing the closure of their mine site which is in the same location as this proposed wind farm. Yet Synergy DOESN'T have that sort of expertise and they think they can manage the situation. BHP thought they could manage it too. The partners who own 80.1% of this project are only there for the MONEY. They have no interest in the fragile environment in which they'll be constructing. Just the MONEY is too good to pass up. Unfortunately, by the time it's discovered they have harmed this area it's TOO LATE. Dams dug on the Scott River plain to water livestock have been known to turn toxic due to acid sulphates and cattle have been severely impacted and would have most certainly have died but for rapid intervention. There are 4 aquifers underlying the Scott River Plain. One of these is pressurised meaning no pumps are required to flow water to cattle troughs for drinking purposes. We have one such bore which was drilled in the 1950's and has maintained its pressure ever since. This water comes from a bore 6m deep.

		Synergy needs to put turbine footings down to 10-15m deep. How with they manage that without rupturing the pressurised aquifer. The Scott River depends on that water also. Then comes the MAJOR PROBLEM and that is Shire Staff and Shire Councillors will be making positions about this project whilst most have never been on site at the Scott River. Who will advocate for the Quokkas, Quendas, Possums, Black Swans, Red Tailed and Baudins Cockatoos and the most elegant and threatened Spoonbill??? Certainly not Shire Staff or Councillors or Nature Conservation Margaret River or Augusta Margaret River Community Clean Energy or local environmentalists. The silence has been deafening! Synergy has curbed their ability to speak out with confidentiality clauses tied to their inducements. In fact, they all have a Conflict of Interest. Renewable energy has a place but the Scott River has many unique features pertaining to it – Acid Sulphate Soils, Aquifers, River Systems, Threatened Ecological Species [with a Federal Govt Covenant], Unique fauna and Conservation Reserves, Wetlands and Diverse bird life that make it very different to other wind farm sites. Some things ought not be sited in certain locations. Would you allow a brothel near a school? NO! Then it follows, turbines ought not to be built on this ultra sensitive eco system at Scott River.
93	Support	No one wants electrical infrastructure in their backyard but we have to make the shift to renewable energy and away from polluting fossil fuels. Solar and wind power are the best options presently and we need them where they are most effective i.e. wind farms where it is windy so I support the proposal.
94	Object	We are long-term local residents of Courtenay who have invested our life savings into developing our Scott River property. In 2021 we bought our dream farm in the area, after selling our previous neighboring residence as a result of ongoing noise impacts from limetrucks on Brockman highway. We spent the first year of owning the property undertaking infrastructure upgrades, understanding the differing features on the land, before settling on the locations to build our house, and agritourism dreams. We entered into a building contract for our dream home in February 2022 and received approval from the shire in September 2023 with development commencing shortly after. At the same time we continued to work with architects to design chalets for our property. These chalets were approved by the Shire in September 2024. In January 2023 representatives from synergy met with us on our property to let us know they were considering a windfarm development nextdoor. They verbally guaranteed it would be small scale, with only 1 turbine intended for the very southeast corner on the property adjacent to us, in the location of WTG6 of the proposal (approximately 2.8km from our chalets). These representatives communicated they were aware of our house site, and we explained and showed them the location we would be building our chalets. In this conversation they promised the design the project to ensure no development buffers would be included within our property, and offered to complete baseline noise monitoring and visual impact assessments at our house and chalet sites to mitigate our nerves. Consultants took photographs from our property in the weeks that followed to do the visual renders of what the wind turbines will look like. A noise monitor was never installed. In early 2023, we had multiple conversations with Rowan and Whitney from Synergy. During these discussions, they offered us a restrictive “neighbour agreement” and suggested we relocate our approved chalets or even move or redesign our home. We sought

		advice from our builder, who confirmed that altering or revoking our contract would cost approximately $100,000. We asked Synergy if they would cover these costs, they refused. As a result, we made it clear that we would proceed with our plans as approved, declined to sign any restrictive agreement, and requested instead that Synergy ensure no part of our property was included within their development buffer or footprint. This was verbally agreed, with Synergy stating that the only turbine on our neighbour's property would be positioned in the south-eastern corner, well back from our boundary. You can imagine our shock when reviewing the documentation associated with this development approval, that there are now 3 turbines intended to be installed on our neighbours property, with the closest now intended to be only 1.2km from our approved chalets. Adding to our dismay synergy although very aware of our intentions for our property and having had transparent communication on the location of our chalet development have excluded these approved sensitive dwellings from all feasibility documentation, even though we gave them maps and exact locations and shared our development approval with them prior to the feasibility assessments being completed. This proposal would profoundly alter the outlook, amenity, safety, and viability of our home and tourism venture. We invite elected members, DAP decision makers, and Shire officers to visit our property (by appointment) to understand the terrain, aspect, and proximity of turbines to our dwelling and chalet sites, and the implications for noise, visual impact, telecommunication reliability, and fire response. We object to the proposed SynergyRED Scott River Wind Farm and request refusal on planning, amenity, and risk grounds. If not refused, we seek strict conditions to avoid, minimise, and fully mitigate impacts, with clear accountability to the proponent for costs where services or amenity are affected. Our property includes one of the identified 33 impacted dwellings along with approved tourist chalets 1.2 km from WG11, conveniently excluded in the developed application. Synergy had documented awareness of our approved chalet locations from project inception yet excluded them from 'sensitive receptor' assessments, despite our ability to commence construction immediately. This omission undermines the credibility and completeness of the DA and the public interest test. Beyond procedural gaps, the proposal poses unacceptable risks in noise (likely exceedances above WA thresholds at our house/chalets), electromagnetic interference (EMI) to already marginal mobile services, visual dominance (250 m turbines immediately opposite and uphill), fire safety risks, and consultation shortcomings inconsistent with WA guidance. The EPA's 'not assess' decision under Part IV of the EP Act does not replace proper planning scrutiny of amenity, noise, EMI, layout buffers, and social values, matters squarely within the DAP remit. Sensitive Receptors Omitted (Approved Chalets @ 1.2 km from WG11) Our approved chalets (tourism accommodation) at ~1.2 km from WG11 are noise-sensitive premises for planning and noise regulation purposes. They were excluded from the DA's sensitive receptor assessments despite Synergy acknowledging (in correspondence we hold) that it knew our approved locations from inception. WA planning expects complete identification and assessment of sensitive land uses; excluding approved chalets capable of immediate construction biases the noise, visual, and social values analyses and misleads decision-makers (AMR Shire DAP/RAR process; WAPC Position Statement). Remedy sought: Require Synergy to re-run all assessments (noise, EMI, visual, social values) including our approved chalets and our

		dwelling, with conservative assumptions and worst-case ground cover/status. Telecommunication/EMI Risk and Accountability Synergy's documents acknowledge potential electromagnetic interference (EMI) to mobile phones in areas with low coverage and in close proximity to turbines, which describes Scott River. Australian wind-farm EMI assessments (e.g., Willatook EES; Uungula EMI Study; Brewster EMI) show turbines can reflect/obstruct radio signals (mobile, microwave, broadcast), with mitigation requiring pre- and post-construction signal-strength surveys and rectification at the proponent's cost. Community wind guidance (C4CE) outlines that EMI exclusion zones must be mapped (ACMA licenses within 20–30 km) and siting adjusted to protect services; if issues occur, the proponent must rectify. Condition requested (if approved): • Baseline and post-construction signal-strength testing at our house and chalet sites; • Mandatory rectification by Synergy for any degradation (boosters/repeaters/antenna works or network upgrades), with bond/financial assurance to guarantee timely resolution—irrespective of baseline monitors being on our property. Noise—Likely Exceedances and Methodology Concerns DWER's Environmental Protection (Noise) Regulations 1997 set legal standards at sensitive premises; DWER is actively reviewing wind-farm noise management via its Wind Farm Noise Reform work. Synergy refused us baseline noise data and placed no monitors on our property, yet modelling reportedly shows, in most scenarios other than the lowest windspeed case, predicted noise at our dwelling and chalet sites exceeding 35 dB. The model assumes current blue-gum plantation height for ground attenuation rather than worst-case (post-harvest), uses 5 m contours over complex upwind/uphill terrain, and has not been stress-tested against exposure from our house facing the array. Further, the only baseline monitor was placed in the north-west quadrant adjacent to a working farm shed on a property set to benefit from the proposal. This raises serious concerns about impartiality and accuracy from the outset and undermines confidence in the modelling. WA Energy Policy references WHO's guideline of ≤ 45 dB Lden to minimise health impacts; many jurisdictions require conservative modelling and post-construction compliance verification with operational curtailment if required. Remedies/conditions sought (if approved): • Updated noise modelling including our approved chalets and dwelling using worst-case ground cover (post-harvest), refined terrain, and turbines at maximum height (250 m); • Independent compliance testing at our receptors during worst-case meteorology, with transparent data sharing; • Operational curtailment triggers to maintain legal compliance at sensitive premises; and no reliance on neighbour agreements to dilute compliance at non-involved properties. Setbacks & Buffers—Conservative Distances Are Required The DA proposes up to 20 turbines at heights of up to 250 m within a large envelope; turbine procurement is not finalised, which demands conservative setbacks. WA's Position Statement: Renewable Energy Facilities and local policies (e.g., West Arthur LPP No. 5; Wagin draft) emphasise minimising amenity impacts through adequate setbacks, visual sensitivity, and engagement. Australian commentary

		notes that as turbine size increases, buffers must extend beyond the commonly cited ≥ 1.5 km, with calls for 2 km or more for towers approaching 250–300 m. Importantly, the Joint Development Assessment Panel (JDAP) has set a clear precedent: in decision RDAP/74 (15 November 2022, Two Rocks Wind Farm), JDAP imposed a minimum setback of no less than 1.8 km from the nearest approved sensitive noise receptor. That project involved smaller turbines than proposed here, reinforcing that a precautionary approach is essential where turbine heights exceed 200 m and procurement details remain uncertain. Further, RDAP/74 also required Electromagnetic Interference (EMI) testing pre- and post-construction at all approved and existing sensitive dwellings within 5 km. This demonstrates that EMI risk is a recognised planning consideration and proactive mitigation is standard practice for projects of this scale. The EPA project page confirms a 3,597 ha development envelope with ~107 ha disturbance. Impact buffers (noise, EMI, visual/shadow) should be legally contained within the development footprint to protect off-site amenity and avoid creeping impacts onto neighbouring land. Condition requested (if approved): • Apply a mandatory minimum setback of 1.8 km from all non-involved adjoining properties and approved sensitive receptors, consistent with RDAP/74 precedent. • Require EMI baseline and post-construction testing at all approved and existing sensitive dwellings within 5 km, with full rectification obligations for any degradation in service. • Ensure all impact buffers (noise, shadow flicker, EMI, visual) are contained within the development footprint, with no encroachment onto neighbouring land. • Require micro-siting adjustments or turbine deletion where compliance cannot be achieved. Visual Amenity—Extraordinary Scale, No Practical Screening, and Scheme Non-Compliance Synergy's own materials show turbines up to 250 m and public photomontages. Under LPS21 and the Residential Design Codes (R-Codes), typical built forms are capped at approximately 6 m wall height and 9 m total height. Our approved chalets comply with these limits. The contrast in scale demonstrates visual dominance and inconsistency with the planning framework's intent for local built-form character. Synergy refused to share our property-specific visual facades and suggested we "commence screening"—impractical, as no vegetation can screen structures of 250 m. Condition requested (if approved): • Publication of full, property-specific visual facades for our dwelling and chalet sites; • Micro-siting or turbine deletion where visual dominance breaches acceptable thresholds; • Finish and lighting controls to minimise skyline intrusion. Shadow Flicker & Blade Glint Impact

		Shadow flicker and blade glint from turbines will significantly affect both our dwelling and approved chalets. These impacts occur when rotating blades cast moving shadows or reflect sunlight, creating visual disturbance and discomfort. For tourism accommodation, such effects are unacceptable and will degrade visitor experience, reducing the viability of our planned chalets. WA planning guidance and international best practice require assessment and mitigation of shadow flicker and glint impacts at sensitive receptors. Condition requested (if approved): • Comprehensive shadow flicker and blade glint modelling including our dwelling and chalet sites; • Operational curtailment during high flicker periods to maintain acceptable amenity; • Installation of anti-reflective coatings on blades and, where feasible, vegetative or structural screening; • Micro-siting or turbine deletion where modelling predicts unacceptable flicker/glint exposure. Environmental Sensitivities & Biodiversity Values The Scott River and surrounding Courtenay area is ecologically significant, supporting diverse habitats, wetlands, and species that contribute to the region's unique biodiversity. This landscape is valued for its environmental integrity and underpins local tourism and agritourism ventures. Large-scale industrial infrastructure such as 250 m turbines introduces risks of habitat fragmentation, bird and bat strike, and cumulative impacts on flora and fauna. These risks are amplified by the proximity of turbines to conservation areas and waterways, and by the absence of comprehensive biodiversity impact assessments in the DA. WA planning principles and State Planning Policy require developments to avoid or minimise impacts on environmental assets. The omission of detailed ecological studies and mitigation strategies in this proposal is inconsistent with these requirements and undermines the region's environmental and tourism values. Condition requested (if approved): Comprehensive biodiversity and habitat impact assessment prior to construction, including bird and bat collision modelling; Implementation of avoidance and mitigation measures (micro-siting, seasonal curtailment, habitat offsets); Ongoing monitoring and reporting of ecological impacts to the Shire and community. Fire Response & Safety Risk DFES has advised us that aviation support cannot operate within the proposed development area. The closest DFES ground response is over 30 minutes away, and local volunteer brigades can only respond to bush or grass fires, not complex turbine-related incidents. The Zone Response system was introduced in this region due to significant bushfire spread risk. Removing aviation support dramatically increases fire risk and may increase local insurance premiums, jeopardising tourism viability. State Planning Policy 3.7 (Bushfire, 2024) requires that bushfire risk be a key consideration in land-use decisions. Condition requested (if approved): • A comprehensive Fire Management Plan endorsed by DFES, including alternative suppression strategies where aviation is restricted; • Sufficient on-site water storage, rapid deployment systems, and funding for enhanced local brigade capability; • Insurance impact assessment and mitigation measures.

		Social Values & Consultation Deficiencies The AMR Shire notes the DAP pathway and the role of the RAR informed by community submissions. Independent reporting confirms this project is divisive and that consultation transparency has been questioned; many nearby residents only learned of details late, with concerns over noise, amenity, land values, and community cohesion. Our experience: Synergy consulted once (two years ago) while we were two months into a $1 million build, then refused to share baseline data or include our approved chalets in sensitive receptor lists; we were excluded from the social values assessment on the basis that "too many people had similar views." What We Bought Into vs. What Is Proposed We purchased knowing of a potential, community-designed, small-scale wind concept near Governor Broome Road (max height ≈ 120 m)—not an industrial-scale development with 250 m turbines next door. The scale change materially alters amenity and risk and is inconsistent with the intent to minimise impacts set out in WA planning guidance. We requested Synergy support neighbouring residents in covering the costs of independent property valuations and, should we determine to sell during the life of the project, a guarantee that any deficit from market value properties experience from the project will be compensated by Synergy. Closing & Relief Sought This proposal is not just a planning matter—it is deeply personal. We have invested our life savings and years of effort into creating our home and agritourism venture. The uncertainty and stress caused by this process have taken a significant toll on our mental health and our marriage. We share this not for sympathy, but to underscore the real-world consequences of decisions made without fully appreciating their impact on families and communities. We invite elected members, JDAP decision-makers, and Shire officers to visit our property (by appointment) to see firsthand what this development would mean for us—the proximity of turbines to our home and chalets, the visual dominance, and the risks to amenity, safety, and viability. Primary request: Refusal of the DA due to incomplete assessments, omitted sensitive receptors, unacceptable amenity risks (noise, EMI, visual), fire safety deficiencies, and consultation shortfalls. If approved: Conditions for sensitive receptor reassessment, telecommunications protection and rectification, noise compliance and curtailment, conservative setbacks, visual mitigation, fire management, biodiversity protection, and transparency.
95	Object	I oppose the Scott River wind turbine project because there are not sufficient protections in place to reduce negative impacts on surrounding neighbours. Neighbours should not have to deal with noise from the project, they should not have to deal with their views day and night changed with no compensation. Decrease in land value is a real threat and we should not have to deal with this negative impact without any compensation. Increased fire risk, delays during construction when our only access roads will be clogged up for years and again without any compensation!

		This project should not be built on prime farmland, the acide sulphate soils will destroy the Scott River and the Blackwood, and all the surrounding national park and bushland, including my 28 acres directly on the project boundary. Set backs to neighbouring residents are not big enough. This is a cash up and grab scheme by overseas investors and synergy red at the detriment to the highly fragile environment in which we live and should protect. It has already been seen what happens in this area with the Beenup mineral sands mine. Please stop this or forever live with guilt for allowing it go ahead and destroy the area. Could you live with that knowing you could have stopped it for the right reasons?
96	Object	I am concerned at the scale of the wind farm proposed, and the effect of placing a large industrial development in a key farming area. The siting of this project seems opportune, mainly because there is an existing transmission line nearby, from the defunct Beenup mine, rather than any study that makes this a suitable area otherwise. I am also mindful of the concern and stress of several of my neighbours and community members who have farming or other connections to the Scott River area, it seems this will have ongoing impacts for them and I'm not sure they will receive ongoing support? If the proponent is determined to build a wind farm, smaller and fewer turbines would have less local impact. Thank you for the opportunity to provide comment. Although, with the recent passing of the state's new Development Approval laws, projects like this may be pushed through anyway, despite the result of any local concerns, consultations or similar!
97	Object	These wind farms, cost too much to install, Go on fire, last for 10-15yrs ,concrete bases have to be poured for each turbine, can't use the old base, difficult to service,danger to environment when they fall over, danger to birds,eyesore on the landscape, don't employ Australians all overseas installers.
98	Object	I object to the Scott River Wind Farm Development Application (DA) as it lacks the necessary detail for a comprehensive assessment, particularly for a development of this magnitude and duration. As a financially invested individual in this area, I am concerned that the development may diminish the desirability and affluence of the region. The developer has not provided a detailed analysis of the visual and noise impacts of the twenty 250m tall wind turbines with 90m blades (no tower width was mentioned) on the future of Augusta, Molloy Island, East Augusta, and the surrounding agricultural land. The analysis should encompass and not be limited to the effects on land value in suburbs and areas, population fluctuations, town development, and the potential decline of vitality, job opportunities, and community cohesion. Additionally, it should consider the impact on tourism and recreational activities that require unspoilt natural beauty. I anticipated that the developer would have specified the turbine model and the installation plan in the DA, enabling the shire to conduct a thorough assessment. Furthermore, an updated map for the taller turbines should have been provided indicating the 5km, 10km, and 15km distances and impacts of the wind turbines on humans, wildlife, livestock, and marine life in each zone. Noise modelling should be conducted using the most advanced technology on the modern 250m tall turbines, with measurements calibrated to mimic local weather conditions and topography. Include continuous noise monitoring and enforce shutdowns if limits are exceeded. Ensuring those that live at close proximity are protected from damaging infrasound. The foundation design options presented in the Feasibility Assessment - Part 2 on page 13 are not to scale, which may be misleading and subject to change based on the selected turbine model. Without precise detailed drawings and comprehensive information on the

		foundations, construction, engineering, materials, contamination risks, and appropriate mitigation strategies, I request that qualified independent expertise be consulted to conduct assessments prior to any approval being granted. DWER should be included as a partner in this development. Distances between turbines and homes/dwellings/stock/nature reserves and Crown Land should be established based on the specific specifications of each turbine rather than being vague “guidelines” that allow for interpretation. Crown Land should be sanctioned as areas for wild life preservation and natural beauty. The developer states in the DA that they heard the communities concerns and addressed them in the "Feasibility assessment finding - part 2" however many were not consulted despite living at close proximity to the proposed development. More consultation is needed with those in close proximity and greater transparency of the concerns raised is required. The proposed community benefit fund warrants scrutiny, as its allocation appears to be influenced by political considerations. I ask that the shire refuse the Development Application until the turbine model and make is chosen, the layout planned, detailed analysis’ completed on the construction and possible water contamination and lowering ground water, noise and visual impacts the turbines will have to the construction site, town of Augusta and the surrounding areas and all its inhabitants including wildlife, stock and marine life.
99	Object	The wind turbines should be in a more arid and less populated area. They are too close in my opinion.
100	Object	I object to being asked to agree to the wind farm proposal because the development application is not detailed enough to assess properly. Approval should not proceed on “work it out later”. The shire is being asked to approve a concept, not final design….there is no business case. My concerns are….. No final turbine layout…. Turbine locations are not locked in & can be moved at the developer’s discretion which changes who is impacted by noise, shadow flicker & visual dominance…. No final turbine specifications….. The final turbine model….. Height & operating mode are not confirmed, yet these are the inputs that determine noise levels, low frequency noise, infrasound characteristics, shadow flicker, blade glint & safety risk. No detailed construction methodology….there is no clear, site specific construction plan for foundations, trenching, dewatering volumes, soil handling, acid sulphate management, traffic management & rehabilitation. Missing “worst case” impacts….without fixed turbine locations & specs, there is no credible “worst case” assessment for most affected homes & boundaries. Inadequate transparency…..telling the public “details will be finalised later” is not acceptable for a development that will reshape the region for 30 to 60 years.

		I am asking the shire to refuse or defer the DA until a final design, verified noise framework, & robust environmental and emergency management plans are provided & independently reviewed. There is no mention of a fire plan. Wind turbines do catch fire. As an ex firefighter of 30 years I would never send my crew into such a high risk zone as a turbine fire. Water bombers cannot operate safely within the turbine area. A detailed hydro geological assessment is essential…we request that be done before approval. Also require acid sulphate soil investigation & an enforceable dewatering/ASS management plan be done before any approval. BHP had to close their Beenup Mine because of acid sulphate entering local waterways. This is the same location of the proposed wind farm. What has changed? There is no detailed construction & management plan. Scott River residents need to be assured that there will be no road damage & that they will have full access from & to their homes, especially in the case of an emergency. The school bus will also need safe & efficient access. Bird & bat strike risk is not a theoretical issue; it is inherent to wind facilities & must be assessed transparently. 26 species of flora & fauna are listed as threatened, rare or at risk, occur within the Scott River. We require stronger, transparent monitoring conditions & avoidance-first design not "mitigate later" language. It would be abhorrent behaviour to not fully research potential endangered animal loss. Many affected landholders report no direct engagement. The DA does not clearly summarise community feedback or demonstrates how concerns were incorporated. The scale of opposition should be acknowledged & transparently addressed. No clear minimum standard with community engagement. Totally inadequate considering the scale of this project. We require genuine consultation outcomes & publish responses to key community concerns, not GENERIC assurances. I once again emphatically ask the shire to refuse or defer the DA until a final design, verified noise framework, & ROBUST environmental & emergency environmental plans are provided & independently reviewed. Kim Basford, Augusta
101	Object	Great resource doesn't need to be in view of Augusta.
102	Object	The proposed Scott River wind farm has raised concerns about potential negative impacts on both the environment and nearby residents. The construction could disturb sensitive soils and ecosystems, increasing the risk of water contamination and harm to local flora and fauna, including bird species. Residents are also worried about noise, visual impacts from large turbines, and possible declines in property values, as well as broader effects on the rural landscape and community wellbeing.
103	Object	I strongly oppose the installation of 250m-high wind turbines in the Scott River region, a unique agricultural and tourist area in south-western Western Australia. This landscape is a vital asset for the environment, agriculture, and tourism, and should be protected. Key Environmental and Social Concerns • Wildlife Fatalities: Tall turbines significantly increase the risk of bird and bat collisions, especially for migratory and threatened species. The exceptional height amplifies these risks. • Noise Pollution: Turbine noise, including low-frequency and infrasound, disrupts wildlife behaviour, reduces bird presence, and displaces animals from suitable habitats, threatening local ecosystems. • Visual Impact: The towering structures would dominate the landscape, causing irreversible visual pollution and reducing the region's

		appeal to tourists, which could harm the local economy. • Habitat Fragmentation: Construction and operation would fragment habitats, displace wildlife, and compound pressures on biodiversity. • Human Wellbeing: The psychological effects of living near such large industrial structures are not fully understood but should be considered. End-of-Life and Recycling Impacts • Blade Disposal Challenges: Wind turbine blades are typically made from composite materials (fibreglass, carbon fibre, epoxy resins) that are extremely difficult to recycle. Most blades end up in landfill at the end of their service life, contributing to long-term waste problems. • Volume of Waste: Each turbine can have blades weighing up to 20 tonnes each. With hundreds of turbines, this results in thousands of tonnes of non-biodegradable waste that must be managed. • Limited Recycling Technology: While some research is underway, current recycling options for blades are limited and costly. Mechanical recycling often results in low-value products, and chemical recycling is not yet widely available. • Hazardous Materials: Some turbine components contain hazardous substances (e.g., resins, lubricants, metals) that can leach into soil and water if not properly managed during disposal. • Decommissioning Impacts: The process of dismantling turbines requires heavy machinery, transportation, and energy, which can further disturb local habitats and increase carbon emissions. • Foundation Waste: Turbine foundations are made of large volumes of concrete and steel, which are often left in place after decommissioning, causing permanent land disturbance. • Resource Use: The recycling and disposal process consumes additional resources and energy, offsetting some of the environmental benefits gained during the turbine's operational life. Conclusion Given the documented risks to wildlife, local ecosystems, tourism, and the significant end-of-life waste and recycling challenges, I urge authorities to reject this proposal and instead site such developments in areas with minimal environmental and social impact.
104	Object	I am not convinced wind turbines are that green, and they are going to spoil another natural piece of coast line
105	Support	As the founding Chair of Augusta Margaret River Clean Community Energy, I am familiar with the area and the suitability of the site for construction of a wind farm. AMRCCE conducted a high level feasibility of establishing a wind farm at the site and gained approval for submitting 22.5 MW of power to the Beenup substation. The initial process included a rigorous criteria evaluation of the site. It is important that the site has an existing transmission line with sufficient capacity as this minimises the disruption to the existing agricultural industry. The project has minimal clearance of native vegetation. The wind generation of the area is high and the wind is generated in the late afternoon and evening which complements solar generation. The area does not have a high residential population and has good road access. It complements the dairy industry of the shire which is the shire's highest generating agricultural industry. From a Planning perspective, the Project demonstrates a high level of compliance and alignment with

		Federal, State, Regional, Local tate, Regional and other frameworks that are relevant in considering Wind Farm Projects It will benefit Augusta and Margaret River in providing more reliable electricity supply. The Project is an important renewable energy development which will make a significant contribution to the State's decarbonisation. The Project has been comprehensively considered at a technical level, and this Report demonstrates its general compliance with relevant technical and planning legislation and frameworks. I support the Development Application approval for the 'maximum case scenario' in terms of level of impact. The relevant technical studies that have informed this Project, appended to this report, have all been based on this 'maximum case scenario'. This includes investigation of the acid sulfate soils of the area. From a Planning perspective, the Project demonstrates a high level of compliance and alignment with Federal, State, Regional, Local and other frameworks that are relevant in considering Wind Farm Projects. In conclusion I feel that this project is highly compliant.
106	Object	Dear Sir/Madam, I am writing to lodge an objection to the Scott River Wind Farm Development Application currently under consideration by the Shire of Augusta Margaret River. As a young person who expects to live, work and raise a family in this region for decades to come, I am concerned that this proposal would permanently change the Scott River area without providing the level of certainty or detail needed to properly assess its long-term consequences. Although the Development Application is extensive, it relies heavily on broad parameters and future flexibility rather than confirmed, final design decisions. At this stage, the proponent has not confirmed the final number of turbines, their precise locations, turbine height, turbine model, or final construction and operational methods. These details are fundamental to understanding how the proposal would affect the environment, rural amenity and surrounding land over the long term. Approving a project of this scale without fixed design information shifts risk onto the community and future generations. Noise impacts are a particular concern. The noise assessment relies largely on desktop modelling rather than real-world, site-specific measurements under local conditions. The Scott River area is generally quiet, and even relatively small increases in background noise can have a significant impact on liveability. The modelling also relies on noise criteria developed for much smaller turbines and does not adequately reflect the scale of the turbines proposed. Low-frequency noise and infrasound are not properly addressed, despite increasing international research suggesting that these emissions may affect some people's health and wellbeing. The application does not clearly commit to independent, continuous noise monitoring at nearby homes, transparent reporting, or enforceable shutdown provisions if limits are exceeded. Without these safeguards, future residents are left without certainty that noise impacts will be managed responsibly. The proposed setbacks between turbines and property boundaries are also concerning. Allowing turbines of this size to be located close

		to boundaries places long-term impacts on neighbouring land and limits how that land can be used in the future. As someone who hopes to continue living and working in this area, I am concerned that this effectively locks in land-use constraints and reduced amenity for the rest of this century. The visual impact of the proposal would be significant and permanent. Turbines taller than Perth's tallest buildings would dominate the landscape and skyline for many kilometres. Scott River is valued for its rural character, natural environment and sense of openness. Industrialising this landscape would permanently change the identity of the area and reduce its appeal for future generations. I am also concerned about the environmental risks associated with the floodplain location. The presence of acid sulfate soils and a shallow aquifer connected to the Scott River system means that deep foundations, trenching and dewatering carry serious risks to water quality and ecosystem health. The Development Application does not provide sufficient site-specific information to demonstrate that these risks can be avoided or responsibly managed over the long term. Bushfire risk and emergency management are also important considerations for the future of the region. Wind turbines can restrict aerial firefighting and introduce additional risks in extreme fire conditions. The application does not clearly explain how emergency response, evacuation or environmental protection would be managed during major fire events. Finally, I am concerned about the level of community consultation undertaken. Many people who will live with the long-term consequences of this proposal feel their concerns have not been adequately heard or addressed. For a development that would affect the region for generations, consultation should be thorough, transparent and genuinely responsive. For these reasons, I ask the Shire of Augusta Margaret River to refuse the Scott River Wind Farm Development Application. At a minimum, any decision should be deferred until final turbine locations and specifications are confirmed, noise assessment methods reflect modern turbine scale, and robust environmental, bushfire and construction management plans are independently reviewed. This proposal would permanently alter the Scott River area. As a member of the next generation who will live with the consequences of today's decisions, I believe the risks to landscape character, environmental values, rural amenity and long-term land use are too great to accept in their current form.
107	Object	The Biodiversity of the Scott River region should be protected from further development (from what hasn't already been cleared). I applauded the work done by the AMR Shire in fining the Blue Water Whale Farm Plantation $141,000 in September 2024 for illegal clearing of areas of rare and endangered flora. Synergy (via their own documentation) appear to be doing the same clearing for the Wind Turbines, which reeks of double standards. The acidic sulphate soils that exist in the region are also of great concern, dating back to the BHP Beenyup mine development that has seen no progress made in fully containing the soils. My concern is that if BHP were not able to develop due to the soil type, then how are Synergy going to safely make it work in the same soils?
108	Object	I write to lodge a formal objection to the Scott River Wind Farm Development Application currently before the Shire of Augusta Margaret River.

		In my assessment, the Development Application does not provide the level of certainty or final design detail required to properly evaluate a proposal of this scale and long-term consequence. Although the application is substantial in length, it relies heavily on broad parameters, conceptual layouts and future discretion rather than confirmed, finalised information. The Scott River area is a sensitive rural landscape with high agricultural, environmental and hydrological value. Any development proposed for this location should therefore be assessed against a clear, fixed and transparent design. The current application does not meet this expectation. At this stage, the proponent has not confirmed the final number of turbines, their final siting, turbine heights, turbine model, foundation design, construction methodology or operational parameters. The application allows turbine locations and specifications to be altered after approval. These elements are fundamental to understanding impacts on noise, shadow flicker, visual amenity, bushfire risk, groundwater systems and surrounding land use. Deferring these decisions until after approval removes the community's ability to meaningfully assess the full impacts of the proposal. Noise impacts are of particular concern. The noise assessment is primarily based on desktop modelling rather than comprehensive, site-specific, in-field measurements under local conditions. Desktop modelling cannot adequately account for the coastal and inland weather patterns experienced in the Scott River area, nor for atmospheric inversion effects that influence noise propagation at night. Without baseline and ongoing real-world measurements, the accuracy of the predicted noise impacts cannot be verified. In addition, the assessment relies on Western Australian noise criteria developed for much smaller and older wind turbines. These standards do not adequately reflect the scale and operating characteristics of modern turbines approaching 250 metres in height. The application also fails to properly examine low-frequency noise and infrasound, despite increasing international research suggesting that such emissions may adversely affect some people, particularly in quiet rural settings. The Development Application does not include clear commitments to independent, continuous noise monitoring at nearby dwellings, transparent reporting, or enforceable shutdown provisions if noise limits are exceeded. This leaves affected residents without meaningful protection should impacts prove greater than predicted. The proximity of turbines to dwellings and property boundaries is also unreasonable. Adjacent landowners should not be expected to absorb the impacts of an industrial energy facility as an informal buffer. The setbacks proposed do not reflect the scale of contemporary turbines or reasonable expectations for rural amenity. Approving turbines close to boundaries transfers noise, shadow flicker and visual impacts onto neighbouring land and effectively constrains future land use for decades. The visual impact of the proposal is substantial. Turbines exceeding the height of Perth's tallest buildings will dominate the landscape and skyline across a wide area. The Scott River region is valued for its rural character, open landscapes and agricultural setting. Introducing infrastructure of this scale would permanently industrialise the area and result in an irreversible loss of landscape character, with negative implications for tourism, community identity and property enjoyment.

		The floodplain location of the proposal raises serious environmental concerns. The presence of acid sulfate soils and a shallow superficial aquifer connected to the Scott River system significantly increases the risks associated with deep foundations, trenching and dewatering. The Development Application does not provide a sufficiently detailed, site-specific hydrogeological assessment or a robust acid sulfate soil and dewatering management plan. Reliance on reactive measures such as emergency lime treatment is not a responsible long-term strategy, particularly given the importance of lime to local agricultural operations. Bushfire risk and emergency management have also not been adequately addressed. Wind turbines can restrict aerial firefighting operations and introduce additional ignition risks. Internal access tracks do not necessarily provide safe evacuation routes during fast-moving rural fire events. The application does not clearly demonstrate how emergency response, evacuation or the protection of significant environmental assets would be managed during extreme fire conditions. Construction impacts are similarly underdeveloped. There is insufficient information regarding access routes, heavy vehicle movements, traffic volumes, construction duration, dust and noise management, and protections for local residents and road users. These impacts may extend over long periods and should not be treated as minor or temporary disruptions. I am also concerned about the adequacy of community consultation. Many affected landholders report limited or no direct engagement. The Development Application does not clearly document community feedback or demonstrate how concerns raised have influenced the proposal. Given the scale and permanence of the development, the consultation undertaken to date is insufficient. For these reasons, I request that the Shire of Augusta Margaret River refuse the Development Application. At a minimum, any decision should be deferred until a final turbine layout and specifications are provided, noise assessment methods are updated to reflect contemporary turbine scale, and comprehensive environmental, bushfire and construction management plans are independently reviewed and made publicly available. In my view, the Scott River Wind Farm proposal is not suitable for the Scott River floodplain. The risks to rural amenity, agriculture, water resources, environmental values and landscape character are significant and enduring, and have not been adequately addressed in the current application.
109	Object	I am writing to formally lodge an objection to the Scott River Wind Farm Development Application currently under consideration by the Shire of Augusta Margaret River. This objection is made on the basis that the Development Application, as submitted, does not provide sufficient certainty, specificity or final design information to enable a proper, informed and transparent assessment of a development of this scale, duration and consequence. While the documentation is extensive in volume, it lacks critical settled details that are fundamental to understanding the full scope of impacts associated with the proposal. The Scott River area is a highly sensitive rural and environmental landscape, valued for its agricultural productivity, hydrological significance, ecological features, landscape character and quiet rural amenity. Any development proposed for this location must therefore

		be supported by a high standard of rigour, clarity and precaution. In my view, the current application does not meet that standard. At the time of assessment, the proponent has not confirmed the final number of turbines, their definitive locations, turbine heights, turbine model, foundation design, construction methodology or operational regime. Instead, the application allows for turbine locations to be altered, turbine models to change, and key construction decisions to be made at the proponent's discretion after approval is granted. These matters are not minor or administrative details. They are fundamental determinants of impact. Turbine height, rotor diameter, blade speed, spacing and placement directly influence noise emissions, low-frequency noise and infrasound, shadow flicker, visual dominance, bushfire risk, foundation depth, groundwater disturbance, road infrastructure requirements and long-term land use constraints. Approving a development of this magnitude without fixed and final design parameters effectively requires the community and the Shire to accept unknown outcomes, with impacts to be managed later rather than properly assessed upfront. This approach undermines meaningful public participation and the integrity of the planning process. Noise impacts represent one of the most significant and enduring concerns associated with the proposal. The noise assessment relies predominantly on desktop modelling and assumed inputs rather than comprehensive, site-specific, in-field measurements under local conditions. Desktop modelling cannot fully account for local meteorology, atmospheric inversion effects, terrain interactions, cumulative turbine effects or night-time propagation characteristics. The Scott River area experiences coastal and inland weather patterns that materially influence sound behaviour, yet the modelling has not been validated through long-term baseline monitoring. In addition, the noise assessment framework relies on Western Australian noise criteria developed for much smaller, older-generation turbines. These criteria do not adequately reflect the scale or operating characteristics of modern turbines approaching 250 metres in height. Applying legacy standards to infrastructure of this magnitude risks underestimating impacts on nearby residents and rural amenity. The Development Application also fails to adequately address low-frequency noise and infrasound. While scientific opinion continues to evolve, there is growing international literature indicating that pulsating infrasound from large turbines may adversely affect the health and wellbeing of some individuals, particularly in quiet rural environments. Regardless of differing interpretations, the precautionary principle requires these potential risks to be examined carefully rather than dismissed. The application does not demonstrate how such emissions would be monitored, managed or mitigated over the operational life of the project. Further compounding these concerns is the absence of clear, enforceable commitments to independent and continuous real-time noise monitoring at sensitive receptors, transparent public reporting of results, and mandatory shutdown or remediation mechanisms in the event of exceedances. Without such measures, affected residents have no meaningful assurance that noise impacts will be properly controlled. The proposed setbacks between turbines, dwellings and property boundaries are also unacceptable given the scale of the turbines proposed. Neighbouring land should not be treated as an informal buffer for industrial development. Locating turbines close to property boundaries displaces noise, shadow flicker and visual impacts onto adjoining land and effectively constrains surrounding land use for generations. This approach erodes rural amenity, diminishes property enjoyment and value, and creates long-term land sterilisation that is incompatible with the expectations of rural landholders.

		The visual impacts of the proposal are severe and unavoidable. Turbines and rotating blades exceeding the height of Perth's tallest buildings will dominate the landscape and skyline for many kilometres. The cumulative presence of turbines, access roads, hardstand areas, transmission infrastructure and aviation lighting will permanently industrialise a landscape currently valued for its agricultural character, openness and sense of place. These impacts cannot be mitigated through landscaping and will result in a permanent loss of landscape character, with flow-on effects for tourism, recreation and community identity. The location of the proposal within a floodplain raises serious environmental and agricultural concerns. The presence of acid sulfate soils and a shallow superficial aquifer connected to the Scott River system significantly heightens the consequences of ground disturbance. Deep turbine foundations, trenching and dewatering pose high-consequence risks to soil chemistry, groundwater quality, surface water systems, farming operations, dams and bores. The Development Application does not provide a sufficiently detailed, site-specific hydrogeological assessment or a robust acid sulfate soil and dewatering management strategy capable of addressing these risks over the long term. Reliance on reactive mitigation measures such as emergency lime treatment is not a responsible or sustainable approach, particularly given the competing demand for lime within the agricultural sector. Once acidification occurs, impacts may be irreversible. Bushfire risk and emergency management have also not been adequately addressed. Wind turbines introduce additional ignition risks and may restrict aerial firefighting operations through the creation of no-fly zones. Internal access tracks do not necessarily provide safe evacuation routes during fast-moving rural fire events, particularly in floodplain terrain. The Development Application does not convincingly demonstrate how turbine-related ignition risks would be managed, how firefighting access would be maintained, or how evacuation and protection of rare or significant flora would be achieved under extreme fire conditions. Construction impacts are similarly under-developed. The application lacks sufficient detail regarding access routes, heavy vehicle movements, traffic volumes, construction timelines, hours of operation, dust suppression, noise management and protections for local residents, road users and businesses. Construction impacts of this nature may persist for extended periods and cannot be dismissed as short-term or minor inconveniences. I am also concerned about the adequacy of community consultation. Many affected landholders report limited or no direct engagement. The Development Application does not clearly summarise community feedback or demonstrate how concerns raised have been meaningfully addressed or incorporated into the proposal. For a development of this scale and permanence, the consultation undertaken to date is inadequate. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the Scott River Wind Farm Development Application. At a minimum, any decision should be deferred until a final turbine layout and confirmed turbine specifications are provided, an appropriate and contemporary noise assessment framework is applied, and comprehensive environmental, hydrogeological, bushfire and construction management plans are independently reviewed and made publicly available. This proposal is not appropriate for the Scott River floodplain. The risks to rural amenity, agriculture, water resources, environmental

		values and landscape character are substantial, enduring and, in my view, unacceptable. Planning approval should not be granted on the basis of uncertainty and future discretion, particularly where the impacts, once realised, cannot be reversed.
110	Object	The WA Government has disregarded its own policy safeguards to push this proposal forward. The EPA has failed to confront the severe risks posed by ASS disturbance. Heavy industry in this location is fundamentally incompatible with the landscape and community values. Previous ASS disturbance at this exact site resulted in decades long contamination and containment management costing BHP hundreds of millions in project failure and remediation. This proposal lacks scientific integrity and represents an unacceptable environmental, financial, and policy failure. It must be cancelled or relocated out of the region immediately Avoidance of ASS disturbance is the only scientifically defensible position.
111	Support	Climate change is real and needs to be addressed immediately. One way of doing this is by building clean energy projects like the proposed wind farm to replace aging and dirty power sources I believe the environmental impact on the area will be minimal. The main objection seems to be the visual impact. Opponents of the wind farm say otherwise and claim to be in favour of renewable energy projects, but really it more to do with a " not in my backyard " (NIMBY) attitude. It is imperative that government at all levels take responsibility for the implementation of these type of projects.
112	Support	I support the development of the wind farm as a form of sustainable energy production and to reduce our reliance on fossil fuels.
113	Object	
114	Object	I believe the proposed turbines contain lots of toxic products and they are an eyesore.
115	Support	We need the electricity to replace the coal fired power when Collie is closed down.
116	Support	I strongly support the proposal. The detailed process of site selection and feasibility assessment that followed the community proposal for a wind farm at a Shire- community workshop, and the rigorous surveys and assessment that followed, have convinced me that, subject to management of any potential impacts, the project should proceed. It is vital that we maximise renewable energy to contribute to phasing out fossil fuels. Climate change is impacting sw WA. The shire and community are committed to protecting the environment on which all aspects of our lifestyles and livelihoods depend. Vociferous minority opposition that has often been based on inaccurate or incorrect information has been a recent distraction in an orderly process over many years. It is time to move forward and show leadership in renewable energy development.
117	Support	As a dairy farmer in the area I am confident that renewable energy and the wind farm proposal in particular can co-exist. We view it as a great support for for diversifying our farming practices, providing a much needed strong and reliable power supply, reducing carbon emissions, and supporting financial sustainability. The road network proposed to access the turbines will assist us to farm more efficiently when harvesting fodder. The improved water supply outlined in the proposal would be very beneficial in the need of bushfires. The supply grid from Collie is challenged as demonstrated in the recent extended outage on 15/16 Dec 2025. It would be a huge benefit to farming to have local power generation and will provide opportunities for supply risk mitigation in future power challenges.

		We accept the visual impact. We actually view looking at them with a great sense of pride that we are contributing to sustainable energy, the greater economy, and sustainable change. Wind turbine are used all over the world and all over Australia in a safe and productive manner. They will have more positive impacts and fewer minor impacts.
118	Object	The WA Government has disregarded its own policy safeguards to push this proposal forward. The EPA has failed to confront the severe risks posed by ASS disturbance. Heavy industry in this location is fundamentally incompatible with the landscape and community values. Previous ASS disturbance at this exact site resulted in decades long contamination and containment management costing BHP hundreds of millions in project failure and remediation. This proposal lacks scientific integrity and represents an unacceptable environmental, financial, and policy failure. It must be cancelled or relocated out of the region immediately Avoidance of ASS disturbance is the only scientifically defensible position.
119	Object	Good Afternoon - My concerns regarding the P225771 windfarm submission are as follows: 1. The potential impact/displacement of our local wildlife with the construction, commissioning and operation of 20 wind turbines. 2. The potential impact to local farmers and their stock with the construction, commissioning and operation of 20 wind turbines. 3. Wind turbines on the horizon are an eyesore that will impact tourism for Augusta, a location synonymous with natures beauty. 4. The potential low noise disturbance that could be experienced on Molloy Island. Surely there is a more suitable location.
120	Object	Submission on Draft Local Planning Policy 23 – Large-scale Renewable Energy Facilities (LPP23) I am writing to make a submission on Draft Local Planning Policy 23 – Large-scale Renewable Energy Facilities (LPP23). I have owned my property at 1948 Brockman Hwy Courtenay since 1990 and lived there from 1992 till 2010 when we moved for business to Busselton. We have in 2025 made our farm house a short term farm stay. One of the thing we found was when we had visitors they all commented on how quiet it was. After visiting Albany and Jurien Bay wind farms i feel that the noise from the windfarm will destroy this tranquility. Ever as technology improves and noise levels are decreased there is still evidence of health affects. https://www.dailytelegraph.com.au/subscribe/news/1/?sourceCode=DTWEB_WRE170_a_DDG&dest=https%3A%2F%2Fwww.dailytelegraph.com.au%2Fnews%2Fnsw%2Fjet-engine-couple-wants-out-of-wind-turbine-deal-over-noise%2Fnews-story%2Fd1b18abf16509c7254cb8f05b6564265&memtype=anonymous&mode=premium&v21=GROUPA-Segment-1-NOSCORE As my property is located on the Northern side of the wind farm and the prominent wind direction is from the South i feel the noise will be constant. The issue of fire which can be quite common is also a concern as the prominent strong Southerly wind can blow it directly towards our property. The wind turbines proposed for the site are large and will have a negative visual impact on the natural environment around the area. Simply requiring compliance with the Environmental Protection (Noise) Regulations is not enough to protect rural amenity around very large turbines in a quiet landscape. Key gaps in the current draft include: • no explicit recognition of low-frequency noise, infrasound or amplitude modulation

		• no requirement for independent noise monitoring with public reporting • heavy reliance on proponent-prepared management plans. WA noise rules and typical modelling approaches are geared to audible dBA limits and older, smaller turbines, not modern 250 m-class turbines proposed for Scott River. Synergy has acknowledged infrasound in previous conversation • Desktop modelling only: the noise work is based on computer assumptions (inputs, propagation, operating modes) rather than field-verified measurements in local conditions (wind shear, temperature inversions, humidity, terrain, vegetation, background rural noise). • No confirmed turbine model: without a final turbine model and operating parameters, predicted noise levels are not reliable and cannot be meaningfully verified. • WA framework limitations: compliance is typically framed around audible noise metrics (dBA) that do not adequately address low-frequency noise and infrasound characteristics of large turbines. • Pulsating infrasound: emerging international evidence suggests amplitude-modulated/pulsating components from large turbines are an unaddressed risk for some people (sleep disturbance and physiological stress pathways are commonly raised concerns). • Post-construction reality: there are examples elsewhere in Australia where communities were told there would be no offsite impacts, yet post-construction complaints and disputes persisted because conditions and monitoring were insufficient. Minimum protections to demand: • A requirement for independent, continuous, real-time noise monitoring at representative nearby residences (not just at the boundary), including reporting and public transparency. • Mandatory post-construction compliance testing under a range of weather and operating conditions, with results published. • Enforceable curtailment/shutdown requirements if limits are exceeded, and a clear complaints response protocol with timeframes. Rural amenity is both visual and acoustic. I have chosen to live and farm in this district precisely because of its quiet, peaceful, rural character. I support the Shire having a clear local planning policy for large-scale renewable energy. However, in its current form LPP23 does not provide strong enough protection for floodplains, food production, water resources, bushfire safety, biodiversity or rural amenity. Many of the concerns raised by the community during the earlier Renewable Energy Issues and Options Paper process do not appear to have been carried through into this draft. If the Shire approves the current DA our they going to take responsibility for the issues raised?
121	Support	
122	Object	With regards to wind Turbines proposed being installed. Has the appropriate risk mitigation plan been made considering all factors including economic,environmental and social impacts. To look overseas the green agenda is dead in the water.It does not add up financially or environmentally. I strongly oppose the proposed project based on overseas withdrawal and dismantling of defunct projects. What are you people thinking!

123	Object	I think there would be better places to put the turbines if was going to happen . I just don't think it's necessary and there's other things that this town needs before wind turbines.
124	Object	I objection to the Scott River Wind Farm and inadequate Development Application currently before the Shire of Augusta Margaret River. I do not believe the Development Application provides sufficient detail to allow a proper assessment of a project of this scale and consequence. While the application is lengthy, it lacks the certainty, specificity and final design information required for informed decision-making. At present, the proponent has not confirmed the final number of turbines, their final locations, the final turbine height, the final turbine model, or a detailed construction and operations methodology. Turbine locations may be moved at the developer's discretion. These matters are fundamental to assessing impacts such as noise, infrasound, shadow flicker, visual dominance, bushfire risk, groundwater impacts and overall amenity. Telling the community that these details will be "worked out later" is not acceptable for a development that would permanently alter the Scott River area for decades. I am particularly concerned about noise impacts. The noise assessment relies on desktop modelling and assumptions rather than real-time, in-field measurements under local conditions. The modelling is also framed around WA noise rules that focus on audible dBA limits developed for much smaller, older turbines, not modern 250-metre turbines of the scale proposed for Scott River. The application does not adequately address thwe issue of infrasound, despite growing international evidence (Dr Ken Mattson) that pulsating infrasound from large turbines may present unaddressed health risks for up to 30% of people who are susceptible. There are no clear commitments to independent, continuous real-time noise monitoring at nearby residences, nor enforceable shutdown provisions if limits are exceeded. The proximity of turbines to homes and property boundaries is also unacceptable. Neighbouring land should not be treated as a buffer for industrial development. The setbacks proposed do not reflect the scale of modern turbines or reasonable expectations for rural amenity. Approving turbines so close to boundaries shifts noise, shadow flicker and visual impacts onto neighbouring landowners and effectively sterilises surrounding land use for the rest of this century. I live 10km from the proposed development and have received zero communications from the shire regarding this project. I had a shed building approval delayed by the shire because my two neighbors of a half and one kilometre away were formally given the option of objecting to the chosen colour of the shed, of which can't even be seen from their properties. Why have I not been formally notified of this project by the the shire? The visual impact of the proposal is significant. Turbines and blades exceeding the height of Perth's tallest buildings will dominate the rural landscape and skyline for kilometres. Scott River is valued for its natural landscape, agricultural character and quiet rural amenity. Industrialising this landscape would result in a permanent loss of character and would undermine tourism and the long-term enjoyment and value of surrounding properties. The site's floodplain location raises serious environmental concerns. The area contains acid sulfate soils and a shallow superficial aquifer that is linked to the river system. Deep foundations, trenching and dewatering pose high-consequence risks to soil stability, water quality, farming operations, dams and bores. The Development Application does not provide a credible, site-specific hydrogeological assessment or a robust acid sulfate soil and dewatering management plan. Reliance on emergency lime treatment is not a sustainable or responsible mitigation strategy, particularly given competing demands on lime for agricultural use.

		Bushfire risk and emergency response have also not been adequately addressed. Wind turbines create no-fly zones that may restrict aerial firefighting, and internal access roads do not equate to safe evacuation routes in a rural fire scenario. The application does not demonstrate how fire ignition risk, emergency response or rare flora protection would be managed in extreme fire conditions. Construction impacts are similarly under-developed. The application lacks detail on access routes, heavy vehicle movements, timing and duration of works, dust and noise management, and protections for local residents, road users and businesses. These impacts are not short-term inconveniences but could extend over months or years. And I remain concerned about the adequacy of community consultation. Many affected landholders report no direct engagement. The Development Application does not clearly summarise community feedback or demonstrate how concerns have been meaningfully addressed. Given the scale and permanence of this proposal, the consultation undertaken to date is inadequate. This proposed windfarm is not suitable for the Scott River floodplain, and the risks to community amenity, farming, water security, environment and landscape character are unacceptable. I acknowledge that Renewable energy projects are needed to mitigate climate, however, this is the wrong location for a project such as this.
125	Object	The WA Government has disregarded its own policy safeguards to push this proposal forward. The EPA has failed to confront the severe risks posed by ASS disturbance. Heavy industry in this location is fundamentally incompatible with the landscape and community values. Previous ASS disturbance at this exact site resulted in decades long contamination and containment management costing BHP hundreds of millions in project failure and remediation. This proposal lacks scientific integrity and represents an unacceptable environmental, financial, and policy failure. It must be cancelled or relocated out of the region immediately Avoidance of ASS disturbance is the only scientifically defensible position.
126	Object	The WA Government has overlooked key policy safeguards in fast-tracking this proposal. The EPA has not fully addressed the extreme risks associated with ASS disturbance. Heavy industry is incompatible with the proposed location of the Wind Farm and its surrounding landscape. Previous disturbance of ASS at this site resulted in contamination that has persisted for over 20 years and cost BHP an estimated hundreds of millions in project failure and remediation. This proposal lacks sufficient scientific credibility and poses serious environmental, financial, and policy risks. Avoidance of ASS disturbance is the only scientifically defensible position.
127	Object	I object most strongly to the Scott River Wind Farm DA chiefly because the in depth detail essential for a proper assessment is absent. Approval is being sort without any specific assessments in any of the key sticking points ,approval should NOT proceed on the premise of 'work it out later'. There are many issues that require addressing . I will unable address the following as time does not permit : Impact of proximity to homes , boundaries and rural lifestyle can not be used as buffers. Bushfire and emergency response : aviation restrictions and evacuation realities. Traffic ,access and construction disruption :local roads not built for heavy haulage. However , I will address in detail six other major issues The Shire is being asked to approve a concept , not a final design and to add to the insult there is no business case .The development

		lacks details of final turbine model or specifications . In addition there are no detailed construction and environmental management plans that can be assessed and conditioned. Included in this inadequate transparency with the public , is secrecy where farmers were directed not to disclose their interaction with Synergy to other local farmers ."Do not rely on neighbours agreements" position: private agreements should not be used to qualify offsite impacts. No comprehensive construction methodology for site specific foundations , trenching, acid soil management , rehabilitation and traffic management has been presented . These inadequacies only increase the reasons why the Shire should NOT approve the DA. Desktop modelling of Noise , low-frequency and infrasound created , are only based on computer assumptions rather than actual field-verified measurements in local conditions. Findings are based on older ,smaller turbines not the modern 250 m-class turbines proposed for Scott River. Compliances are limited as constructed around audible noise metrics that do not address low-frequency noise created by large turbines. The Shire must require independent continuous noise monitoring at nearby farms not just those on the boundary . Public reporting and transparency need to be part of this and enforceable shutdown requirements if limits are exceeded together with a complaints system enforced within a strict timeframe. These skyscraper-scale structures visible for kilometers will destroy the quality of the natural landscape for decades. This pristine rural Scott River landscape must not become known by tourists as a place to avoid owing to the domination of noisy swirling industrial giants, ' blots on the landscape'. Rather, as it is now, for the magnificent quiet rural character and open horizons ,sadly in decline all over Australia. Faulty visual assessments in the form of photos , often misleading (deliberately or otherwise) fail to address the real issues of scale . Destroying this distinctive landscape will not be a 'minor impact' but a major ecological failure by the Shire if they do not oppose this DA. This location has known soil sensitivity, as a result earthworks and dewatering can and has caused irreversible damage to the environment. The embarrassing failure of BHP's Beenup Mineral Sands Mine in the Scott River catchment in 1999 was a direct result of the mismanagement of sensitive acid sulphate soil. The mismanagement was at a cost of millions of dollars to BHP share holders. Neutralizing the dam water and acid soil with lime is still on going. Lime is imported from South Africa at great expense. Deep foundations planned for the windfarm structure, trenching and roadworks all require excavation and dewatering .Exposure of acid sulfate soil or lowering groundwater in this environment can generate acid and mobilise metals .Proven in the case of BHP's Beenup mine. Contamination of water quality is a risk for farmers . Bores , drains , dams, pathways and stock water can all be impacted . The DA does not have a final design, dewatering plan, there is no credible risk assessment to manage volumes of water , or disposal, treatment or monitoring of and contingencies for water. There has been no study undertaken of the linking of the superficial aquifer and the Scott River system . Who will carry the cost to correct any environmental travesties ? It appears the local farmer, not the developer , as Synergy hasn't presented plans covering such events. Synergy do not even have a plan to manage emergency acid sulfate soil mitigation . If the unthinkable should happen, where taxpayer funds have to be used to pay billions of dollars in an attempt to neutralize sulfate soil mitigation ,as is the case with BHP at Beenup (thankfully NOT our money.) then surely such a risky gamble with taxpayers funds could not possibly be contemplated by Synergy. (WA's share of GST will not last forever) . It is unthinkable that the lives and property of people in the Augusta area , could be put at risk of acidic sulfate soil ,river and ground water contamination if the Shire allowed Synergy to progress this application . Who will provide compensation for acid contamination that could last hundreds of years , possibly rendering the whole district infertile and uninhabitable. It is not beyond the realms of possibility that the Shire and representatives could be open to being individually sued by those owners impacted by such a monumental disaster. The Shire must demand from Synergy an in depth hydrogeological assessment , a thorough acid sulfate soil investigation and an enforceable dewatering /ASS management plan ' all independent assessments ' BEFORE any approval of the DA is contemplated.

		The wildlife and environment hasn't been given due consideration in the DA. What consideration has been given to monitoring impacts and enforcement? There is no mention of thresholds that will initiate mitigation or what form enforcement will take. Biodiversity is a hallmark of this area ; 26 species of flora and fauna are listed as threatened or considered rare and at risk. Bird and bat strikes are intrinsic to wind facilities , clearing and fragmentation of land inhabited by fauna adds further pressure. All issues must be assessed honestly with vigor and with a view to protecting the area at all costs .The Scott River area deserves strong crystal-clear monitoring as a prerequisite and a blueprint demanding 'avoidance -first ' requirement with NO reference to "mitigation later " too late when irreparable damage has occurred. Consultation with the community has been spasmodic at best. Many affected land owners report No direct engagement with Synergy. While others complain of the 'secrecy' involved with compensation/payment when they were first approached to allow wind turbines on their land. Secrecy, that could have the affect of turning longstanding neighbours against each other. It is noted the DA does not clearly summarise community feedback and in addition demonstrate how concerns were incorporated. Surely input from the community should ,at the very least, be accurate and clearly stated? The DA should concede the degree of opposition to the Windfarm and the responses from the community should be clearly outlined. The intensity of the community to engage in this project should not be underestimated , therefore genuine consultation outcomes and published responses to key community concerns are essential if the Shire is to retain credibility among the stake holders. Please no generic assurances. It would be most worthwhile for the Shire to investigate other Synergy Windfarm sites (if they haven't already done so) that are supposedly up and running, to see first hand how the projects are managed once Synergy palms the process off to independent companies. The Synergy Windfarms projects in the Collie area have created many issues windfarms being shut down ,as there was no means of storing the energy created . Only one battery had been installed in Collie while others were on order from China, yet here we are facing possible power shortages during a predicted extremely hot summer . The 'cart before the horse' would be a suitable analogy in this instant . Synergy or one of the Greenwinds Renewables Companies handling these projects seem to have 'dropped the ball'. Is this the type of mismanagement that will be accepted IF the DA goes ahead? Farmers in the Collie area NOT taking part in the Windfarm projects have been left to deal with satellite companies such as Ambrosia Windfarm Holdings and Moonies Hills Energy . It appears Synergy are not obliged or interested in dealing with demands for compensation from farmers whose property is impacted by the noise of the turbines, their proximity to habitable dwellings and the loss of value of their farms . Farms that in many cases form the basis of the families superannuation. Synergy ,it appears do the spade work for the project , then palm the accepted plan off to companies that have no interest in facing the obligations created by Synergy and outlined in the agreement. A personal farming friend who opted out of having windfarms has been in the process of attempting to lodge a compensation claim but is unable to contact any of the directors of the company now in control of the windfarms affecting his farm and life style. Will this scenario be repeated at Scott River if Synergy 's DA gets the go ahead and satellite companies at arms length from the negotiation process take control and fail to honor the agreements made by the government ? In conclusion, I ask the Shire to refuse outright the DA on the grounds that Scott River is an unsuitable site for a Windfarm project that will impact the greater area in unimaginable ways if the balance of nature in one of its rawest forms "acid Soil" is disturbed.
128	Object	I am strongly opposed to the proposed installation of 250m-high wind turbines anywhere in a pristine agricultural and tourist area, as would anyone purporting to have genuine concern for the environment. The southern western tip of Western Australia should be regarded as a treasure for its scenic landscapes, productive agricultural land and natural beauty that supports domestic tourism and biodiversity. I

		formally object to this development on the grounds of its negative environmental impacts, which are well documented in scientific literature. These impacts include: High Risk of Bird and Bat Fatalities from Collisions Wind turbines pose a serious threat to avian and bat species through blade collisions, with taller turbines (such as the proposed 250m structures) sweeping larger rotor areas and increasing risk, particularly for migratory and soaring species like raptors. Studies across multiple facilities have documented thousands of bird and bat deaths, including diverse species. In Australia, similar concerns apply to local wildlife, and the unprecedented height of these turbines would exacerbate collision risks in an area likely used by threatened or migratory birds. Noise pollution disrupting wildlife behaviour and ecosystems Wind turbine noise, including low-frequency and infrasound, can detrimentally affect wildlife by interfering with survival, social interactions, and breeding. Research has shown reductions in bird presence (up to 30%) near operating turbines due to noise, as well as avoidance and displacement of birds and mammals from otherwise suitable habitats. In a rural farming district, this could disrupt local ecosystems and species reliant on quiet environments. Visual intrusion and negative Impacts on tourism The massive 250m scale of these turbines would dominate the skyline, causing irreversible visual pollution in a region prized for its natural beauty and scenic views. Scientific studies indicate that visible wind farms reduce tourist appeal, with visitors less willing to rent accommodation or visit areas overlooking turbines, leading to potential declines in coastal or rural tourism. This would harm our local economy, which depends on agriculture and tourism drawn to unspoilt landscapes. Habitat fragmentation and ecosystem disruption Construction and operation of large-scale wind farms alter ecosystems through vegetation clearing, soil disturbance, and functional habitat loss, causing displacement of wildlife and fragmentation of movement corridors, particularly for soaring birds. In a farming district, these effects would compound existing pressures on biodiversity. These impacts are not speculative but supported by peer-reviewed research and observations from existing wind facilities worldwide. The exceptional height of 250m turbines amplifies many of these risks. The deleterious effects on the human psyche, living amongst such monstrosities, has not at this stage been fully measured, but should be a consideration for anyone accountable in making these decisions. I urge the Authorities involved to reject the proposal, it should be built in an area where the land is unproductive, not arable and has minimal impact on the environment and human and animal life.
129	Object	I have farmed in the Scott River district since the early 1970s. I am lodging this submission to object to SynergyRED's proposed wind farm Development Application. I am not against sensible progress, but this proposal is industrial in scale and it is being put into a working farming and high environmental

		value landscape. Turbines up to 250 metres high do not “blend in” to Scott River. They change the character of the district and shift real, long-term impacts onto neighbouring farms and families. 1) Protecting farms, livestock and families must come first Scott River is a working farming district. Our farms are homes and workplaces. Noise, shadow flicker and night lighting are not minor issues when you live and work on the land every day. This proposal risks turning a rural area into an industrial zone, with impacts that fall on people who did not choose to host the project. 2) Duty of care for farm workers and safety risks As farmers we have a duty of care to our workers and contractors. A large industrial facility next door introduces new safety and operational risks—construction traffic, oversized loads, changing access conditions, and the risk that farm work will have to be planned around turbine operations and constraints. This is not how rural land should be managed. 3) Fire and emergency risk is not resolved Scott River is bushfire-prone. Any development that increases complexity in emergency response must be proven safe before approval. The emergency planning in this DA is not strong enough to give confidence that suppression, access and response will be effective in a fast-moving fire. 4) Scott River is a special place for wildlife and needs protection from industrialisation This district has important waterways, wetlands and wildlife. Industrialising the landscape with turbines, roads and associated infrastructure risks long-term harm. Surveys and protections must be robust, transparent and genuinely precautionary. If the proponent cannot show strong avoidance-first protection, the proposal should not proceed here. 5) The DA is too flexible and should not be approved as lodged The DA seeks approval for a “maximum case” while leaving key details to be finalised later. That approach is not fair to neighbouring landowners and it does not provide decision-makers with a clear, final project to assess. If a proposal is going to change Scott River for decades, it must be assessed on a fixed design with clear and enforceable protections. For these reasons, I request that the Shire recommend the RDAP refuse the application as lodged, or defer it until the proponent provides major further information and a properly defined, assessable proposal that protects farmland, livestock, families, workers, fire safety and the environment—and then re-advertise it for community review.
130	Object	I’m 12 years old and I live on a farm at Scott River. I want to be a farmer here when I grow up. I’m writing because I don’t want this wind farm approved the way it is right now.

		These wind turbines can be up to 250 metres high. That is massive. You can't put something that big into a quiet farming area and pretend it won't change everything. Noise, shadows and stress on animals - On a farm, people and animals are outside all the time. If there is constant noise or the "shadow flashing" from the blades, we can't just escape it. Livestock can't move away from it either. The rules should keep big turbines far enough away so families and animals are protected. Scott River is full of wildlife and special places - This area has wetlands and animals that belong here. They are unique. I'm worried about what happens when they start clearing, building roads and digging. If the company says it will be "fine", they should have to prove it properly and show exactly what they've checked and what they will protect. Bushfires are real here - We get fires. Theres one burning right now down the raod. In an emergency you need firefighters to be able to do their job safely and quickly. I'm worried that huge turbines make that harder. A fire plan should be clear and strong before anything is approved. The plan is too vague - From what I understand, the company is asking for approval first and then working out the exact details later. That doesn't feel fair to families who will live next to it for years and years. If it's going to be approved, everyone should be able to see the final plan and comment on the real version. Please recommend that this application is not approved as it is. It should be stopped or sent back until the company provides a clear final plan that truly protects farms, families, animals, wildlife and safety.
131	Object	I am a landowner and working farmer directly adjacent to the proposed Scott River Wind Farm Development Envelope. I object to this Development Application (DAP/25/02933) as lodged and request that the Shire recommend the RDAP refuse the application or, at minimum, defer determination and require major further information with re-advertising before any decision is made. This proposal is an industrial development of exceptional scale—up to 20 turbines at 250m tip height—in a rural district that relies on farming, environmental values, rural amenity and the region's tourism and lifestyle brand. A project of this magnitude does not "blend in" and it must not be assessed or approved on a 'concept envelope' with key details deferred to later stages. The DA itself confirms that the final turbine make/model and the specific location of infrastructure will be confirmed later through procurement and further design, and that approval is being sought for a "maximum case scenario". In my view, this is an "approval first, argue later" approach. The DA is weak, overly flexible, and not fit for determination. 1) Consultation and social licence: weak engagement and dismissive conduct From my direct experience, Synergy's engagement has not met the standard expected for a project that will affect neighbours for decades. In a meeting with Synergy's project team, when setbacks and neighbour impacts were raised, the project manager said words to the effect

		of: “Did you know I can put these turbines wherever I like.” That was the moment I realised we were dealing with a company that was not listening to our concerns or the community’s concerns. It was dismissive and disrespectful, and it does not inspire confidence that neighbour impacts will be treated seriously. For a proposal of this scale, consultation must be meaningful and transparent—not a box-tick exercise. The Shire should treat consultation quality as a material planning consideration because it directly affects social licence and whether the Shire will inherit decades of complaints and disputes. What I am asking for: The Shire should require a public, auditable “issues raised / response / design change” schedule showing what concerns were raised, what commitments were made, and what design changes were actually implemented. 2) The DA is not properly assessable: “maximum case” envelope with key details deferred The proponent confirms the final turbine model and the precise location of infrastructure will be finalised after approval. Those are not minor details. They determine real-world impacts: noise, shadow flicker, visual dominance, ecological risk, aviation constraints, bushfire response, and enforceability. A DAP approval should not be granted when the final design that drives the impacts is unknown at determination. This approach leaves neighbours in a position where we can only complain after impacts occur, when the project is already built. What I am asking for: Refuse or defer. Require a revised DA with fixed turbine model(s), fixed turbine coordinates, fixed infrastructure alignments, and updated technical studies tied to the final design—then re-advertise. 3) Neighbour protection must be based on impact containment, not risk transfer Impacts should be contained within the project footprint. Any approval approach that allows noise, flicker, lighting and safety risks to spill over the boundary is not protecting neighbours—it is transferring risk and burden onto us. As a working farm directly adjacent, we are not passive receivers of impacts. Farming involves livestock welfare responsibilities, workers and contractors, machinery operations, and constant land management. Noise and shadow flicker are not abstract. They affect people living and working on the farm, and they can affect livestock behaviour and day-to-day operations. What I am asking for: The Shire should adopt an “impact containment” principle. If the proponent cannot meet conservative thresholds without relying on curtailment promises or future “management plans”, then the site/layout is wrong and the proposal should be refused or redesigned. 4) Groundwater, aquifers, ASS and dewatering: due diligence is not credible Scott River is a high water table landscape with known acid sulfate soil risk. The DA acknowledges “significant challenges”, yet the

		baseline investigation presented is not commensurate with the risk. It appears the proponent relies on only three core soil samples to characterise soil profile and acid sulfate soil (ASS) risk across a large multi-lot development envelope. That is not good enough. This district has a clear warning in the history of the Beenup mineral sands mine. The lesson is that “we will manage it” is not a substitute for conservative investigation, avoidance-first design and enforceable controls. I do not accept that this DA should be approved on minimal baseline sampling with critical controls deferred to later plans. Lime demand concern: If Synergy’s approach relies on agricultural lime (“aglime”) to neutralise PASS soils and treat dewater, the Shire must require full disclosure of expected lime volumes, sourcing, haul routes and storage risks, and the implications for local agricultural supply. Lime is essential for productive farming systems. It should not be diverted locally to backfill an inadequate investigation program and weak planning. What I am asking for: No approval unless the proponent provides a robust turbine-by-turbine ASS and geotechnical investigation program (including roads/cable corridors/borrow pits), independently reviewed, and a conservative hydrogeological assessment tied to final turbine coordinates, with enforceable monitoring triggers and contingency responses. 5) Public conservation estate inside the envelope: survey coverage must be proven and disclosed The Development Envelope includes public land managed by DBCA for conservation. That alone requires a higher threshold of evidence and transparency. Survey coverage must be proven and disclosed—survey dates, methods, effort, spatial coverage maps and results (with appropriate redaction for sensitive species). Public conservation land cannot be treated as a survey gap or left to “finalise later”. 6) Bushfire and emergency management: weak and reactive for 250m infrastructure This district is bushfire-prone. The DA relies on future bushfire planning and references turbine shutdown capability. That is not a credible emergency strategy for 250m infrastructure. Aerial firefighting is critical during major events. A 250m turbine field and rotor-swept airspace can constrain aircraft approach paths and safe drop zones. In practical terms, suppression may be unable to be applied where it is needed most and a fire may be forced to burn through the project footprint and be caught on the far side. That increases risk to lives, farms, conservation estate and firefighters. If infrastructure burns (turbines, nacelles, blades, transformers, cabling), toxic smoke and contaminated runoff risks must be addressed. These hazards extend beyond the project boundary and can affect neighbours, livestock, waterways and wetlands. What I am asking for: No approval unless DFES/land managers provide explicit operational confirmation that emergency response (including aerial operations) remains feasible and safe for the final turbine coordinates, and unless enforceable shutdown/exclusion protocols and contamination controls are in place.

		7) Long-term Shire and community burden: 30–60 years of ageing industrial infrastructure This proposal would operate for 30–60 years. If approved with flexible parameters and deferred plans, the community and the Shire will carry the long-tail impacts of an ageing industrial installation: ongoing complaints and disputes, pressure for independent monitoring, road and traffic impacts, environmental compliance conflict, bushfire/incident risk, and reputational and tourism impacts. Our region thrives on our tourism and environment brand—not on ageing industrial infrastructure. Respect for the environment and the community must come first. The Shire's job is to protect the public interest, not to make this project "viable" by allowing weak conditions and risk transfer. For the reasons above, I request that the Shire recommend the RDAP refuse the application as lodged, or alternatively defer determination and require major further information, with re-advertising once the application is fixed and properly assessable.
132	Support	I support the Scott River Wind Farm DA as a critical step toward ending WA's reliance on fossil fuels. The project will deliver decades of clean electricity, drastically cut greenhouse gas emissions, and provide local economic activity without toxic emissions. While some details will be finalised later, this is standard for modern infrastructure and ensures the adoption of up-to-date, efficient technology. Concerns raised about noise, wildlife, and construction are manageable within existing WA regulatory frameworks and are negligible compared to the health and environmental damage caused by petrol and diesel vehicles, coal-fired power stations, and gas extraction. The short-term changes to views and local traffic do not outweigh the urgent need for climate-safe energy. We cannot delay renewable transition for another decade of fossil fuel dependency. Approve the DA and hold the developer to strong environmental and social conditions during final design and construction, knowing that the overall benefit is immense and lasting.
133	Object	I'm not sure if I have already filled out this submission, seems I have been submitting objections over and over. And here we still are, with no EPA investigation of this possibly disastrous proposed wind "farm". Nothing like a farm of course, destroying for ever possible farmland by pouring thousands of tons of concrete into it, thousands of tons of reinforcing metal. Who is going to remove it all? No one, that's the eventual answer. You know about the acid sulphate soils and while I have no chemical knowledge, there are plenty of people who do and who have written ad nauseum of their concerns. And still, no EPA assessment. I live on Molloy Island, a peaceful, quiet existence that we have enjoyed for the past 22 years. Maybe I won't hear the turbines, I don't know. But my greatest fear is the obvious potential for environmental damage to the water table and the river systems that will be impossible to fix. It has taken 25 years as I understand it, to rehabilitate the Beenup mine area, and now Synergy and foreign investors with no connection with this land, want to risk it all again. It is insanity, and I plead, I implore, at least have a proper environmental study of the risks versus the dubious benefits. Thank you.
134	Object	Objection to Proposed Wind Turbine Development – Scott River, Western Australia To Whom It May Concern, I am writing to formally object to the proposed wind turbine development in the Scott River area of Western Australia. While I acknowledge the importance of renewable energy and the role it plays in addressing climate change, I have serious concerns

		about the suitability of this project in the Scott River region and the potential negative impacts it may have on the local environment, community, and landscape. The Scott River area is recognised for its unique natural environment, biodiversity, and rural character. Large-scale wind turbines would significantly alter the visual landscape and may detract from the area's scenic and ecological value. The construction and operation of turbines also raise concerns regarding noise pollution, shadow flicker, and long-term impacts on residents' wellbeing and quality of life. In addition, the region supports important wildlife habitats, including bird and bat species that may be adversely affected by turbine operation. I am concerned that the full environmental impact on local ecosystems has not been adequately addressed or mitigated. The Scott River community values its quiet rural setting and agricultural productivity. Industrial-scale infrastructure is inconsistent with the existing land use and may negatively affect property values, tourism, and farming activities. For these reasons, I respectfully request that this proposal be reconsidered and that alternative locations more suited to large-scale wind energy development be explored. I also ask that meaningful consultation with local residents and landholders continue before any decisions are made. Thank you for considering my submission.
135	Support	I think this is a great idea and much needed as we transition from a fossil fuel based energy economy.
136	Object	This area is a known hot spot for birds. Nesting grounds for black swans along Governor Broome Rd. All matter of wildlife use this area to acsses the old beelup mine dams which have been rejuvenated with over 3 million plants. I strongly object to this proposal, protecting this area for future generations must be done.
137	Object	The detail provided for this proposal is a joke, and can not be consider serious . Where is the business plan?? Where is the cost of production?? How can a project of this scale be consider viable when there's no mention of the price they hope to get for the end product. Why are the host property contracts so clouded in secrecy. Commercial confidentiality is a ruse, if something is good ,fair and honest it doesn't need hiding. The transmission line this project says they will connect into is forty year old infrastructure .How many millions of dollars will need to be spent upgrading this? Again, no mention. As a local, the only people I know that support the project, are either getting paid hundreds of thousands of dollars to host the project or don't live locally .Doesn't that tell you something ?? The project area is zoned Agriculture.People have bought into the area, because of this ,and the characteristics that comes with it, not a industrial park. The Properties in the area are too small and there are too many people living and working to close. Its not like this area is like the wheat belt where the properties are 10 times the size and there are far fewer people around. The shire seems to pride itself on its environmental credentials , and always goes on about, how we live in an environmental hotspot. How can the shire even entertain the proposals effects on the environment when the surveys mentioned are so clearly flawed and

		obviously designed in a way to get the project over the line.Any local with only basic awareness of the local environment can pick huge holes in any of them !! Has the shire even sought local knowledge from people who have lived locally their whole lives, or is the shire only interested so called experts who blow in for a few hours and need the survey to tell the right story, so they can get their next contract. No cockatoo roosting trees !!! what a joke, what about the many mobs of 40 or 50 that feed on the pasture paddocks in the late spring all over the project site. What about the hundreds of blacks swans that fly in from the northeast at night into swan lake and also the inlet when the inland habitats dry out in the drier rainfall years. Wait , the survey wasn't done at night , so we didn't see any!!! what a joke, if it was not so serious, and not effecting so many people and destroying the local community , it would be hilarious. The soil pit test hole report is another joke. How many could they even complete or get to the required depth? And then they have the ordasity to expect us to believe that they can manage any challenges they encounter as far as acid sulphate soils and pressured aquifers .We will treat it with lime, they say.Unbelievable!!!These problems are the same problems that stopped BHP at Beenup, surely the shire has learnt that lesson or is the shire going to risk it all again, with this crowd who don't even have the competency to present a credible environmental survey. Thats not even mentioning the lack of engineering detail, very open ended.Wonder what would happen if I applied for a building permit from the shire with such a lack of detail? Its clearly obvious that the proponents of this project hold the shire and the locals in contempt, and the whole thing seems like a forgone conclusion .Now that the state government has canned the community benefit fund , $100000 yearly bribe or blood money, or whatever else one would like to spin it as, don't really see any benefit really, only a real life lesson how dangerous all this net zero zealotism really is.
138	Object	Objection to Planning Application P 225771 Proposed DAP/25/02933 Wind Farm I would like to object to the development application for a proposed large scale industrial wind farm in the Scott River and Blackwood River catchment region. The multi-lot development will have significant adverse impacts on the sensitive ecology, fragile environment and designated Scott River National Park, which is immediately adjacent to the development lots. The development is inappropriate as it's scale is too large, environmental and health impacts have been underestimated or not assessed, and this has already occurred once at the Beenup mine with disastrous results. The bushfire risk is also unacceptable in this location, and there is a lack of planning policy in place currently to fully assess an Application that has been quickly put together using draft documents and with no firm design, layout or specifications, which means that accurate assessments such as noise modelling and acid sulphate soils management planning cannot be performed. An alternate site should be found for such a large scale industrial project. Scale too big: The scale of the proposed wind farm with up to 20 wind turbines at a height of 250 m is excessive for such a sensitive area adjacent to a national park. At 250 m the wind turbines would be the largest land-based turbines in the country and of similar height to a

		skyscraper in the Perth CBD. At this scale the development lots are too small in Scott River to safely host a project of this size (WTGs should 3x the turbine height ie. 750 m from the lot boundary). The turbines will tower over the national park, which will not only reduce the visual amenity of the preserved area, but will also create an adverse impact by the noise and vibration, which is inherently produced by such turbines. What is the point of preserving areas as national parks if industrial scale machinery is placed on the boundary? The Visual Assessment Report attachment to the DAP Application completely ignores the visual impact of the wind farm on the Scott River national park, which is a major deficiency of the report. 80% of Australians are against development in and adjacent to national parks, and protection of nature, saving threatened species, and quiet enjoyment of nature are the top reasons considered to be important (National Parks Australia Council Feb 2022). Environmental impact severe: The ecological impact of this proposed development will be significant and is entirely inconsistent with the sensitive nature of the local ecology, which is protected federally under the EPBC act of 1999. 26 fauna species are listed as threatened, which must not be further impacted by such a development, and this area is internationally considered to be a biodiverse hot spot. Review of the appendices attached to the DAP Application, including the EPA Report clearly indicates there is a risk of acid sulphate soil (ASS) release and the EPA strongly recommends that a detailed Acid Sulphate Soils and Dewatering Management Plan (ASSDMP) be developed, and yet only a preliminary document has been presented for approval. ASS make the area unsuitable for large scale construction and development, including underground cabling, and this area remains at risk from the previous failed development attempted at the Beenup mine (BHP), which has been likened internationally to the Ok Tedi environmental disaster. The fact that the Beenup mine site is still undergoing ongoing rehabilitation and monitoring is evidence enough that this area is too sensitive for large scale industrial development. Full assessment of the environmental risks has apparently been devolved by the EPA to other Regulatory bodies and the stated “lack of need” for EPA assessment gives false security that there is no environmental risk in the proposed development. The EPA response also clearly only considers the land use of the lots directly involved in the proposed site, and does not consider the implications for the co-located Scott River National Park. Health effects: The noise and vibrations produced by large wind turbines result in acoustic vibration and noise of both audible and sub-audible magnitude. Both of these emissions pass well beyond the boundaries of the development lots and will affect neighbouring properties and preservation areas to their detriment. Health effects on both domesticated livestock and native animals is likely to occur based on previous documented research. Nocturnal animals that hunt and feed at night are particularly susceptible to vibrations that disturb their ability to do so. This has been particularly well documented in desert animals in southwest USA, but no local data has been provided or sought on the effects on local fauna. To allow this to occur in a national park area would be negligent of an informed assessment body (DAP). The Noise Impact Assessment (Attachment 4 / Appendix S) specifically excludes noise testing procedures that have considered all frequencies (particularly low frequencies) in the assessment and only modelling has been performed rather than any real-world testing. The modelling input data was also provided by the Applicant who has a conflict of interest (SynergyRED - 1/3 octave source spectra) and this means this is not an independent noise assessment. The Applicant also claims that the “noisiest” WTG data was used, but provides no evidence to support this, and the WTG units to be installed remain completely unknown at this stage. The Assessment has also ignored “tonality” without any justification for this, which would reduce the noise limit by another 5dB. Without this omission, most of the modelled levels at the noise-sensitive receptors would in fact be over limit above wind speeds of 8 m/s. The Assessment also states that the smallest safety margin with their own chosen criteria is less than 1 dB! This unacceptable safety margin is at receptor R32 that sits

		directly on the border of the wind farm and the Scott River National Park. Therefore further environmental and noise impact assessments should be required in such a sensitive area, as the juxtaposition of a national park means this development cannot be assessed merely on the proposed rural land use in isolation. Fire risk: The Scott River, East Augusta and Molloy Island communities constantly live in fear of bushfires with limited escape routes. The single escape route out of East Augusta in fact is directly adjacent to this proposed development. Unsupervised and isolated electricity generating wind turbines feeding into an electrical sub-station are a huge fire risk and a bushfire disaster waiting to happen that is not acceptable under the existing geographic escape constraints. Western Power equipment-related fires have historically been one of the main causes of bushfires in the southwest, and this alone makes this site entirely unsuitable for such a development by Synergy. Also the ability for FESA and local volunteer fire brigades to fight these fires would be severely constrained, with issues of ground access due to geographic and road constraints, sensitive local bushland and irreversible spread of diseases such as dieback, and this puts communities and the Scott River National Park at further risk. No-flight zones above wind turbines facilities also exist and would further restrict FESA efforts to control a bush fire, either started by the facility or otherwise. Land use destruction: The proposed DA contains land access agreements with Synergy, which affect both the host lots and surrounding neighbours. These agreements currently state 33 years + 33 years duration, which makes future land use uncertain, and removes access to vital productive farm land. Food production, which relies on limited productive farm land, remains one of the most important items for our society, which cannot be produced on mountain ridges, uninhabited remote locations or at open-sea installations where wind farms are more suitable. Contamination from wind blade erosion is also significant, producing BPA micro-plastics, which are spread across adjacent land including the Scott River national park. This is entirely unacceptable given the risk these micro-particles will enter the food chain, as well as have local impact on humans, farm animals and native wild-life. Ultimate land ownership also remains unclear from the proposal, as host lots may be sold immediately after approval, with no safeguards for the community on future de-commissioning, decontamination or degradation. Lack of Planning Policy Framework: There is currently a lack of Shire or State planning instruments in place to guide large scale renewable energy development assessments. These instruments are however due to be in effect in 2026, and so assessment of this current policy needs to be made in line with the expected guidelines and policies, and in fact requirements should be more conservative where there are currently significant community concerns. The Department of Planning, Lands and Heritage have produced a Position Statement: Renewable Energy Facilities (March 2020) for the WAPC and this contains some objective guidance including requirement for 1.5 km separation between noise-sensitive land use (such as quiet enjoyment of the Scott River National Park) and wind turbines, and a minimum setback of 3x the turbine height (=750 m) from the lot boundary (with which many of the planned turbine sites do not comply). The DAP Application also indicates that the exact size and specifications of the wind turbine generators are currently unknown and that their location and number, as well as the placement of other infrastructure is also currently uncertain. It is difficult to see therefore how any objective assessment of these “unknowns” is possible. The Applications states the “maximum case scenario” (= worst case scenario) has been presented, but in the setting of so many “unknowns’ it is not possible to assess whether this is in fact the case! The lack of clear detail and certainty of design is also evidenced by the fact that many of the Attachments to the DAP Application (eg. Attachment 4/Appendix B) are still only in Draft format. This suggests that this Application has been “rushed” to the DAP to be assessed prior to proper and likely more onerous planning instruments and policies being put in place. This is entirely unacceptable and the Shire should insist that the DAP consider their Planning Policy, even if only in draft.

		Government subsidy causing conflict: This proposal also relies on significant government provided subsidies (as do all "sustainable energy" projects), as well as being "gifted" a parcel of Crown reserve, and the government and approving bodies are therefore particularly responsible for ensuring that public funds are not directed to private projects that have a direct detrimental impact on local communities and legally protected and endangered environmental assets. These projects should be required to provide direct benefit to the local community in the form of shared remuneration for the Shire or cheap electricity to the locality. Approving a subsidized industrial project adjacent to a national park (Scott River) that has already narrowly missed destruction (by the Beenup mine disaster) is also against the common good, and also against the entire rationale for having government designated national parks. An alternate site that uses non-productive wind swept land of which WA has much, and which does not consume productive farm land of which WA has little, should therefore be found for such a large scale industrial project. The concept of a government funded industrial power plant being approved on the boundary of a national park is ridiculous!
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140	Object	Objection to Planning Application P 225771 Proposed DAP/25/02933 Wind Farm

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		Approving a subsidized industrial project adjacent to a national park (Scott River) that has already narrowly missed destruction (by the Beenup mine disaster) is also against the common good, and also against the entire rationale for having government designated national parks. An alternate site that uses non-productive wind swept land of which WA has much, and which does not consume productive farm land of which WA has little, should therefore be found for such a large scale industrial project. The concept of a government funded industrial power plant being approved on the boundary of a national park is ridiculous!
145	Object	The WA Government has disregarded its own policy safeguards to push this proposal forward. The EPA has failed to confront the severe risks posed by ASS disturbance. Heavy industry in this location is fundamentally incompatible with the landscape and community values. Previous ASS disturbance at this exact site resulted in decades-long contamination and containment management costing BHP hundreds of millions in project failure and remediation. This proposal lacks scientific integrity and represents an unacceptable environmental, financial, and policy failure. It must be cancelled or relocated out of the region immediately Avoidance of ASS disturbance is the only scientifically defensible position.
146	Object	Submission to Shire On renewable policy LPP23 . I have been a resident and business owner for 45yrs. I feel very compassionate about our previously untouched coastal surrounds, and are very concerned that this region is moving faster than we have infrastructure and staffing to manage these projects. I do feel the Shire employees have Augusta in their best thoughts but are tied by government promises and controls on renewables. Whilst I feel strongly for renewables hence(I have just installed solar panels) I feel the area being the proposed Scott River wind farm is far to fragile environmentally to take a risk as you can not guarantee that the sulfate will not be a problem again, just doing their best to avoid is not good enough protection, the fact that this is a point of discussion in the synergy presentation pamphlet means Synergy knows its a possibility . The 26 yrs that it has taken to bring the ponds /area back to watch an asses from the Beenup mine site disaster should be ring sirens on this project. It is great that they have had rehabilitation success, but it should never have happened in the first place. The loss of wildlife and fauna: the area is bordering nation parks water ways wet lands the rivers and oceans, all linked by one of a few rare ecosystems in the world. Hence I can not understand any environment group thinking its a good idea small in-packed or large . The EPA studies not going ahead is just unbelievable, as this should be a high level biodiversity concern. That alone should be enough concern "not" to go ahead, with out taking in consideration the environment visual pollution to an area that has always been sold as the wild natural beauty it is by all eg (Government /Local Shire / Tourism/ business) The ability to protect Augusta Town and surrounding locations from fire as a result of turbines. The financial affect on community is unknown. The infra sound is unknown due to the curvature of the Bay. I lived along side two turbines in the North West with in couple of Klm which required me to use ear plugs to sleep, not everyone was effected but a low hum did exist for some. Most wind farms are generally built along side a town not directly in front, I live on a property so will not see them from my home, i think but visually it will affect the community as a whole. I would also like to express my disappointment that this project started by group basically unknown to the community on behalf of shire and acting on behalf of the community was never transparent considering the time it has been worked on. I believe this is one of the option that was considered by the group and due to the Beenup battery in place is was the best option. Not sure who for. Please think out side the square and find a spot that is not a risk and is not so special. Thank you for your time Susan Roberts Augusta Resident and Business Owner.
147	Object	I write to formally object to the proposed wind farm development at Scott River.

		I am a farmer within the Shire of Augusta Margaret River, with agricultural land located within approximately 10 kilometres of the proposed turbine area. While my property is not immediately adjacent to the turbine sites, I am concerned about the broader impacts of large-scale wind turbines on livestock welfare, agricultural operations, and the surrounding natural environment. Of particular concern is the potential effect of infrasound and low-frequency noise generated by large turbines. While these emissions may not always be audible, there is growing international discussion regarding their potential to influence animal behaviour and stress responses. Livestock confined to paddocks cannot relocate away from ongoing exposure to noise, vibration, shadow flicker or infrasound, and the Development Application does not provide sufficient assurance that animal welfare, behaviour or productivity will not be adversely affected. The proposal also raises concerns for native flora and fauna in the Scott River area. This region supports a range of sensitive ecosystems and species. There is reasonable concern that infrasound, vibration, habitat disruption and ongoing turbine operation may alter wildlife movement patterns and ecological processes. The application does not adequately demonstrate that these broader environmental effects have been fully assessed or that effective mitigation measures are in place. In addition, the industrialisation of agricultural landscapes through turbine infrastructure, access roads, cabling and construction activities risks fragmenting farmland and reducing long-term agricultural flexibility. These impacts have not been adequately weighed against any demonstrated benefit to local agriculture. Given the scale of the proposal, the lack of finalised design detail, and the unresolved concerns regarding livestock, wildlife and agricultural land use, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm
148	Object	They are not clean energy, the take too much of our coal we send to Chine to make them with weiger labour- Nuclear would be more efficient and cleaner
149	Object	I write to formally object to the proposed wind farm development at Scott River. Although I do not reside in the area on a full-time basis, I have a strong connection to the region and am concerned about the long-term impacts this proposal would have on agricultural land, animal welfare and environmental values. The proposed development would permanently industrialise productive agricultural land. Large turbine foundations, access roads, trenching and associated infrastructure will fragment farmland, reduce flexibility of land use and constrain agricultural operations for decades. This represents a long-term loss of productive rural land that has not been adequately justified. I am also concerned about the impacts of infrasound and low-frequency noise generated by large-scale wind turbines on wildlife and farm animals. International experience and emerging research suggest that such emissions can influence animal behaviour and movement. Wildlife may be displaced from habitat, while farm animals confined to paddocks near turbines cannot relocate away from ongoing noise, vibration or shadow flicker exposure. The Development Application does not adequately address these risks or provide confidence that animal welfare will be protected. The application seeks approval of a proposal that is not fully defined. Key details regarding turbine locations, specifications, construction

		methods and operational controls have not been finalised, making it difficult to properly assess long-term impacts on agriculture and the environment. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the proposed Scott River Wind Farm, or at a minimum require a substantially revised proposal supported by clear evidence that agricultural productivity, animal welfare and environmental values will not be compromised.
150	Support	I'd like to commend the Shire for the work done to date on renewable energy planning. The Issues and Options approach shows a genuine effort to balance community confidence, environmental outcomes, and the need for energy transition. In particular, large proposals such as the Synergy project demonstrate what can be achieved when proponents go above and beyond on technical assessment, community engagement, and long-term planning. These types of projects, when well considered, should not be discouraged, and there is a real opportunity for the Shire to build on this experience. I would encourage a clear distinction in policy between small, mid-scale, and large-scale wind energy systems, as their impacts, benefits, and use-cases are very different. Appropriately scaled, on-site systems can play an important role in reducing diesel and grid reliance for farms, businesses, and community facilities. Where community benefit is involved, prioritising locally focused outcomes — such as support for sporting clubs, community facilities, and electrification initiatives — can help ensure renewable energy delivers tangible benefits at a local level. Overall, the direction taken so far is positive. I would encourage the Shire to keep the framework as clear, flexible, and performance-based as possible, allowing for case-by-case assessment within sensible guiding principles, rather than relying on overly rigid rules that may unintentionally limit good projects.
151	Object	Please accept this form as my submission regarding the Scott River Wind Farm proposal. A detailed written submission has been provided separately.
152	Object	24 year resident of East Augusta. I can not even fathom that a proposal like this is considered for an area known for such natural biodiversity not to mention the natural beauty that will be ruined for local people and Augusta residents. There has been a ban on 2 story residences in East Augusta for as long as I know because it spoils the natural and beautiful view from Augusta town site and yet this proposal to turn the view into an industrial skyline is ok? We only get one chance to ruin or not ruin these natural green places, please do not make the wrong decision.
153	Object	I am writing to lodge an objection to the Scott River Wind Farm Development Application currently before the Shire of Augusta Margaret River. I do not believe the Development Application provides sufficient detail to allow for a proper assessment of a project of this scale and consequence. While the application is lengthy, it lacks the certainty, specificity and final design information required for informed decision-making. At present, the proponent has not confirmed the final number of turbines, their final locations, the final turbine height, the final turbine model, or a detailed construction and operations methodology. Turbine locations may be moved at the developer's discretion. These

		matters are fundamental to assessing impacts such as noise, infrasound, shadow flicker, visual dominance, bushfire risk, groundwater impacts and overall amenity. Telling the community that these details will be “worked out later” is not acceptable for a development that would permanently alter the Scott River area for decades. I am particularly concerned about noise impacts. The noise assessment relies on desktop modelling and assumptions rather than real-time, in-field measurements under local conditions. The modelling is also framed around WA noise rules that focus on audible dBA limits developed for much smaller, older turbines, not modern 250-metre turbines of the scale proposed for Scott River. The application does not adequately address low-frequency noise or infrasound, despite growing international evidence that pulsating infrasound from large turbines may present unaddressed health risks for some people. There are no clear commitments to independent, continuous real-time noise monitoring at nearby residences, nor enforceable shutdown provisions if limits are exceeded. The proximity of turbines to homes and property boundaries is also unacceptable. Neighboring land should not be treated as a buffer for industrial development. The setbacks proposed do not reflect the scale of modern turbines or reasonable expectations for rural amenity. Approving turbines so close to boundaries shifts noise, shadow flicker and visual impacts onto neighboring landowners and effectively sterilizes surrounding land use for the rest of this century. The visual impact of the proposal is significant. Turbines and blades exceeding the height of Perth’s tallest buildings will dominate the rural landscape and skyline for kilometers. Scott River is valued for its natural landscape, agricultural character, and quiet rural amenity. Industrializing this landscape would result in a permanent loss of character and would undermine tourism and the long-term enjoyment and value of surrounding properties. The site’s floodplain location raises serious environmental concerns. The area contains acid sulfate soils and a shallow superficial aquifer that is linked to the river system. Deep foundations, trenching and dewatering pose high-consequence risks to soil stability, water quality, farming operations, dams and bores. The Development Application does not provide a credible, site-specific hydrogeological assessment or a robust acid sulfate soil and dewatering management plan. Reliance on emergency lime treatment is not a sustainable or responsible mitigation strategy, particularly given competing demands on lime for agricultural use. Bushfire risk and emergency response have also not been adequately addressed. Wind turbines create no-fly zones that may restrict aerial firefighting, and internal access roads do not equate safe evacuation routes in a rural fire scenario. The application does not demonstrate how fire ignition risk, emergency response or rare flora protection would be managed in extreme fire conditions. Construction impacts are similarly underdeveloped. The application lacks detail on access routes, heavy vehicle movements, timing and duration of works, dust and noise management, and protections for local residents, road users and businesses. These impacts are not short-term inconveniences but could extend over months or years. Finally, I am concerned about the adequacy of community consultation. Many affected landholders report no direct engagement. The Development Application does not clearly summarize community feedback or demonstrate how concerns have been meaningfully addressed. Given the scale and permanence of this proposal, the consultation undertaken to date is inadequate. For these reasons, I request that the Shire of Augusta Margaret River refuse or, at a minimum, defer the Development Application until a final turbine layout, confirmed turbine specifications, verified noise framework, and robust environmental, bushfire and construction management plans are provided and independently reviewed. This proposal is not suitable for the Scott River floodplain, and the risks to community amenity, farming, water security, environment and landscape character are unacceptable. Note: Has the Council taken into account that the Wind Turbines and Solar Panels are made in China by forced slave labour by the Chinese Communist party, and both panels and wind turbines are not recyclable, so where will the spent turbines be buried? (Margaret River).

154	Object	Objection to Proposed Wind Turbine Development at Scott River, Western AustraliaTo Whom It May Concern,I am writing to formally object to the proposed wind turbine development in the Scott River area of Western Australia.While I acknowledge the importance of renewable energy and the role it plays in addressing climate change, I have serious concerns about the suitability of this project in the Scott River region and the potential negative impacts it may have on the local environment, community, and landscape.The Scott River area is recognised for its unique natural environment, biodiversity, and rural character. Large-scale wind turbines would significantly alter the visual landscape and may detract from the area scenic and ecological value. The construction and operation of turbines also raise concerns regarding noise pollution, shadow flicker, and long-term impacts on residents' wellbeing and quality of life.In addition, the region supports important wildlife habitats, including bird and bat species that may be adversely affected by turbine operation. I am concerned that the full environmental impact on local ecosystems has not been adequately addressed or mitigated.The Scott River community values its quiet rural setting and agricultural productivity. Industrial-scale infrastructure is inconsistent with the existing land use and may negatively affect property values, tourism, and farming activities.For these reasons, I respectfully request that this proposal be reconsidered and that alternative locations more suited to large-scale wind energy development be explored. I also ask that meaningful consultation with local residents and landholders continue before any decisions are made.Thank you for considering my submission.Yours sincerely,
155	Object	The WA Government has disregarded its own policy safeguards to push this proposal forward. The EPA has failed to confront the severe risks posed by ASS disturbance. Heavy industry in this location is fundamentally incompatible with the landscape and community values. Previous ASS disturbance at this exact site resulted in decades long contamination and containment management costing BHP hundreds of millions in project failure and remediation. This proposal lacks scientific integrity and represents an unacceptable environmental, financial, and policy failure. It must be cancelled or relocated out of the region immediately Avoidance of ASS disturbance is the only scientifically defensible position.
156	Object	I am writing to object to the proposed wind farm next to my farm. I have lived and worked on this land my entire life, and it is both my home and livelihood. This area is valued for its quiet rural character, open landscapes, and abundant wildlife. People come here to escape the city, enjoy nature, and experience the peace that defines this region. Large-scale wind turbines would fundamentally alter this character through noise, visual intrusion, shadow flicker, and increased traffic. And just an absolute annoyance the fact that we won't be paying any less for power. The development would also impact livestock and wildlife, and permanently change the landscape. Once established, these effects cannot be reversed, and they place a significant burden on long-term residents like myself. For these reasons, I respectfully request that the Shire consider the protection of rural amenity, environmental values, and the lived experience of local landholders when deciding on this proposal.

157	Object	I am writing to lodge my objection to the proposed Scott River Wind Farm. I have been a resident of East Augusta since 2007. Like most people I was drawn to the pristine environment of the Augusta area. An unspoilt landscape that is a feature and attraction of the Augusta region, with a community that is proud of the ecological integrity the pristine landscape offers. An undisturbed environment that is visible from both land and sea. I am regularly south of the lighthouse looking back at the land and marvel at the beauty nature has to offer. The marine life that migrates past the cape, the spectacular coast line and natural backdrop that has remained largely intact for centuries. Why would we spoil this environment with monstrous wind turbines? There is nothing attractive about a 250m high structure, built near a wilderness, that can be seen for 70km. Visible from numerous points from Augusta and surrounding area, including Flinders Bay and the Southern Ocean. The AMR Strategic Community Plan to achieve the vision of "One Community, standing together with nature", provides the guiding framework to protect our natural environment. The whole community should aspire to uphold the focus areas detailed in the Strategic Community Plan, while the shire's has the authority to enforce the three focus areas this plan, in particular the first of these "Caring for our environment". An extract of this section of the plan is "...it's more than where we live, it's who we are. We strongly believe that nature underpins our lives, and when nature thrives, we thrive. There is continuing demand to not only preserve our precious bushland, waterways and coastal areas, but to restore and revegetate where possible, paying special attention to wildlife corridors and management of non-native and invasive species. This also extends to our marine environment, with a call to better protect ocean health and marine biodiversity as part of our broader commitment to environmental stewardship." This is exactly what needs to happen now. Preserve this pristine environment. The road into East Augusta is the Scott River Road. A road that is traveled daily by some residents and very frequently by others. What a ghastly, abhorrent sight this would make - seeing them for almost the entire journey out of East Augusta and for part of the journey in. Why should residents be subjected to this. As stated in the Strategic Plan - "New development is concentrated within clearly defined areas to avoid impacts on remaining farmland and ecosystems." I have been made aware of studies done on infrasound - low frequency sound waves (1 to 20Hz). While the intrasound is below the frequency audible by humans, it is claimed to have potential negative effects on humans such as nausea and headache. It was interesting to note that one project in Norway, reported the indigenous reindeer have vacated the area for a 10km radius. Were you aware of this? The video was made by a Professor Ken Mattsson primarily to make people aware of infrasound and the effects this is having on the environment. No doubt this has been assessed as part of the Synergy submission?? I would like to know the results. IF THERE IS ANY DOUBT ABOUT POTENTIAL NEGATIVE EFFECTS, then a full and comprehensive study will need to be performed over months even years - not for a 10 minute period that I have been lead to believe is the time period companies use to ascertain impact of potential negative effects. Synergy has stated audible sound will be heard in East Augusta at a level of a ticking clock. Who wants that? Certainly not me. East

		Augusta is a place I reside, where one of the reasons is to strengthen my mental health. Augusta is a special place that needs to be protected from big business, who put profits before the environment. I have been told this Synergy project is 80% backed by Italian and Japanese Oil and Gas giants Eni and INPEX. The site for the proposed wind farm is no doubt selected to use the existing infrastructure put in place to support the failed Beenup mine project. So obviously selected as it's a lower cost option to alternate locations. This mentality is at odds with the Strategic Plan. It's the wrong philosophy - put the environment and community interests ahead of profit. Put people first and if the wind farm is a preferred renewable option then put it out of site, away from people and environmentally sensitive areas. There are a number of other reasons to support my objections: - Parts of the Application that I have read, while lengthy lacks specific details. - The EPA will not be assessing the proposal??? In an environmentally sensitive area? This is unheard of. - Potential noise impact from the proposed turbines which are claimed to be the tallest built in Australia. Surely the noise and infrasound generated from these would be different from smaller turbines?? - Bushfire risks and the only real way out of East Augusta is the Scott River Road.
158	Object	I oppose the Scott River wind farm because 250m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn't real and the project has no enforceable protections for people living nearby. It threatens food and water security, bushfire safety, rural amenity and the environment.
159	Object	I relocated to Augusta just over three years ago due to its quiet rural character, favourable climate, high environmental values, and nationally significant scenic landscapes. These attributes are fundamental to my amenity, wellbeing, and lifestyle. I support the transition to renewable energy and acknowledge its importance in state and national policy. However, support for renewable energy must not come at the expense of unacceptable environmental, social, agricultural, and amenity impacts—particularly in highly sensitive rural and environmental landscapes such as the Scott River floodplain. SUBMISSION TO THE DEVELOPMENT ASSESSMENT PANEL (DAP) Relevant Authority: Development Assessment Panel (DAP) Related Agencies: Shire of Augusta Margaret River; Western Australian Planning Commission (WAPC); Environmental Protection Authority (EPA); Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) _____ 1. PURPOSE OF SUBMISSION This submission is made in response to the proposed Scott River Wind Farm Development Application, anticipated to be lodged imminently. It is prepared for consideration by the Development Assessment Panel (DAP) and is intended to inform both State and Commonwealth decision-makers. The submission assesses the proposal against relevant Western Australian planning policy, Environmental Protection Authority (EPA) objectives, and potential referral triggers under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). It also highlights matters warranting Ministerial and Parliamentary scrutiny. _____ 2. PLANNING CONTEXT AND POLICY FRAMEWORK 2.1 Western Australian Planning Policy

		The proposal must be assessed against, but not limited to: • State Planning Policy 2.5 – Rural Planning • State Planning Policy 2.7 – Public Drinking Water Source Policy • State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning • State Planning Policy 3.7 – Planning in Bushfire Prone Areas • State Planning Policy 3.4 – Natural Hazards and Disasters • Draft State Planning Policy – Renewable Energy • Local Planning Strategy and Local Planning Scheme provisions of the Shire of Augusta Margaret River These policies collectively prioritise protection of: • Prime agricultural land; • Environmental and landscape values; • Water resources and floodplain systems; • Community amenity and public safety; and • Rural character and tourism-dependent economies. The Scott River floodplain conflicts fundamentally with these objectives. _____ 3. SITE UNSUITABILITY AND ENVIRONMENTAL CONSTRAINTS 3.1 Floodplain and Acid Sulphate Soils The Scott River floodplain is characterised by acid sulphate soils, high groundwater tables and hydrological connectivity to the Scott River, Hardy Inlet and the Blackwood River system. Large-scale excavation, turbine footings, access roads, and dewatering present a high risk of: • Acid sulphate soil oxidation; • Saline groundwater up-coning; • Contamination of waterways, wetlands and farmland; and • Permanent hydrological disruption. These risks directly conflict with EPA objectives for inland waters, land, and environmental quality, and are inconsistent with the precautionary principle embedded in WA environmental assessment. Once triggered, these impacts are irreversible. _____ 4. EPA OBJECTIVES AND ENVIRONMENTAL IMPACTS The proposal is inconsistent with the EPA's key environmental factors, including: 4.1 Inland Waters • Risk of contamination through soil disturbance and altered drainage; • High connectivity between groundwater and surface water systems; • Potential long-term degradation of water quality. 4.2 Terrestrial Fauna and Flora • Habitat fragmentation and displacement from noise, infrasound and visual disturbance; • Direct mortality risk from blade strike; • Loss of breeding and foraging habitat.

		4.3 Threatened Ecological Communities The Scott River Ironstone Association is a Threatened Ecological Community listed under State and Commonwealth frameworks. Any excavation, drainage or infrastructure development places this TEC at risk of collapse, contrary to EPA objectives to avoid and minimise impacts on significant biodiversity. _____ 5. EPBC ACT – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE The proposal should trigger referral under the EPBC Act due to potential significant impacts on: • Critically Endangered Species: o White-bellied Frog (Geocrinia alba) o Western Ringtail Possum (Pseudocheirus occidentalis) • Endangered Species: o Carnaby's Black Cockatoo (Calyptorhynchus latirostris) o Baudin's Black Cockatoo (Calyptorhynchus baudinii) • Threatened Ecological Communities: o Scott River Ironstone Association • Hydrological systems connected to Ramsar-listed and nationally significant wetlands Given the scale of disturbance and cumulative risk, referral to the Commonwealth Minister is not optional but necessary. _____ 6. AGRICULTURAL LAND AND FOOD SECURITY The Scott River district forms part of Western Australia's prime agricultural land, supporting beef, dairy and grain production for domestic and export markets. Industrial wind turbines introduce unacceptable risks to: • Food safety and contamination; • Export market integrity; • Long-term agricultural productivity. Blade erosion and particulate shedding from imported turbine materials present contamination pathways into soils, pasture, livestock and crops. These risks have not been independently assessed and are incompatible with State policy protecting agricultural land. _____ 7. AMENITY, NOISE AND SETBACKS Current setback standards are outdated and were developed for turbines significantly smaller than the proposed 250-metre structures. Minimum requirements must include: • A minimum setback of 3 kilometres from dwellings; • A minimum of five times turbine tip height from property boundaries; • Full containment of noise, low-frequency noise, infrasound, vibration and shadow flicker within the project boundary. Neighbouring land must not be relied upon as an industrial buffer. _____ 8. BUSHFIRE RISK AND EMERGENCY MANAGEMENT The Scott River catchment is one of the most bushfire-prone areas in the South West. Fire response is severely constrained by environmental access limitations designed to protect sensitive habitats.

		Turbines introduce ignition sources into a landscape where evacuation, suppression and asset protection are compromised. This conflicts with SPP 3.7 – Planning in Bushfire Prone Areas and places unacceptable risk on residents, landholders and emergency services. _____ 9. TOURISM, LANDSCAPE AND COMMUNITY WELLBEING The Augusta–Margaret River region is internationally recognised for its scenic landscapes, tranquillity and nature-based tourism. A 250-metre-high industrial skyline would: • Permanently degrade visual amenity; • Undermine tourism viability; • Cause psychological and health impacts associated with noise and shadow flicker; • Devalue residential and rural properties. These impacts are incompatible with State and local planning objectives. _____ 10. CUMULATIVE IMPACT AND PRECEDENT Approval of this proposal would establish a precedent for further industrial-scale renewable energy development across the Scott River floodplain, Hardy Inlet and surrounding ridgelines. Cumulative impacts would result in irreversible transformation of the region, contrary to orderly and proper planning principles. _____ 11. CONCLUSION AND REQUEST The proposed Scott River Wind Farm is fundamentally inconsistent with Western Australian planning policy, EPA environmental objectives, and Commonwealth biodiversity protections. The site is unsuitable. The risks are irreversible. The impacts extend beyond the project boundary and beyond the present generation. Accordingly, it is respectfully submitted that: • The proposal should not be supported by the DAP; • The site should be excluded from industrial-scale renewable energy development; • Any proposal must be referred once more to the EPA... and the Commonwealth Minister under the EPBC Act; • The Shire's Renewable Energy Policy be strengthened to reflect these constraints. This matter warrants Ministerial and Parliamentary oversight to safeguard Western Australia's biodiversity, food security, community safety, and international reputation.
160	Object	I object to this proposal. The scale and nature of the project is inappropriate and there is not enough detail in the DA (which describes a conceptual project) to fully understand the impacts on issues such as acid sulphide soils and groundwater effects. This project is in an environmentally sensitive area. Where are details on exact location and specifications of the turbines and associated infrastructure, site specific acid sulphate soil investigation, detailed hydrological assessment, etc. The worst aspect of this proposal is the visual impact. These towers will be seen from Augusta town and beaches such as Flinders. These therefore fundamentally alter the character of the area, in a way which most residents and visitors would say is detrimental. thanks
161	Object	My Family and I have lived in East Augusta now since 2001, and enjoyed the peace and serenity and healthy living, with no noise pollution apart from the cicadas and whale song. We take great pleasure in the fact that although it is a n effort living here sometimes, we

		benefit greatly mentally from this, no traffic, or pollution associated with this and a complete escape from the rat race that we lived in so long so we could move here and live like this. We are opposed to the wind farm for these reasons: Noise Pollution - when I asked at a local info session given by synergy, a member from their team likened it to an air conditioning unit or leaves in the trees being blown by the wind. Two very different types of noise as you can imagine, wind in the trees yes please any time, but the constant whirr of an air conditioning unit is what we have escaped from. CONSTANT. No turning it off. tic tic tic tic. No thanks. Studies have shown that infrasound is real and that people suffer from nausea and other symptoms. I would like to see a much bigger study on the effects of the noise pollution in the vicinity. I believe the study or information given re the sound is for a much smaller scale turbine. These are said to be 250 meters tall. Surely the sound will travel further. What happens to the poor farmers/landholders who oppose the turbines and end up with one next door to them? Is there a boundary limit? or setback? What will the minimum be? A turbines height? I am not opposed to renewable energy; it is the way forward. I am opposed to massive 250 m turbines on prime biodiversity land when there is a huge country with empty spaces out there. The argument that there is already a power hub there on Scott River is weak as when questioned about it at the talk the member said that there would have to be a huge upgrade of the lines. So just build elsewhere, where there are no people affected by this. Augusta is a tourism destination, and the visual impact of these manmade turbines will literally be colossal. We are one of the last places with uninterrupted views for as far as the eye can see, why on earth would we change this / It adds to our uniqueness and is a major drawcard for tourism. The rules and regulations that common landholders have to jump through to build a shed or house is lengthy and arduous and incredibly strict on tree removal and height regulations and not to mention bushfire requirements, and yet here we have a proposal for 30 wind turbines. 30 skyscrapers. Welcome to the new gold coast. I believe the Beenup Mine was shut down due to the acid sulphate leaching into the local waterways, it took 10 years and who knows how many millions to mitigate that error, why is this even being considered on the same site ? It has already been shown that it is an environmental disaster waiting to happen AGAIN. I hope the shire has a plan for when this happens again or is asking for the right investigations before it starts. My husband and I are members of the EAVBFB, our brigade like most in the shire ids volunteer based. These volunteers are far and few to mention and not young. We have one truck. We depend on aerial support, what is the no-fly zone around these turbines? What about the RFDS getting to emergencies on farms in the Scott River? We need to know what the fire mitigation process will be. Renewable energy is evolving and happening and is not going to go away, if we are going to welcome it and have everyone on side, (impossible) we need policies and protection for the environment and the affected landholders that match and evolve with the times. If this is swept under the carpet and shuffled in a pile of papers because the policy is old and it goes ahead with restrictions that are not geared for such a huge project, we will NEVER get the land back to what it was.

162	Object	I do not have a problem with wind turbines or solar farms being built in our region. I do have a problem however with this proposed wind farm at Scott river.I think the Augusta Margaret River Shire should have been far more active in testing its residents reaction to this proposal,particularly those who live in the area that are going to be most affected. In this case the shire should not necessarily listen to the majority of ratepayers in the shire but to those close to the wind farm who will be affected both financially and in terms of health and lifestyle. This project would be a lot less controversial if it was moved east twenty or thirty kilometres.I know there is an argument about using existing infrastructure of roads and an old existing power transmission line and it is also much easier for our labour governments to make sure that renewable projects are constructed on what they love to call degraded farmland. I am sure our well respected farmers at Scott River object to this term being used.It is of concern that good farmland is being taken out of production at a time when there is an increasing worldwide demand for food. Australia wide this pattern of using “degraded farmland”for renewables is meeting with a lot of resistance.It would seem that it is not acceptable to Labour-Greens governments to locate renewable projects on environmentally sensitive areas of public land. On that matter the fact that the EPA are suddenly not required to have input into this decision as it is going onto “degraded farmland” seems very convenient. There are concerns of public health and safety, the fact that Synergy sneek around signing long term contracts(66 years)with people who won’t be alive at the end of the term,Synergy are only approximately 20% of the controlling corporate structure with the other 80% being two multinational oil and gas companies. I think this project should not proceed and the project partners should look at negotiating with the Western Australian Government for a more suitable location perhaps closer to Windy Harbour.
163	Object	I am objecting to this wind farm as it is totally incompatible with its surrounds; Molloy Island is surrounded by water courses and uninterrupted natural vegetation. Maximum building height in our shire is 8m and here the proponent is proposing to build rotating structures of 250m tall. Higher than any structure in Perth and in plain view, towering over the natural vegetation. Totally out of proportion in this tourism hot spot. All the modelling seems to have been done on a desktop as there is no precedent for these turbines. All the existing turbines are much more to a domestic scale and are for local purpose (Albany, Hopetoun, Denmark and Bremer Bay). I wouldn't mind 2 or 3 sixty-meter-tall turbines for local energy supply as these would disappear in the landscape and affect only the land there're located on. This mega farm is not for local purposes but for electricity for Bunbury/Perth. As these Turbines have an unprecedented scale and are largely untested on their impact, I dispute the expected noise findings in the proponent's report. Molloy Island is surrounded by water and flat natural vegetation, both of which do very little to block or reduce noise. The fact that these turbines are so elevated above anything else will make them audible from a very long distance more like how the noise of a plane travels. Molloy Island is one of the quietest places I have ever lived or stayed with no traffic or other noises to speak of. I know the turbines will be audible. My last concern is the regarding the acid sulfate soils that the foundations for the turbines will have to be constructed in. Regarding the proposed method of dealing with excess water from the dewatering that will need to be done: I have during my working life worked for the water authority in the Netherlands and have experienced firsthand how difficult it is to even in seemingly easy condition to re-inject water into unlaying aquifers. Here the proponent has to deal with treating the acid water with lime and then returning this in an area full of coffee rock and very high-water tables. I think the proposed methods for foundations is wishful thinking and hoping for the best. I hope the engineers have had a very good look at the failed Beenup mine and the potential costs of an environmental catastrophe. I would also point out that if the proponent manages to put these foundations in, they will be exposed to the natural acidity and will be prone to

		concrete rot with an obvious end result. Apart from being a windy location and the fact there is a substation to hook the wind farm into, the Scott River site is totally unsuited and will ruin 285 family's life on Molloy Island, many more in Augusta, Scott River, East Augusta and Alexandra Bridge. The Shire should not approve this project for no local gain at the expense of the enjoyment of all above mentioned residents that have lived or bought here on the assumption it was not going to be turned into an industrial landscape.
164	Object	I write to lodge a formal submission on Synergy Renewable Energy Developments Pty Ltd's (SynergyRED) Development Application (DAP pathway) for the proposed Scott River Wind Farm. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, the lack of an assessment by the EPA and the significant long-term impacts the development would have on the environment, including groundwater and impact of acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a very early stage proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks and I am very concerned about the lack of a full environmental effects assessment. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, flora, fauna and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. Structures of this magnitude do not "blend in" to a natural rural landscape. They fundamentally industrialise it. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be

		designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. These are unusually large turbines and if built to the proposed height, will be the tallest wind turbines in Australia, surpassing the Wambo Wind Farm in Queensland. It is staggering that this could be proposed without a full EES and substantive community review and engagement. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. This development has been kept under wraps for several years and the consultation is now entirely inadequate for the township of Augusta, the local community and appears to be rushed through this critical part of every renewable energy development process. Why is the community consultation period for major infrastructure in such an environmentally sensitive area been so entirely inadequate and condensed into a traditionally busy period for all communities in the lead up to Christmas and summer holidays? Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. The proposal is silent on impacts to tourism and land values as well as any planning or response plans for potential flow of acidic water into the Scott River and ultimately into the Blackwood river mouth at Augusta. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the application. Please confirm receipt of this objection and ensure it is considered in the planning determination.
165	Object	Stop wasting money on so called renewable energy rubbish It is a lie!!! Go nuclear Go coal Go gas STOP
166	Support	I strongly support the proposed Scott River wind farm based on the following views. Overall, the proposed windfarm will: 1. Provide a net community benefit for people in the Scott River district and AMR Shire generally. 2. By contributing to the renewable energy transition and global action to mitigate climate change, provide a net benefit to local and global environments. One thing I don't agree with is the NIMBY view that, while transitioning to renewable energy is warranted, any projects should be in another district, region or country. I would be very disappointed if the AMR Shire were to follow a NIMBY path. Further details on my views on benefits to the community and the environment follow.

		Net community benefits. 1. For the landowners who wish to have one or more turbines on their property, this is a golden opportunity to diversify their income streams. For farmers, this is an opportunity for reliable annual income, i.e. drought proof income that is the same even in the poorest of years for agricultural crops. If the wind turbines are 'within regulation', I think 'it would unjust if neighbouring landowners or the wider community were allowed to deny a landowner the opportunity to diversify an agri-business with wind turbines'. 2. I understand that neighbouring landowners can feel aggrieved that their lifestyle will be negatively impacted by wind turbines, e.g. visual and noise impacts. However, I also understand that Synergy offers those landowners financial compensation through a 'neighbourhood agreement' and that such agreements will include few, if any, restrictions to farm operations and developments. 3. Primary production in the Scott River region includes agriculture, plantation forestry and horticulture ventures. The negative economic impacts of the proposed wind farm on those ventures will be minor, e.g. a relatively small loss of land for the turbines and access roads. However, primary production in the region is already suffering the effects of climate change, particularly the effects of a drying climate. Without action on climate change, the losses are only going to increase. Contrary to what we see from the anti-wind farm campaign, I think we need the wind farm to 'save our farmlands'. 4. Community benefits in the AMR Shire include the Community Benefit Fund of $100,000 per year, increased jobs around the wind farm and tourism opportunities. These are great opportunities in the Shire. My view is they provide more than adequate compensation to the people that don't want to see wind turbines. Personally, I expect to see the tops of some turbines from my home in Augusta if the project goes ahead, but I welcome that as I know how much good a wind farm will provide. Net environmental benefits 1. It was re-assuring to see the EPA's recent decision that the environmental effects of the wind farm are not so significant or unmitigated as to warrant formal assessment. 2. While there would be negative environmental impacts of a wind farm, these need to put in perspective compared to the environmental benefits, e.g. a. Loss of biodiversity: the claim that the wind farm should be stopped to save the biodiversity of the Scott River area seems extraordinary. If the biodiversity loss will be due to clearing of native forest, consider that less than one hectare of native forest will be cleared for the wind farm. Compare that to the tens of thousands of hectares of native forest that I understand have been cleared for farmlands in the Scott River region. I also note that it is fertiliser, other chemicals and sediments from farming operations that have substantially contributed to degradation and loss of biodiversity in the Scott River. b. Bird kills: While some birds may be killed by wind turbines, that can be compared to birds and other wildlife killed by cars and trucks. I understand that, in the Scott River area, more wildlife is likely to die from road kills than from wind turbines. However, there is little public concern expressed over road kills. I also note that Synergy has a comprehensive Bird and Bat Adaptive Management Plan to minimise risks to birds. In contrast to the loss of birds from wind turbines, the loss of plants and wildlife from climate change is huge. That includes species extinctions. Hence the importance of the proposed Scott River wind farm as part of global efforts to mitigate climate change. c. Acid Sulphate Soils - Naturally, given the problems with Acid Sulphate Soils (ASS) in the nearby Beenup mineral sands mine, concerns have been expressed that installing wind turbines will cause similar problems. However, the disturbance involved is quite different. E.g. the mine involved excavation to considerable depth (? 50 m) and the mine was never filled in. In comparison the reported plans for installing the wind turbines, will involve minimal disturbance, e.g. auger holes for inserting piles to anchor the foundation will be immediately filled to minimise exposure of any ASS to oxygen. In addition, I understand that the foundation plans for each turbine will require approval from the Department of Water and Environmental Regulation. I also note that, in the Scott River region there are pivot

		irrigation systems (including one in the wind farm area) and farm earth dams, apparently operating without ASS problems. d. Environmental benefits – while the proposed wind farm will not directly provide a substantial benefit to the environment of the Scott River area or the AMR Shire, global action on climate action will have a substantial benefit. It is vitally important that we make a responsible contribution to those global actions. 3. In summary, my view of the environmental impacts of the proposed Scott River wind farm, are that 'we need the wind farm to save the biodiversity and the environment in the Scott River area'. Thank you for the opportunity to comment on the proposed Scott River wind farm.
167	Object	I strongly oppose the proposed wind farm at Scott River. My concerns include the visual effect of the turbines in this pristine and picturesque setting that will be seen from iconic locations like flinders bay and colourpatch . Also I'm very concerned about the ongoing harmful effect to wildlife and marine life as not enough is yet known about the sound effects . The damages caused by installation and the short lifespan of the turbines along with the waste is also a concern .
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171	Object	I have concerns about this proposal for several reasons... 1. Acid Sulphate soil where the turbines are to be built could not be controlled by BHP previously, how can this project guarantee there will be no disaster. If this acid soil finds its way to the river and ocean the whole area will die. 2. Wildlife and farm animals in the area will be effected. Synergy says they will take injured wildlife to the local carers. I am a wildlife carer in Augusta, we are already under pressure and do not have capacity for more in jured animals. 3. Noise...the effects of turbine noise on humans and animals is insidious and is yet to be recognised as a condition. Many people living near turbines have adverse effects to their health. 4. It is unknown whether the turbines at a height of 200 - 250 Ms can withstand the wind speed in the area. 5. Asbestos contained in the turbines a hazard. 6. 20 plus of the tallest wind turbines in the southern hemisphere are going to be an eyesore. 7. Synergy is not being transparent or open with the local residents.
172	Support	I fully support a wind farm to enhance the State's renewable energy capabilities. I would like to think that an incentive for a wind farm near Augusta would be that those Communities that frequently experience power outages because they are at the end of the Grid "line" (ie Augusta) would ALWAYS receive first power thus reducing the number of times they have power outages.

173	Object	I write to formally object to the proposed wind farm development at Scott River. Below will be comments that have become common topics after research but I would like to add that I work as a contractor on some of the properties that are potential hosts. I have huge concerns about any large infrastructure being built on such wet lands\. We struggle at the best of times to complete tasks due to the water table. I also would like documented the large number of Black Swans that gather in these paddocks This is food growing land not wind turbine land! I object to the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site.

		Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the application.
174	Object	I write to formally object to the proposed wind farm development at Scott River. My objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, groundwater and acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region.

		The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine

		specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000 tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values. My family has lived here for many many years and are horrified that this was even suggested. Too many concerns that the shire need to look seriously at before making a big big mistake. For these reasons, I respectfully request that the Shire of Augusta Margaret River refuse the application.
175	Support	
176	Object	We have farmed in this Shire for the past 50 years and purchased Scott River Station in 2000. Our property adjoins the proposed Windfarm envelope. We strongly oppose this Windfarm for the following reasons. 1. Potential disruption to the underlying aquifers. Our stock water on lot 1 is supplied directly via a pressurised bore from the superficial aquifer. This has been tested by DWER and is top quality water . Synergy's mapping shows a proposed wind turbine less than 100 meters from this bore. Any disruption to our water supply would have a detrimental effect on our ability to run cattle on that property. 2. We have a set of cattle yards less than 100 meters from a proposed turbine. It has been documented that infrasound and shadow flicker from wind turbines can affect animals and people and therefore hinder our daily livestock activities, our health and quiet enjoyment of our property. 3 Potential leaching of acid sulphates into the Scott and Blackwood rivers as this area is a floodplain in Winter. Synergy has only provided vague plans for mitigation of these acid sulphates, has not recognised that lime is a limited resource for mitigation and has completely ignored the lessons learnt by BHP in their adjoining failed mineral sands mine. 4. Our roads will not be able to accommodate the size and volume of vehicles and traffic associated with this project. 5. Loss of property value. We are wanting to retire and sell this property- we have already experienced buyer resistance with a Windfarm proposed next door. 6. Loss of threatened ecological communities - any disturbance of the topography and hydrology of the land could potentially cause damage to protected ecological communities. These are protected under a Commonwealth covenant.
177	Object	We were forced to sell our property at the Scott River due to financial pressure, financial risk and uncertainty caused by this Project..... It has shattered our lives....

		I oppose the Development Application for the Scott River Wind Farm . I do not support the DA, its supporting Landscape & Visual Impact Assessment (LVIA) and its Social Values / Social Impact Assessment which contain material shortcomings and methodological gaps that undermine confidence the project can avoid unacceptable and lasting harm to the visual amenity, social fabric and environmental values of the Leeuwin–Naturaliste / Augusta region. Given the level of community concern shown during the EPA referral and public consultation, the project should not proceed without: (a) independent, transparent reassessment of visual and social impacts; (b) a full public environmental assessment (EPA or equivalent) prior to any Development Approval; and (c) improved, independent community engagement and mitigation measures. The EPA referral record shows significant public concern and that 321 of 384 submitters requested a public environmental review. 1. Visual impact assessment — substantive shortcomings and “holes” The LVIA is central to judging whether the proposed turbines (up to 250 m tip height) will unacceptably degrade the special landscape and coastal setting. On careful review of the DA and LVIA references, the following major issues are apparent: 1.1 Limited / selective viewpoint sampling — potential bias The DA states the LVIA assessed 12 viewpoint locations selected from desktop work, fieldwork in March 2024 and “community feedback”. Twelve viewpoints is a modest sample given the project’s scale (up to 20 turbines, 250 m tip height) and the proximity to sensitive coastal routes, tourism vantage points and residential receptors across several corridors. Relying on 12 viewpoints risks missing key visual receptors (tourism vantage points, short-range views from valleys, vistas from Leeuwin–Naturaliste ridgeline approaches and private properties). Your Say Augusta Margaret River 1.2 Over-reliance on “maximum case” photomontages without documenting intermediate/peripheral views The DA includes simulations from selected viewpoints using the “maximum case” specification, but the LVIA documentation referenced does not transparently present a full suite of photomontages for peripheral or cumulative skyline views (e.g., long coastal vistas, views from approaches to Cape Leeuwin, and from local roads and tourist nodes). The absence of comprehensive photomontages from all likely tourist routes and private properties weakens any claim that visual impacts are “managed”. Your Say Augusta Margaret River +1 1.3 Visual magnitude and “High–Moderate” impact acknowledged but mitigation unclear The DA and LVIA themselves acknowledge “High–moderate visual impact across a majority of identified viewpoints”, yet the mitigation measures listed are generic (setbacks, non-reflective paint, underground cables “where practical”, retaining vegetation). The LVIA does not quantify residual visual dominance, nor commit to enforceable landscape conditions (planting schedules, maintenance obligations, replacement planting, guarantees on undergrounding of lines). A finding of high-moderate impact should trigger stronger, quantifiable mitigation or reconsideration of siting. Your Say Augusta Margaret River 1.4 Setbacks do not resolve landscape-scale or skyline impacts The proposal claims turbines will be set back 1.5 km from existing dwellings and 3× turbine height from boundaries. Setbacks to dwellings do not address visual dominance of turbines on skylines and long views from tourism routes, nature reserves and key public vantage points (e.g., coastal roads). A skyline-dominant turbine cluster 15 km NE of Augusta will still be highly visible from important Leeuwin–Naturaliste corridor vantage points. Setbacks to dwellings are a noise/amenity mitigation, not a full visual solution. 1.5 Cumulative and sequential viewing effects not robustly addressed

		The LVIA and RSD state that cumulative impacts were considered, but there is no thorough, published cumulative assessment showing how Scott River turbines would appear with other regional turbines (existing or proposed) across commonly experienced travel sequences (e.g., tourist drives, hikes). Sequential visual intrusion (multiple views experienced during a single trip) can amplify perceived impact but is not transparently modelled in the DA/LVIA materials. 1.6 Inadequate treatment of important visual receptors The site is within a region with high tourism and conservation value (Leeuwin–Naturaliste sub-region, proximity to reserves and national park). The LVIA acknowledges this but does not demonstrate how the turbines' presence would affect visual connectivity, sense of place, or tourism amenity—matters of particular importance for Augusta and the coastal tourist economy. The DA's mitigation commitments are framed as potential ("will investigate," "where practical") rather than mandatory conditions. Conclusion — LVIA: the LVIA does not meet the level of transparency and comprehensiveness required for such a high-profile scoping in a world-class tourism and biodiversity region. The acknowledged "High–moderate" impacts require further independent visual analysis, broader viewpoint sampling, cumulative/sequential visual modelling, enforceable landscape mitigation conditions, and transparent photomontage outputs for all sensitive receptors. 2. Social impact / Social Values Assessment — methodological gaps and insufficient data The DA references a Social Values Assessment (Appendix R) and a broad program of community engagement. However, the record reveals worrying limitations: 2.1 Extremely limited neighbour sampling in the SVA The DA records that "Two (2) neighbours took part in the Social Values Assessment." For a project spanning 3,597 ha and affecting multiple private properties and local communities, two adjacent-neighbour interviews are not an adequate representation of the most directly impacted residents. This is especially concerning because neighbours are the people most likely to experience visual, noise, and lifestyle impacts. 2.2 Consultation quantity ≠ consultation quality — no clear independent analysis of sentiment Synergy's engagement log lists a large number of activities (59 meetings, 11 drop-in sessions, ~372 drop-in attendees, ~2,866 page visits). However the DA does not make transparent how those interactions translated into a statistically robust, independently analysed measure of community sentiment (percent support/oppose, reasons for opposition/concern, distribution of views across localities, tourism operators, Indigenous stakeholders, small business operators). High attendance at sessions can mask polarized views; without publication of full survey instrument, raw responses and independent coding, the claim that engagement was "extensive" does not prove social licence. 2.3 Social Values Assessment: There is no published independent peer review or raw dataset for community surveys and interviews available in the DA public materials. Independent verification is essential where the proponent's social assessment underpins claims about community support or acceptability. 2.4 Key social issues insufficiently explored The DA/SVA references social surroundings impacts (noise, dust, vibration, visual amenity). But it does not robustly address: Tourism/economic risk to Augusta and coastal attractions from perceived loss of visual amenity.

		Cumulative amenity impacts if more large-scale renewable installations are proposed. Long-term sense of place / community identity concerns from residents and Indigenous custodians beyond token consultation. . Conclusion — Social Values Assessment: the social impact analysis is not demonstrably rigorous enough to justify a decision based on adequate social licence. The very small sample of nearby neighbours in the SVA and the lack of independent analysis of consultation outputs are material shortcomings. 3. Community consultation — numbers, transparency and interpretation the DA and the EPA referral materials shows a disconnect between the proponent's description of "broad engagement" and the public feedback recorded externally: The Shire/DA record shows numerous engagement activities (59 meetings; 11 drop-in sessions with ~372 attendees; 2,866 webpage visits). But the DA does not present disaggregated analysis by stakeholder type (landowners vs wider community vs business vs First Nations) that would allow a decision-maker to evaluate the scale and direction of concerns. The EPA referral public comment summary records a total of 384 submissions to the EPA referral: 39 "Do not assess", 10 "Assess" (referral), 14 "Assess - environmental review - no public review", and 321 requesting Public Environmental Review (PER). Those numbers show a strong public appetite for a more rigorous and independently scrutinised assessment than the proponent's referral/DA currently provides. The EPA elected not to assess under s.38 but recorded the high public interest. This is important evidence of community concern and indicates that the level of public unease is substantial. EPA WA Local and national media reporting documents that the project is divisive in the community. That community division and public request for a PER should be weighed heavily by the RDAP when considering whether the DA as presented provides adequate information and social licence. Conclusion — consultation: while the proponent ran many activities, the DA lacks transparency (raw consultation data, survey instruments, respondent demographics), independent analysis, and adequate sampling of nearest-affected residents. Public submissions to the EPA demonstrate strong community concern that is not reflected as resolved by the DA materials.
178	Support	It makes sense all round. It will bring clean energy, employment, and income for farmers. Great idea
179	Object	I attended a meeting with Synergy staff but was disappointed with their availability and knowledge. I believe that it has not been clear or transparent. There are so many problems with the proposal- it makes no sense economically and it will take good farm land out of production. Where is your food coming from? I can't accept that it is fair to proceed without completely explaining all the implications. The massive quantities of materials which ,in that environment, will have a limited life makes no sense. We in the regions are being asked to allow development that would never be considered in other electorates- it is quite insulting .It will have a huge negative impact on all of us in this area yet we have been excluded. I have read that many other places are moving away from building these wind farms and few are as big as these. This area has always been either farmland or natural environment. This is not the place to insert massive industrial development.

		This proposal has had a huge impact on the residents - we are heartbroken that you can even consider such a terrible destruction of our beautiful area. I don't think you understand how strongly the locals feel.
180	Object	I am permanent resident of Augusta 1. The turbines will be clearly visible from the town of Augusta. Augusta is on a ridge that faces where the proposed wind farm will be located. I DON'T WANT TO BE ABLE TO VIEW THE WIND FARM EVERY DAY !! 2. Could the Wind Farm be housed in the southern part of the poor bushland that grows between Sues Road, Brockman Highway and Mowen Road. That bushland is not productive or would have been cleared and developed. This bush still receives our strong SE south coast winds. The Wind Farm could possibly be designed to only clear a Minimum of vegetation and possibly become a productive and interesting tourist destination. ??? 3. I am amazed that Synergy has been able to even think of developing a wind farm at Scott River. BHP walked away from their mineral sands operation due to the acid soils in the area and the effects of that into the future. I have just read an article regarding Infrasound from Industrial Wind Turbines and health. That is all quite concerning as to what effect the wind turbines could have on people, land and marine animals and birds in the future. SO..... I do not want the Synergy Wind farm to be built in the Scott River Area.
181	Object	My objections to the project are due to the scale of what is proposed (i.e. 20 turbines at 250m height) and the impact it will have on the visual landscape and the surrounding natural environment. Molloy Island (with 240 property owners and over 200 dwellings) is located only 7km from the proposed site and the turbines will be visible from many locations on the island. A lot of effort has gone into preparing the Development Application, however key details are not provided and it appears to be more of a concept plan than a proper development plan. I cannot see how this can be objectively assessed on the basis that important details are not provided, i.e. turbine specifications, turbine locations, actual foundation construction methods etc. We are being told that there is no noise (including low-frequency and infrasound) impact expected for Molloy Island, however I am confused how that statement can be made without having confirmed a particular wind turbine model and turbine locations. Technical parameters will vary between turbine sizes, models, types, so any assurances being made to the community are based on assumptions and computer modelling, rather than available data. This is not adequate and appropriate for a very significant development that will impact not just current, but future generations. The AMR Shire's Renewable Energy Policy paper refers to turbine setback from boundaries of "3x height of turbine", which in this case would be 750m. The DA itself however proposes "blade length + 20/30m" which is a much shorter distance of 110-120m. Although I'm not directly affected as a neighboring landholder, I would not consider that an acceptable setback, given the excessive building height. The DA lacks the detail needed for a proper assessment and I ask the AMR Shire to refuse the application until a final design with all relevant details and verified noise framework have been provided.
182	Object	Only some parts of wind farm units (wind turbines) are recyclable when they break down or reach the end of their life. However other components are much harder to recycle. My other related concerns are numerous. a) Biodiversity impacts: The Scott River area is environmentally sensitive, with rare flora, wetlands, and wildlife. Large turbines, access roads, and transmission lines will fragment habitats and disturb ecosystems.

		b) Wind farms pose collision risks, particularly for migratory birds and bats that use river corridors and coastal–forest systems. c) Construction of a wind farm in Scott River will affect fragile soils, wetlands, and water flows that support the river system and surrounding park. d) The Scott River National Park is protected for conservation, recreation, and nature connection. Nearby industrial-scale infrastructure may be seen as undermining the purpose of the park. Even if turbines are technically outside the park boundary, their visual and white noise pollution, and ecological effects will extend into protected areas. e) Wind turbines are tall and highly visible. I believe that they will significantly alter the natural, and aesthetically pleasing landscape surrounding the park- that presently makes this area so unique and should be preserved without disruptions. f) While noise and shadow flicker may be regulated, these will still impact nearby residents and visitors seeking quiet and solitude. The region is valued for bushwalking, camping, birdwatching, and low-impact tourism. There are concerns that industrial infrastructure will affect visitor experience and local tourism economies. g) The Scott River area holds deep cultural significance for Traditional Owners. Inadequate consultation or perceived risks to cultural sites is perceived as a major concern for emerging elders. h) In 1999, BHP prematurely closed its Beenup titanium mine in Scott River due to environmental issues regarding the exposure of acid sulphate soils. When disturbed or exposed to air, acid sulphate soils can release sulphuric acid and other heavy metals into surrounding water bodies and groundwater. While Synergy's EPA submission includes plans to neutralise the exposed acidic soil with lime treatment during construction to avoid contamination, the management plan has not allayed the serious concerns of some nearby farmers and landowners living close to the closed titanium mine in Scott River. FIND ANOTHER LOCATION!!
183	Support	I support this and other terrestrial based alternative means of power generation.
184	Support	I fully support the proposal and the development of the Scott River wind farm. I see it as a near perfect location in terms of the world's best standards for wind conditions. All year around and almost all day every day the wind blowing over the proposed site is ideal for generating electricity. The other big positives for the location are the already cleared, flat landscape, the road access and the Beenup high voltage transmission lines. I also believe that the increase in tourism due to the location will help the small town of Augusta. The current situation of the rapidly increasing population and the approaching decommissioning of the Collie coal fired power stations can only be serviced by energy sources that can be quickly installed and commissioned. The only solution to this problem is renewable energy resources. I believe that this is of the highest priority for the regional development and security. In fact I believe that this proposal should be fast tracked, and planning for further wind farms in the region should be a high priority. I fully support the transition to renewable energy resources and the location of this project.

185	Object	The wind turbines will add no value, rather they will negatively effect the residents and fauna in the area. They are a fast depreciating structure that will be another environmental issue to solve when it ends up becoming obsolete and needs to be decommissioned.
186	Support	
187	Object	The DA is not detailed enough to assess properly (approval should not proceed on “work it out later”) The Shire is being asked to approve a concept, not a final design… there is no business case. Do not approve the DA, developer lacks detail of final turbine model/specs, and detailed construction and environmental management plans that can be assessed and conditioned. Noise, low-frequency noise and infrasound: modelling is hypothetical and protections are weak WA noise rules and typical modelling approaches are geared to audible dBA limits and older, smaller turbines, not modern 250 m-class turbines proposed for Scott River. A requirement for independent, continuous, real-time noise monitoring at representative nearby residences (not just at the boundary), including reporting and public transparency. We need: • Mandatory post-construction compliance testing under a range of weather and operating conditions, with results published. • Enforceable curtailment/shutdown requirements if limits are exceeded, and a clear complaints response protocol with timeframes. • A “do not rely on neighbour agreements” position: private agreements should not be used to legitimise offsite impacts. Proximity impacts: homes, boundaries and rural lifestyle are not buffers. The impacts of an industrial wind facility should be contained within its footprint. Neighbouring land should not be treated as a sacrifice zone. This is an important factor. We need: Modern setbacks proportionate to turbine height (for example, a minimum of 3x turbine height from boundaries) and sufficient separation from dwellings to protect amenity. We note that Synergy is trying to manipulate the outcome with Shire in regards to setbacks. Shire needs to advocate for community , not for the corporates. Visual impact and landscape character: industrial scale, permanent change These are skyscraper-scale structures in a rural landscape, visible for kilometres, for decades. Augusta and tourism and the natural environment is what brings people here, not an energy park. • Dominance: turbines and blades will exceed the height of Perth’s tallest buildings and dominate skyline views from rural homes and roads. Approving this development effectively constrains future rural and tourism land uses on neighbouring properties for the rest of this century. It doesn’t meet current local planning scheme and will have a devastating impact to the value of land, amenity and enjoyment. Floodplain, acid sulfate soils and shallow groundwater: high consequence risk This location has known sensitivity. Earthworks and dewatering can trigger irreversible impacts. Water quality and farming risk: contamination pathways can affect drains, dams, bores and stock water; the consequences fall on local landholders, not the developer. • Lack of detail: without a final design and dewatering plan, there is no credible risk assessment for volumes, disposal, treatment, monitoring and contingencies. • Linking of the superficial aquifer and the river system

		• Synergy don't have a plan when it comes to emergency acid sulfate soil mitigation… adding lime from a scarce resource is not sustainable or responsible… taking lime away from farmers. The shire should require detailed hydrogeological assessment, acid sulfate soil investigation and an enforceable dewatering/ASS management plan before any approval. Bushfire and emergency response: aviation restrictions and evacuation realities: No-fly or restricted airspace around turbines can impede aerial firefighting operations. • Emergency access: heavy infrastructure and internal roads do not equal safe evacuation routes for locals. • Fire ignition and spread: the DA should clearly address ignition sources, response capability, and how turbine operations interact with fire-weather conditions. • Rare flora is at threat from an established no go zone with fire trucks not permitted and restricted aerial suppression. The Shire should require a credible, independently reviewed bushfire and emergency response plan that addresses aerial firefighting constraints, evacuation, and response time realities. Traffic, access and construction disruption: local roads are not built for this. Especially Scott River Road. Construction impacts are not a side issue; they are months/years of disruption. The Shire should require a detailed traffic and construction management plan, with enforceable limits, routes, timing controls and compliance reporting. Wildlife and environment: insufficient detail for a high-risk setting This is a biodiversity-rich area; risk assessment must be robust and precautionary. Wildlife and environment: there is insufficient detail for a high-risk setting. Require stronger, transparent monitoring conditions and avoidance-first design, not "mitigate later" language. Consultation and community sentiment: inadequate engagement, no evidence. Many affected landholders report no direct engagement. • The DA does not clearly summarise community feedback or demonstrate how concerns were incorporated. • The scale of opposition should be acknowledged and transparently addressed. • No clear minimum standard with community engagement. Totally inadequate considering the scale of this project. WE: • Require genuine consultation outcomes and publish responses to key community concerns, not generic assurances.
188	Object	I would like to express my concerns regarding the Development Application for the Scott River Wind Farm and the lack of details and transparency by Synergy and potential consequences required to assess a project of this scale. Some of my concerns are: No final turbine locations, layout or specifications: these are not locked in and can be changed at the developer's discretion, changing who is impacted by noise, infrasound, shadow flicker, safety risks and visual dominance. That public have been told that "details will be finalised later" is not acceptable for a large-scale development that has such a dramatic impact on the region. Emerging international evidence suggests amplitude-modulated/pulsating components from large turbines are an unaddressed health risk for people and wildlife. There have been a number of international studies on this, yet they have been omitted in the proposal. Turbines and blades exceeding the height of Perth's tallest buildings will dominate the rural landscape and skyline for kilometres. The proposed height of the turbines are the tallest in the world, so there have been no studies or risk assessments done on these. Bushfire risk and emergency response have not been adequately addressed. Wind turbines create no-fly zones that may restrict aerial firefighting, and internal access roads do not equate to safe evacuation routes in a rural fire scenario.

		The Development Application does not provide a credible, site-specific hydrogeological assessment or a robust acid sulfate soil and dewatering management plan for this area. The site's floodplain location raises serious environmental concerns. The area also contains a shallow superficial aquifer that is linked to the river system We value the quality of our natural landscape. This is a biodiversity-rich area and risk assessment must be robust and precautionary. I do not believe the Development Application provides sufficient detail to allow a proper assessment of a project of this scale and consequence. The application does not adequately address low-frequency noise or infrasound, and there are no clear commitments to independent, continuous real-time noise monitoring at nearby residences, nor enforceable shutdown provisions if limits are exceeded. The application lacks detail on access routes, impact of heavy vehicle movements, timing and duration of works, dust and noise management, and protections for local residents, road users and businesses. Finally, I am concerned about the inadequacy of community consultation. Many affected landholders have reported no direct engagement. The Development Application does not clearly summarise community feedback or demonstrate meaningful addressed concerns, given the scale and permanence of this proposal. I ask the Shire to refuse or defer the DA until a final design, verified noise framework, and robust environmental and emergency management plans are provided and independently reviewed.
189	Support	Our community must embrace Renewable energy to transition from fossil fuels. The Beenup site makes sense logistically & is multifunctional as has been shown worldwide, livestock grazing is compatible with wind farms.
190	Support	Build the wind farm - it will be great for our shire to be using clean energy. There has to be places to build these if we want to be serious about climate change and this is a good location . Cheers
191	Object	We oppose the proposed Scott River Wind Farm. The location is unsuitable, it is a biodiverse rich hot spot within our South West. We have spent much time at that location over the years and can attest to the birdlife species that will be impacted. Operations of the project pose an unacceptable risk to all three Endangered species of Black Cockatoo, the hundreds of Black Swans that congregate on that farm land in the cooler months until Spring, also the up to 15 Wedge tailed Eagles that patrol the skies in that location. You cannot claim to be champions for the welfare of our Iconic and Threatened Black Cockatoos by supporting a project so detrimental to them - it is smack bang in the middle of their known flight corridors to their foraging habitat. Any loss of their numbers to turbine collision will be unacceptable collateral damage!! Placing 20 250m turbines on a floodplain with acid sulphate soils, shallow groundwater with active farming is too risky too. There is threat of contamination to the important Blackwood and Scott River waterways. The farm threatens food and water security.

192	Object	I have lived in Augusta for over 30years, my main Concerns are not just the Visual Impact on our beautiful Vista, but also the Mental Health Issue caused by the Sound created by these Turbines, it has been proven to be louder than going to a Music Event. Why Augusta? Why not Gnarabup???
193	Object	Scott River is the wrong location for a wind farm for environmental, ecological and health reasons: Two abandoned mining operations in an area high in acid sulphates. If these are liberated into the Scott river catchment? Proximity to people - infrasound health and mental health issues. Research from Professor Ken Mattson of Uppsala University, Sweden shows 30% of the population is highly sensitive to infrasound, experiencing symptoms such as insomnia, migraines, high blood pressure, heart problems, headaches, a pressure in their heads, and palpitations. Infrasound that can travel up to tens of kilometers depending on conditions. Endangered Baudin and Carnaby cockatoos. Only 3km from Chester and Pagett reserves. What value can be placed on lost pristine tourist views? Tourists love Augusta for it's pristine views. Realty values are likely to decline as who wants to buy real estate with industrial windfarm views? Money. Is it about building it cheaply? If it is, then expand the Colgar project in the wheatbelt as working infrastructure including a purpose built power transfer station is already there. Profit for shareholders of foreign companies INPEX and Enel that have a majority 80% holding in this project above all of this? I have no confidence in Julia Jean-Rice representing Augusta via DAP. It is well know that her objective is for this windfarm to go ahead. That would not be representing the community's interests. The shire has been deceptive about the true scale of this project from the onset with the number of turbines and that they are as high as the tallest buildings in the Perth CBD. And where is the EPA on this? They received 380 public submissions and 320 were against it. The EPA's decision not to assess this proposal has removed the only process designed for open, independent, whole-of-environment scrutiny and this has has plainly undermined community confidence in the EPA and the shire. I live 10km from the proposed project and have not received any correspondence from the shire on regarding this windfarm. I am not a climate denialist, however, Scott River is the wrong location for a project such as this.
194	Object	As a frequent guest of beautiful, untouched Augusta and surrounds - I oppose to the Scott River wind farm because of the sheer ugliness of it all! I also oppose to the Scott River wind farm because 250m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn't real, and the project has no enforceable protections for people living nearby. It threatens food and water security, bushfire safety, rural amenity and the environment.
195	Object	I STRONGLY object to the proposed Scott River Synergy Wind power station. South West WA is a world recognised biodiversity hotspot and industry of this scale is demonstrably inappropriate. The region is a tourism and environment mecca also world renowned to site such impactful infrastructure in this area is unbelievable and does not at any stage meet the required "social licence" that is paramount for such a project of this scale and impact. As a resident of the south west and a regular traveller to the area for over 50 years I implore this Government Dept follow the precautionary principal. There simply is too much to lose. The size of over 250m is of note given there is no such turbines of this scale anywhere in WA presently. To suggest it is appropriate to locate in the Biodiversity Hotspot of WA Is inappropriate at every level and I implore that this proposal is rejected for the inappropriate and detrimental impacts it will have now and into the future.

196	Object	Stop destroying the beautiful Southwest by favouring multinational companies only interested in profit and not the community. Build one in Cottesloe instead.
197	Object	Per the Draft Local Planning Policy 23 – Large-scale Renewable Energy Facilities (LPP23). I live in the beautiful, undisturbed, pristine town of Augusta. Within 10 kilometres from this proposed wind farm. My family have a long history and residence here, like most of the locals who cherish it. I am a 'greeny' by and for nature. I vote green, I care more for the environment than myself. I support the gradual shift to renewables to try and slow human impact on our vulnerable earth. Though I keep an open mind on agendas such as this wind farm proposal and the chosen location and long term limitations are of great concern to me. It is not about the impact on my views, my real estate or my back pocket. It is the undeniable, factual research out there on the environmental impact that appears to have been brushed over in this instance. To learn that the EPA recently decided to not bother looking into the fragile ecosystems in the Scott River, is disturbing. I attended the Synergy led 'town talks' and got some prepared feedback on a few questions. I will outline my primary concerns: 1) the impact on our local and migrating birds - I was informed due to the size (250) that they 'won't impact the flight path' of all birds. Is this an assumption? Or a fact? 2) When I asked how/where these monstrous structures are disposed of when they break down/reach their end - I was informed 'there is a decommision plan' and that the 'technology was improving all the time so when these ones deteriorate there will be improved versions to replace them'. Not quite the answers needed on the waste disposable long term and the extraction plan. 3) The audible sound and strobe lighting from a 250m high mechanical structure, the direct impact on wildlife and people. There is a lot of concerning research on, not just the human biological impact for anyone near to them, but more concerning is the publicly available data on infrasound. It travels extensively underwater and through ground. What do you think this pulsating unnatural field will do to our local whale and sea life populations? There is clear evidence from European countries where these are located where entire populations of species have disappeared from the area. They are more sensitive than people to these waves. 4) the 'greenwash' that appears to be pushing this plan very hastily. It is public knowledge that the largest investors are overseas (Italian, Japanese) mining groups. Though this initiative is being sold to the public as a locally beneficial incentive. The deeper you look into the people invested in this project are in some way benefiting financially, even if indirect. Majority of whom do not live or have anything to do with, or care about Augusta. Overall, this smells like a large scale 'rubber stamp and rollout' campaign without the due diligence of reliable research (quantifiable, statistical scientific data on infrasound impact and spread, soil and water contamination, flora and fauna viability) and not thoroughly assessing the impact on local environment and community long term health, does not sit well and there is very little trust in future large-scale energy project planning in this district. I would sincerely ask this Council to reconsider the location of this plot. Why can't they be installed further from fragile, vulnerable habitats and communities? There is a very large landmass inland on this continent that is unused, available and ideal for the largest solar, wind, whatever farms with little to no threat to any species? Mining magnates will not hurt from a few additional overheads and longer cables. The irony of having to look at these everyday and know the energy isn't even supporting our town? Lowering our power bills? Watching our sea animals and birdlife disappear? Is it really to save $$ for the 'existing infrastructure'? Please can someone reveal where these things will be buried when they faulter? Is it true these larger ones have components of asbestos in this day n age? We all know this is NOT the long term solution. If anything at all, please reconsider the location of LPP23 before it is finalised. If it has been communicated that this local community are in support of this proposal then I would question the motives of the source this

		information has come from. Many in this community feel the federal govt has simply rubber stamped and there is no point in voicing objection.
198	Support	
199	Object	I am totally against the proposal and would hope this comment reflects the outcome
200	Object	i vehemently object to this proposal. it is in the wrong location - sensitive environment and too close to peoples homes. no consideration has been given to the wider community who has been told to just deal with it whist the farm owners get their pockets lined with money. This money should not go to the farmer but into a trust for the local community so everyone would benefit, note just the select few. noise and visual pollution. structures are way too big and will be a blight on the landscape. wind is outdated and inefficient power source. More effort should be going into solar panels on existing buildings and battery storage options. scott river is prime farm and should not be transformed into an industrial power plant.
201	Object	I oppose the Scott River wind farm because 250 m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn't real, and the project has no enforceable protections for people living nearby. It threatens food and water security, bushfire safety, rural amenity and the environment.
202	Object	My husband and I are both opposed to the Wind Farm Development at Scott River. Our major concerns are the impact on birds and wildlife as well as the visual impact and emissions that will result, effecting our environment. Another concern is the fact that tis issue is dividing our close knit community. If this development is approved will the following technologies be utilised: Radar and cameras to detect bird movement & slow turbines when birds are detected Sonic deterrents to protect bat activity.
203	Object	I am writing to convey my strong objection to the Scott River Wind "Farm" development application submitted to the Shire of Augusta Margaret River. As I have stipulated in previous "have your say" submissions on the topic, there is a deceptive pattern of ambiguity from the proponents regarding community consultation and the development application its self. I feel the Augusta community has been poorly represented by the Shire and the resounding number of community members that will be significantly affected opposed to the development, trivialised. At best the submission is wishy washy, lacking no commitment to turbine specifications ie height/model number to reference, exact location of all structures within the development footprint. The scale of the structures will have a significant impact on the depth and concrete tonnage of each footing and associated trenching which leads to concerns regarding the consequences of earthworks and dewatering activities in high risk environments such as shallow groundwater, acid sulphate soils and the knock on effect of being located in a floodplain. There has been no definitive advisory on the effects this development will have on aviation flight paths (royal flying doctor, aerial firefighting operations). No clarity on light pollution, (I was told by a Synergy representative that the turbines do not require aircraft warning lights or any lighting for that matter). With a proposal standing to completely change the region, clarity regarding worst case scenario (disaster preparedness) should be transparent to community, thus far there have been no consultations regarding negative impact

		concerns regarding mitigation and rehabilitation. As it stands the DA lacks fundamental details to fairly assess and approve. Currently this is a concept and not something one can make an informed decision on. The town of Augusta has been designed with the aspect facing predominantly North East, directly at the developments proposed site. There are very few homes that from the town's design perspective that will NOT have their visual amenity affected. This has been downplayed by both the Shire and the proponent. Many of the permanent residents of this region have invested everything into their properties (which also fund the shire....). We live in a small town with very little amenity, sacrificing access to what people in the CBD take for granted, trading it for unindustrialised natural landscape .... this is also what brings tourists .... it's what keeps our town afloat. Safe guarding our visual amenity and historical view should be considered a primary planning factor in developmental proposals that seek to industrialise rural and natural landscape values as the same applies to building codes regarding height restrictions ect. Finally id like to express my concern regarding the apathy shown by the EPA on the topic of biodiversity with in the proposal site. Floodplains are a crucial part of this region's habitats, they are crucial for biodiversity, providing food, shelter, and breeding grounds for countless species, from fish and birds to mammals, while also acting as natural filters and buffers against floods, though often threatened by development. This environment relies on periodic flooding to distribute nutrients and maintain its ecological health. WA has historically viewed floodplains as wastelands and as a result many have been lost to development, harming ecosystems. Floodplains are vital to healthy river systems and are wildlife corridors connecting aquatic and terrestrial environments, serving as critical feeding, breeding and migration pathways for many animals, acting also as refuges during drought. **THIS PROPOSAL IS THE WRONG PROPOSAL IN THE WRONG PLACE**.
204	Object	I believe that a better fit for utilising the Beenup Power Line would be a large scale solar farm with battery infrastructure for the following reasons: 1) Minimal environmental impacts. 2) No visual impact. 3) No sound disturbance. 4) Bird life would be little effected. 5) Little Acid Sulphate soil disturbance. 6) Solar is taking energy direct from the Sun rather than via complex relationships with weather patterns and the atmosphere. Importantly it would not be polarising the Augusta Community. Please note importantly " AEMO slashes forecasts for wind farms as falling costs fuel solar and batteries" Link below:https://www.abc.net.au/news/2025-12-10/aemo-isp-slashes-wind-forecasts-as-solar-batteries-rise/106120076?utm_campaign=abc_news_web&utm_content=mail&utm_medium=content_shared&utm_source=abc_news_web
205	Object	Wind turbines, while often promoted as clean energy solutions, face several environmental sustainability challenges that their proponents would acknowledge. The manufacturing process requires significant amounts of steel, concrete, and rare earth materials, with substantial carbon emissions generated during production and transportation. The massive turbine blades, typically made from composite materials like fiberglass and carbon fiber, are notoriously difficult to recycle and often end up in landfills at the end of their 20-25 year lifespan, creating a growing waste management problem. Wind farms can also disrupt local ecosystems, causing bird and bat mortality through collisions, altering wildlife migration patterns, and requiring large land footprints that may involve habitat destruction. Additionally, the intermittent nature of wind power necessitates backup power systems or extensive battery storage, which carry their own environmental

		costs, and the infrastructure required for remote wind farm locations—including new roads and transmission lines—can fragment natural landscapes. However, it's important to note that most energy researchers and environmental scientists would argue that despite these legitimate concerns, wind energy still produces far less environmental harm over its lifecycle than fossil fuel alternatives, with studies showing it offsets its production emissions within months of operation and prevents substantial greenhouse gas emissions that drive climate change.
206	Object	First and foremost this is a total and complete disregard to the current environmental laws and requirements . It it well known that the area is known to contain acid sulphate, the BHP mine was closed due to this. The shire president and other council members have and are actively promoting this project . synergy has for reasons that I cannot fathom choosing not to have thorough environmental assessments and analysis not only carried out but also published and community comment sought. Any organisation other than a government entity would be required by law to do this. The pollution that acid sulphate release into our precious Scott and Blackwood rivers would be catastrophic. The import of blades is also problematic as it has been reported that asbestos has been identified within them. The potential for the turbines to catch fire is also real, as a volunteer fire fighter the sheer height of the towers and volume of flammable materials such a oils renders us unable for effectively fight and extinguish any fire . Not to mention the real danger to is volunteers… our focus is saving and preserving our bush. The promoters are either ignorant or ignoring the impact of these turbines on the heath of every living creature in the area. It is my view that those who ignore the laws and promote this potential environmental disaster should be investigated and if necessary removed from any involvement and prosecuted l, in the event that wrong doing is revealed. Wake up those involved you work for us your voters and are not elected to the position you hold to self serve your personal agendas" Be open and transparent and be prepared to listed not to dictate.
207	Object	This will be an eye sore from the coast of Augusta not to mention the impact this type of infrastructure will on the Scott River population, in using farm lands and water ways. I strongly oppose this development.
208	Support	With the ongoing expansion of rural/residential areas in the AMR shire, there will be a increased need of grid based electricity seeing that most new houses will all have airconditioning installed which greatly increase the electricity consumed especially during periods of extreme heat and or cold temperatures. Although grid services have been upgraded in recent years, the ever increasing demand will cause future blackouts especially during the night times when solar has shut down. We need extra baseload power for this.
209	Object	
210	Support	We need more wind generation and this is an ideal location.
211	Object	I STRONGLY object!. I'm a 70yr old, normally law abiding man, not a greenie and I lived in Scott River in the 80s. Do NOT destroy this pristine region of the southwest. I cannot say this strongly enough, I will join in any protest on site, should the proposal go further. I am prepared to go to prison to help stop you from destroying the area. I know of many others who say the same but will not openly say so in advance.
212	Object	I have lived in the Scott River district for 36 years and will be directly affected by how LPP23 is written. Large-scale renewable enery is something I support, but the current draft does not cover enough protection in relation to floodplains, farming and very importantly bushfire safety, biodiversity is another matter not covered enough. I ask that LPP23 be amended so that impacts are kept within the project footprint and neighbours' land and public roads are not treated as buffers. I know that the floodplains and land with acid sulphate soils are already subject to covenants, which in my opinion should not be

		considered for large scale industrial facilities. Setbacks should be in conjuction with 250 m turbines and the Shire's pattern of small rural lots, with significantly larger separations to both houses and boundaries, and no reduction through private neighbour agreements or curtailment arrangements.I ask that LPP23 be amended so that impacts are kept within the project footprint and neighbours' land and public roads are not treated as buffers A stronger protection for noise needs to be addressed in more depth including low frequency and infrasound.The policy should recognise farming and the access to water as most important. It should also require assessment of the impact on the Scott River so as not turned into an industrial energy zone. Please spend more time on LPP23 to make it stronger before it is finalised and used to assess the Scott River wind farm and any future proposals.
213	Object	I am totally apposed to the Scott River Wind Farm due to the scientific evidence stating that infrasound with effect neighbouring properties. It could also affect groundwater and fertility of livestock, wildlife and neighbouring population. What gives you the right to go ahead with a project of this magnitude without an environmental impact study?
214	Object	My home on Molloy Island is on the eastern side of the Island overlooking the Scott River Basin and the Scott National Park. The installation of the Wind Turbines will cause visual pollution for us and also devalue the property which presently has pristine views. This is one of the reasons that my wife, Dorelle, and I purchased the property approximately 33 years ago. Whilst the wind turbine may look small from the Augusta township, they will tower over our views from Molloy Island. I was also involved in objecting to the Minister about BHP Beenup, applying for and been granted approval by the State Environmental Authority to empty excess water overflow into the Scott River because of the sulphuric acid arising from the acid sulphate soils when exposed to air and water. BHP indicated that they had the best scientists in the world to resolve the problem. I responded to BHP stating that having the best scientists had never solved the problem in the past. BHP then withdrew its application to dump water into the Scott River but were granted permission to keep the acid sulphate water in retention ponds. It has taken over 20 years for these ponds to be restored and returned to nature. Initially, numerous truckloads of lime were used to try and neutralise the sulphuric acid. This has also been a major problem in NSW on the coastal plains and on which the NSW government now has strict controls on disturbing such soils. It is the NSW government that supplied me with all of the information that they had on acid sulphate soils when I was assessing the BHP project as the WA government had very little information on the problem at that time. For the above reason, I am extremely concerned about the disturbance and digging of the soil because it will expose acid sulphate soils to water and air thus causing major environmental problems. The other issue that will arise will be at the end of the life of the wind turbines as to who will be responsible for their removal, contamination issues and burial and will they have the funds to do this.

		I asked the same question of BHP as the entity of BHP conducting the Beenup project was a company with only a small paid up capital and could have been let go into liquidation thus leaving the state government with the costs of clean up. I suggested that the state government obtain the guarantee of the holding company in order to avoid the costs of clean up being left in the hands of the government.
215	Object	"I object to the Scott River Wind Farm DA because it has not had the proper thoroughness needed for a proper assessment. The proponal has not finalised turbine locations, their specifications or even a final design, how can approval be given when the details are not set in stone. The noise, shadow flicker and other impacts inc visual is impossible to make a decision on and as a neighbour I would like further investigation of the risks before a decision is made. Considering the noise assessment was based on a desktop assumption and suited to older turbines not these modern 250m turbines it is not up to date monitoring and where will the protections lie if limits are exceeded. Another big concern is the floodplain location with the history of acid sulfate soils andshallow groundwater, how will that affect the risk to water quality and neighbouring farms such as myself. All I ask is the Shire to refuse or defer the DA until a final design, verified noise framework, and robust environmental and emergency management plans are provided and independently reviewed."
216	Object	Dear Augusta-Margaret River Shire, We are part of a family who owns 58 and 60 Sabina Drive, Molloy Island, Augusta, WA 6290. We live here on more than an occasion and still do. We have more than basic researched these issues for a long period. Could you please consider the following when they draft the new energy policy. Draft Renewable Energy Policy We want the Renewable Energy Policy strengthened so that:- • Impacts are kept well inside the project footprint, • High-risk floodplains and acid sulphate soils are off limits, • Food and water security and bushfire safety come first, • Neighbour's properties are never treated as buffers for industrial developments, • Noise monitoring must be real, independently verifiable and enforceable, • A bond for end of turbine farm life to cover rehabilitation. • A communication and interface system with landholders is accessible and reasonable at cooperating with communicating if and after implementation occurs. Visually and audially we value our locality and lifestyle, industrialisation should considerate of this and the Scott River region. Augusta has long been a nature affiliated, picturesque and largely untouched area. Please allow consideration of our requests in the Council's deliberations. Our experience living in the shire has been more than remarkable, thank you, it has been a privilege.

217	Object	I have recently purchased at Karridale. One of the main features of this area I and others are drawn to, is the fact we live in a “relatively” pristine environment. Of all the areas in WA affected by mining, pollution, deforestation and contamination; Augusta Margaret River is faring far better. It is up to the council/ government to respect the community rights/wishes to protect our land, environment and the health of the community. This area is one of the main tourist areas of the state, and is important for generations to come that we hold firm and stand strong in protecting what is ours. The environmental and health risks are already obvious, it almost seems redundant to have to repeat them. Infrasound, asbestos, PFAS pollution will affect peoples health. The soils themselves are not suitable for this type of venture. Why not solar? Let’s face it, none of these inventions are “clean” but let’s choose the option with the least adverse affects to human health, let alone the environment and animals. This development in no way contributes to the community, economically or sustainably. Our community is clearly striving to move in a regenerative, eco conscious direction, with a pristine environment that has a lot to offer our country. We cannot let big corporations put profits over what we need to protect. Non polluted areas in our country are demonising. There are some towns/communities that have proudly stood up to coal seam gas, wind farms and mining, and they remain valuable pristine natural habitats for all to enjoy. Let’s be one of these communities that puts our foot down when it comes to letting our pristine environment be bought out with no benefit to our community. Lastly, if you wouldn’t have these in your backyard, why are you happy to approve it in someone else’s? Do you see wind farms being pushed in Sydney or the Gold Coast or other beautiful locations? No. You get them where there are less people who will stand up and say no and cause less of a scene. Let’s stand up as a strong community with a backbone and say no. We are not at the mercy of big corporations, people with decision making power need to rock the boat and make a difference.
218	Object	Wind farms have been proven to mot be environmentally friendly. WA should not be erecting any more windmills.
219	Object	This plan for 20 Onshore 250 meter tall wind turbines is the thin end of the wedge and is only possible with the dictatorial State and Federal Labor Government's undemocratic and indecently hasty tactics to railroad small communities. 20 turbines in this beautiful part of the world, is Too many. The number of submissions will always be small due to the population size. That does not mean that many West Australians, who are mostly unaware of this project, its location and its impact, will not be outraged by the wanten destruction of areas of natural beauty and biodiversity. (I count Roger Cook as one of these people who is unaware of the impact on Scott River, as he said on the radio, only a few days ago, that he was not familiar with the Scott River area issue.) The irreparable damage to this beautiful part of the world will be severe, with an industrial turbine site ripping through massive transportation to and from the area with steel, concrete, huge blades, support columns TRASHING the countryside that is supposed to be SAVED by these turbines, in its wake. Why is the Labor Government not held to account about despoiling the most green and biodiverse areas of Australia, like Scott River, when there are countless featureless, uninhabited, wilderness desserts that the Government and Planners can choose from. Apart from the visual impact and constant drone of these 250 meter tall hazards to aircraft, fire-fighters and wildlife, the Scott River area is home to many rare and endangered species of flora and fauna including Black Cockatoos and Wedgetail Eagles, which will be further depleted by turbine strikes. Intermittent wind turbines only work to about 30% effeciency which is no good to anyone, especially as their lifespan is only 15 to 20 years; after which time, turbines will have to be decommissioned, recyled, and replaced at huge expense. RECYCLING and the COSTS

		OF RECYLING IS A JOKE. There is NO CURRENT SENSIBLE PLANS to recyle BLADES and no one is addressing the environmental impact of the latest ASBESTOS SCANDLAL that surrounds wind turbines. Apart from porential asbestos pollution in this beautiful area, there is also the very real and shocking issue of the particle shedding from the coating on the turbine blades, which will pollute surrounding farmland and waterways. This shedding material includes BISPHENOL A which is known carcinogen and TOXIC TO HUMANS and has the ability to enter the foodchain. Why should Synergy, a monopoly power company be gifted a turbine contract that will not deliver cheaper power, will be given handouts of OUR TAX MONEY by the Labor Government? How will Synergy and the State and Federal Government plan to deal with the dangerous chemicals that will pollute the site over time, and has TRUE COSTINGS available to the public to show how much this Chris Bowen Vanity Project will end up costing. This Ponzi Scheme is not about clean and green power, it does so much more harm with little to show for the environmental impact, and yet another example of Government overreach at the taxpayers expense. This Synergy/Government backed project in Scott River (and others) will be seen by generations to come as criminal environmental vandalism and those associated with it should be held to account morally and more importantly FINANCIALLY. Australians want cheap power and we are being LIED TO, all we will get is HUGE DEBT, DESTRUCTION OF HABITAT, POLLUTION and BIG LITTER
220	Object	Object to the visual impact Object to the environment impact
221	Object	Hello. I implore you please, to NOT go ahead with the proposed windfarm in Scott River. Reason/s being, the techology is not there yet, it is not clean energy. And its an economic disaster. I have watched other windfarms around the globe. The spot you have chosen has a plethora of native flora and fauna, some critically endangered. Watching other windfarms, i see the birds that are killed, the massive oil leaks, the destruction to the ecosystem, the fact that it cannot be recycled adding to landfill and the economic disaster in maintenance. Some countries have banned windfarms from above reasons mentioned. It's going backwards! I do fear though that the deal has been made. After seeing the EPA backout, i can only imagine the deals going on under the table. We, the people are aware! My only hope is that "someone" sees this and in a quiet moment of reflection, truly asks if this is right? For their kids, their grandkids as they will be the ones dealing with the fallout and destruction of such a pristine environment. Only to hear of the distant memories of how clean and beautifull this area "used" to be. Please, do NOT let this go ahead.
222	Object	Scott River Wind Farm • I am concerned and apprehensive that a 250 metre high, multi turbine wind farm is proposed for construction on a sensitive flood plain with acid sulphate soils and a shallow superficial aquifer. • I am concerned and apprehensive that the installation will pose unacceptable risks to beef, dairy and cropping, from dewatering and contamination of dams, bores and drains. • I am alarmed that seasonal bushfire risks and no fly zones around the turbines impact aerial firefighting and evacuation. • I am concerned and apprehensive that noise and low frequency noise and infra sound from turbines are too close to homes and boundaries. • I am concerned and apprehensive that shadow flicker and 24/7 disturbance in a quiet rural environment. • I am concerned that Scott River being transformed from a food bowl and quiet rural landscape into an industrial power zone. • I am concerned that the Development Approval does not include a confirmed turbine model, this means that the noise model used is hypothetical. This is unconscionable. We need:- a) Real time Noise Monitoring at nearby homes, b) Mandatory post construction verification of actual noise levels, c) Enforceable protection and shutdowns if limits are exceeded.

		d) A bond for the land rehabilitation at end of turbine farm life. I oppose the Scott River wind farm as described above.
223	Support	Moving to renewable energy is essential in the transition to low carbon generation and reducing emissions. Climate change is resulting and will increasingly result in far more bushfires heatwaves and drought and consequently environmental damage to Scott River and the South West
224	Object	
225	Object	Please do not build these wind farms. They are harmful to wildlife and can be harmful to surrounding residents.
226	Object	I'm a long-term local shire resident and frequent visitor to Augusta to take advantage of its natural beauty and use the river and beaches to swim and generally enjoy outdoor pursuits. My sadness is that all the objections to this development will not stop it going ahead, but I do wish to convey my thorough disapproval and objection to this Wind Farm application. With all the space we have available in this state it seems ludicrous to place the proposed wind farm in such a sensitive area where it completely destroys the visual amenity of an area that has been largely untouched by large scale industrial development. I implore you to reject this application.
227	Object	On behalf of my family and myself, we have strong objections to the proposed wind farm in Scott River, Western Australia, citing several critical concerns. 1. Firstly, the area has high ecological value protected under the Environment Protection and Biodiversity Conservation Act 1999, jeopardizing endangered flora and fauna due to potential risks from construction and operation. 2. Secondly, the risk of increased fire hazards in the community and issues related to Acid Sulphate Soils that could affect sensitive waterways and surrounding farmland are alarming. 3. Additionally, neighboring landowners have legitimate health concerns regarding exposure to noise and disturbances from the 250m tall wind turbines. 4. The proposal threatens both the unique environment of the Scott River district and local wildlife, including endangered species within the federally protected ecological community. 5. The project is deemed unsuitable due to inadequate block sizes and anticipated alterations to the rural landscape, raising further issues of amenity and safety for residents.
228	Object	Wind farms are extremely detrimental to the environment, ineffective and inefficient. We want to preserve our efficient electrical generation in Western Australia with the use of coal and gas.
229	Support	I strongly agree that Synergy has thoroughly researched all aspects of constructing a wind farm in that particular area and mitigated any concerns. It is the perfect site for a wind farm and it is vital that the Shire supports this to combat the effects of climate change. The fact that infrastructure already exists at the old Beenup mine site, transmission lines are already in place and minimal clearing is required makes it ideal. It is also where the wind blows consistently. Areas in other parts of Australia that have wind farms in farming areas have found no adverse affects and in fact have found positive ones including land values increasing rather than decreasing.
230	Object	Insufficient impact studies and consultation with neighbor's directly impacted on this large scale development. Insufficient studies into the effect of interference with the water table and possible Acid sulfate disruption. Direct property value impact on neighboring properties with zero consultation potentially costing large losses in equity and investment or retirement planning
231	Object	I oppose the Scott River wind farm because 250 m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn’t real, and the project has no enforceable protections for people living nearby. It threatens food and

		water security, bushfire safety, rural amenity and the environment. I moved to Augusta many years ago for the wonderful community, bush views and peace and quiet. As the local council you are responsible for this beautiful area and should not preside over a project that turns it into an industrial are with risks to the environment (acid soils), noise levels and visual aspects of the area. The proposal indicated that the visual impacts would be significant and not in keeping with the area. The local community will have minor benefits but major detriment from this project. There are many possible locations for wind farms without putting them 15 Km from a town like Augusta. Clearly this is just to reduce cost of transmission lines. This is just too many turbines on land that is valuable farming land and too close to people's homes and farms.
232	Object	I'm strongly against this wind turbine project @ Scott River due to the environmental destruction which will be caused, to an already fragile environment, these"so called green energy" is a lie, the eyesore from surrounding communities, the noise pollution & also the rain barrier that wind turbines create! No No No!!!!!
233	Object	Insufficient impact studies and consultation with neighbor's directly impacted on this large scale development. Insufficient studies into the effect of interference with the water table and possible Acid sulfate disruption. Direct property value impact on neighboring properties with zero consultation potentially costing large losses in equity and investment or retirement planning.
234	Object	I oppose the Scott River wind farm because 250 m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is a risk to the environment and to the livelihood of the farmers nearby and the tourism industry of the nearby towns. The specification of the turbines is not detailed and therefore the noise modelling is just a guess. There is no real assessement of the affect on fire risk in the are or how the local firefighters would respond to it. The proposal itself said that the visual effect was not in keeping with the local environment. My mother lives in Augusta and does not want to look out over wind turbines instead of native bush. People go to Augusta for the natural views and peace and quiet. As the local shire you will know that the community benefit they are proposing is paltry and will in no way offset the damage, and potential damage done to the community. In order to protect the community there needs to be monitoring of noise, acid soil levels and any other environmental damage, with the power to shutdown if these are breached. This installation is just too close to homes and farms. It is not an appropriate location.
235	Object	These are toxic possibly asbestos filled with over 300 Litres of oil that can not be recycled when they stop working with a life span of 20 years at best. They are the most expensive of all forms of energy but the main thing is they are experimental. Some of these intermittent part time have never been built before so what could go wrong will go wrong. Leave our pristine oceans for our much loved marine animals especially our whales.

236	Support	Based on information provided, it appears a positive addition to the renewable energy mix, particularly as there is negligible impact on native vegetation. I trust that the WTG blades are constructed of recyclable material (decompostable resin base) as this aspect of WTG is a major environmental concern.
237	Support	Just hurry up and build it
238	Support	I fully support this project. Please disregard the fool's making any submission that claims it's an eyesore or a swindle factory. Please build it quickly.
239	Object	Come and see the damage all the high voltage lines are now doing to Karijini area. No way we want that in our beloved country side as well. It's not worth it. Think of your kids, kids. You will be leaving them a trashed environment. Anyone with common sense would say a Big NO to this plan.
240	Object	Nations across the Western world are turning their backs on wind and solar farms as the expense (lining the pockets of International Companies, not Australian) far outweighs any perceived benefits. While renewable energy generation is a lovely idealistic thought, the grim reality is that it is not reliable, ridiculously expensive and will have a negligible effect on reducing global emissions. China alone produces the same amount of CO2 in 12 days, that takes Australia 12 months. Scott River is a beautiful, isolated part of WA and the legacy of these obscenities will last far longer than the brief ,feel good moments when they are built. I also now understand they are made of a plastic that sheds microfibres and also asbestos. I think AMR shire should stand up for preserving their pristine and beautiful region.
241	Object	The Scott river area has been an area that my family has holidayed on for many years. It is a unique environment and should not be plundered for the labor governments net zero obsession. From the frogs to the bats this area needs to be saved from climate alarmists.
242	Support	
243	Support	I great idea 💡
244	Object	Submission – Objection to Scott River Wind Farm Development Application (Prepared by a young adult resident with concern for the environment, waterways, wildlife and future generations) I strongly object to the Scott River Wind Farm Development Application. As a young resident of this region, I am deeply concerned about the long-term environmental, ecological and social consequences of this project. The proposal fails to demonstrate that the full extent of impacts on ecosystems, water quality, aquifers, and endangered species can be properly assessed or managed, and it lacks the scientific detail needed for an informed planning decision under both Western Australian and Commonwealth environmental law. Lack of Scientific Detail and Risk Assessment The Development Application does not contain a final turbine layout, confirmed turbine specifications, or comprehensive construction and environmental management plans. Without these essential details, it is impossible to properly assess impacts on waterways, soils, groundwater, noise and vibration, fauna habitats, and landscape character. Approving an incomplete concept shifts risk onto residents, landholders, and the natural environment. Threatened Ecological Community: Scott River Ironstone Association The Scott River Coastal Plain supports the Scott River Ironstone Association, an Endangered ecological community listed under both the EPBC Act and WA Biodiversity Conservation Act. This community includes many rare and endemic plant taxa such as Darwinia ferricola, Lambertia orbifolia and Grevillea species, and depends on seasonal inundation and groundwater connectivity to survive. It is highly sensitive to hydrological change, soil disturbance and clearing. Disturbing this habitat for industrial infrastructure puts this unique ecological community at further risk of decline.

		Biodiversity WA Rivers, Aquifers and Aquatic Fauna The Scott and Blackwood Rivers form major parts of the Hardy Inlet catchment, which supports high ecological value aquatic biodiversity. Long-term monitoring under the Healthy Estuaries WA program shows that the lower Scott and Blackwood catchments host up to 19 native aquatic fish and crayfish species, many of them endemic to south-west WA and some of conservation significance, including the Balston's pygmy perch (Vulnerable under the EPBC Act), mud minnow, black-stripe minnow, salamanderfish and migratory pouched lamprey. Healthy Estuaries The Blackwood River system is one of only two river systems in the southwest coast drainage division that contains all eight freshwater fishes endemic to this region, highlighting its ecological importance. Healthy Rivers Groundwater connectivity is crucial to sustaining these populations; disruption from excavation, dewatering, sediment release or contamination could reduce water quality and degrade key breeding and refuge habitats. Historic data show that rivers like these serve as critical spawning and nursery grounds for native fish communities. Docslib Marine and Estuarine Environment: Hardy Inlet and Flinders Bay The Scott and Blackwood Rivers discharge into the Hardy Inlet, a permanently open estuary that then flows into Flinders Bay — an area used by migratory waterbirds and marine mammals, including whales and dolphins. Changes to freshwater inflows, water chemistry or sediment loads from land disturbance can affect estuarine and marine food webs, breeding cycles and habitat quality. Algal blooms and low oxygen levels have already been recorded in parts of the inlet, indicating existing stress on the system. Healthy Estuaries Soil, Acid Sulfate Soils and Chemical Risks The valley plains of the Scott River contain acid sulfate soils and shallow aquifers that are highly sensitive to disturbance. Excavation, trenching and dewatering associated with turbine foundations, roads and underground cabling risk mobilising acids and heavy metals into waterways and groundwater. This can degrade water quality for native fish, crustaceans, stock water and riparian vegetation. The DA does not provide an enforceable, site-specific plan to manage these high-consequence risks. Endangered and Threatened Species In addition to aquatic fauna, rare terrestrial flora associated with the Scott River Ironstone Association — such as Darwinia ferricola (Endangered under EPBC) — are highly restricted in distribution and vulnerable to habitat disturbance. Wikipedia There is also evidence of numerous threatened and priority fauna species in the broader Scott catchment, including 26 fauna species of conservation significance. openPetition Legal and Planning Responsibilities The DA in its current form fails to provide the environmental evidence required to satisfy: Environmental Protection Act 1986 (WA) — by not adequately assessing biodiversity, soil, water, and ecological risks. Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) — by not fully considering potential impacts on listed threatened species, migratory waterbirds, estuarine and marine mammals. Augusta-Margaret River Local Planning Scheme — by proposing industrial infrastructure that will significantly alter rural landscape and

		ecological values. Compliance with these laws requires full, evidence-based assessment of impacts on ecosystems, species and water systems, which the DA does not provide. Future of Young People and Long-Term Community Well-Being As a young adult who plans to live, work and contribute to the future prosperity of this region, I am deeply concerned about: Permanent degradation of river health, aquatic biodiversity and estuarine systems. Loss of unique ecosystems that cannot be replaced once destroyed. The cumulative environmental burden that my generation would inherit. The erosion of natural landscapes that support recreation, tourism and cultural identity. The rural and coastal environment of the Scott River area is part of what makes this place liveable, economically vibrant, and culturally significant. Its degradation jeopardises the future of young residents, future landholders, and the broader community. Request to the Shire In light of the above evidence: Refuse this Development Application until a final design and comprehensive, independent ecological, hydrological and environmental risk assessments are conducted and made publicly available. Ensure full compliance with WA and Commonwealth environmental legislation, including rigorous assessment of impacts on threatened species, rivers, aquifers, and coastal ecosystems. Actively oppose the project at state and federal levels, prioritising protection of biodiversity, waterways and community well-being over premature approval of an incomplete proposal. Closing Summary The Scott River Wind Farm proposal, in its current form, places unacceptable and irreversible risks on rivers, aquifers, unique ecological communities, endangered species and coastal environments, without the scientific detail necessary for responsible decision-making. The long-term environmental, social and economic costs — especially for young residents and future generations — are far too great. I strongly urge the Shire to refuse this application and advocate for the protection of our precious natural environment, waterways and biodiversity for the future.
245	Object	Submission – Objection to Scott River Wind Farm Development Application I am writing to strongly object to the Scott River Wind Farm Development Application. The proposal, as it currently stands, presents significant and irreversible risks to the environment, wildlife, water systems, and community amenity. It fails to provide the necessary level of detail for a proper assessment and does not comply with Environmental Protection Act 1986 (WA), the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act, Commonwealth), or the Augusta-Margaret River Local Planning Scheme. Regulatory and Environmental Concerns Wind farm developments are required to demonstrate compliance with strict environmental and planning regulations, including: EPA Act 1986 – for assessment of impacts to terrestrial and aquatic ecosystems, particularly in areas with threatened species and sensitive habitats. EPBC Act 1999 – for protection of nationally listed threatened species, migratory birds, and marine mammals. Local Planning Scheme – for protection of rural amenity, landscape character, and tourism values. The current DA fails to provide the level of detail needed to comply with these regulations, making it impossible to assess potential impacts properly. Biodiversity, Threatened Species, and Habitat

		The Scott River region is part of the South West Australian biodiversity hotspot, a globally recognised area with high species richness and endemism. The area supports: 26–28 threatened terrestrial flora and fauna species, including Western Ringtail Possums, Carnaby's Black Cockatoos, and numerous priority plants. Migratory and endangered bird species, whose habitats could be lost or fragmented by turbine construction and cabling. Marine mammals, including whales and dolphins in Flinders Bay, whose communication, breeding, and feeding could be disrupted by noise, vibration, and sedimentation during construction and operation. Research and ecological surveys show that even limited clearing or disturbance in this area can have disproportionate effects due to the restricted ranges of many species. The project also poses a cumulative risk when considered alongside other regional developments. Soil, Groundwater, and Floodplain Impacts The project site includes acid sulfate soils and shallow groundwater systems that are highly sensitive to disturbance. Excavation, dewatering, and infrastructure installation could: Mobilise acids and heavy metals, contaminating stock water, dams, and waterways. Alter aquifer flows and compromise water quality for farming and ecosystems. Introduce permanent damage to fragile soils, similar to issues observed in other WA projects. The DA provides no enforceable management or mitigation plan for these high-consequence risks. Noise, Vibration, and Infrasound The proposed 250 m-class turbines generate noise, low-frequency vibrations, and infrasound that extend well beyond the project footprint. Current desktop modelling is insufficient and does not reflect real-world conditions: Noise limits rely on dBA metrics suitable for smaller turbines and do not account for low-frequency impacts on humans, livestock, or wildlife. No continuous real-time monitoring or independent verification is proposed. Evidence from other wind farms shows post-construction complaints about sleep disturbance, stress, and livestock impacts. Visual and Landscape Impact The turbines would dominate the rural landscape: Skyscraper-scale structures would be visible for kilometres, permanently altering the character of the Scott River region. Tourism, property values, and rural lifestyle would be negatively affected. Photomontages in the DA fail to adequately convey worst-case visual impacts. Approval would sterilise surrounding land, limiting future rural and tourism use for decades. Bushfire and Emergency Management Scott River is not an urban grid; in a fire emergency: Restricted airspace around turbines could impede aerial firefighting. Heavy infrastructure does not guarantee safe evacuation. Rare flora and fauna may be threatened where emergency vehicles are restricted. The DA does not provide a credible, independently reviewed bushfire and emergency response plan appropriate for this terrain. Construction, Traffic, and Community Disruption Construction impacts are extensive and prolonged: Heavy vehicles, oversize loads, dust, noise, and road upgrades will disrupt residents, farmers, and tourists. Safety risks increase on rural roads with increased truck traffic.

		The DA lacks detailed construction methodology, haulage routes, timing, and enforcement protocols. Cumulative Lessons from Other Wind Farms Other WA and Australian wind farms have demonstrated that: Agricultural productivity can be affected by noise, vibrations, and soil compaction. Livestock may experience stress and health impacts. Soil and aquifer contamination can occur due to excavation, dewatering, and cable installation. Habitat loss and bird/bat strikes can lead to measurable declines in local biodiversity. These documented outcomes highlight the irreversible environmental and social costs of industrial-scale wind projects in sensitive areas like Scott River. Strong Request to the Shire Given these serious concerns, I request that the Shire: Refuse the Development Application due to incomplete environmental, noise, visual, and construction impact assessments. Ensure compliance with EPA and EPBC regulations, including rigorous assessment of impacts to endangered and migratory species, aquifers, soils, and ecosystems. Actively oppose the project at state and federal levels, advocating for protection of our community, landscapes, and irreplaceable wildlife. Summarising Statement In conclusion, the Scott River Wind Farm proposal poses unacceptable and irreversible risks to terrestrial and marine biodiversity, groundwater, soils, and community amenity. The permanent industrialisation of the Scott River landscape, combined with threats to endangered species, migratory birds, whales, and dolphins, and the documented risks from infrastructure and cabling, far outweigh any potential benefits. Approval in its current form would impose environmental, social, and economic costs that cannot be justified, and it would violate EPA, EPBC, and Local Planning Scheme obligations. I strongly urge the Shire to refuse the application and act decisively to prevent this project, ensuring that our community, landscapes, and irreplaceable wildlife are fully protected for generations to come.
246	Object	Submission – Objection to Scott River Wind Farm Development Application I object to the proposed Scott River Wind Farm on planning, environmental, safety and community grounds. The development application seeks approval for an industrial-scale wind energy facility without providing the level of detail required for a proper, lawful and informed assessment. The proponent has not finalised turbine locations, turbine specifications or a final design, yet requests approval now with the intention of resolving key impacts later. This approach prevents meaningful assessment of visual impact, noise, vibration, environmental risk, bushfire response and construction impacts, and shifts unacceptable risk onto neighbouring landholders and the wider community. In planning terms, the absence of critical information prevents the Shire from making an informed decision. Approval in these circumstances would be premature, inconsistent with sound planning practice, and contrary to the principles of orderly and proper planning. Resident Impact and Sense of Place As a resident of the Augusta Margaret River region, I do not want to see industrial-scale wind turbines visible from Augusta, nor do I want to experience their associated noise, low-frequency vibration or operational impacts. The visual and environmental connection between Augusta and its surrounding natural and rural landscapes is fundamental to the town's identity, liveability and sense of place. Introducing turbines of this scale into the broader viewshed would erode that connection and diminish the quiet coastal and rural character valued by residents and visitors alike. Concerns regarding noise and vibration are material planning considerations. Modern turbines of this height are known to generate low-frequency noise and vibration that can propagate over long distances in quiet environments and

		under certain atmospheric conditions. The absence of a final turbine design, site layout and enforceable, independently verified monitoring framework means residents cannot be assured that visual dominance, noise and vibration impacts will be avoided or adequately managed over the life of the project. Residents should not be expected to accept permanent industrial visual intrusion, noise and vibration in order to accommodate a development that is fundamentally incompatible with the existing landscape and settlement pattern. Visual Impact and Landscape Character The proposed turbines are industrial-scale structures of skyscraper height that would permanently alter the rural landscape of the Scott River area. These turbines would be visible for kilometres and remain in place for decades, resulting in an irreversible change to landscape character. The Augusta Margaret River region is internationally recognised for its natural environment, scenic quality and rural identity, which underpin tourism, lifestyle appeal and land value. Industrialising the Scott River corridor would undermine these defining attributes. The turbines and rotating blades would exceed the height of Perth's tallest buildings and dominate skyline views from rural homes, local roads and public vantage points. Their scale and movement would overwhelm the existing landscape and cause a substantial loss of visual amenity. The visual impact assessment relies on photomontages that do not adequately represent worst-case scenarios or the true scale and dominance of the turbines. Key viewpoints, including roads, residences and public vantage points, are not convincingly or transparently represented. Without realistic visual modelling, the impacts cannot be properly assessed or accepted. Approval would also result in a sterilisation effect on surrounding land, constraining future rural and tourism uses on neighbouring properties for generations. This outcome is inconsistent with the intent of the Local Planning Scheme and represents a devastating impact on land value, amenity and enjoyment. Floodplain, Acid Sulfate Soils and Shallow Groundwater The Scott River area is a known floodplain environment with shallow groundwater and documented acid sulfate soil sensitivity. Construction activities involving deep turbine foundations, cable trenching and roadworks pose high-consequence environmental risks. Disturbance of acid sulfate soils or groundwater drawdown can generate acid and mobilise metals, leading to irreversible impacts on soils, waterways and agricultural productivity. Contamination pathways may affect drains, dams, bores and stock water supplies beyond the development footprint, with consequences borne by local landholders. The application lacks sufficient detail to assess these risks. There is no final design, no confirmed excavation depths, and no credible dewatering strategy. Without this information, there is no meaningful assessment of groundwater interception, discharge volumes, treatment, monitoring or contingency responses. The application also fails to adequately address the hydraulic connectivity between the superficial aquifer and the Scott River system. The proponent has not demonstrated a sustainable or credible emergency acid sulfate soil mitigation strategy. Reliance on lime is inappropriate in a region where lime is a scarce agricultural input essential to farming productivity. Bushfire Risk and Emergency Response Scott River is a rural area with limited access routes and heavy reliance on aerial firefighting during bushfire events. The introduction of large wind turbines raises serious concerns regarding emergency response capability. Restricted or no-fly zones around turbines can impede aerial firefighting operations, reducing response effectiveness during critical fire events. Internal service roads do not equate to safe evacuation routes for residents. The development application does not adequately address fire ignition risks, turbine operation under extreme fire-weather conditions, evacuation logistics, or realistic emergency response times. Rare and threatened flora is also at risk where turbine exclusion zones may

		restrict ground-based or aerial suppression. A credible, independently reviewed bushfire and emergency response plan is essential and has not been provided. Traffic, Access and Construction Impacts Construction impacts will extend over months or years and represent a significant disruption to the local community. Rural roads in the Scott River area are not designed for sustained heavy vehicle traffic or oversized turbine components. Increased truck movements, dust, noise and road modifications will affect residents, farm operations, tourism and local businesses. Safety risks for residents, school transport, farm machinery and visitors have not been adequately assessed. The application does not provide sufficient detail regarding haulage routes, staging, timing, road upgrades or protections for residents. Wildlife, Birdlife and Marine Environment The Scott River and broader Augusta–Flinders Bay area is environmentally sensitive and biodiversity-rich. At least 26 species of flora and fauna listed as threatened, rare or at risk occur within the area. Bird and bat strike risk is inherent to wind energy facilities and must be assessed transparently and conservatively. Habitat clearing, fragmentation and disturbance further compound these risks. The application does not demonstrate how impacts will be avoided, monitored or enforced over the life of the project. Flinders Bay is an internationally recognised marine environment and an important habitat for migrating whales. Construction noise, vibration, increased vessel activity and operational impacts have the potential to disturb marine mammals. The application does not demonstrate that marine impacts have been adequately assessed or that precautionary buffers and management measures are in place. The absence of a comprehensive, precautionary assessment of both terrestrial and marine fauna is inconsistent with accepted environmental assessment standards. Consultation and Community Engagement Community consultation has been inadequate given the scale, permanence and regional significance of the proposal. Many affected landholders report no direct engagement. The application does not transparently document community feedback or demonstrate how concerns have influenced the proposal. Generic assurances do not constitute meaningful consultation. Planning, EPA and Regulatory Compliance The development application does not demonstrate compliance with the objectives of the Local Planning Scheme, which seeks to protect rural character, landscape values, environmental assets and residential amenity. Further, the proposal does not provide sufficient information to demonstrate consistency with the Environmental Protection Act 1986 (WA) objectives, including the precautionary principle and the prevention of environmental harm. The lack of detailed environmental investigations, final design information and enforceable management plans means the environmental acceptability of the proposal cannot be established. Without this information, the Shire cannot be satisfied that the proposal meets the requirements of sound planning practice or that environmental risks can be effectively managed. Conclusion and Request This development application seeks approval for an industrial-scale wind farm without providing the information necessary for a lawful, transparent and defensible planning decision. The proposal would result in permanent landscape change, loss of rural and coastal character, environmental risk, compromised emergency response capability, and unacceptable impacts on residential amenity. In planning terms, the absence of critical information prevents the Shire from making an informed decision. Approval in these circumstances would be premature, inconsistent with sound planning practice, and contrary to the long-term interests of residents, the

		environment and the Augusta Margaret River region. I respectfully request that the Shire refuse the application, or at a minimum defer it until a final design and independently reviewed environmental, visual, marine, emergency and construction management plans are provided and made available for public review.
247	Object	Members of the Council, while I have no direct interest in the Scott River project. I would like to acquaint you with a number of facts, that show wind turbines are not electricity generators and are a definitely negative project to have in your Council area. A modern electricity Grid, requires a constant, reliable supply of baseload electricity 24hours, a day, 7 days, a week (24/7). That electricity can only be supplied by electricity generators, able to generate for 24hours a day. Such as Coal, gas, hydro and nuclear powered generators. Wind Turbines, ARE NOT 24/7 Electricity Generators. Wind Turbines are 'Fake', Intermittent, Unreliable, Uneconomic. Energy Converters. That are fueled by a weather fuel, the Wind. Because they can only produce electricity, when the wind speed is between 12kms/hr and 90kms/hr. The industry reports that Wind Turbines only produce electricity on average for only 35% of their rated capacity or on average for eight hours per day. Wind Turbines, experience wind droughts and can be becalmed for hours, days or even weeks at a time, producing no electricity. Likewise, if a gale blows for several days no electricity is produced. https://www.energysage.com/about-clean-energy/wind/pros-cons-wind-energy/ In addition, wind energy converters have other downsides. Such as environmental damage https://news.harvard.edu/gazette/story/2018/10/large-scale-wind-power-has-its-down-side/ and shedding a toxic epoxy resin bisphenol across surrounding land. https://gerardrennick.com.au/is-there-a-toxic-chemical-in-wind-turbine-blades/ Claims of electricity production made by wind energy converter operators are misleading. The claim a wind converter will power 395,000 homes (Spicers Creek Wind Farm https://www.squadronenergy.com/our-projects/spicers-creek-wind-farm) needs to be qualified to say that the wind converter may power the 395,000 homes for intermittently for an average of 8hrs a day. With the 395,000 homes needing at any time to seek a completely different source of power for the remaining 16 hrs of each day. A wind energy converter is completely unsuitable and uneconomic to supply baseload electricity 24/7 for a modern society. Wind turbines are designed to last 20 – 25years however with each turbine having over 8,000 parts, breakdowns may be earlier. It is reported that at 10 years of life, blades and gearboxes are needing to be replaced already so it is unlikely they will make it another 10 years. https://energyfollower.com/how-long-do-wind-turbines-last/ A wind energy converter is usually sited, hundreds of kilometres from the Grid. Extra HV Transmission lines have to be constructed across productive farmland and national parkland to connect the wind converter, causing havoc to farmers, including paying a rent fee. Altogether greatly increasing the cost to the consumer. NOTE: When practical commonsense, replaces fantasy when new High Efficiency Low Emissions (HELE) coal fired power stations and Small Modular Nuclear Reactors come on line, the new transmission lines, will become redundant. Will they be removed? Wind energy converters. Are known to increase the heating of surrounding land. It has been found that Wind Turbines actually increase

		the land temperature downwind of where they are operating. (It only stands to reason as we see how winds dry up the Country. Wind Turbines, chop and change the wind as it passes through the blades, causing a more drying effect. And it even has a global effect https://www.instituteforenergyresearch.org/renewable/wind/wind-farms-raise-temperatures-at-the-surface-level/ Decommissioning. The cost to teardown a single turbine is estimated at $A800,000. Wind Converters, proposers or actual operators, I believe, have an understanding in the industry that when it comes to decommissioning that the base will NOT be removed only covered up. Being covered up by only 75cms or 1m of soil, the area covered by the bases will not grow good crops or pasture It needs to be asked, have the proposers/operators have done a close analyse of how the removal of the wind turbines will done, where the debris will be taken too. In particular the huge fibreglass blades. Most of them may left in paddocks or go to landfill. With the host/landowner responsible for the cleanup and bankruptcy. https://stopthesethings.com/2023/10/31/touring-texan-turbine-graveyards-becomes-latest-green-tourism-venture/ The Wind Converters proposers/operators, need to be challenged. As to whether they have done any costing of the decommissioning, restoration and disposal/recycling. And it is misleading for the proposers/operators, to say to the Hosts. That two years before the closure of the Wind Farm, a fund will be set up to pay for the decommissioning, restoration and disposal. Is it feasible to put aside a sum of $800,000 per turbine, while paying dividends to investors? What if Government subsidies stop? What if new High Efficiency, Low Emissions (HELE) coal fired power stations, along with Nuclear Reactors are installed and bidding to supply is increased to six hour blocks of uninterrupted supply. What if the operators become insolvent? As they are only leasing the site, they can break the lease and walk away, leaving the Host, Augusta Council and Community with $billions costs to clean up a toxic rubbish heap. Or be left with a toxic wasteland.
248	Object	I oppose the Scott River wind farm because 250m turbines on a floodplain with acid sulphate soils, shallow groundwater and active farming is a risk. There has been no real modelling of impacts on the surrounding farms, people, livestock and wildlife. Why risk such a catastrophic environmental disaster in one of the most pristine parts of Australia. The impacts will be felt in the local community affecting small businesses, farms and tourism. This infrastructure should not be considered until all modelling, adequate risk assessments and complete transparency are provided and completed.
249	Object	Scott River Wind Farm • I am concerned and apprehensive that a 250 metre high, multi turbine wind farm is proposed for construction on a sensitive flood plain with acid sulphate soils and a shallow superficial aquifer. • I am concerned and apprehensive that the installation will pose unacceptable risks to beef, dairy and cropping, from dewatering and contamination of dams, bores and drains. • I am alarmed that seasonal bushfire risks and no fly zones around the turbines impact aerial firefighting and evacuation. • I am concerned and apprehensive that noise and low frequency noise and infra sound from turbines are too close to homes and boundaries. • I am concerned and apprehensive that shadow flicker and 24/7 disturbance in a quiet rural environment.

		• I am concerned that Scott River being transformed from a food bowl and quiet rural landscape into an industrial power zone. • I am concerned that the Development Approval does not include a confirmed turbine model, this means that the noise model used is hypothetical. This is unconscionable. We need:- a) Real time Noise Monitoring at nearby homes, b) Mandatory post construction verification of actual noise levels, c) Enforceable protection and shutdowns if limits are exceeded. d) A bond for the land rehabilitation at end of turbine farm life. I oppose the Scott River wind farm as described above.
250	Object	I oppose the Scott River wind farm because the 250 m turbines are on a sensitive flood plane. The asbestos in the brake pads are a risk to beef, dairy and cropping from dewatering and contamination of dams. The shadow flicker and 24/7 disturbances in a quiet rural environment. It threatens food and water security andis a bushfire risk.
251	Object	Too big and ugly, spoiling one of the views in Australia! Western Australia has access to massive gas fields, and no it's not running out! The government should be targeting the big multinational companies for way more domgas supply and run power generation off that. Get off the renewable bandwagon as it's not better for the environment especially Chinese built shit. No one wants it to go ahead, especially Augusta residents
252	Object	Please don't give the Scott River wind farm the green light! Positioning the 250m turbines on the flood plain with such shallow groundwater in acid sulphate soils is too risky as history has proven. The noise modelling is not adequate as it is too close to surrounding homes and work sites on neighbouring farms. Infrasound studies prove potential effects on people, livestock and wildlife. Other reasons include bushfire risks with lack of affective firefighting capabilities and shadow flicker from blades. Please don't allow this farming community to become an ugly industrial zone ruining the rural amenity and environment. The pristine coastline is the very reason thousands of tourists visit our unique region. Please don't spoil it.
253	Object	It is a recipe for disaster. With Acid sulphate soils, endangered and threatened flora and fauna it is clearly not a suitable location for this. Potential disruption to the acid sulphate soils and the consequential contamination of the Scott River/ Blackwood river would have a devastating impact on the entire region's ecology, economy and lifestyle. Combine this with the large quantities of oil contained in turbines the nearest structural fire fighting service (they are volunteers) is over 35 minutes away drive time. This could also lead to significant environmental damage not if but when 1 catches fire. The visual pollution of our pristine coastline would ruined for ever. I implore the shire to OBJECT to this.
254	Object	Thank you for the opportunity to"Have a say"in the proposed SRWF development. This proposal has become A very divisive community issue . I wished it would go a way, It wouldn't affect me, I would be dead and gone. I sat on the fence, I was complacent. And then Synergy Red came to town with their "road show". They we re nice people full of answers , glossy magazines and half truths. They were evangelising the "Wind Farm " industry giving all the pros and none of the cons.

		The whole process felt cultish. As in “We know what’s good for you” sit down shut up and the Wind Farm bosses will tell what they are going to take and what they would give for it after they’ve used our subsidised capital. By now the initial spiel of zero emissions by 2050 and we will save the planet from global warming was having little to do with the development compared to the noise and $ being made by the wind industry. Synergy Red own less than20% of the project the rest is owned by Japanese and Italian energy companies . The whole renewable energy industry is being hyjacked. The price this community and its environment is being told too much for what it is likely to gain. What is gained. 1. Electricity for houses. Better value if solar panels were fully funded 2.A $100,000 indexed yearly for community projects .That’s less than$20/person, that’s less than 20 “pieces of silver” surely not shut up money. 3. Granted some minuscule reductions would be gained re our carbon footprint 4.Some “warm fuzzy”feeling for doing our bit . 5. We will be able to say we were the “Guinea Pigs” for 250 meter high towers not yet tried out on other communities . ??? 6. A few farmers will have a financial gain. Let’s hope there is no “sting the tail “ 7. I can’t think of any other advantages. What will be lost is the next part of my findings. 1. Community cohesion. (This cohesion has been permantly lost in many other communities world wide) 2.An industrial vista with no removal clause when it goes wrong. 3. Potential risks. a. Release of acid soil. (Don’t forget the BHP disaster) b. The Hardy inlet ,Scott River , Molloy Island. are all at risk c. The four aquifers will , need special care d. Properties will be devalued (Real estate agents must disclose any affect or potential affect created by wind farms eg noise ,flicker, vista) e. It won’t be a selling point that sellers use. f . The sound emissions research is based on smaller mills with less and inconsistent recording machines . This science is out of date , however these results are being used for this proposel. The Nord2000 is redundant .The calibrated SoundSim360class is the current machine which consistently gives accurate readings. g.The warnings given by professors Ken Mattsson and Dr Hakan Enbom are surely red flags to be ignored at a great risk. If you have read this far Thankyou Dr Cliff Owen F.I.C.D PS I do hope I don’t have to explain to grandkids what went wrong
255	Object	We ride with Capel riders and come down here every year for charity toy run to this beautiful town. If proposed wind farm goes ahead. We wish not to return to Augusta as due envirmentao damage it will cause.

256	Support	The opponents of the Scott River Wind Farm have been very intimidating and abusive towards others in their community who do not hold the same views as themselves. Personally I think the location is perfect because of the consistency of wind in this area, the land is mostly already cleared agricultural land that will still be usable agriculturally. Many deliberate negative fabrications have been spread within the local community about the ongoing usability of that land. There will be comparatively little negative impact against local native species - it's long time farming land as such most of the negative impact on local native species occurred long ago by said farmers land clearing and ongoing farm practices ! Opponents are also spreading negative and false information regarding the impending destruction of the Scott River. I do not know how that can happen…., especially when compared to ongoing coal mining and traditional carbon intensive power generation. I could go on and on…., but my support for the Scott River Wind farm is wholly about decarbonising. I will support this proposal because it is a comparatively low impact renewable energy system ! It's the way of the future !
257	Support	We must act now to secure affordable energy that doesn't impact negatively on nature for the future. I also happen to think wind farms are beautiful.
258	Object	This should not happen in such a diverse area. This is farming land and the Blackwood and Scott River are there as is the wetlands in Scott River. This was almost destroyed once before by the Beenup mine and still bears the scars from that. Hardly any rehabilitation at all. People of the Augusta, Scott River, Karridale, Kudardup etc do not want or need this. If the MR councillors think it is so good for the community then put it smack bang in the middle of the Leeuwin Estate! How would they like these monstrosities in their backyard? They wouldn't and neither would you. The company proposing this is Inpex a Japanese fuel company. They are not a green company, far from it. Look them up. They have been given gas from the NT for years and sold it for billions to Malaysia, Singapore and the like. This is not renewable when you see how these turbines are constructed. 3000 tons of concrete and 800 tons of steel mesh just in the base for each turbine alone! How is that good for the planet? What happens in 15 years when their life span is over? How the hell do you get rid of all of that concrete and steel? Has that even been factored in, it doesn't like it. The visual aspect from the town of Augusta will be awful. Not what locals and tourists want to see at all. It will also not create local jobs in the long term. Once up and running they are controlled remotely. What benefit then for locals? Noise for those nearby. 1.5 km buffer is ridiculous. And what about the migratory birds? Please do your research. So many states are now rejecting these due to wildlife and health concerns. Your photos on your submission page also are laughable. They will look a lot bigger than that. My daughter lives in Merredin and she is 30kms from the Colgar Wind farm and they are clearly visible from her place. They did not provide local jobs, all came from interstate, overseas or Perth. 4 or 5 locals maintain it and thats it. You can't approve this and then make up N your Renewable Policy after. The horse will have well and truly bolted by the. This really shouldn't go a head. People living in Margaret River should not have a say, only those within the area. Thank you
259	Support	Renewable energy is urgently needed in WA.
260	Object	This should not be built in this area. It is close proximity to The Blackwood and Scott Rivers. There are farms nearby and wetlands with migratory birds.There are now serious doubts in other parts of the world with micro pollution from the blades. Noise and interruption to migratory birds flight paths.

		The company is Inpex who are a Japanese oil and gas company. They are not trying to save the planet they are here to make a profit. This makes them look "green" by investing in this. The NT has been ripped off for years by this company. It takes gas from there and then sells at a premium to there countries. Wake up Augusta Margaret River Shire! This will not do anything for your community. It will not create jobs in our shire. Look at Merredins windfactory. It employs 4 people locslly with 130 turbines. They are wirelessly controlled from the city. You are destroying farmland and wetlands. And dont talk to me about buffer zones. 1.5km as suggested is ridiculous. Have you actuslly been near these turbibes in full mode? Tge constant drone is horrendous. If you MR councillors are hell bent on having it, then put it amongst your vineyards up in MR. Visually it also is not appealing. Imagine tourists sitting on the banks of the Blackwood enjoying a beer at the Augusta hotel and in the distance all you can see is 200 metre turbines. That's not what they come to the south for.. yuk! There are studies out there if this Shire bothered to find regarding longterm health effects from the constant noise. What happens when this is decommissioned? If the EPA isn't involved now, who will oversee that. Each turbines needs 3000 tons of concrete and 800 tons of steel per base! How environmentally friendly is that? When they are decommissioned what happens to all of that? That isn't be rehabilitated! Wake up to yourselves. Do some research. When they are producing power yes its green, but look at all the destruction that goes into making them and building them. I am ashamed of this Shire. The govt bans old growth Forrest logging to protect the area, and then you allow these monstrosities. Don't be sheep, look at reports from NSW and QLD from people affected by these. Don't just say,"oh it will only effect a few people". That us do wrong, this has shattered and now divided our community, it has pitted neighbours against one another. You promote a nature inspired visit to this region, bike trails, walking trails, whale watching, getting back to nature and then you promote these safe infrastructures. Tell me or show me what happens when their is a fire on the top of a turbine? Planes won't help and neither will our fire fighters. This is all rushed. You dont even have a renewable policy in place or a anactio plan for when it all fails. That should have been done first before getting this happen. What do you the Shire stand to gain from this? Because the people of Augusta, Scott River, Molloy, Karridale dont stand to gain anything! Wake up and down your research before thinking this is green, when it certainly isn't. This isn't saving our planet, it is destroying it. Thank you.
261	Support	
262	Support	
263	Object	☑ WHAT TO SAY – QUICK GUIDE 1 Synergy Scott No turbines of this industrial scale, largest in Australia. 250 m turbines on a sensitive floodplain with acid sulfate soils and a shallow

		aquifer • Risks to beef, dairy and cropping from dewatering and contamination of dams, bores and drains • Bushfire risk and no-fly zones around turbines affecting aerial firefighting and evacuation • Noise, low-frequency noise and infrasound from turbines too close to homes and boundaries • Shadow flicker and 24/7 disturbance in a quiet rural environment • Scott River being shifted from a food bowl and quiet rural landscape into an industrial power zone The DA does not include a confirmed turbine model, which means the noise modelling is hypothetical. We need: • Real-time noise monitoring at nearby homes • Mandatory post-construction verification of actual noise levels • Enforceable protections and shutdowns if limits are exceeded No-one should be forced to “trust” untested data with turbines this close to homes, livestock “I oppose the Scott River wind farm because 250 m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn’t real, and the project has no enforceable protections for people living nearby. It threatens food and water security, bushfire safety, rural amenity and the environment.” There is no clear plan for the damage done to birds or wildlife. There are no facilities / services to care for these animals when injured. The natural environment will be impacted ,at a time when we should be protecting it. Do no harm , in fixing the issue. First principle of medicine should apply here Nature is good for mental health that's why people come to augusta. Don't make it an industrial landscape
264	Support	Transition to renewables is essential for the ongoing survival of human and all other life on this planet. Small local inconveniences or aesthetics shouldn’t trouble us if it helps us phase out fossil fuels, which we absolutely must do.
265	Object	Huge impact on local farms that have been living uninterrupted for so long for this to happen. Research and updates show only problems have come from these installations. Area does not need this for now or future
266	Support	Definitely support such an important alternative power source- use nature to its best ! For a cleaner WA moving forward
267	Object	I oppose Synergy building 250m turbines on a sensitive floodplain with acid sulfate soils and a shallow aquifer I have concerns that risks to beef, dairy and cropping from dewatering and contamination of dams, bores and drains. A definite bushfire risk when no-fly zones around turbines affecting aerial firefighting and evacuation. It is a scientific fact that noise, low-frequency noise and infrasound from turbines too close to homes and boundaries effects peoples mental health. Shadow flicker and 24/7 disturbance in a quiet rural environment causing health problems. The Scott River being shifted from a food bowl and quiet rural landscape into an industrial power zone. The DA does not include a confirmed turbine model, which means the noise modelling is hypothetical. We need: • Real-time noise monitoring at nearby homes • Mandatory post-construction verification of actual noise levels • Enforceable protections and shutdowns if limits are exceeded

		No-one should be forced to “trust” untested data with turbines this close to homes, livestock and workplaces. I oppose the Scott River wind farm because 250 m turbines on a floodplain with acid sulfate soils, shallow groundwater and active farming is too risky. The noise modelling isn’t real, and the project has no enforceable protections for people living nearby. It threatens food and water security, bushfire safety, rural amenity and the environment.
268	Support	I strongly support the proposal for the Scott River wind farm. I have been a rate payer and resident of Augusta for 30 years and I look forward to being able to see the wind farm from my front yard, if I live long enough to see it built. While this wind farm would be a small contribution to reducing global carbon emissions Augusta should play our part. We cannot expect the rest of the world to do it for us. I believe we need renewables to reduce carbon emission as much as possible. This is also in line with the Shire's plan to decarb by 2030, which I am in favour of. Based on my conversations with those who don't support the wind farm, I understand that they don't believe that humans are causing climate change and their opposition is only serving their own self interest, not the bigger picture.
269	Support	The windfarm provides strong societal and future generation benefits: - Avoids approx 175,000 tonnes CO2-e per year from the current SWIS generation mix which, through climate change, is impacting natural ecosystems (reefs, forest), agriculture and communities (flooding, fire) - Avoids Coal-fired power generation pollutants such as fine particulate matter (PM2.5), sulfur dioxide (SO_2), nitrogen oxides (NO_x), mercury, and heavy metals, all of which are strongly linked to serious health impacts including heart disease, lung disease, stroke, asthma, and premature death - Avoids land impact of alternative generation such as coal or gas which require ongoing mining/drilling and transportation - Reduces wholesale electricity prices These effects are generally ignored by a vocal minority who oppose wind turbines as "harming the community" based upon unsubstantiated claims of harm caused by nano plastics, infrasound, etc.
270	Support	I’m generally supportive of the Scott River wind farm — it makes sense to add more renewables and use the existing transmission line — but my support really hinges on how they manage the acid sulfate soil (ASS) risk, which is the biggest concern for me. This area has a known history of problems, so the project needs strict monitoring, clear triggers, and strong management plans to make sure excavation and dewatering don’t create serious environmental impacts. These safeguards also need to be fully transparent and publicly available, so the community can see exactly what’s being monitored and how risks are being handled. The government must maintain solid oversight during the highest-risk phases, and if any triggers are breached, there must be legislated conditions that hold Synergy accountable for both management and full remediation. On top of that, the project should deliver tangible benefits to the local community, not just broad commitments. If all of that is done properly, then I’m comfortable backing the project.
271	Support	The anti turbine group is very noisy and has mislead and exaggerated the arguments. We are confident that the soil acidification issue can be managed appropriately and the infrasound issue is overstated, with little evidence of any adverse health effects. Although our property is one of those which will see the turbines more than any others we see this as a reasonable price to pay for the benefits. It is telling that the existing communication towers in Augusta, which are very prominent because of their location in town attract no adverse comment at all.

		We believe that it is important that our community contribute to reducing carbon emissions and that the site chosen has the appropriate attributes.
272	Object	Whilst windy this is an inappropriate location - shortsighted to say the least. Location was not discussed adequately in previous public consultation and requires further investigation.
273	Object	Dear AMR Shire Council, Subject: Objection to the Proposed Scott River Wind Farm Location I am writing to formally object to the proposed location of the Scott River wind farm. While I appreciate the need for sustainable energy solutions, I believe that the chosen site poses significant visual impacts that could detract from the unique character of Augusta and its surrounding natural beauty. One of Augusta's most cherished assets is its unspoiled vistas, particularly from the elevated areas that offer breathtaking views to the east and northeast. These panoramas are not just visually stunning; they contribute to the town's charm and appeal, drawing residents and visitors alike. The introduction of wind turbines in this landscape would disrupt these views, fundamentally altering the aesthetic experience that makes Augusta special. The visual impact of the wind farm would be felt from numerous elevated points within the town and surrounding areas, diminishing the natural beauty that residents and visitors have come to appreciate. This alteration in the landscape not only affects our immediate enjoyment of the environment but could also have longer-term repercussions on tourism and the local economy, which rely heavily on preserving our scenic views. I urge the Council to reconsider the proposed location of the Scott River wind farm and explore alternative sites that would mitigate the visual impact while still supporting renewable energy initiatives. Protecting Augusta's unique landscape should remain a priority as we move towards a sustainable future. Thank you for considering my objection. I hope to see a solution that balances energy needs with the preservation of our town's natural beauty.
274	Object	This project will have an unacceptable (and as yet not fully understood) environmental and visual amenity impact within the Shire. Much of the structure and components are produced overseas, where the standard of environmental (and industrial) practices are significantly lower than in Australia. This means that we are effectively outsourcing rather than reducing our carbon emissions. The reliability of the infrastructure is uncertain and is most likely to still require carbon emitting backup sources. The project is therefor unlikely to have any significant impact on decarbonisation.
275	Object	I do not believe windfarms are a viable way to secure our energy future. They are unsightly, damage the environment, and create a long term problem either in costly replacement or removal.
276	Object	I believe the use of Windfarms to be a totally wrong direction for future energy needs because of their damage to the environment, longer term pollution and ongoing replacement. They are also a visual eyesore and noise problem for those closer.

277	Support	We see the windfarm as a wonderful opportunity not to be missed in the perfect location for the following reasons: 1 The high power line to Manjimup already there. 2 Land already nearly all cleared. 3 Much better alternative than the previous proposal on the coastal dunes which would be very disruptive to native bush & wildlife. Also very expensive to construct in undulating terrain. 4 Where do objectors think future power should come from? Coal and/or nuclear? 5 Complimentary to solar, which is over supplied in the daylight hours in summer.
278	Support	The proposed project uses a large amount of existing, underutilised, infrastructure. This includes, significantly, major roads and high voltage transmission lines. It is also a low population location with a good wind resource on cleared agricultural land. If wind farms are to constructed anywhere, then this site meets the majority of the criteria.
279	Object	1. Location directly impact lots of surrounding properties including ours, I dont want to see massive wind turnbines on the horizon 2. Better locations would be available but they have chosen the cheapest. (Really only because of the Beenup Mine power distribution system with the 132KV line) 3. Cheapest option is not the best. We should only approve the best option, with low impact, if the costs doesn't stack up then, project shouldn't go ahead. 4. Politically driven, at the cost to the environment and community to meeting renewables targets. 5. I am for renewables but needs to low impact, smart and sustainable. 6. Wind Farms are ugly, they have a massive impact to surrounding properties and environment. 7. As technology evolves, there is a good chance that they will be obsolete before the 30-60 life span and its crazy to committ to such long projects, look how far we have come in the last 60 years. Local community and environment will be stuck with them 8. Not in my backyard - It won't be affecting the People that are making these decisions
280	Support	Although we will see the wind turbines from our house I fully support the project. The electrical infrastructure is mostly in place and the use as a wind farm is far less damaging to the environment than the current farming practices.
281	Object	On Holiday from UK and Spain. Frequent traveller to WA. Strongly object to inappropriate ill-thought out placement of Wind Turbines that affect the landscape and would deter me returning to this area. Green energy is the way ahead, but it cannot be excused for poor placement and without proper consultation with the local population.
282	Support	Wind as renewal alternative energy must be supported.
283	Object	Do not support this project , Visual pollution Disruption to farming practices In the long term do not believe renewables are the answer to our power and environmental problems
284	Object	The AMR planning scheme document states : Minimising Visibility: Development in areas of "Natural Landscape Significance" or along major tourist routes is mandated to be "visually inevident". This often means avoiding building on ridgelines (to prevent skylining) and requiring buildings to use non-reflective, muted materials that blend into the environment. I do not believe the proposed wind farm project will be “visually inevident” at its proposed location.

		If it were 20-30km further east, it might meet this criteria. I have no objection to wind power generation per se. However, the views to the east and north east of elevated areas of Augusta will be permanently changed if this project goes ahead as planned. People choose to live in Augusta because of the sense of beauty and peacefulness created by these views. Once this vista is spoiled by industrial scale wind turbines, Augusta will have lost this unique aspect of its character as an historic town. If I think about what makes Augusta so special, it's the feeling I get when I drive into town from the north and see the views across Hardy Inlet and out to Flinders Bay. When I sit at the Augusta Hotel or walk along the beach at Flinders, the feeling is the same. I strongly urge the AMR to request these issues be considered before allowing this project to proceed in its current location. There must be other locations that suit a wind farm and also preserve Augusta's unique natural visual landscape Kind regards Sue Knight
285	Object	I wish to lodge a formal objection to the proposed development of 20 wind turbine generators, each up to 250 metres in height, within the vicinity of Augusta and within 10 kilometres of my residence at 78 Albany Terrace, Augusta. The proposal represents a major industrial-scale development with long-term impacts on the unique environmental values, residential amenity, and community character of Augusta. After reviewing available project information, I have significant concerns that the development, in its current form, is unsuitable for this sensitive coastal and rural region. 1. Landscape and Visual Amenity – Incompatible With Augusta's Character Augusta is defined by its pristine coastal outlook, forested hillsides, and rural landscapes. Turbines up to 250 m in height would be visible from substantial distances, including residential areas, farmland, tourism outlooks, and public coastal viewpoints. Specific concerns include: Dominance of industrial-scale structures impacting the Cape Leeuwin and Flinders Bay visual corridor. Loss of Augusta's renowned low-impact coastal landscape, which is central to the town's identity, liveability, and tourism appeal. Night lighting and aviation beacons degrading dark sky values important for residents and astronomy-based tourism. Given the importance of scenic quality to the Shire's planning principles, this scale of development appears inconsistent with the region's landscape protection objectives. 2. Noise, Infrasound and Health Impacts Wind turbines of this height generate: -low-frequency noise -infrasound -amplitude modulation -night-time noise propagation enhanced by coastal temperature inversions Augusta's quiet residential environment means that even moderate turbine noise has disproportionate impact. There is no evidence the proposal has modelled:

		-worst-case meteorological conditions, -topographic reflection effects common in the Augusta hills, -coastal wind shear variability, or cumulative noise over time. This raises serious concerns regarding sleep, stress, wellbeing, and long-term amenity for nearby residents. 3. Shadow Flicker and Blade Glint Given the turbine height and the region's sun angles: shadow flicker may extend well beyond typical 1–3 km modelling thresholds, properties, roads, and rural dwellings may be intermittently exposed, blade reflections (glint) could affect residences and traffic during sunrise/sunset. The available documents do not show adequate shadow flicker mitigation or worst-case modelling. 4. Environmental and Wildlife Impacts – Critical in This Biodiversity Hotspot The Shire of Augusta–Margaret River is part of a globally recognised biodiversity hotspot. Concerns include: -risk to raptors, black cockatoos, migratory birds, and bats, -habitat disruption in a region already sensitive to fragmentation, -turbine-related mortality not adequately addressed, -insufficient baseline environmental surveys, -potential cumulative impacts with existing coastal and forestry pressures. Given WA's environmental constraints, this project warrants thorough independent ecological assessment before any approval is considered. 5. Increased Bushfire Risk Wind turbines of 250 m height introduce risks of: -mechanical failure, -transformer and nacelle fires, -lightning strikes, -blade throw during fire conditions. Emergency access during summer conditions is of particular concern in heavily vegetated areas around Augusta. Fire risk mitigation appears underdeveloped in the project documentation. 6. Negative Impact on Property Values A growing body of real estate evidence indicates that large wind farms can reduce residential and rural property values, particularly in areas reliant on scenery, lifestyle quality, and tourism appeal. As Augusta is a lifestyle, retirement, and tourism-supported economy, the negative economic impact on property owners deserves significant weight.

		7. Impacts on Aviation – Helicopters, Emergency Services, and Recreational Aircraft The Augusta area is serviced by: -RAC emergency helicopters, -firefighting aircraft, -recreational aviation activities. Turbines up to 250 m pose significant navigational and operational risks. The proponent documentation does not provide aviation safety modelling specific to Augusta's weather patterns and coastal fog conditions, which can require low-altitude operations. 8. Construction Impacts – Traffic, Roads, and Amenity Construction of turbines this size requires: -extreme oversize haulage, road widening, -major transport works on rural roads not designed for massive industrial vehicles, long-term dust, vibration, and noise impacts. These would impose substantial and prolonged disruption to the Augusta community without adequate demonstrated mitigation. 9. Inadequate Community Consultation The consultation process to date has been insufficient: -limited early notification to residents, -lack of accessible technical information, -absence of genuine engagement on alternative siting, turbine height reduction, or community concerns. Given the scale of this development, the community should have been more thoroughly involved from the outset. 10. Lack of Demonstrable Local Benefit The project provides minimal tangible benefit to Augusta: -no long-term employment or economic stimulus, -no guarantee of local power cost reductions, -no infrastructure investment tied specifically to community needs. The burdens appear to fall on locals, while most benefits accrue to the developer and external stakeholders. In conclusion; For the reasons outlined above — including landscape impact, amenity loss, environmental risk, bushfire concerns, aviation safety issues, construction disruption, and inadequate consultation — I respectfully request that the Shire of Augusta–Margaret River refuse the proposal or require substantial redesign and further assessment. Augusta is a unique coastal town with irreplaceable environmental, scenic, and community values. A development of this scale and industrial intensity is incompatible with the region and the expectations of its residents. Thank you for considering my objection.

286	Indifferent	Quite upset that there is to be no environmental study to be done for this proposed wind farm in Scott River. If were not to consider what potential damage to the environment and those who live this area maybe, how can this be a fair and reasonable process? It would appear the decision is already made to go ahead despite a lot of local objections. Which brings me to another alarming point that both reps from the shire which are meant to represent the whole of the community views are both pro wind farm Both Julia Jean Rice and Greg Bowland. This hardly seem fair when it's quite obvious there is quite a lot of local objections to the wind farm, at the very least they should have a voice at the table. I Know shire have no say if goes ahead or not. I think we should expect our Shirer to represent to the whole community and not just a section. Look forward to a reply
287	Object	As a geologist I am extremely concerned that the proposed wind farm will be using conventional foundations for its turbine towers rather than those employed in offshore developments. Tthis is in light of the experience gained from the failed sand mining attempt by BHP in the 1990's, the remediation of which tool almost 20 years at a cost not far short of a billion dollars in today's money. I am not convinced that similar consequences can be averted by heavy applications of lime in the excavation/dewatering operations. Under the circumstances I am amazed that the EPA has decided that they do not need to be involved in the approval process for this project. Despite the obvious attractions of this area for harvesting wind power, there are significant environmental risks.
288	Support	Disappointed that those opposing the wind farm are so vocal and disrespectful.
289	Object	I strongly oppose the Scott River Wind Farm. Inadequate Referral Assessments by SynergyRED and the severe risk to agriculture, environment, health, taxpayers and neighboring areas. Contamination: Cattle farmers are required to provide Vendor Declaration if wind or solar farms are on their property or neighboring (re fibre shedding from infrastructure). Other farming types will soon follow significantly effecting their income and operations. Contamination is a must disclosure for Rural sales of product & real estate. Synergy's claim is supported by a single study. Synergy have provided no biological impact studies concerning EMR, EMF, EMI, or PFAS blade pollution & shedding. Acid Sulphate Soils exist on the sites and this can't be ignored as not only a potential contaminant plus any dewatering like the failed neighbouring BHP mine, the location of transport of the soil spoil from infrastructure construction & Acid Sulphate Soils have corrosion on infrastructure once constructed. Left over contamination risks are real with real world examples of this let alone the neighbouring ex BHP mine. The 20 tests were dug to 2m in depth. This depth does not adequately reflect turbine foundation depth and the underlying Acid SS soils. Seriously, drill the sites for their footprint and required depth, not doing this with be inadequate let alone unprofessional. Imminent Environment Impact: Little info is given on bird-flight path assessment. True knowledge knows that there are many bird & bat species in the area & that most bird & bat movement occurs between 2.5hrs before last light & 2.5hrs after first light. No assessment has been done on indigenous Black-Swans or Baudin/Fire Tailed/Carnaby Cockatoos or local parrots or plovers, and they are crucial to this area. Full bird study data needs to be property & fully conducted & published. There is a vast ecology in the DCBA referred Scott River wetlands. Turbines risk this & increase to area risk with added Bushfire risk from turbines & the servicing of them. How can it be shown that costs to the wetland area and the water use are fully assessed? Human health & costs: Construction activities have a carbon cost to make, mix & transport vast amounts of concrete, then to build, ship, transport & construct the turbine themselves, plus the environment impact to the area & traffic due to all this. The assessment and the maintenance! Australia's Port Fairy wind farm was constructed 25yrs ago, now it's being decommissioned due to the costs for upgrades, is this not a lesson?!

		Synergy might have a decommissioning plan but what is the cost in time, in research, in consultation, in construction, in operation & in deconstruction, in money and to the environment let alone to the effected people, family & property along the way? There is no funded decommissioning plan or recycling strategy. Lets get real & make the environment assessment complete because costing it is part of it even though assessment of the people effect will most likely still be left out as it lacks measurability. Humas costs are noise (and not just those measured in decibels), visual, shadow flicker, farming contamination, residential/construction setbacks, mental health and loss of land value in the surrounding areas. These massive monoliths are seemingly without rules. There is no clear explanation of setback distances or how they were determined. Noise modelling lacks detail & independent verification, & shadow flicker & tonal noise impacts are not well addressed. These things could effect vegetation & animal growth & mating too with no research into these. The facts that Synergy disregards human-health impacts shows contempt for a full EPA assessment let alone that decarbonisation is even real by this project and others like it. Synergy is only using the science it wants and not inviting new science or conflicting views. Non-disclosure of Conflicts of Interest & failure of broader consultation including Indigenous consultation: 6 Stakeholder Organizations that participated in the 'In-Depth Interview' have financial interests in the project (Appendix-R, p68) and Community Engagement Failure with only 7 days to read and respond to 22 documents & over 3,000pages provided in the Oct 2025 EPA papers is ridiculous & legally appalling. There is a petition against this project with 1,377 signatures. Even Synergy's Corporate Strategic Pillars included Social Value commentary. 143 respondents shown with mixed views. Synergy is compromising their own policies given they are aware of opposition to this project & its also not declared the ownership of their proposed project if its 100% State owned or majority foreign owned through Bright Energy Investments and SynergyRED. Min information is provided on Heritage & Traditional Owner Engagement for heritage surveys or Traditional Owner involvement. Engagement lacking & its essential, especially in areas with cultural significance. There is a Heritage Act Breach. The Karri-Karrak are not the sole Indigenous stakeholder. Further to this, 4th & 5th generation farmers will feel indigenous to this broader area & have not been broadly consulted. Conclusion Synergy's feasibility study provides a surface overview only & lacks the rigour, transparency, & independent validation required to properly inform community therefore I don't support this. Key environmental including farming, heritage, & operational risks are not well reviewed at all in Synergy assessments, & community benefits are vague at best. The Synergy provided studies should have been better in the first place therefore its not genuine complete data. If you are the Peer review then fail this project. Clear commitments to holistic environmental protection & community equity is required. A full project life cycle analysis should have been prepared with results publicly presented. This is not a compatible nor warranted or wanted to Agriculture here either.
290	Object	This proposal should not proceed for the same reasons the Beenup Mine failed. That is highest risk for ground water disturbance/contamination and deleterious affects of acid soils runoff into the Scott and Blackwood Rivers and the Hardy Inlet.
291	Object	this renewable energy has a huge affect on landfill in the future. Damage to environment damage to wildlife, including birds noise to people living close by people need to reduce the amount of energy they use. Landfill it a huge problem
292	Object	I have serious concerns about the project. The towers are too tall and will be visible from many points along the Augusta coast. One of the advantages of the area are the incredible natural views looking east and south from the township.

		The location of the project is in an ecologically fragile area which should not be disturbed. There is now an abundance of information to suggest that wind turbines have a significant impact on the health and well being of humans and animals. They also create transport and disposal issues at the end of their life span. As the first leader of the Greens said recently- not all renewable projects are good projects. This is a prime example of a bad one.
293	Indifferent	While I strongly support renewable energy initiatives, this particular proposal raises serious environmental, community, and transparency concerns that make the site wholly inappropriate for such a project. 1. Threat to Native Birds and Wildlife The Scott River area is rich in biodiversity, providing essential habitat for numerous native and migratory birds and bat species. Large-scale wind turbines pose a well-documented risk to birds and bats through collision and displacement from key feeding and breeding grounds. These impacts would be especially harmful in this region, where many species already face mounting environmental pressures. The cumulative effect on the local ecosystem could be irreversible. 2. Damage to Sensitive Habitat and Acidic Soil The proposed site is known for its highly acidic soil composition, which is both environmentally fragile and difficult to rehabilitate once disturbed. Construction activities such as road building, excavation, and heavy machinery movement would permanently disrupt the soil structure and surrounding wetlands. The loss of native vegetation and changes to soil chemistry could severely impact the delicate ecological balance that defines the Scott River landscape. The Scott River Ironstone Association is one such fragile system. Two Landholders adjoining the proposed Wind Farm have sold their properties to Plantation Farmer Growers putting the Scott River in danger of monoculture and plantation fires thus putting the Scott National Park, Molloy Island and East Augusta at risk. 3. Fire Threat in a High-Risk Area Scott River is already classified as a high fire-risk zone. Introducing turbines and extensive electrical infrastructure into this environment significantly increases ignition risk, particularly through electrical faults or maintenance-related incidents in isolated areas. This represents a serious and ongoing hazard to local residents, wildlife, and emergency services — one that cannot be adequately mitigated given the terrain and distance from firefighting resources. 4. Impact on Augusta's Character and Tourism Appeal Augusta and the surrounding region thrive on their natural beauty and untouched landscapes — a cornerstone of the local tourism industry. The visual intrusion of large wind turbines would dramatically alter the skyline and diminish the area's sense of remoteness and tranquility, which visitors and residents alike deeply value. The long-term economic and cultural impact on Augusta as a tourism destination must not be underestimated. 5. Lack of Transparency and Conflicting Information from Synergy Perhaps most concerning is the lack of consistent and transparent communication from Synergy representatives. At various community drop-in sessions, different Synergy personnel provided conflicting statements regarding turbine placement, environmental impacts, and community benefits. This inconsistency has created confusion and distrust among residents. When public confidence is undermined, it becomes impossible for the community to meaningfully engage in the decision-making process.

		Such inconsistencies raise serious questions about whether Synergy has adequately assessed and disclosed the full environmental and social implications of the project.
294	Object	I am opposed to wind turbines in the Scott River area. The visibility of these turbines will be a blight on the area. The idea that wind turbines are a clean energy is incorrect and the disturbance to the natural world to erect them will impact the area negatively. Loss of habitats, noise pollution and the danger to migratory bird life are all concerns. Money is to be made by a few but locally the rural landscape will be forever altered.
295	Object	We are totally opposed to this hi risk "renewable energy" proposal. My husband and I brought a block of land in Kurdardup a couple of years ago with the intention of retiring down that way. We are absolutely disappointed with the AMR Shire with their slow response to community consultation on this proposal. My main concern is the environmental impact it will have on our pristine area. Why would you allow 250m turbines on a sensitive flood plain with acid sulfate soils and a shallow superficial aquifer? What of the risks to the surrounding farmland (cattle & crops) from dewatering and contamination of the dams, bores and drains. We are new to the area but like most of WA there is always bushfire risks particularly in the warmer months. There are no-fly zones around turbines which will affect aerial firefighting and in response to this, evacuation. My other concern is how will this affect our health. I do not want to be a guinea pig to this; seems Synergy RED has done little to ease my concerns on not just the audible noise but also infrasound. We may not be in close proximity to get the unfortunate shadow flicker effects, but it seems the Scott River community could quite possibly be. Unlike others that have already built in our lovely Kurdardup estate I have a choice to either stay or go. We are extremely disappointed with this proposal & the way Synergy RED has conducted the community consultations with very little information to ease our concerns. We are considering selling our piece of paradise as it will no longer be so if this project goes ahead.
296	Object	The impacts from the State and Federal government renewable energy projects threaten agriculture and nature in many of the same extractive ways of the industrial revolution. A Margaret River-urban based environmental movement supported by commercial energy developers have proposed the Scott River Windfarm project. They have turned a "Blind Eye" to this biodiversity-destroying project to meet renewable-energy and emissions-reduction targets. This has created tensions within our local community as affected ratepayers seek to defend their landscapes, property rights and rural lifestyles. Our family's appreciation of us and with over 50 years of living and farming on our rural property has been classified by the proponents of the Scott River Windfarm project in the Referral Document (RSD-Appendix S-Noise Input Assessment) as being R13. Our family are not only R13 but are the "Wrens", a family who with other like- minded families form part of the local community of "Alexandra Bridge". The site for proposed the Scott River Windfarm project sits adjacent to failed BHP mineral sand mine which closed in 1999. That BHP project was controversial when first raised to me, my family and the community in 1989 due to its size and location in an area highly valued for its natural assets. BHP couldn't contain the toxic reaction in the soil when they disturbed the soil below a certain depth. This environmental disaster cost the mining company $800 million dollars to clean up and is still under ongoing rehabilitation and monitoring to ensure the toxic sulphuric acid and heavy metals and arsenic do not leach into the nearby Scott River. "The legacy of the BHP Beenup Titanium Mineral Sands mine is evident… In some ways, it appears to have raised understanding of the natural values in the region. However, the short-lived mine has also created some skepticism that significant developments could have a greater impact than initially anticipated or shared by the developer," the attitudes survey by ID Consultants says There is a very high risk of Acid Sulphate Soils being created during and after the construction of the enormous wind turbines and what this will present to the sensitive waterways of the Scott and Blackwood River and farmland. The Scott River district is known for its high ecological value and is protected under the ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (Scott River Ironstone Association – Endangered Category) there is a high risk to endangered flora and fauna from wind turbine construction and operation. There are 26 fauna species listed as threatened, priority or

		under protection that occur within the Scott River catchment. The northern part of the Catchment provides more habitat for roosting and main channel for foraging. As a farmer and landowner living near the proposed wind farm, I have valid health concerns living near the 250m high wind turbines and my family could be exposed to noise, disturbance and the changes made by the industrialized development forever to our rural landscape. I request that you consider the rare and endangered wildlife, the rural landscape, nearby residents and the unique and sensitive environment when assessing the proposed Scott River Windfarm project.
297	Indifferent	Wind turbines are becoming common in nearly every westernised country around the world including Antarctica. I will be impaced visually by these from my house, but understand the need to improve electricity supply for the future. However, my concerns also relate to reliability as Augusta is already being impacted on a regular basis with outages and no details have been provided about whether having these in place, will minimise this for our town. Synergy have advised the residents that if this is approved they will be setting up a Community Fund of $100,000 annually. We have had promises like this in the past, but often it never actually occurs. How can Synergy be forced to proceed with that promise when I do not think it has been included in their submission. Overall, the consultation has answered a lot of my questions, but have concerns of 'end of life' planning when I have just read that the Albany wind farm is now at 'end of life' and discussions on its future are only just beginning. Just like in mining, Synergy should already have an 'end of life' plan in place which is adapted regularly to ensure it is still relevant.
298	Object	As a resident of Augusta, the proposal to construct a large-scale wind farm on the Scott River raises profound concerns about environmental stewardship, community wellbeing, and the long-term character of the region. While renewable energy development is a critical national priority, not every site is appropriate—and the Scott River and nearby Flinders Bay illustrate exactly where the balance tips sharply against industrialisation. The most immediate and unavoidable issue is the visual impact of turbines that would rise to approximately 250 metres! Structures of that magnitude would dominate the landscape, transforming what is currently a largely untouched natural environment into an industrial skyline. The Scott River region is prized for its tranquillity, forested horizons, and the sense of isolation that makes it special. Turbines of this scale would be visible from great distances, altering sightlines not only along the river but also from surrounding rural properties, tourism viewpoints, and public conservation areas. The argument that people “get used to” turbines dramatically underestimates the significance of a visual intrusion of this magnitude. Once erected, the character of the region is changed permanently—and not for the better. This inevitably leads to another serious concern: devaluation of local property values. Numerous studies, both in Australia and abroad, indicate that proximity to tall turbines can reduce property desirability and long-term market value. Buyers seeking rural or semi-wild settings do not expect to live next to moving industrial towers with flashing lights, shadow flicker, and constant low-frequency sound. For many landowners, their property is their major lifetime investment. Asking them to absorb an economic loss raises fundamental questions of fairness. Even more troubling is the potential impact on the abundant local birdlife and especially the whales that have for countless generations relied on Flinders Bay as a migration rest point and calving area. Although the proposed turbines would be land-based, their proximity to the bay and the documented ability of low-frequency emissions to travel over long distances raise legitimate concerns. Whales are highly sensitive to low-frequency noise, using similar ranges for navigation, communication, and mother-calf bonding. Disturbance in this

		frequency band can cause stress, behavioural changes, and displacement from critical habitat. It is difficult to reconcile the precautionary principle with a development that introduces large-scale, persistent low-frequency noise so close to an established whale hotspot. Finally, there is the question of community benefit—or the lack thereof. Too often, regional communities are asked to shoulder the environmental, visual, and economic burdens of large energy projects while receiving only token contributions in return. If developers insist this project is in the public interest, they must articulate clearly how the local public is to be directly compensated. Will there be significant reductions in electricity costs for residents? Will there be revenue-sharing arrangements principally for the Augusta community as the district most directly affected? Without robust, transparent, and enforceable mechanisms for community benefit, support for the project is not just unlikely but unreasonable. What's more, Synergy has given no reassurance that this is a finite number of turbines, nor has the WA government guaranteed that the project will not be transformed into a joint-venture or wholly on sold to a private investor fund, specifically Bright Energy Investments (BEI) with whom it has historically passed over many of its existing wind farm projects. As of now, there is to be no public record of a finalised ownership or investment structure (e.g., joint-venture, private investor fund, community-owned model, etc.) for Scott River and because many details remain 'commercial-in-confidence', it's not yet possible to definitively say exactly how profits will be split. Ultimately it appears to me that the Scott River wind farm proposal risks sacrificing the region's natural identity, property values, and marine ecology for benefits that may never flow directly to the very community asked to bear the cost. Environmental responsibility requires more than building turbines—it requires placing them where they truly belong, in close proximity to areas already zoned for the purpose of industrial development. Thank you for your consideration in this matter.
299	Object	No to wind farms
300	Indifferent	I object to the view of the proposed wind farm creating an industrial look amongst the beautiful natural scenery. I object to the proposed wind farm in relation to environmental factors that may relate or be impacted by the equipment should it deteriorate over time. I object to the proposed wind farm should it cause health issues or noise that may affect humans or animals. I do not know enough positive and realistic information and evidence about wind farms. I do support renewable energy that fits the above mentioned points and perhaps wind farms in areas that are not impacted by the above mentioned factors.
301	Object	Great risks of fire. And fighting fires as water bombers cannot operate. Health of wildlife, stock and humans from blades, infrasound and noise. This beautiful, quite, hugly productive Scott River area will be turned in to ugly industrial zone. Disturbance the acid soils will ruin the Scott River area and beyond.
302	Object	It will be an eye sore. Fire risk Long term lease, no flexibility if circumstances change

		The benefit will only benefit a few people, will making a lot peoples life unpleasant Little or no jobs for local people
303	Object	I have concerns about the visual, noise and environmental pollution of this project. It's one of our most beautiful tourist locations in the state, where people come to see the stunning views and the natural beauty of this area. We have primary producers, wineries and people just wanting a quieter way of life. What is also concerning is the reports of asbestos being found in wind farms already established, I'm wondering what guarantees will be given to prevent this from happening in the future, spreading into our beautiful waterways and land. Might be better suited to Cottesloe Beach, or Mr Cooks backyard.
304	Object	I object most strongly to the proposed wind farm development. The proposed wind farm is only 5km from Molloy Island. The population of the island will be subject to the audible pulsating disturbance of the turbines from the turbulence they cause to the normally laminar airflow. This pulsation is a known cause of detrimental health effects on humans. It is the unchanging regularity of the pulsations, not the level of their audibility, which causes health problems. The pulsations are actually surges in air pressure which upset the balance mechanism in the inner ear. In the case of both Molloy Island and Augusta, the location of the turbines directly to the east is an exacerbating factor. The direction of prevailing winds for a major part of the year, and particularly overnight, is directly from the east. Night time is the time when the environment is normally the quietest and the time for sleeping. Sleep is essential for good health. The pulsing of the wind turbines will be most pronounced overnight at exactly the time when peace and quiet is most needed for healthy sleep. Furthermore, the area where the wind farm development is proposed includes both widespread and concentrated areas of Acid Sulphate Soils. When left undisturbed in their natural state, these soils are effectively benign and do not cause any problems to the environment. However once disturbed and exposed to normal atmospheric oxygen, they produce sulphuric acid which is highly toxic not only to local flora and fauna, but can cause much wider uncontrollable and permanent damage once it enters waterways such as the nearby Scott and Blackwood Rivers. The Scott River flows through the Scott National Park and confluences with the Blackwood River at Molloy Island. The former BHP Beenup Mineral Sands Mine project, which is nearby to the proposed wind farm, failed in its development stage as a direct result of sulphuric acid contamination caused by the disturbance of acid sulphate soils. Despite millions of dollars and many years spent by BHP trying to contain the problem sufficiently to make the mine viable, the project was eventually and unavoidably discontinued. BHP then spent many more tens of millions of dollars and more than 20 years to rehabilitate the affected area. A major part of the expense was on preventing an acid sulphate plume from spreading to the Scott and Blackwood Rivers. The experience of BHP so close by in the same type of soil cannot be dismissed as irrelevant. Although this current period for public submissions might be seen as an attempt at consultation, it is in reality little more than a poorly implemented public opinion poll. Instead, a thorough and exhaustive Public Environmental Assessment, at the very least, is warranted. Rushing this proposal past the eyes of the public with an obscenely short consultation period is not the way a responsible community would mistreat and disrespect its precious environment and certainly not the rights of people to a healthy, peaceful existence. I object strongly to the proposed wind farm development.

305	Object	I object very strongly to the proposed development. The level of objection to this proposal must not be assessed simply on the number of objections. That would be totally misleading given the low number of properties within the area affected by the proposed development. The true degree of public objection must be based on the proportion of the submissions which are in objection. I am a retired professional Civil Engineer with over 45 years' experience in planning, designing and construction of major infrastructure with the Water Corporation of WA, including earth fill dams, water supply and wastewater tunnels and pipelines, as well as service reservoirs, high level water towers and similar water services infrastructure. I bring that experience to my objections to the proposed development. My objection is based on three main points DAMAGE TO THE NATURAL ENVIRONMENT HEALTH DETRIMENTS TO NEARBY RESIDENTS, and NEED FOR COMPLETE PUBLIC ENVIRONMENTAL ASSESSMENT 1. DAMAGE TO THE NATURAL ENVIRONMENT The area where the wind farm development is proposed includes both widespread and concentrated areas of Acid Sulphate Soils. When left undisturbed in their natural state, these soils are effectively benign and do not cause any problems to the environment. However once disturbed and exposed to normal atmospheric oxygen, they produce sulphuric acid which is highly toxic not only to local flora and fauna, but can cause much wider uncontrollable and permanent damage once it enters waterways such as the nearby Scott and Blackwood Rivers. The Scott River flows through the Scott National Park and confluences with the Blackwood River at Molloy Island. The former BHP Beenup Mineral Sands Mine project, which is nearby to the proposed wind farm, failed in its development stage as a direct result of sulphuric acid contamination caused by the disturbance of acid sulphate soils. Despite millions of dollars and many years spent by BHP trying to contain the problem sufficiently to make the mine viable, the project was eventually and unavoidably discontinued. BHP then spent many more tens of millions of dollars and more than 20 years to rehabilitate the affected area. A major part of the expense was on preventing an acid sulphate plume from spreading to the Scott and Blackwood Rivers. In my experience as a 45-year career Civil/Structural and Hydraulic Engineer with the Water Corporation of WA, acid sulphate soils are an absolute red flag to disturbance by development. If detected on a planned infrastructure development site where excavation is unavoidable, the solution often is to construct a barrier to depth around the area to be disturbed before removing the acid sulphate soil from within the barrier and from site, backfilling with clean sand, compacting and then proceeding. Acid sulphate soils are by no means a minor risk at the proposed wind farm. The experience of BHP so close by in the same type of soil cannot be dismissed as irrelevant. 2. HEALTH DETRIMENTS TO NEARBY RESIDENTS The proposed wind farm is only 5km from Molloy Island. The population of the island will be subject to the audible pulsating disturbance of the turbines from the turbulence they cause to the normally laminar airflow. This pulsation is a known cause of detrimental health effects on humans. It is the unchanging regularity of the pulsations, not the level of their audibility, which causes health problems. The pulsations are actually surges in air pressure which upset the balance mechanism in the inner ear. In the case of both Molloy Island and Augusta, the location of the turbines directly to the east is an exacerbating factor. The direction of prevailing winds for a major part of the year, and particularly overnight, is directly from the east. Night time is the time when the environment is normally the quietest and the time for sleeping. Sleep is essential for good health. The pulsing of the wind turbines will be

		most pronounced overnight at exactly the time when peace and quiet is most needed for healthy sleep. 3. NEED FOR COMPLETE PUBLIC ENVIRONMENTAL ASSESSMENT Although this period for public submissions might be seen as an attempt at consultation, it is in reality little more than a poorly implemented public opinion poll. Instead, a thorough and exhaustive Public Environmental Assessmentm, at the very least, is warranted. Rushing this proposal past the eyes of the public with an obscenely short consultation period is not the way a responsible community would mistreat and disrespect its precious environment and certainly not the rights of people to a healthy, peaceful existence. The approach being used appears to have a mercenary intent. There may be some few merits in increased use of wind energy but it most certainly must not be at any cost and even less so at an unknown cost and risk. IN CONCLUSION I object in the strongest terms to the proposed wind farm development. At the very least, a Public Environmental Assessment is essential in this case, even if other objections are overlooked.
306	Support	The dreaful overpopulation of Australia and the Shire requires additional power. The alternative to renewables is to burn fossil fuel or gererate nuclear power, none of which will be palatable in the Shire. Objecting to the wind farm equates to being a NIMBY (Not In My Back Yard). The current hysteria over the proposal verges on insane, focussing on just one aspect of overpopulation. Examples of objections being voiced on Molloy Island include: • Noise from the wind turbines: if you can hear them over the chain saws and leaf blowers • Birds will be killed: how many dead birds are seen on our roads, yet we don't stop driving • The turbine blades will be visible: houses on Molooy Island are visible, but we don't object to houses being built. The proposed development has merit, as long as proper environmental controls are implemented during construction: especially prevention of acid sulphate soils contamination to the river systems.
307	Object	
308	Support	As an owner of properties in Augusta and Kudardup, I am strongly in favour of the proposed development. WA needs at least ten projects on this scale to make a dent in its night-time burning of coal and gas; most of those can be further north, but those can only be built as fast as the transmission network can be extended northward to reach them. In the meantime, we need to make a start where we can.
309	Object	The Hutton family purchased lot 4157 Governor Broome Rd Scott River in 1972. We then purchased the neighbouring property, Lot 2, in 2019. And have farmed the land from this date. At no time did the AMR shire approach land owners, other than those land owners who had signed land access agreements in 2017/2018, and disclosed the intent of the AMR Shire which was to endorse the AMRCCE to lead the development of a large scale renewable energy facility in the region. The publicly available evidence shows the intent of the AMR Shire Council. A number of Councillors, vice & presidents held positions on the AMR shire and the AMRCCE concurrently including Chair and vice chair. 2017 to 2025 Local Energy Action Plan 2018: OCM 28th June: Shire Council fund, support and explicitly endorse AMRCCE as a strategic delivery partner (“vehicle for achieving Council’s LEAP”) - only 42 days after AMRCCE incorporated [OM2017/150]. AMRCCE Affiliates in Shire: 3-out-of-7 Councillors are AMRCCE members..

		We were first made aware of the proposed Scott River wind farm when we were approached to be a project host by Synergy representative Rowan Gallagher in November 2022. As stated in a 2017 report penned by then Chairperson of AMR community energy project working group created by Shire in 2016 : The extent of AMR Clean Community Energy's shareholding in the ultimate entity will depend upon the negotiated value placed upon the assets created by AMR Clean community energy and offered to the entity that will ultimately own and operate the Renewable Energy facility. The aim is that AMR Clean community energy will become one of the 20,000 social enterprises in Australia, most of which are owned by not-for-profits, that are self sustainable and use their income generating activities to benefit their communities.... How did AMRCCE generate income? (other than Council funding & donations)? By oppertunistically selling assets obtained by AMRCCE including wind data obtained from other potential developers and land access relationships. In doing so, subjecting the local community and neighbouring land owners to years of uncertainty, conflict and high risk. ie throwing the local people under the bus. The AMR shire and the AMRCCE have sold us out. After seeking legal advice we refused to host turbines or sign a neighbour agreement. The uncertainty & concern we voiced on a number of occasions to the Synergy reps regarding not only the detrimental impacts on our business, but the potential impacts on our land and environment caused by industrial scale wind turbines. These concerns are reflected in the opaque nature of the Synergy DA to EPA. Acid sulphate soil contamination not only in the waterways of the wetland environment, but lateral movement of the acid pyrites through the soil profile. Our property is/was directly downstream of the project site. Damage to pressurised surface aquifers effecting water tables and the ironstone community. Noise, vibration, infrasound and EMF. Survival birds and bats, including but not limited to thousands of migratory black swans which have inhabited both host and neighbouring properties... The use of our land as project buffer - regardless of signing a neighbour agreement. Dictating to us where we could build our family homes on the property. Risk created by blades shedding carbon fibre, turbine fires and health risks to animals..... All responses to our concerns were either denied or we were given "settled science" to read.....This then makes one question the authenticity of the intent behind this proposal... dismissing genuine health concerns eg Infrasound as 'Nocebo' enables these projects to proceed. If renewable industry proponents were forced to acknowledge the human, animal and environmental damage & death caused large scale renewable projects, they would simply not get Approval. We were forced to sell our farm due to the financial uncertainty that has accompanied the Scott River turbine project.
310	Object	This proposed wind factory for the Scott River is extremely unsuitable. What it has done is divide the community. It appears that the majority of those that support this dont live anywhere near the site and live in a suburban setting with no regard for environmental impact. And yet those opposing this know full well what detrimental effects the wind turbines will present. There will be a huge impact on the fragile Scott River ecosystem. The laying of huge concrete support for each of these turbines will impact on the acidic sulphate soils sending further to the destruction of the diverse flora and fauna that exists in this pristine area. There is very little trust in the company, that it will return the site to it's original state if decommissioned, which it will be because all over Australia and world wide, people are waking up to the inefficiency of wind turbines. They only produce intermittent and variable energy and definitely not on demand. Battery storage is not solved for a growing demand. Vesta-Synergy RED's preferred supplier for the Scott River wind factory has been named in the national asbestos scandal. Synergy RED and Vesta need to be open and put their full supply chain on the table, every component, every supplier, every safety check. Prove that it complies with Australian law. If this proposed goes ahead, on completion, those that inhabit the surrounds will be subjected to excessive noise, infra sound, EMF, BPA,

		PFAS, Cadium and Asbestos. The cost of a wind farm is never reported in the promotion but hidden away in the contract. It threatens bio diversity, selling a vision in which all the faults are hidden, more marketing then science. The value of properties in this area will go down. Coal produced energy is far more efficient and reliable. Stop making this a political issue and return us to a productive industrial and farming community.
311	Object	Subject: Submission Regarding Proposed Wind Farm Development I appreciate the opportunity to provide feedback on the proposed wind farm development in Scott River. While we acknowledge the importance of renewable energy initiatives, we have significant concerns regarding the adequacy of the submission and the potential impacts on the local environment, community, and our property. 1. Overall Concerns The submission does not sufficiently address key issues, and several reports rely heavily on desktop studies rather than comprehensive field investigations. This approach raises serious questions about the accuracy and reliability of the findings, particularly in areas such as geotechnical assessments, which are based on a limited number of test sites. 2. Social and Economic Impact The proposal offers minimal economic or social benefit to the Scott River community, aside from a few landowners hosting turbines. The consultation process has not adequately engaged affected residents, resulting in a polarized community. The referenced 'Way of Life' study does not reflect the views of many landholders within the area. 3. Environmental Impact • Flora and Fauna: The assessment lacks sufficient detail due to limited fieldwork. Birdlife is likely to be significantly impacted by turbine strikes. Surveys were conducted within the development envelope over a short timeframe, which does not provide a representative view of biodiversity. • Fire Risk: Wind turbines pose a fire hazard. The submission lacks clear mitigation strategies and compensation measures for potential fire damage to adjacent properties. • Greenhouse Gas Assessment: The estimates for supply and construction phases appear understated and rely on theoretical assumptions rather than confirmed turbine specifications. 4. Visual and Acoustic Impact • Visual Impact: The windfarm does not enhance the visual landscape in any way and will be prominent from many locations in the district. The wind turbines proposed are of an industrial scale and not suited for this sensitive environment The proposed turbine height of 250m is disproportionate and incompatible with the sensitive landscape. The turbines should not be higher than 140m, consistent with most other Australian wind farms. 5. Acoustic impact • Significant concerns over Noise, vibration, infrasound, and flicker impacts on health and well being of people in the vicinity of the wind turbines 6. Groundwater and Acid Sulphate Soils Everyone is aware that Scott River area is highly sensitive to acid sulphate soils and groundwater management. The geotechnical report

		indicates significant dewatering at turbine sites, posing risks to the environment and our property. Independent evaluation of these issues is essential. This is a significant risk in this region and needs to be further evaluated by parties independent of this approval. We note from the geotechnical report that borehole WM02 on the block adjacent has an extreme reaction when checking for acid sulphates at a depth of 3.5m. which is extremely close to our boundary and is a major concern. 7. Construction Phase The project will require substantial raw materials, likely sourced from the adjacent gravel pit, which has previously breached operational conditions. We have serious concerns about compliance and enforcement during construction. 8. Fire Risk The project does pose a degree of fire risk to the area and given that the operation of the turbines will be undertaken remotely we are concerned that fires will be identified too late and become uncontrollable with consequences to properties and residents in the area 9. Impact on Our Property We hold a Development Approval for three chalets near Coostien Road and plan to commence construction in early 2026. Four turbines are proposed within 1.5 km of this development, yet the submission does not consider the impact on our tourism venture. We seek assurances that: • Noise: The noise impact assessment does not include our planned chalets. The area is currently very quiet (we are able to hear the ocean which is 5km from our property in the evening), and continuous turbine operation will significantly alter this environment. We request assurances that noise levels will comply with WA EPA Noise Regulations 1997. The windfarm DA Submission states that the internal noise levels of a property will not exceed 30dba in the evenings and 45dba externally. If this development proceeds we would expect that a noise-sensitive receptor be installed near our chalets to trigger turbine shutdown if limits are exceeded. • Infrasound has not been assessed and must be evaluated to ensure no detrimental effects to humans. • No vibration impacts from the wind turbines have been included in the DA Submission and that these will be addressed • Shadow Flicker: Compliance with national guidelines must be confirmed, and our chalets should be included in the analysis. • Any future expansion of chalets or additional uses we may wish to proceed with on our land will not be restricted by wind farm operations. 8. Other Considerations The wind farm will likely reduce the value of our property and the viability of our tourism business. Despite this, we intend to proceed with development and subject to the final outcome use the chalets as a case study of tourism coexisting (or not) with large-scale wind farms in an ecologically sensitive area. 9. What we would like to see • Comprehensive environmental and social studies with meaningful community engagement. • Independent assessment of groundwater and acid sulphate soil risks. • Inclusion of chalets on our property in all impact assessments. • Conditions to ensure compliance with noise, flicker, and vibration standards. • A maximum blade height of 140m. • The Shire to ensure compliance with all relevant codes/legislation and standards and accept that the Synergy submission requires to be further detailed and challenged for accuracy and completeness. This was certainly not the case with the gravel pit on Gov Broome Road as the detail in the Gravel pit submission was never adequately checked for accuracy. Also the commitments made by the operator in

		their submission/ approved BL are not being adhered to. Thank you for considering our submission. We look forward to your response and to working collaboratively to ensure that if any development proceeds it is undertaken responsibly and with due regard for the Scott River community and environment.
312	Object	This proposed wind farm situation is forcing a clash between renewables and tourism! It should never be sited near an incredibly popular laid back tourist town of Augusta. It has and will divide the community! It should never be located on top of poor farmers in one of the states most productive agricultural regions. The WA coastline is massive and a better site should have been chosen. I personally will avoid looking at them when in Augusta as they are ugly and annoying. Frankly placing them there is criminal arrogance. Property prices will plunge and someone is going to be sued! I feel extremely sorry for all those residents who have to live next to these monsters and have to look at them daily. In most other states they have been located far away from populated areas in remote locations. It seems like in WA it doesn't matter who suffers as the$ rules under the disguise of renewables!!!
313	Support	
314	Object	I am apposed to the wind farm in Scott river , near crown land .. because the 250 m turbines need to be processed , and the energy to :dispose of the wastes may exceed the benefits!! I am concerned about asbestos and problems with environmental impact .please don't rush ,- this is a huge project with huge impacts and honestly need to be carefully investigated.. This will impact the reputation of the Augusta -Margaret river region as a premier international destination for tourism , farming cropping and it needs to seriously be considered, as once taken away or contaminated- it will : not be "energy -efficient "to recover. I am considered the risks of decontamination and dewatering of dams , bores and drains .. The 250 m turbines upon a sensitive floodplain with acid sulfate soils with a shallow aquifer. The firefighting difficulties , evacuation and no fly zones above the turbines . Concerned about noise, infrasound and shadow flicker from turbines that may be too close to homes and boundaries. I have moved to Augusta for the serenity and natural landscape , tranquility and am concerned about the wind turbines effect (as may be visible / noticeable from multiple points in around town) on my and many others' mental health .Artists will not choose the area and the impact may be felt in the Margaret river open studios art trails which has generated income , work for both cultural and entertainment venues, culinary and organic food.. (impact of , beef and greenery) Scott river being changed from a food bowl to an industrial power zone ; having irrevocable consequences on the surrounding region… the proximity to the natural resources is what concerns me.. is there not a location somewhat further from the natural resources . and less populated area .. ? I am concerned about the transparency of the application process for these turbines.- .. please can we have more open discussion forums . What about the wildlife impact? Bats , birdlife native..)
315	Object	Will destroy the character of the town and all properties on Turner street. Severely impacting property values as the negative effects on the environment, bird life, eyesore. Will impact tourism and the towns economy as the majority of the town will look over this eyesore. People leave concrete jungles to embrace nature - just to face unsightly structures build in / on environmental sensitivity area with some of the last natural areas and views left in WA. This process and approvals is a disgrace! I strongly object against approval of this project!

316	Object	environmental concerns negative visual impact from our property reduced property issues for nearby land owners
317	Object	negative visual impact on our coastal town negative impact on our property value environmental concerns
318	Object	I am strongly opposed to the Scott River Wind Farm project for the following reasons. - The site is on sensitive flood plains in a biodiversity hotspot which will no doubt have a detrimental effect on the plants and animals. - The bushfire risk and no fly zones is so dangerous in an area that is neighbouring essential primary producers and close to increasingly populated areas including the new Karridale and Kudardup residential subdivisions. - The wind farms will take away from the natural/ untouched views which bring so many tourists to the area each year. The untouched beauty of Augusta is what makes it so special. Seeing 250m high wind turbines from Flinders Bay and the Augusta hotel will be such an eyesore and a terrible shame.
319	Object	Although generally in favour of renewable energy projects, I have some objections and concerns regarding the Scott River proposal. 1. The height of the towers at 250 metres is out of place with the general skyline of the local environment. At about 5 times the height of the Cape Leeuwin lighthouse, the wind turbines would reduce the amenity of views for local residents and visitors to the area. 2. The area in question has an important aquifer and the deep foundations required for the turbine towers may impact the water supply as experienced with the BHP mineral sands mine (now closed). 3. Will the existing powerline network have the capacity to carry the electricity generated? If additions to the network are required in the future, then, there is likely to be significant clearing. 4. Currently, the area concerned is, generally, productive rural land. Will the location of the turbines reduce the area for primary production activities?
320	Support	I support a move away from fossil fuels and this part of the country has an abundance of wind . This makes sense to capture this for the future move to away from coal fire power stations. I do not consider them to be an eyesore as they have been used all over the country without any detrimental effect
321	Support	
322	Object	i am in opposition to this developement. destroying nature to save the environment is non-sensical wind farms have a massive environmental 'footprint' the vested interests in this are obvious, including the bias on the local councils behalf once again we will see big business move in on local community and do as they please psm.
323	Object	I’m concerned my health quill be effected

324	Object	There is enough peer reviewed papers suggesting health risks are associated with industrial wind turbines.
325	Object	I do not support the proposed wind farm in our shire. It is not wanted by the community, and proceeding with it would be a waste of time, resources, and ratepayers' money. The community has already indicated clearly that there is no support for wind farm development in this area. Projects like this are being pushed despite consistent local feedback. The proposal does not reflect our community's priorities, and it risks creating unnecessary division and expense for no genuine benefit to residents. Council resources should be directed toward projects that have real support and clear value for the people who live here.
326	Object	Wrong project for the wrong reasons: Disadvantages: 1) no jobs beyond unskilled for land clearance/concrete foundation pouring; materials/equipment imported and transported by 'oversize road trains' to site. Construction and infrequent maintenance will be undertaken by itinerant labour; operations will be remote. 2) Unpredictable intermittent power generation supply: hence, cannot displace baseload power generation. It is an ineffective project if Synergy are trying to displace power generated by fossil fuels. 3) Reliant on this type of project will create an increase in the frequency of spikes in demand above supply, which firstly increases power generation unit costs as a result of inequality of supply vs demand and secondly will lead to load shedding, brown-outs and black-outs particularly at edge of grid : i.e. AMR shire (similar to any regional/centralised edge of grid areas, for example within countries such as northern Norway and Canada). 4) Significant positive carbon footprint (not a good outcome): planting trees elsewhere is unfortunately greenwashing. No ability for recycling materials; for example, used turbine blades are shredded and end up in landfill. The project proponents cannot take credit for displacing any existing baseload power generated by fossil fuels. 5) Low plant availability: infrequent availability of power generated when required by the grid: majority of times either power generation is available, but demand is not required, or when demand is required, generation is not feasible due to lack of wind. 6) Major negative impact from loss of farmland and local biodiversity. 7) Project economics will always need to rely upon an assured revenue stream to calculate the NPV and reach financial closure. Upside from any unknown quantity of intermittent power supply cannot be credibly taken up in the economic viability assessment. This is being particularly so, if the project proponents are looking to farm down their investment at some point in the future. Hence economics will rely upon an artificially high annual installation tariff. The taxpayer will be paying for the wind farm through increased electricity bills, to compensate for the frequent periods when the facility is idle/off load. 8)AMR Shire should be across the ranking of this project against all other options to meet the regional forecast power generation demand curve, whilst phasing in a manageable way, the reduced reliance upon baseload power generated by fossil fuels. For example three alternatives provide greater long term economic and environmental benefits to our community: A) Questions remain as to why are Synergy not promoting further the greatest impact to increasing power generation though their 'Project Symphony' program: why is this roof top integrated solar power project, potentially from Mandurah to Joondalup not being implemented as a priority when the benefits clearly outweigh any land base wind farm. B) Greater long-term planning and implementation of multiple interconnected decentralised power generation, transmission and distribution networks will afford greater alignment to the community needs. C) Thirdly offshore wind farms also better address the power generation unpredictability factor, through access to less turbulent/ more laminar wind flow. Short-term increased capex considerations associated with shallow water installation (as opposed to land installation), should not override the

		permanency of land damage through unnecessary land clearing for onshore operations, simply because BHP previously laid a power cable nearby. 9) In summary AMR should push back on accepting a project in the Shire that has no discernible benefits and major disadvantages and seek to work with Synergy to implement only those projects that generate long term real benefit for our community. Simply labelling this project as a renewable project is disheartening when it clearly has a major carbon footprint and does not discernibly address the ability to withdraw the reliance upon fossil fuel generated power.
327	Object	It costs more to the enviroment to make wind turbines than they use
328	Object	I strongly disagree to this absolute scam/hoax and believe it will have such a negative impact on our community, water ways, farm land, nearby farm animals.
329	Support	I support renewable energy generation over burning coal or nuclear power generation. Most important we get on target before all the obvious signs of extreme bush fires, destructive winds, rain and rising sea state engulf our world. I and many in the community would like to see an impact study on mostly how the environment will be affected, both fauna and flora. How it will affect local businesses and communities during construction and period of operation.
330	Object	The Scott River is not a suitable or sustainable location for a wind farm. The acid sulphate soils, if disturbed, have potential to dramatically damage the Scott and Blackwood rivers. Should hydrological changes be put in place to prevent leaching of acid sulphate soils there is a significant risk of damaging threatened flora such as Darwinia ferricola (endangered), Grevillea manglesioides subsp. ferricola (priority 3), Lambertia subsp. Scott River Plains (endangered) and Melaleuca subsp. Gingilup (priority 2). The increased traffic that would accompany this project would also greatly increase the risk of Dieback (Phytophthora) introduction and weed introduction. The Scott River area is currently subject to Environmental Protection and Biodiversity Conservation Act which in itself should prove this area is not suitable. Many unique Ecological Communities are at significant risk of damage from this proposal. The visual pollution from this proposal is also significant. The visual landscape will be changed forever with the introduction of the wind farm and its effects will be greatly felt by the residents of Augusta. Our beautiful natural environment and landscape should not be destroyed by the permanent, man made, visual and auditory pollution these structures would bring. How will fire within this site be managed? Wind turbines are a structure, this and the Hazmat they present would mean local Bushfire Brigades are unable to assist directly with fires involving the turbines. The closest VOLUNTEER Fire and Rescue Brigade is over 35 minutes drive away plus mobilisation time. At every angle the risks of this proposal are not worth any possible minuscule gain. I implore the Augusta Margaret River Shire to oppose the Scott River wind farm proposal. Please keep my name confidential as this is a very emotive subject within our community

331	Support	I support the proposal as I would like to be using wind power generated electricity in my home, rather than that produced by fossil fuels that climate change worse. However I only give my support for a facility that minimises any clearing of native vegetation, and doesn't adversely impact local native endangered flora and fauna.
332	Object	Acid sulphate soil disturbed during construction leaching into Scott River,, Blackwood. I use both.
333	Support	Like the idea, should have provision for battery storage
334	Object	I will be able to see the turbines from my house. presently all I see is green bushland and that is the way it should stay. Wind farms should be placed in already visually polluted areas such as existing industrial areas. I'm also not convinced of the long term viability of wind farms given there relatively short life spans.
335	Object	What a blight to this beautiful area. We should enhance our beauty and protect our wildlife with every ounce of our being. I do not want to live in the line of this ugliness & believe it will not only affect the residents but could also impact the value of my property and all surrounding properties into the future. Clearing of 1 ha of native bush - how many animals will be displaced & eco systems destroyed. No more clearing of any land should be allowed no matter the reason. We need to stand up for those who can not speak for themselves, the small creatures, the birds, the insects - they all matter. I SAY NO TO THE WINFARM lets keep Augusta Margaret River pristine for the future.
336	Support	I don't live in Scott River and the proposed wind farm doesn't affect me directly, but I support renewable energy generally. I am concerned that climate change will have devastating impacts on everyone, so everything possible should be done to reduce the impacts of fossil fuels. If I lived in Scott River, and the wind farm proposal was next door, I would still support it.
337	Support	I hear y support the installation of up to 20 WTG's in the proposed location
338	Object	Policy must be relevant to modern sizes of turbines and projects. Buffer zones shouldn't be absorbed by neighbouring properties and host properties should br large enough to absorb appropriate setbacks to dwellings and boundaries. Independent environment impact studies should be at the forefront to accurately assess risk VS benefit and identify high risk floodways and water catchments. Decommissioning liability needs to be clearly established and cumulative impact disclosed.
339	Object	Sensitive ecosystem with high risk acid sulphate soils. High potential to contaminated water ways and aquifer affecting diverse flora and fauna in and around river catchment. Lot Holdings are too small for such a large scale industrial project. I am highly concerned about the vibration, infrasound and noise pollution. Increased fire risk with limited defence capacity due to no-fly zone.
340	Support	Very much in favour of a renewable energy transition away from fossil fuels and therefore very supportive of this proposal. I strongly support this being done with the least impact on the local environment, in particular any impact resulting in loss of habitat for local fauna and flora as well as any adverse impact on areas of cultural significance.
341	Object	
342	Object	Reasons for Objection below Community: If the shire supports this DAP application it would present as a classic case of the AMSRC favouring one cohort of rate payers over another. The proposed wind farm will be an absolute eye sore degrading the natural beauty of the Augusta region and town vista, and will erode or supress real estate values. The Augusta rate payers would wear this decision and vandalism solely and in full (in disproportion to

		the wider shire rate payer base) and in doing so would rightly have a case to pursue damages. Should this DAP application be approved our household will be one of what is a growing number of rate payers in the Augusta region that are now committed to contributing to funding to take every legal avenue available to us to overturn, delay and/or frustrate the development process for as long as possible. Environment: There is a very probable risk of Acid Sulphate Soils being created during and after the construction of the enormous wind turbines and what this will present to the sensitive waterways of the Scott and Blackwood River, neighbouring farmland and Flinders Bay. It's been proven 20+ years ago with the failed Beenup mineral sand mine that sits adjacent to the site. BHP couldn't contain the toxic reaction in the soil when they disturbed the soil below a certain depth. This environmental disaster cost the mining company $800 million dollars to clean up and is still under ongoing rehabilitation and monitoring to ensure the toxic sulphuric acid and heavy metals and arsenic do not leach into the nearby Scott River. The modern wind turbine requires substantial footings of 10m plus and extensive underground cabling to connect to the grid... The proposed location of the wind farm, will also risk the superficial aquifer system and the native vegetation that has specifically adapted to the ironstone profile of esturine environment. Wind turbine foundations on this known, high risk Acid Sulphate Soil site at the Scott River is a disaster waiting to happen! The Scott River district is known for its high ecological value. The entire wind farm project is located inside the sensitive 'Scott River Ecological Community protected federally under the EPBC act. There are 26 fauna species listed as threatened, priority our under protection that occur within the Scott River catchment. Flinders Bay is an internationally recognised birthing ground for the endangered Southern Right Whale and and a successful and sustainable aquaculture industry, an Acid Sulphate Soil breach at the Scott River will have serious effects on our environment and wildlife. Setbacks: The block sizes are too small at the Scott River to safely host an industrial energy project of this size and scale. The wind turbines proposed will be unprecedented at 250m high and the largest land-based turbines in the country, equal height to the largest skyscrapers in the Perth city skyline! The amenity and rural landscape will be changed forever with multiple industrial skyscrapers towering over residents 365 days of the year, creating noise, shadow flicker and other disturbances like flashing lights at night. Fire: Industrial wind turbines will increase fire risk to Augusta, Scott River, Molloy Island, East Augusta, Karridale Alexandra Bridge, Warner Glen and Kudarup communities. With no aerial and limited ground support around the industrial site. This is due to the no-fly zone above a wind turbine facility. Firefighters are already restricted at ground level due to the high value ecological communities that are protected federally under the EPBC act (Scott River Ironstone Association) that exist in the neighbourhood. Ground crews and fire trucks are restricted on sensitive sites surrounding the wind farm proposal. This puts our community and assets at a heightened risk from bushfires.with no aerial support and limited ground support around the proposed wind farm. Industrial wind turbines disperse highly toxic compounds onto the ground and into the air during catastrophic failures.

		Health Effects: Synergy is claiming that it's safe to live near and run livestock under the turbines. However, many international studies have shown there are serious health effects for humans and livestock. A German study found the pulsing acoustic vibration from wind farm infrasound 20 kilometres out from turbines. Something to consider for residents living in Augusta, East Augusta, Karridale and Kudarup, just over 10km from the Scott River proposal. Molloy Island, Nillup, Warner Glen and Alexandra Bridge residents are in the firing line at just under 6km. Wind turbines create a noise that humans can hear measured in decibels. However, they also produce a sound ultrasonically by the blades, called infrasound. Humans don't hear it as such, it's more like a frequency and a vibration and it's measured below 20 hertz. Infrasound easily travels through the walls of your home and into the human body. This creates serious discomfort in people. Causing sleep disturbance, balance problems, nausea and headaches. One common link amongst sufferers of infrasound exposure is heart disease. It's been shown that in some cases livestock actually die from the stress and lack of sleep, as they simply can not rest with the noise, ultrasonic vibration and disturbance from the wind turbines, around the clock. Developers of industrial wind facilities are currently only regulated by audible noise measured in decibels, not low frequency emissions measured in hertz. This policy needs to change. Contamination: Contamination of farm land and waterways is a serious concern for residents. The 100m long blades of a wind turbine erode during operation. This leading edge erosion spreads micro-plastics over great distances.
343	Support	I believe this to be an excellent project, contributing to our collective responsibility to reduce our carbon foot print. Hopefully it might also contribute to the provision of a more stable supply of power to Augusta. I am vehemently opposed to the stance taken by those who oppose these type of projects on the basis of aesthetics and/or impact on agricultural operation or loss of production. Any fair minded analysis of these arguments show that the benefits out weigh any negative impacts. The NIMBY attitude of such people is slowing down, and increasing the cost, of meeting our obligations to future generations!
344	Object	I strongly oppose the Scott-River Wind Farm on the basis of considerable public objection, inadequate assessments, and the severe short and long term impacts and risk to habitat, wetlands and health extending into a huge area of a unique and fragile ecosystem globally recognised as a unique biodiversity hotspot. That the project is being 'sold' as a green, environmentally positive solution to the public and decision makers is simply ridiculous. The sheer scale of the proposal of 20 turbines to a height larger than the tallest current building in Western Australia, visible for approximately 68km and only 6km away from the residential area of Molloy Island and close to Augusta should have triggered rejection well before now. The prominent visual feature of the nearby tourist town of Augusta and tallest lighthouse on the Australian mainland at just 39m will be dwarfed by the eyesore of 20 x 250m turbines in the distance. Augusta has been recently chosen as the filming location of several high profile film productions with major economic benefit to the area and that choice was due to the area's untouched beauty, 'that view' from the Augusta Hotel will lose its appeal and the beautiful reputation will be destroyed for an outdated energy solution. In additon to the visual intrusion, auditory impacts from infrasound are expected to be detected up to 90km away - 6km is unacceptable and poses significant human and wildlife health risks. Sleep disturbance from wind turbines are known to be responsible for mental health decline, cardiovascular problems, immune system and metabolic issues and safety concerns from drowsiness. Habitat clearing and the impacts of infrastructure are also unacceptable from a government that promised protection of environmental assets. I am quite honestly shocked that this proposal has continued in any form for this pristine area of the state. It's continuation would only occur for the benefit of a few and to the detriment of many (especially the fragile environment). I urge the authority to consider the long-term legacy of this decision. Approving this project in this sensitive location would represent a significant and lasting misstep in regional planning and would result in a permanent and irreversible degradation of the unique landscape and amenity of the area for future generations.

345	Support	Strongly support the proposal. The windfarm will have a strong positive environmental impact and very little permanent adverse environmental or social impact. It is essential to the preservation of the region.
346	Object	This is an ugly industrialisation of a beautiful natural environment. The risks for environmental damage to the Blackwood river and estuary are too high for the convenience of location alone. There is no direct benefit to the Augusta community especially when it comes to the continuity of electricity supply. Just massive risk with no reward. Why on earth isn't Augusta at the very least getting a community battery out of this that can power the town for days while flakey transmission lines are fixed after a storm? Or better still, use some of the massive millions being offered to overseas companies to build these hideous windmills to provide batteries on every solar home in Augusta to create a Virtual Power Plant for Augusta together with the community battery that could make Augusta self sufficient?
347	Object	This is an ugly industrialisation of a beautiful natural environment. The risks for environmental damage to the Blackwood river and estuary are too high for the convenience of location alone. There is no direct benefit to the Augusta community especially when it comes to the continuity of electricity supply. Just massive risk with no reward. Why on earth isn't Augusta at the very least getting a community battery out of this that can power the town for days while flakey transmission lines are fixed after a storm? Or better still, use some of the massive money being offered to overseas companies to build these hideous windmills to provide batteries on every solar home in Augusta so that the community battery could make Augusta self sufficient? We have had dozens of power outages this year.
348	Support	I strongly support this proposal. Windfarms are an essential part of the energy transition and a great way to supplement solar. They are safe and have minimal impact on wildlife.
349	Object	The proposed Scott River wind farm/factory will be a significant industrialisation of a picturesque, pristine, rural landscape of quiet farmland and native bush well known for its diversity of flora and fauna. From our property the visual pollution will be significant and not inconsequential hence it is our considered opinion that resale property prices of our property and 90% of Augusta will be adversely affected. Another aspect to this development is the guaranteed high risk of environmental damage from acid sulphate soils proven to be present in the development envelope. To hope to control this with lime application as the Synergy proposal states is nothing short of naive when it comes to the cavalier approach of most construction contractors, hence environmental damage to the Blackwood River estuary is almost certain with result death of the estuary, an important breeding ground for marine and aquatic life. The aspect of noise pollution is also of concern given we will be at 10 km direct line of sight from the development and that current proven scientific data about the adverse affects of this pollution at this distance, is uncertain/unknown. There is no doubt that the wind resource for this wind farm/factory is very good and that the location adjacent to a HV transmission line is also very good, however to use these as sole justification for the project over other far less risky and remote locations is short sighted at best when the environmental risks are so high.
350	Object	Absolutely reject the proposal of those wind turbines anywere in the south west. They destroy more than they save, please wake up.
351	Object	I object to this proposal because of the potential adverse environmental impact the towers will have on the Scott Plain, Yarragardie Water System and the Flinders Bay marine and coastal environments. This is due the severe acid sulphate soil and underground environment that exists. Eg: BHP minesite and agricultural operations impact. I also object to the significant potential the towers could have on industrial sound and their visibility over the Augusta, Flinders Bay, Molloy Island, Karridale and farming communities. as well as the impact on the national parks in the locality. Surely we can locate a location that does not have the risks and potential damage that this proposal would create. The changes to the environment and community could be adversely life changing. As a community we do not want this to occur.

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352	Support	I support the DAP Application by SynergyRED for a proposed wind farm in Scott River (P225771 - DAP Application DAP/25/02933 - Wind Farm), including the approval sought for the 'maximum case scenario' in terms of level of impact. My reasons for supporting the application are: (1) I understand that emission of CO2 through the burning of fossil fuel by humans is leading to warming of the planet. This conclusion is supported by science, see References 1 and 2 below. In summary, References 1 and 2 show that the way in which the return to space of the energy reaching the Earth from the Sun is being affected by an increasing concentration of the CO2 in the atmosphere. The overall effect is to increase the surface temperature of the Earth, leading to rapid human induced climate change with seriously detrimental effects, being: - Increase in frequency and severity of agricultural & ecological drought - Increase in frequency of fire weather with consequent more frequent wildfires - Increase in frequency of flash flooding - Increase in frequency of storms, heavy rain, and hail - Glacier retreat - Global sea level rise with coastal inundation and heightened storm surges - Upper ocean acidification with consequent adverse effects on marine ecosystems - Increase in frequency and severity of land and marine heatwaves The use of renewable forms of energy, such as the SynergyRED wind farm at Scott River will reduce CO2 emissions from energy production in the SWIS, and hence help globally to reduce the abovementioned detrimental effects of human induced climate change. (2) I believe the benefits of the SynergyRED wind farm outweigh the detrimental effects of it. The benefits include: - Wind is a renewable source of energy and use of it to generate electricity produces less CO2e/kWh over the lifetime of energy production than equivalent coal and gas generation as shown in the following comparisons (Reference 3): - Wind: 0.01 kg/kWh - Coal: 0.82 kg/kWh - Gas: 0.49 kg/kWh - Wind is a low-cost source of energy and the use of it to generate electricity costs less over the lifetime of energy production than equivalent coal and gas generation as shown in the following comparisons (Reference 4): - Wind: $27-$73 per MWh - Coal: $69-$168 per MWh

		- Gas: $45-$108 per MWh - Energy Independence: Wind turbines can generate electricity locally, reducing reliance on imported fuels. - Sustainability: Wind turbines can be built on agricultural land, allowing for dual use. References: (1) "Principles of Planetary Climate" by Raymond T. Pierrehumbert - This text book gives the reader an understanding of the present and past climate of Earth in terms of thermodynamics, infrared radiative transfer, scattering, surface heat transfer, and various processes governing the evolution of atmospheric composition. (2) "Intergovernmental Panel on Climate Change AR6 Synthesis Report: Climate Change 2023" - This IPCC report summarises the state of knowledge of climate change, its widespread impacts and risks, and climate change mitigation and adaptation. (3) "Australian Energy Update 2025 report from the Department of Climate Change, Energy, the Environment and Water". (4) "CSIRO 2024-25 GenCost Report".
353	Object	This proposed wind farm will destroy the habitat of many wildlife animals and birds and destroy the natural environment it will stand on.
354	Object	Our 'Unique town of Augusta's' claim to be 'an area of outstanding natural beauty' demands to be nurtured and respected now and for future generations to enjoy. The majority of residents are saddened by this extraneous and shocking proposal our community now has to address. Our protection now is essential, or this will be destroyed and irreplaceable in the future! Many of our small towns in Western Australia have already seen this happen by stealth, please do not allow Augusta to follow!
355	Support	I support renewables in general, and this proposed location has the advantage of strong winds and existing transmission lines. It's a another step on the long journey to net zero in 2050. Good to see only 1 hectare of native vegetation will be cleared - far less than the clearing done on the farms in the site area. Visually, it's a long way from Augusta, so most people will hardly notice it. Those opposed to it there will get used to the sight of it, as has been the case for the Denmark wind turbines.
356	Support	although in support of the windfarm, I am concerned that the foundations for the towers may have a yet to be established (to my knowledge) impact on both surficial and deeper ground water aquifers.
357	Object	The proposed wind farm threatens native wildlife and fauna, disrupts scenic real views and introduces industrial noise into a peaceful area. We must say no to this project and push for alternatives that truly protect our region.
358	Object	This proposal is a ridiculous size which impacts socially on the surrounding and nearby settlements and will affect the livelihoods of those residents. The noise, visual intrusion and potential health impacts are real. In addition it will impact on the pristine Scott River

		environment, valued by most local people. It will destroy the quiet, clean and beautiful environment of this area. These projects should be located on more remote farms and pastoral leases where there is less of a social impact and environmental damage - keep these wind farms away from river systems and place of precious environmental value.
359	Object	They will be an eye sore & noisy & unknown health affects
360	Support	I am looking forward to having a wind farm in the area and hope it will supply the Augusta community with much needed renewable energy.
361	Support	I'm very much in favour of this project going ahead. The location is ideal for generation of wind power and close to transmission lines. The only thing missing is a 'community' battery to store the power for local residents who cannot afford their own. For the last few months , there has been a huge amount of negative campaigning about this project in the Augusta area. Much of this has used emotional language to frighten people , without giving any scientific basis to the claims.
362	Object	I object to the proposed windfarm in Scott River. Unlike other parts of the Shire, the Scott River National Park is unique and pristine in nature where a development with turbine structures as high as 250m do not belong in this National Park. There is a reason for the name 'National Park'' not to be abused. Leave our area alone as it has been for decades before us.
363	Support	We need to urgently address global warming and that means everyone playing their part. I also support action to ensure a safe and reliable energy supply that can support the local economy into the future. I do not support an “at any cost approach” but believe that reasoned debate should not be hijacked by a small group of vocal objectors who do not seem to offer other options. This proposal seems to have few contentions and we need to just get on with it, especially in the light of recent announcements about 2030 and 2035 targets not being met. -The project will be owned by Synergy thus ensuring government and constituent oversight, -The synchronicity with solar energy is advantageous given the potential to generate power at night and at other times when solar is not optimum. - WA taxpayers need to stop propping up an inefficient coal mine owned by overseas interests just to keep an aging power station running. This is economic madness. - There is minimal impact on uncleared land with existing farm land being utilised - There is minimal need to build transmission lines with the potential for the State to recoup previous losses incurred in installing the transmission line for the failed Beenup mine. - It seems ludicrous that a sand mine could be approved but not a wind farm. - Whilst there will be some aesthetic impact on the Augusta township, the proposal is unlikely to impact other possible developments in the Scott River area. It is a relatively isolated, windy place. - There is the potential for farmers that hosting alternative energy projects helps keeps agricultural industries viable especially in unpredictable climatic conditions. Food and fibre security is an issue the whole community will need to address. - Reliable energy supply will act as an impetus for more industries- food processing, aquaculture etc helping to broaden the economic base of the Shire, plus enable development of local expertise and employment in the renewable energy field. Surely this proposal represents the “lowest hanging fruit” in terms of renewable energy projects given the lack of impact in terms of clearing of native vegetation and non requirement to build transmission lines. Being operated by a Government Authority constantly under scrutiny by Parliament, media, taxpayers etc gives a level of oversight that would not happen with private enterprise.

		People seem to resist change but the uptake of solar by Australian households, the recent elections of the Federal, State and our Local government of people and parties with renewable energy policies indicates that the majority of the community supports renewable energy even if they do not express their views by active community debate. Unfortunately the aggressive and often personalised expression of views by opponents actively discourages public debate. I applaud the council for offering this opportunity for input on this proposal. -
364	Object	Augusta is a small town known for its stunning natural beauty. We don't want a massive industrial infrastructure in this location. It will affect unique and often endemic species of fauna, also affect the identity of a small country tourist town that would like to see its natural beauty preserved, kept away from big scale Industrialisation. Please find another place for these gigantic turbines. Not in our town.
365	Support	We urgently need renewable energy!
366	Object	Unsightly. Unsustainable and impossible to dispose of in an environmentally friendly way. A hazard to light planes. An ugly blot on a beautiful landscape.
367	Object	Subject: Objection to Proposed Scott River Wind Farm To whom it may concern, I am writing to formally object to the proposed wind-farm development at Scott River. While I support responsible and effective renewable-energy policy, this project represents an approach where the perceived environmental benefits are enjoyed mostly in distant urban areas, while the significant environmental and social impacts fall squarely on the local community that actually lives here. 1. Disproportionate Burden on Local Residents Residents of Scott River bear the direct consequences of noise, visual impacts, heavy-vehicle movements, and land-use change. These are permanent, daily effects that cannot be shifted elsewhere.

		2. Minimal Local Benefit The project delivers limited long-term employment, limited local energy supply, and no meaningful community uplift despite imposing substantial disruption. 3. “Symbolic” Rather Than Practical Environmentalism Many supporters of projects like this live far from the affected area and experience none of the consequences. Policy should not prioritise symbolic gestures over well-designed, community-centred renewable outcomes. 4. Environmental Concerns Specific to Scott River Scott River is a sensitive landscape with ecological features that must be protected. The development risks: wildlife habitat disturbance bird and bat strike clearing of vegetation in a region that depends on ecological balance disruption to hydrology and water-quality flows 5. Major Risk: Exposure of Acid Sulphate Soils and Release of Sulphides Large-scale excavation, pylon footings, road widening, and cabling trenches threaten to disturb acid sulphate soils known to occur in parts of the Scott River coastal plain. When these soils are exposed to oxygen, they can oxidise and release acidic runoff, sulphuric compounds, and heavy metals. If not perfectly contained, this process could:

		contaminate nearby river systems, wetlands, and groundwater mobilise acidic leachate into the Scott River and its tributaries flow downstream into coastal marine environments, damaging seagrass, fisheries, and the wider ocean ecosystem cause long-term, possibly irreversible ecological damage Given the region's high water table, interconnected drainage, and porous soils, the ability to contain such contamination is uncertain at best — and catastrophic at worst. Once triggered, acid sulphate soil reactions can continue for decades. This is an unacceptable risk in a region that relies on clean waterways, healthy soils, and intact ecosystems. 6. Inadequate Community Consultation Local residents report that concerns about soil disturbance, hydrology, fire risk, and long-term environmental safety have not been adequately addressed. Proper consultation must be thorough, transparent, and not treated as a procedural formality. 7. Preferable Alternatives Renewable-energy planning should prioritise generation closer to urban demand centres, integrate rooftop and distributed solutions, and use lower-impact technologies before resorting to large industrial-scale installations in sensitive rural areas. Conclusion The Scott River community should not be asked to shoulder the environmental, ecological, and social risks of a project that delivers little local benefit and carries significant potential for long-term damage — including the catastrophic consequences of disturbing acid sulphate soils.

		I respectfully urge the decision-makers to reject the proposed Scott River wind-farm development in its current form.
368	Support	Very pro wind farms Angry and discusted at anti campaign claiming affecting biodiversity of beef farms and crazy notions acid soil and bio magneitic nonsence Wa needs to do start doing its part to reverse climate change and this is a great start for our children and planet Please please go ahead w wind farms!
369	Object	
370	Support	This wind farm is a wonderful idea that has been a decade or more in the making. Many properties are unable to generate electricity from rooftop solar as there is too much shade from trees around. The project has my full support from an environmental and employment perspective.
371	Object	Approval of this wind farm will only provide a win for the local landowners who directly benefit from infrastructure on their properties and the overseas owners (Energy providers) of the wind farm, plus the petty annual amount given to the shire. The installation of this wind farm will also prove that no matter what the levels of impact are environmentally those people already brainwashed into thinking that we must save the world by committing to net zero by whenever (ASAP) and will stop at nothing to convince us all that sea levels are rising and its our fault. Wind farms are nothing short of disgusting visual pollution and any noise emanating from these structures must be considered unnecessary noise pollution. I definitely object to this proposal.
372	Object	Seriously why even risk the chance of polluting the aquifers at Scott River. If pollution occurs in to the aquifers it will seep into all river systems. History should be enough information to not even risk this.
373	Support	Supportive: have already installed solar and batteries here to reduce reliance on a largely coal powered grid. The look of turbines is quite calming to me while noise issues at Augusta and nearby hamlets will be non-existent. Modest environmental impact much of which can be mitigated (far more modest than farming's impacts on the Scott River and Hardy). This proposal is not of industrial, wide landscape scale that would be visually jarring. The opposition group have been misleading, aggressive, intimidating and causing great visual pollution for more than a year; difficult people to live with.
374	Object	Due to the sensitive enviromental nature of the Scott River there is no doubt that it will have a negative impact on wildlife native and active in this area .Also the Scott River has a fragile water system that absolutely needs to be protected. Another important consideration is the representation of the community by Julia Meldrum who invested,worked and campaigned with the AMRCCE to get the wind farm up and running . Greg Boland who will also be representing the community is an ex Greens leader so there is a conflict of interest and they SHOULD NOT be allowed to represent our community on this issue .
375	Object	Why use stupid big expensive wind turbines that only last 10 years, Other countries are creating more greener energy for less money and less impact of the environment! Leave this beautiful part of the world alone and go ruin other Barron areas of Australia that don’t have as big of an ecosystem.

		Would love to show my children what being out bush and in the scrub means down here but with what yous are doing I don't think anyone will want to be down here, you's are ruining our lives and life for our future generations.
376	Object	My property is located 4 km from the proposed wind farm. I've owned it 18 years. My property includes a residence that is 4km from the wind farm. Synergy have not contacted or engaged with me in any way as an immediate land owner. I'm also a Synergy customer at the property and there is power infrastructure that traverses my property. I'm deeply troubled by this failure to engage. There has been no engagement on what wind farm noise we will hear from our property, what mitigations are available to us, risks on human health, risks to the aquifer which I am licenced to draw water for agriculture purposes, and the reduction in value of my property due to the wind farm and its impacts. It beggars belief that a land owner in the immediate surrounds has had no engagement. From my perspective this has been a flawed process. Separately, I am also troubled with locating this within productive farmland in Augusta Margaret River when there is extensive coastline land nearby for locating the turbines. The Albany wind farm is a model example, does not impact farmland or those who reside on farms. Please reconsider where such a long term project is located.
377	Support	I support the proposed windfarm because of the climate mitigation aspect but also because of the benefits to the local economy from it. I have some concerns that I think Synergy could address: 1) More equitable distribution of benefits to near neighbours of the windfarm. At present the hosts would get paid handsomely and the adjacent neighbours get nothing but may have visual and noise impacts. 2) The Community Benefit Fund should be earmarked for East Augusta community development and not allocated to AMR Shire general revenue.
378	Object	* Environmentally protected area already. Ignored in this proposal. Change the rules to suit the circumstance. * Failed mine due to acid soil and environmental damage leakage in adjacent area -more disturbance (footings/underground cables / access) - major risk to wetlands/ river systems - reparation is STILL ongoing. * Foreign ownership / no genuine care factor of implications or mitigation of issues (current research shows blade colour a bird deterrent) (profit driven). Will there be asbestos in the material blades are made from? Long term vision for disposal? * Largest turbines in Australia - what lessons have been learnt from overseas relating to size /lifespan/ environmental impact/ these may be causing and are any strategies being implemented? Not mentioned. *Impact on wildlife (birds / bats) - survey / not comprehensive (in adequate monitoring/ duration / times / species) and dismissive of the number death caused - due to perceived numbers of existing. NO serious monitoring or management plan for care of injured wildlife. Impact of sub sonic noise on wildlife / animals not even considered. Adjacent to large area of natural bush and wetlands hence likelihood of injury / death increased. Wildlife do not go around windfarms. * Augusta is major holiday destination - due to NATURAL BEAUTY - and isolation away from city living. One of the last non spoilt / populated places in WA South West. It should not have INDUSTRIAL infrastructure on the doorstep, that impacts on the tranquility and sense of well being, mental health that goes with being in nature. Place closer to source of need in the city (precedence has been set - Chicago) * Government has no viable energy policy related to increasing use of Solar and making affordable for ALL people and viable policy to DECREASE energy demand. The need for this type of infrastructure in this proposed location would be mitigated if every new build in WA had solar mandated, producing enough / most energy for use by that facility. Either housing / industrial. * 2 MR Shire representatives on committee that are representing the public/council are bias. Both have previously expressed their advocacy for the wind turbine project and so neutrality in representing the people is questionable. Neutral parties expressing all concerns / aspects of public should be in place.

		* We are not the only community that has concerns for the "mad dash" to net zero. Where is the states / Australian publicised "vision" - of areas to be affected and by what projects? Undertaking and dividing regional / rural areas with these proposals - that affect many "small Australians " and the environment while people in suburban areas largely have a no care factor as they are not immediately affected.
379	Support	It is critically important that our society moves to renewable energy sources for the future. These are the cheapest and cleanest energy sources available. This project provides a fantastic opportunity for the Shire to contribute to this aim. The background and consultation work has been extensive and we are ready to go. The potential downside of the project is that the wind turbines will be visible in the middle distance from parts of Augusta. However, some may argue this a benefit, and it is certainly better than a view of a coal-fired power station or a nuclear reactor. It would be great to be able to quarantine the wind power for use within the Shire.
380	Object	Strongly object to the proposed wind farm as it will be a complete blight on the horizon looking from a view to east Augusta im certain this wont be a good look for either locals or tourists not to mention the impact on the local wildlife etc This area has been beautiful pristine piece of the South West for as long as i can remember and i cant see why we should ever consider a wind farm of this magnitude
381	Support	I support this proposal with the following conditions: 1. It is clearly demonstrated that there is no risk of acid sulfate soil contamination and/or problems to the district's waterways. 2. Absolutely no more than the clearing of 1 hectare of native bushland as proposed. 3. Turbines are located no closer than 400 metres to neighbouring property boundaries. 4. Extensive use and application of planning tools such as Avistep are used to minimise danger and harm to native fauna
382	Object	Thank you for the opportunity to comment on the Scott River Wind Farm development application. I wish to lodge my objection to the proposal in its current form. While I am supportive of renewable energy projects and the long-term transition to cleaner power generation, this development places significant industrial infrastructure far too close to established communities when there are ample opportunities to locate these components in less populated areas. The South West region has extensive open land where turbines, associated facilities, and transmission infrastructure could be sited with minimal impact on residents, local amenity, and the natural environment. The developer has not adequately justified why the proposed infrastructure needs to be positioned so close to dwellings and community areas when viable alternatives clearly exist. My concerns include: • Proximity to homes and community spaces when non-residential areas are available • Avoidable impacts on landscape, noise, and environmental values • Insufficient exploration of alternative siting options that would reduce these impacts • Unnecessary encroachment on a built-up or semi-built-up locality despite the region’s capacity to accommodate infrastructure elsewhere I urge the decision-makers to require the proponent to reconsider the layout and relocate turbines and infrastructure to areas that do not impose these avoidable impacts on residents. I appreciate the chance to provide feedback and ask that these concerns be taken into full consideration when assessing the proposal.

383	Support	As a farmer on really prime agricultural land, we are seeing the effects of a change in our environment and on our production. All effort must be given, no matter how small to reduce the use of fossil fuels for electricity generation an transport. This wind farm will have minimal impact, will grow local jobs, will come with a community fund, uses already existing transmission infrastructure and will improve power reliability in the SWIC south of Forest Grove. The objectors, namely Scott Baxter lives in Busselton Shire, has property in Scott River, but leased for 30 years by another real farmer.
384	Object	The visual impact is astonishingly bad. Who knows what the sound impact will be. The impact on surrounding farm life and wildlife is also intuitively going to be very significant. Surely there are other locations which do not have these impacts. If not, then the whole venture should be abandoned In the final analysis 100 MW is not a significant contribution to the power grid so it is not justified on Power contribution either.
385	Support	This wind farm has everything going for it (wind speeds, connection to SW grid and suitable site. We are living in a time when climate change in the SW is very clear. The need to reduce fossil fuel emissions and to move to more renewable energy is evident. The SW requires more wind power (there are plentiful solar panels on houses). Synergy have carried out an exemplary series of communications to engage the community. And, there will always be folk who object to wind farms and many will find them visually unappealing. Despite this, I strongly support the development of the Scott River Wind Farm.
386	Object	Bird strikes are not acceptable. Requires govt funding/offtake guarantees that cost taxpayers more than other power sources Remediation and closure has no solution for turbine blades other than land fill Balsawood in turbine blades sourced from Amazon rainforest etc is totally unacceptable
387	Object	
388	Support	Strong support for renewable energy sources and this site has consistent winds which is ideal. Local environmental concerns such as rare flora and fauna and acid sulfate soils have been addressed well. Visual impact is negligible including from Augusta townsite and surrounds.
389	Support	I am a resident of Margaret River, and I am writing to express my support for the proposed Scott River Wind Farm. I believe this project is both responsible and necessary for our community, the environment, and the long-term sustainability of our region. The proposed site is highly suitable. There is an existing substation nearby, the land is already cleared, and extensive environmental and feasibility studies have been conducted. I have read the reports, the EPA documentation and applications. I'm confident that the actions taken to protect bird and bats are enough and that the cost of inaction by way of climate action is a far greater threat. There is also support from a substantial number of local landholders, showing that the project has backing from those directly impacted. I am aware of claims that all farmers oppose the project. They are being promoted by a group led by an individual who does not reside in the Augusta-Margaret River Shire and who appears to have a political agenda unrelated to the interests of our broader local community. Most importantly, this is a matter of climate action. Too often, discussions focus on opposition rather than the consequences of inaction.

		Continuing to rely on fossil fuels threatens our wildlife, environment, and contributes to rising energy costs. Transitioning to renewable energy is not only environmentally responsible, it also makes complete economic sense. The Scott River site, located on cleared land with suitable infrastructure, represents an ideal location to contribute to a sustainable energy future. In conclusion, as a local resident, I strongly support the Scott River Wind Farm. It is a practical, responsible, and forward-looking project that will benefit the community, the environment, and our economy. I urge the Shire to approve this development in recognition of its many advantages.
390	Object	Disagree with the benefits and believe no good will comes of this project to the area. Totally miss lead by government about how harmful this will be for animals and humans. Have no faith in our local, state or Federal governments to make correct decisions for the right reasons for the people. Only money benefiting them. Speaking with large amount of locals in area not one has said this will be good. Researching other projects in Australia and around the world it does seem scary at this point we are discussing the removal of native bush to install concrete
391	Support	Land is mostly cleared already Visual impact is negligible Renewable energy is great Area gets a lot of wind
392	Object	Wind turbines destroy the liveability and visual amenity of any area. They produce noise and visual pollution. They have a limited life span and then the cost of deconstruction is prohibitive leaving behind deteriorating land junk. This is not good planning or land management for the future. Technology will certainly provide simpler and more efficient energy. alternatives in the near future. Let's wait and plan for these.
393	Object	
394	Object	No way
395	Object	I want to begin by saying that I support renewable energy — we all know how important it is to move toward a cleaner, greener future. But we must also be smart about where and how we place renewable projects. The Scott River region is simply not the right place for wind turbines. Scott River is one of the most beautiful and ecologically significant areas in our part of the world. It's a landscape rich in native bushland, pristine waterways, and valuable farmland. It's home to unique wildlife and migratory birds that rely on these open spaces. Installing industrial-scale wind turbines here would change the character of the region forever. The first major concern is environmental impact. Large turbines require extensive clearing for roads, foundations, and power lines. This disrupts natural habitats and risks polluting waterways that feed into the river. The noise, shadow flicker, and vibration also disturb local fauna — especially bird species and bats that play an essential role in maintaining the balance of the local ecosystem. Secondly, there's the impact on local residents and farmers. The Scott River area supports agriculture, tourism, and small communities that depend on peace, open skies, and the natural beauty that brings visitors to the region. The presence of 150-metre-high turbines and red aviation lights would permanently alter that sense of place. Once that's lost, we can't get it back. We also need to think about economic practicality. Wind energy only works efficiently where consistent wind resources exist, and studies

		show that Scott River's wind profile isn't as strong or reliable as other coastal and offshore areas. That means we'd be sacrificing our local environment for relatively little return in power generation. There are better alternatives. Offshore wind farms, solar developments in already cleared or degraded land, and community-scale renewable projects can all deliver clean energy without sacrificing an area as unique and sensitive as Scott River. So today, I'm not arguing against renewable energy — I'm arguing for responsible renewable energy. For smart planning, genuine consultation with the community, and protecting the land and waterways that make our region what it is. Let's stand for a future that is sustainable in every sense — not just in power, but in people, nature, and place. Thank you.
396	Support	Wind turbines are beautiful. I'm confident the supplier will provide mechanisms to alert passing birds .
397	Support	I couldn't be more in support of this green energy solution. I would be happy for there to be wind farms in Margaret River also. Bring on the transition!
398	Object	This proposal is based on the belief that CO2 is the problem. Dr Mototaka Nakamura "Says CO2 is not the CONTROL KNOB" (He is not the only one.) CO2 lags temperature. CO2 is NOT a pollutant! CO2 is currently 0.04% of our atmosphere, its has increased from 0.03%. If it drop below 0.02% plant life start to die. Forget Net-zero that's fantasy land. Forget DC & inverters (wind, solar & batteries)to power our country. We need reliable and constant power (coal, gas & nuclear). NO inertia in wind, solar & batteries! If it's not economically sustainable, "it's NOT SUSTAINABLE". Also CO2 is logarithmic not linear in the way that it acts in the atmosphere. Do your own personal research. https://heartland.org/ https://friendsofscience.org/about/about-us.html

		https://www.climatedepot.com/2019/08/24/climatologist-dr-tim-ball-defeats-michael-manns-climate-lawsuit/ https://www.youtube.com/watch?v=vcAHdmYs0j0
399	Object	Visually destroying the forested view
400	Object	Negative impact on endangered birds in the area. Visual pollution. Noise pollution.
401	Support	This project is a major opportunity for the SWIS and for the Shire. Unlike a lot of the Wheatbelt wind, which peaks during the day while solar is already doing the heavy lifting, Scott River has strong overnight wind profiles. That's exactly what WA needs right now, clean generation that keeps batteries charged overnight and actually relieves pressure on the grid instead of adding to daytime oversupply. From what I've seen, the location is well chosen with minimal native clearing, minimal visual impact, and a layout that has clearly been designed with the local environment in mind. It also brings direct benefits to the community through the Community Benefit Fund, plus long-term regional jobs and local contracting opportunities, which is huge for the South West. Overall, this is the kind of well-planned, well-sited renewable project WA needs if we're serious about hitting our carbon targets and supporting a stable SWIS. I think the project is responsible, considered, and absolutely something the Shire should back.
402	Object	In response to proposed wind farm at Scott River, I strongly object to the project. The scale of the turbines will dominate Augusta's almost untouched vistas of the south coast, with negative effects on tourism, housing prices, and the mental wellbeing of local residents. There would be fewer residents of Augusta and surrounding areas objecting to this proposal if the turbines weren't roughly the same height as the tallest building in Perth. The turbines at Albany windfarm are 100m high. There should be shire restrictions limiting the scale of these industrial power generators. Much the same as building codes have height limitations for residential and industrial areas. There are countless reasons why this development should not go ahead, however, I would like the negative visual impact on the town of Augusta to be documented as a strike against the project in this shire. An industrial wind farm using the tallest turbines in Australia is not cohesive with a small coastal country town that relies on tourism.
403	Object	
404	Object	I object to the proposal by SynergyRED on the grounds that the proposed turbines would lead to significant visual harm to the Augusta community, and impact an already fragile ecosystem. I firmly believe that there also needs to be further work undertaken into developing reliable and effective energy storage systems so that the power generated by renewables is able to be stored. This includes the power generated by solar and alternate renewable sources. The fact that domestic solar has been implemented by households to such an extent that the power providers are having to turn off or reduce the capacity of their generation systems at times of peak solar power production needs to be addressed and storage systems need to be investigated and developed. This should be done before any further investment in wind generation is undertaken so that we do not have the often experienced situation where you see wind turbines idled.
405	Support	

406	Support	In my opinion this proposal is not only necessary, but a major bonus for the shire. It's a step in the right direction for a sustainable future. A future powered by clean, emissions free energy. I believe that the proposed Scott river wind farm should have the full support of our council.
407	Object	Infrastructure with a limited lifetime needs to be managed sustainably with long-term goals beneficial for all concerns.
408	Object	The environmental impact of wind turbines is so bad with the production of turbine components, like the metals and concrete used, has its own environmental footprint, including the use of fossil fuels during manufacturing. Currently, it is difficult to recycle turbine blades, which are a composite material. Wind turbines can kill birds and bats that collide with the blades. They can also disrupt habitats and navigation, particularly for bats that use sonar.
409	Object	No no no. Wind farms are terrible.
410	Support	I support the investment in renewable energy sources, including wind farms. The proposed development is an important addition to society's move away from fossil fuels. I have been appalled by the conspiracy theories and misinformation campaigns that have propagated within the community.
411	Object	The major tourist selling point for Augusta is its feeling of expanse of nature when you look to the east. The sunrises are something special and Augusta doesn't really have a sunset west view so the wind towers will take away the natural attraction that it has.
412	Object	
413	Support	I fully support wind farms in our Region.
414	Object	Net Zero is killing rural communities!! For the better of peoples ethics and values surely this project has to be further examined. I believe the environmental studies are flawed and have not been fully assessed in relation to to the location nor been honestly reported by multiple independent experts.
415	Object	They dominate the landscape in their size . They ruin the pathetic look f the horizon Visually Stunning don't feel they suit the raw rugged and beautiful landscape of Scott river I think the level of energy and carbon caused is n the manufacturing and removal is excessive for the returns If alternate energy is what they are after they need to find much more non intrusive ways for the environment to be sustainable They give of a hum or sound which maybe low but can be oppressive and iratatating for humans animals and birds. Especially over a long duration of time once they are there. We are going to have them for a long time . The landscape with its lakes unique flora and habitats is protected in its isolation and natural ruggedness . Die back is a bad g problem n theses landscapes the digging and removal of dirt and increased traffic will spread this disease fungus through out the landscape putting many vulnerable species at risk like banksias jarrah and a multitude of different ther rare species . Black point is highly me to one of these banksias species that once infected and spreading there is no reversing the damage . Where you could loose specific endemic species like banksia occidentalis I don't support thus project
416	Object	Western Australia has many places of wind and solar gathering regions. Augusta has one of the most precious environments in the country. With only 5 full time jobs at the end of it, I struggle to see the benefits. I'm for change but there are better options at a lower risk.
417	Object	Makes no sense to be putting them in such a prominent position…. impacting the landscape of one of australia's best coastlines.

418	Object	The visual, environmental impact by far outweighs the benefits that the wind farm will provide to the community
419	Support	I fully support this initiative
420	Support	Understand people on property nearby may find this change difficult. I think the arguments have been had and the choice is clear towards renewables. Cheaper and better for the majority going forward. But let's help out those most directly impacted. maybe property buy backs by state or federal can be offered?
421	Support	i support the idea as I know that during summer farmers have days where they use genoraters so augusta can have essentual power needed
422	Object	I think putting this development into the area will display a lack of knowledge of the river and ocean systems, the extra construction of the development of the wind farm will take the animals in the area away and works will bring extra transport into the area and roads
423	Object	I object to the proposed wind farm on the following basis 1. Environmental Impacts Scott River is an ecologically sensitive landscape containing diverse flora, fauna, wetlands, and important habitat corridors. The proposed turbine locations appear to be sited in or near areas that support bird and bat populations known to be vulnerable to turbine strike. Noise, vibration, and increased human and machinery activity also risk disturbing native wildlife and disrupting established ecological patterns. Construction works, including access tracks, turbine foundations, earthworks, and heavy-vehicle movement, pose a clear risk of soil disturbance, erosion, sediment runoff, and impacts on waterways that drain into the Scott River system. This catchment is already under cumulative pressure from agricultural activity and must be protected from further degradation. 2. Impacts on Landscape and Local Amenity The visual impact of industrial-scale wind turbines in a rural, natural landscape will be significant and irreversible. Scott River and is valued for its open spaces, natural scenery, and low-impact rural atmosphere. The introduction of large turbine structures, aviation lighting, and associated infrastructure will fundamentally alter the character of the area. Noise pollution, low-frequency sound, and shadow flicker have the potential to impact residents' wellbeing, daily activities, and property use. These impacts can extend far beyond immediate turbine locations, particularly in open and quiet rural landscapes where ambient noise levels are low. From Augusta, a place cherished for its breathtaking coastal vistas and pristine natural horizons, the sight of towering industrial turbines would be a jarring and unwelcome intrusion. The sweeping, uninterrupted views that define Augusta's character—and draw people to its lookouts, beaches, and headlands—would instead be marked by the constant presence of moving blades and stark vertical structures. This dramatic change would erode the town's sense of tranquillity, diminish its natural beauty, and replace a cherished, timeless landscape with an industrial skyline that does not belong in this iconic coastal setting. 3. Inadequate Assessment of Cumulative Impacts It is unclear whether the application adequately considers cumulative impacts from other existing or proposed renewable energy and transmission projects in the wider region. Cumulative effects can amplify environmental pressures, noise levels, habitat fragmentation,

		and overall visual intrusion. A thorough, region-wide cumulative impact assessment is essential for responsible planning and decision-making, yet the current proposal appears to lack meaningful analysis of this kind. 4. Bushfire Risk Scott River is located within a known high-risk bushfire zone. Turbines, transformers, cabling, and electrical infrastructure introduce potential ignition sources, especially during high-temperature and high-wind conditions typical of the region. The proposal does not appear to include a detailed, independently verified bushfire management plan outlining: ignition-prevention measures emergency response protocols access arrangements for emergency services maintenance requirements to minimise fire risk Given the region's fire history, this gap is a serious concern. 5. Insufficient Community Consultation A project of this scale, longevity, and regional impact requires genuine, transparent, and ongoing community consultation. Many landholders and residents appear unaware of key project details or feel that their concerns have not been appropriately acknowledged or addressed. Meaningful consultation must occur early, openly, and continuously—not as a procedural formality or after decisions have already been made. 6. End-of-Life Impacts, Waste Management, and Decommissioning Wind farm end-of-life and decommissioning obligations are often overlooked at the planning stage, yet they represent a major long-term challenge. Wind turbine blades, typically constructed from composite materials, are extremely difficult to recycle and often end up in landfill. Nacelles, generators, tower sections, and large concrete foundations can also pose disposal, removal, and contamination challenges. Without detailed commitments, communities can be left with industrial waste, degraded land, or incomplete rehabilitation.

		The current application lacks clarity on: Who is financially responsible for full decommissioning, removal of all above- and below-ground infrastructure, and site rehabilitation How composite materials, particularly blades, will be responsibly disposed of or recycled Whether adequate financial guarantees or bonds will be in place to ensure decommissioning even if the operator ceases to exist Expected environmental risks associated with long-term material breakdown Given the project's 20–30+ year lifespan, end-of-life impacts must be addressed at the outset, not deferred to future landholders or the broader community. Conclusion For the reasons outlined above—including environmental concerns, amenity impacts, inadequate cumulative impact assessment, bushfire risk, insufficient community engagement, and unresolved end-of-life waste management issues—I respectfully request that the proposed wind farm development in Scott River be refused.
424	Support	Fully support. Ignore the vocal minority. Most people in town support this but are intimidated by the vocal anti group.
425	Object	Wind farms are costly, ugly and inefficient. This one will be no different. Who pays for their upkeep and eventual replacements as they age, and what becomes of the waste products, will they be recycled effectively? How much of the money they generate stays in Australia and how much goes offshore? Who compensates the residents who must endure the construction process, the impact on services, the blight on their land and the health issues that may afflict them as a result of close proximity to their homes? What of the wildlife that is displaced, injured, killed by these massive, insidious turbines? Please listen to the residents of Scott River and have a care.
426	Support	I believe Scott river provides a perfect location for this great renewable energy, proven technology project.
427	Object	I don't support wind turbine as a power provider solution, especially in Scott River or anywhere else in the South West. Information available about turbine uses point in the direction that it isn't a good sustainable, eco friendly or 'green energy ' solution to offering extra power to the grid. The environmental impact on the land they would be set on is irreversible not to mention the cost and energy needed to then dispose of each turbine after its used by date, it just doesn't make sense to ruin such a beautiful area for the short term future gains!
428	Object	I object to this development on the grounds that it will harm the ecology and aesthetics of the delicate environment in the area. There is ample evidence now that wind turbines are a major hazard to birds and bats. The Blades shed toxic particles into the surrounding environment that could have devestating impacts on farmland and it's produce, humans and native wildlife. Harmonic pollution from the spinning blades can cause detrimental effects to humans over a large area within hearing distance from the turbines. Wind turbines are a diffuse, low output, intermittent generation method that on average output around 25% of claimed capacity.

		It is resource intensive for construction and implementation materials and is unlikely to repay its debt of emissions in its lifetime, which by the way is 20-25 years not the claimed 60 in the proposal.
429	Support	Great project, no real need to be 250m high The objections to it are baseless scare campaign. I would like to see a similar project along the Leeween Ridge West of Golf club.
430	Object	I refer to the Planning Application to install wind turbines across the riverine land of Scott and Blackwood Rivers, Augusta. We like seeing wind turbines in the landscape such as near Geraldton, across South Australia and further inland; we are not anti-turbine. We explored the Scott River area in the seventies and compared that to another visit three weeks ago. In the seventies, we found the area had risks – deep white sand to dark water covered with scrub and swamp in all directions. All around appeared fragile, roadside drains contained marron. We now see that roads have been raised and widened a bit and there are lush, green paddocks. As previously, we noted clearly visible, extensive sheets of water. The area appears very unsuited to heavy, moving structures sitting on sand and swamp currently stabilized with scrub, trees, or vigorous pasture across paddocks. Once installed - if it all goes wrong (and it certainly could) the task of removal and restoration would be messy, massive if not impossible. A turbine disaster in this area plays into the hands of fossil fuel supporters. There is legitimate concern over acid sulphate soils that cancelled two mining enterprises in this area. Using the left-over power infrastructure sounds logical, expedient but the necessary upgrade (including underground cabling according to a local) wipes out the financial gain sought and further increases the risks. Two wrongs do not equal a right. We have huge concerns that massive, heavy turbines will sink or tilt into riverine soil (like our vehicles could have). Blade movement at the top of such massive structures may coax the release of acid sulphate into fragile waterways seriously damaging seafood and tourism that are critical to the well-being of local people and visitors. Steady ocean level rise is already being documented. Higher ocean levels mean higher rivers, larger swamp areas, higher ground water putting top-active turbines on even riskier ground forcing farmers to watch an endowment delivering increasing threats to livelihood and life. The nation needs clean/green energy. In this case, there is unacceptable risk. While initially supportive of wind turbines near Augusta, after investigating we had no hesitation in changing our views. The idea is extremely risky in such a fragile area. Solar panels are light and stationary - yet not an option if something must go into this area? Huge aesthetic, environmental and livelihood impact before all roofs and car parks are put to use (something which would truly offer dual benefit).
431	Support	How can we ever get to net zero if we don't move ahead with renewable energy?

432	Object	I think they are a complete waste of our taxpayer dollars !! Building them alone will do more damage to the land and environment before it actually does any good! It pose risks to any potential wildlife living in the area! They give off a terrible noise! They only have a 20 year lifespan and then they are just left to rust away and be a complete eye saw. The cost to have them removed/recycled will cost more to have the built! Please don't do it!
433	Support	Wind and solar seem appropriate ways to manage our current and future electricity needs especially when used in current or former tree plantations.
434	Object	
435	Object	I strongly object to the industrialisation of this incredibly beautiful and biodiverse coastline. A project of this caliber does not belong on a flood plain/wetland with such a fragile constitution. (Where is the disaster mitigation plan should the highly probable acid sulphate soil contamination reach the water table that connects to our wetlands and river system?) This area plays host to a gamut of critically endangered flora and fauna, further more there has been no transparency regarding the fortified protection of wildlife within the industrial park's boundary's. Species of great concern due to their CR, EN, CD and VU ratings are Carnabys cockatoo, red-tailed black cockatoo, baudins cockatoo, blue billed duck, hooded plover, pouched lamprey, pigmy dugite, south western brown bandicoot, rakhi, western brush wallaby, western false pipistrelle and south western brush tailed phascogale, bar-tailed godwit, black tailed godwit, bridled turn, broad-billed sandpiper, Caspian turn, common green shank, common sandpiper, crested turn, double-banded plover, glossy ibis, grey plover, osprey, pacific golden plover, red-necked stint, ruddy turnstone, sanderling, sharp-tailed sand piper, whimbrel, wood sandpiper, grey-tailed tattler, peregrine flacon, curlew sandpiper, eastern curlew, great knot, western ringtail possum, western swamp tortoise, white bellied frog, woylie, Australasian bitten, blackbrowed albatross, black strip minor, dunsbough burrowing crayfish, lesser sand plover, red knot, salamanderfish, white-tailed black cockatoo, Atlantic yellow nosed Albatros, balstons pygmy perch, crates freashwater mussel, western quoll, greater sand plover, malleefowl, mud minnow, orange bellied frog, quakka and the wandering albatross.... to name a few... The whole township of Augusta faces the proposed site, a town whose income predominantly rests on the shoulders of tourism. The scale and visual aspect of this project will undoubtedly have an extremely negative effect on businesses and property value as there will be no escaping their spectre. This town boasts a world class unique and uninterrupted long view which our community generously offers to the state as a global tourism destination... something local businesses have worked tirelessly for years to build and our community is very proud of. Our soft lifestyle and tight knit community has been ripped apart with the presence of this proposal which is a real shame and I feel is reflective of the shire and synergy's lack of respect regarding transparency and honest consultaion. There also appears to be little regard for the property owners of this community and their investments regarding land value decline, many of whom have only recently been informed of the caliber and impact that this colossal project will impose, which is nefariously deceptive considering the shires long time involvement in the project. The two RDAP members tasked with "representing our community views" have a perceived conflict of interest and there is a very strong probability of risk of bias. A proposal of this scale should require independent and undecided representatives and not members that have provided long standing support of this project from conception.

		The SynergyRed group have intentionally withheld information regarding the project to the local community that will directly be affected by the project. It seems they have also intentionally left out important submission requirements to the EPA regarding bird and bat strike mitigation from their proposal which they have now been asked to rectify. And finally I would like you to consider from the ordinary council meeting agenda 26 November 2025 the community vision " one community, standing together" , managing our built environment ,"We're placing a strong focus on ensuring our built environment is functional , sustainable, accessible, safe and sympathetic to the surrounds, and promotes active lifestyles and community connection". Our Strategic goals "Environment-We will protect and enhance the unique natural environment and biodiversity of the region through climate action and informed decision making"
436	Support	
437	Support	
438	Object	This wind farm can be built well away from Augusta township and still collect enough wind.
439	Object	Margaret River shire seems like they've already lined there pockets with this one. Another project that no local wants just like Gnarabup terrible shire never listens to wants actual locals want.
440	Support	I would like to express my full hearted approval of the proposed Wind Farm at Scott River. As local resident I am thoroughly satisfied with the consultation process that has been undertaken by the developer SynergyRED. I note that the proponents have all the mitigations in place and are following the correct procedures. As a nation we are running out of time to replace our energy sources, if we are to leave a better environment for our children and grandchildren. All of us must be prepared to make the hard decisions. I have sensed some division in the community regarding the proposal but I would like to note that the quiet majority have been drowned out by a very organised and loud minority. Thank You for the opportunity to Have my Say on behalf of myself and my family.
441	Support	I strongly support the proposal
442	Object	I am very pro green energy, however I feel this solution isn't the best for this area. I fully support moving away from coal and feel there are fantastic solutions available to us such as hydroelectric, osmotic, or solar. Each have their benefits and drawbacks, but I have been following the windfarm development for a long time and have never seen alternative options presented or discussed. There is such strong community resistance to the windfarm – I feel installing it would be a real setback and would sour a lot of people towards the necessary green energy revolution. The windfarm proposal feels dated and lazy.
443	Object	This is a very sensitive area. The planning states “remnant native vegetation will be affected”. I feel that we have cleared too much native vegetation in the area and this is an unnecessary environmental risk that we should not take. What is proposed is irreversible. I strongly object this proposal.
444	Support	Whilst the views are important. There is evidence that agriculture and windfarms can exist alongside each other in a productive way. We do need to move to more sustainable energy generation and this is a positive and reasonable proposal. I totally support this application.
445	Object	
446	Object	I would like to state that I completely disagree with this development. There is evidence from European studies that have outlined the negative health effects of these type of wind generators on both humans and live stock through subsonic noise generation. This noise issue doesn't seem to have been mentioned. Along with other issues affecting the surrounding area this project is the wrong choice for the

		Augusta and the local community. In addition, I feel that is this project goes ahead it will also have an negative effect on local property values.
447	Object	I'm not for this project in a protected area. It will be a noisy and visually not good looking on the shire. Destruction of wildlife. Thanks
448	Object	I am against this proposal as for visual impact as from our nature's landscape view from our property.No one has come to our house and discussed the views and may degrease our property value. I read in forums from other wind farms about noise pollution blades falling off.asbestos in wind blades and in the braking pads.also motors catching fie and causing bush fires. These wind turbines are not a long term solution as they a short life spa . As per the height of the windmills will they need lights at night for aircraft such as rfds . Eviromentaly this is not good for all wildlife ,people and rivers and land.Why don't you put them in front of Scarborough Beach and see how city people would react.looking at the rest of the world These wind turbines are not sustainable to replace fossil fuel.I am happy for someone to take photos from my balcony and see the beautiful landscape you what to destroy
449	Support	I fully support the proposed wind farm. We need to move towards a sustainable power solution and stop mining new coal and gas. As soon as the wind farm is installed-it will start producing energy without using coal and gas which will benefit our community, country and world. More education on facts (instead of social media false claims) need to be spread from reliable sources such as shire/state and federal government (such as the findings of the latest Australian Government Climate Risk Assessment).
450	Support	bring it on!
451	Object	
452	Object	Natural Gas into existing coal fired powered stations is the only thing that makes sense.
453	Support	This is an important project to help transition from fossil fuels to renewable energy. Renewable energy is essential to address the looming climate emergency and reduce the cost of energy to consumers. This project feasibility study is particularly rigorous and puts to rest all potential issues. The location of the project is perfect! What a stroke of luck to find a location with lots of wind in close proximity to existing high voltage powerlines! It will be great to see these powerlines utilised which were built for Beenup, but hardly used. I particularly like the community payback aspect of the proposal (which is in contrast to fossil fuel projects that only benefit private, usually foreign companies.) Furthermore i think that the windmills are particularly beautiful and will be a wonderful addition to the landscape. I look forward to seeing more projects of this type in the region.
454	Support	I support this project for sustainable energy for the area into the future.
455	Support	Community energy resilience starts with integrating solar, wind and agricultural biomass alongside storage and flexible consumers. This is especially important for regions at the end of the grid such as Augusta. Solar and wind deliver the lowest-cost generation, while agricultural biomass provides firm, dispatchable power and carbon-negative value from manure, effluent and residues. Combined with batteries, micro-grids and demand flexibility, this approach reduces network stress, stabilises weak end-of-line infrastructure, and ensures reliable (non fossil fuel) power for rural communities. Europe has already shown how high renewables paired with biogas, flexible industry and local storage can strengthen the grid while cutting emissions. Supporting this direction enables agriculture to become a clean-energy

		producer and secures affordable, dependable power for regional Australia communities. Iam proud to witness a wind farm of such a scale in our shire.
456	Object	Why are we willing to push for a wind farm in a pristine area within our community without fact backing up the health/ environmental impact / surrounding property valuation impacts . . Farmer impacts that put food on our tables within our community. If we are looking at studies coming through now of windfarms that have asbestos in them how are we regulating the product that is even being brought in? It's a hard NO from me until the studies are conducted factually and the careful consideration of the impact it has on those surrounding. That means independent studies from varying areas not ones that feed into the project getting across the line.
457	Object	Having observed windfalls in other areas, the noise alone is enough to put you off, amongst also the eyesore it is going to create along our beautiful Scott River. The environmental effects it will have will be devastating to our community. With the annual whale migration and the bird population around the area, it has to have an impact! I have no idea how this even got through the environmental perspective. I'm in strong opposition to this project going through.
458	Object	This is not the location to be putting these and we should be using wind power in the first place
459	Object	A horrible eyesore on a pristine stretch of coastline. The materials and cost to build these, along with the maintenance, seems absurd. This is not real 'clean energy' at all!
460	Object	Strongly Object. One of the last remaining Great Southern Wilderness' Western Ringtail Possom Endangerment amongst others. We must question the (real) economic viability and supposed benefit of this project amongst significant landolder conflict.
461	Object	My family and community oppose the wind farm they are too big and too many and the area has significant wildlife including endangered turtles and possums. Please do not let this happen.
462	Object	These wind farms are an eye sore, we are choosing to live in Augusta to embrace the natural beauty of this place without looking at a monstrosity of a windfarm. Extend the gas pipeline down from Bunbury and build a gas fired power station. We have so much gas in WA we should be able to use for free. Cheers
463	Object	This installation of incredibly tall wind turbines will be an eyesore in contrast to the natural landscapes surrounding the area
464	Support	I have a very strong view that reducing our carbon footprint is imperative and fully support the development of a wind farm at Scott River. I understand that every project is determined by a consequence vs benefit analysis and I strongly feel that the benefits of developing a wind farm at Scott River overwhelmingly outweighs any negative consequences. I understand that the environmental impacts will be minimal as this is already mostly cleared farmland and that any disturbance to acid soils will be ameliorated. Research has indicated that detrimental effects on humans and stock are negligible. I have no negative feelings about their visual impact and believe there is the possibility, that

		like the wind farm near Albany, that this will be a point of interest for the many tourists who visit the area. I think renewable energy development, in appropriate locations, is a positive progressive step for the Augusta Margaret River Shire and aligns with the clean, green image of our region.
465	Support	
466	Support	Supportive of this proposal as we move to more renewables. It's aligned with our strategic direction as a country and will have great environmental and energy security benefits. I understand there are more studies to address any negative impacts and I look forward to seeing the results of these.
467	Support	This is fabulous. Very excited to see green energy solutions happening in the SW. As a private business who operates off grid, this is well overdue to provide green energy to households and businesses who can't achieve off grid solutions. Please let's get this across the line! Our planet needs it 🙏
468	Object	Preserve the landscape views. Many negative impacts of wind turbines. Encourage and incentivise solar for premises. Already excess on the grid, support BESS system.
469	Object	I was born in Augusta and spent my whole life here. This is our home. We do not support this and do not want to look at this eyesore for the rest of our lives. Yet another corrupt and closed door deal by the Augusta Margaret River shire. The scam of net zero is crippling the Australian economy and our way of life this is becoming extremely apparent and will no longer be able to hide. This is not about saving the planet it's about labour aligned investment funds getting rich off tax payer dollars. Put your wind farm somewhere else do not bring it here we will not stand for it
470	Object	Object on the basis 1. Effect on wildlife 2. Permanent harm to the local environment 3. Acid soils 4 impact on visual environment 5 the area in question is a pristine local environment…..leave it alone! Learn from the Alcoa experience!
471	Indifferent	Hello - I am all for improvement, regardless of aesthetics, and as long as the wildlife isn't adversely affected, I'm okay with the wind turbines. If they are though, then I would struggle to support - cheers
472	Support	I have been following the debate on the pros and cons of bringing sustainable energy to the Margaret River region. I consider this wind farm project to be hugely beneficial for all of the community. Those residents opposing the project will also reap the financial and environmental benefits. Our landscapes are always changing due to man's interference. Pollution to air land and water has reduced our quality of life rapidly over the last few hundred years. Some of the changes are irreversible and nevertheless we are still plodding along doing the same old thing but expecting better results.

		Here is a chance to join with other communities and countries to wind back the use of carbon in an effort to save our planet. This project has an urgency we need to respond to. Please approve of this project for the sake of our community, good governance and as a model for other less motivated communities.
473	Support	We need to transition our energy supply to be renewable. This proposal at Scott River is eminently sensible and will make the world a more sustainable place with little impact on the local environment.
474	Object	There is no way these windturbines are not going to do damage to enviroment, they only last a short time then they are rubbish. Just no way.
475	Support	A brilliant opportunity to generate clean energy, and a start to more reliable, locally generated energy. We already have more CO2ppm in the atmosphere than we can have for a safe future, and we are already feeling the impacts of climate change, which is only going to get worse and rapidly. It is imperative we do as much as we can do to shift from ALL fossil fuels immediately, and generate renewable energy instead. This project has taken years of considered feasibility studies and I support it going ahead.
476	Object	I do not consent to the proposed wind towers being constructed on the Scott River. The risk to Molloy Island to bush fire potential is too great and it is difficult enough presently in getting home insurance cover on Molloy. The threat to the Scott River, hence to the iconic Blackwood River, as the Scott spills into the Blackwood, would be an ecological disaster. The Real estate value to properties on Molloy could also be de-valued as very few people wish to live near a wind tower. I strongly advise the Augusta/Margaret River shire to reject SYNERGY`s proposal.
477	Support	The Wind Farm is sensibly located and will have minimal impact on the majority of the residents of the AMR shire. Renewable energy is vital to the world's future and we have a collective responsibility to do our share. As owners of 2 Brindley Street, Augusta my wife Susan and I strongly believe it is the AMR Shires responsibility to support this proposal.
478	Support	Excellent proposal. The AMR shire should support this proposal as part of its collective responsibility towards ensuring greenhouse emissions are lowered asap.
479	Support	The world's future climate needs action NOW. The bulk of the transmission lines (thanks to BHP's prior work) are in place thus saving a NIMBY reaction on that score & easy accessibility! The vast majority of the site has already been "spoiled" by humans; so saves some other undisturbed site from having to be selected as we try to get to net zero. Whilst a few number of people are affected by being relatively close to the turbines (& get some monetary compensation), the majority are kms away &, in my view, they are not unattractive looking at them (your Augusta picture at the start of this screed). One is NEVER going to satisfy everyone, but in this case by far the MAJORITY will benefit hugely from its power production, so a WIN WIN for the vast bulk of the community & the CLIMATE.
480	Object	I object to this application entirely on Amenity grounds and submit that the site should be moved 20 km further east. Or to Gage Roads (see below), If the development is built on the current site the turbine blades will be visible from Augusta township and many contiguous areas. That will scarify very high value historic, natural and visual Amenity of the Augusta area. Ie, people's understanding, enjoyment of and expectations of Place.

		I respectfully submit that in some cases (and this is one of them) Amenity must outweigh the pragmatic. I suggest that the days are gone when wind power could be flagged through and almost admired as industrial curiosities. Weight must be given to whether these things can actually be treated as a necessary evil and hidden from view. This is most decidedly the case with the Scott River (sic: East Augusta) proposal. If I am wrong, build this development on or near Rottnest Island to be admired and celebrated by Perth-dwellers. In closing I would like to refer to the concept of Social Capital. The existing visual, natural and historic Amenity of Augusta has enormous value. The residents and other friends of the district are being asked to donate a substantial amount for the pragmatic advantage of others who make no contribution or sacrifice. In that regard, I recently became aware of data that shows approximately 75% of carbon emission reductions and offsets (sacrifices) have been made in rural Australia compared to 25% by urban Australia. The cessation of native logging has been a major component of the rural contribution. So substantial social sacrifices can be seen to have been overwhelmingly made by the minority for the benefit of the majority. It is time for the latter to start making sacrifices; who knows, perhaps their Amenity can be sacrificed for once? There is plenty of room in the ocean off the Metropoltan beaches. Draw a line in the sand here. Protect valuable Amenity. It is worth it.
481	Object	Eyesore, health reasons
482	Object	I vote no to the proposal I don't like how it will look it will be an eyesore to the landscape
483	Indifferent	As a farmer out Nillup I most likely won't be directly effected by the wind turbines. However as a local volunteer Bush Fireman I'm great concerned as to the potential risks of this project causing fires to the South East of our communities. Mostly what does concern me is the speech that Senator Tyron Whitten gave in Parliament that highlighted the seeming cosy relationship between Shire Council, AMRCCE and Synergy. What started as a small scale Clean Energy Project or at least that how it was sold to the public, however it was show by Sen Whitten that it was always been designed to be this huge scale project. This kind of deceitfulness concerns me greatly Whilst the location for such a project is probably ok, the scale is in my opinion just too large for the greater communities to accept. Possibly a project half the scale would be acceptable. I guess that is why I'm indifferent to the project at this current stage however I shall start to follow this Proposal a lot more closely.
484	Object	

485	Object	
486	Support	I support the proposal. However I understand why some may object. My concern is that there is apparently very little in this for the local community. The financial Community contribution is minuscule. This is especially so when considered in light of the ongoing and serious reliability issues in Augusta. I can't count the number of outrages we continue to suffer. As an end of the line community this is serious. There are many end of the line solutions, like virtual power plants, community battery's etc which could be adopted by Westen Power but there has been little action. If Synergy and WP could work together to resolve this issue as part of this proposal I am sure the proposal would garner much stronger community support.
487	Support	Necessary renewable power project despite a minor change to the skyline
488	Support	generating from wind effectively replaces the burning of coal. voting against wind power is effectively voting for coal fired power generation, the most effective greenhouse gas emitter and environmental polluter of all our industries.
489	Indifferent	My concerns are Acid sulphate soils: will the site locations be altered to avoid the acid soils and at what point in the process will this be conducted. Shadow flicker: Feasibility assessment findings – part 2 states that the shadow flicker is expected to be less than 30 hours per year. Is this per turbine? Near buildings? Or in general farm areas. What is the recommended distance that houses be built to turbines, is this distance considered when putting turbines near boundary fences. Noise from turbines, the feasibility study doesn't mention the noise from the turbines and hence distance from houses.
490	Support	I fully support the wind farm proposal. I'm not offended by the view of the turbines, quite the opposite. I don't believe there will be any side effects from the turbines. WA needs more power supply and this is a good addition to existing supply stations. WA is a windy state and perfect for wind power. I say yes to wind turbines in WA, in Scott River and in Geograph Bay. We all need electricity.
491	Object	This proposed Scott River wind farm/factory will be a significant industrialisation of a picturesque, pristine, rural environment of quiet farmland and native bush well known for its diversity of flora and fauna. From our property the visual pollution will be significant and not inconsequential hence it is our considered opinion that resale property prices of our property and 90% of Augusta will be adversely affected. Another aspect to this development is the guaranteed high risk of environmental damage from acid sulphate soils proven to be present in the development envelope. To hope to control this with lime application as the Synergy proposal states is nothing short of naive when it comes to the cavalier approach of most construction contractors, hence environmental damage to the Blackwood River estuary is almost certain with result death of the estuary, an important breeding ground for fish, birds etc. The aspect of noise pollution is also of concern given we will be at 10 km direct line of sight from the development and that current proven scientific data about the adverse affects of this pollution is uncertain. There is no doubt that the wind resource for this wind farm/factory is very good and that the location adjacent to a HV transmission line is also very good, however to use these as sole justification for the project over other far less risky and remote locations is short sighted at best when the environmental risks are so high.
492	Object	
493	Support	I am delighted regarding wind farm Wa needs to pull its weight in investing in renewable energy I am incredulous about current anti windfarm movement spouting about biodiversity

		It is farm cattle land owner by wealthy white baby boomers who climate change will no affect I am very pro the wind farm!
494	Support	I am strongly in favour of ANYTHING that can be done to mitigate greenhouse gas emissions.
495	Support	The perfect place to have a Windfarm. So much less environmental impact than the windfarm proposed on the coastal dunes. High power line already there. We have had a 2.5kw WTG on our property for 30 years which was a wonderful asset. Only killed one bird, a Kookaburra in that time.
496	Support	Overall: Supported. • Renewable energy sources are essential for moving us forward to a net zero future, and reduce the significant impacts of climate change exacerbated by fossil fuel electricity production. • The Beenup site is largely pre-disturbed / already cleared and minimal additional clearing is required. • The Shire of AMR needs to add renewable energy into the mix, population is increasing and renewble energy sources are currently minimal. • The site has a favourable and regular wind supply, making it suitable for wind turbines. • This development should go hand in hand with education / awareness / advocacy from the Shire / Synergy around tips and techniques to REDUCE ELECTRICITY CONSUMPTION and PROMOTE ENEGY EFFICIENCY (i.e. demand side management).
497	Support	Any renewable electricity will be welcomed and of benefit to our community. As it is to be constructed in cleared farmland with minimum tree removal it is a bonus. Bring it on.
498	Support	The benefits of the proposed renewable energy would significantly outweigh economic, social and environmental impacts in this case.
499	Support	Renewables are the only way forward. We have to replace fossil fuels because we have reached so many tipping points with climate change. I attended the synergy presentation and I feel secure in the knowledge that this wind farm has been adequately researched and assessed in order to mitigate the factors that concern the public such as noise, acid sulphate soils, risk to biodiversity etc.
500	Object	I recently purchased this property in Kudardup and have a direct and material interest in the amenity, landscape, and environmental values of the surrounding area. My grounds for objection are as follows: 1. Visual amenity and landscape impact The proposed turbines will be highly visible from my property and will dominate views from my residence and land. This represents an unacceptable loss of rural/residential amenity and will significantly detract from the scenic values that were a key factor in my decision to purchase the property. 2. Property value impacts There is substantial evidence from both Australian and international studies that large-scale wind farms located in close proximity to residential properties can negatively affect property values. Given the recency of my purchase, this represents a material financial detriment. 3. Noise impacts I am concerned that operational noise (including low-frequency noise and amplitude modulation) from the turbines may exceed acceptable limits at my residence, particularly given prevailing wind directions and the proximity of proposed turbine locations. 4. This development contributes to an unacceptable concentration of industrial-scale infrastructure in what is currently a rural/residential landscape. 5. Lack of social licence / community division The proposal has generated significant concern among local residents and appears to lack broad community acceptance. For the reasons outlined above, I respectfully request that the application be refused

501	Object	I strongly disagree with the installment of these wind farms. Both for environmental and community reasons. This is another land grab and money making scheme under the desquise of "green" energy.
502	Object	Lack of transparency has made it hard to inform an acurate decission.
503	Object	This proposal is an environmental disaster if it is allowed to happen. I do not understand the thinking of the proponent. Why destroy a pristine location by the construction of 20 wind turbines to a height of 250 metres plus the associated infrastructure and transmission lines (overhead or underground) in the name of saving the planet? Not to mention the environmental damage done by the construction of the turbines and infrastructure on hand off the site. To my mind this is extraordinarily short term thinking. Inevitably these turbines will deteriorate in time and with use and will need to be disposed of and replaced with new turbines. They are not sustainable. I think that Synergy would be better using their resources to investigate alternative sources of energy if they really need them. Already Synergy receives more energy from roof top solar panels than it needs or can handle hence the low feed back tariff of a token 2 cents per KW.
504	Support	Important project. Strongly support
505	Object	I don't want the wind farm in Scott River mostly due to the environmental impact. Also, it will be a blight on the pristine sky line. I also have concerns with the infrasound.
506	Support	All in favour. I just hope substantial bird studies are done.
507	Object	Why would you want decimate native forest and bushland for these ineffective/non degradable ugly turbines. The majority of local Augusta residents clearly object to this
508	Object	I write not as a permanent resident of Augusta, but as a regular visitor. I object strongly to the proposed wind farm at Scott River. It is a blight and eyesore, and I wish to oppose it any way i can. Given such strong community opposition to the proposed wind farm, it is unconscionable to go ahead with the tallest wind farm in Australia, at 250m. This will affect my future in Augusta. I will not holiday there anymore, nor will my extended family. We do not wish to suffer the effects of low-frequency noise. Wind turbines are not 'green', nor do they have low environmental impact. To quote William Blake in his 1804 poem 'Jerusalem', they are "dark satanic mills".
509	Support	
510	Object	This will have disastrous effects on our local community. I strongly disagree with it going ahead. I have a 6yro, pay rates within the shire and have grown up here. I really hope the Shire will actually take into the consideration the community and how this will effect everyone in the future. It is not the right choice to build any wind farms in this Shire.
511	Object	Augusta is a tourism eco hotspot! My business of selling this ECO Vista across my holidays homes and is vital to my family run business. Experience Augusta hosts more than 50 Holidays homes in Augusta alone, with many that take in the view across the river. Whilst I am not opposed entirely to wind sourced power I feel like this project is going to destroy the pristine nature and beauty of our region. I would like to see it shifted to further back so that our town can remain with the beautiful outcrop which tourists flock here for, so that it can not

		been seen or heard. Further more I would add that the project be scrapped altogether, encourage more people to sustain their own properties and go off grid! Why should we the country folk bear the brunt of the city folks needs. It would be farer to place these in state forest which then is for All West Australians.
512	Support	
513	Support	I completely support the proposed wind farm at Scott River, to help with climate change
514	Support	We are not directly affected by the proposal (just added our residential address because an address is required). We fully support the proposal.
515	Object	Visual. disturbing ocean & farm land & ground water supplies which will affect Blackwood River We have Coal & Oil & lithium available which could be used more efficiently
516	Object	The visual impact is disturbing And the manufacturing carbon foot print is wreckless
517	Support	The proposal makes sense from both a location (transmission lines, sparsely populated, windy) and environmental point of view. It should be fast tracked.
518	Support	Huge emotion based misinformation campaign running in local social media. Only accurate negative is that it will be visible. I can live with that. Very little land clearing for turbines.not requiring significant clearing for power lines/ poles to feed the grid. Hard to imagine a site with less environmental damage.
519	Object	I am totally opposed to this proposal. Firstly it has been carefully pushed by Shire officers giving large sum of money and then same Shire officers masquerading as AMRCCE. There will be eagles and other birds killed, despite what the Synergy says, bitd kill is unavoidable. The beautiful view across thousands of acres of pasture and bush will be destroyed by these monstrosities. The noise, subsonic noise and throbbing can be heard kilometres away and is upsetting to human and animals. The disturbance to local infrastructure of building these massive towers will be huge. The blades are only going to last a few years, maybe 20, then they will be replaced, or the project abandoned, and there is no recycling of blades, they will be huge landfill. It will make our electricity more expensive, despite what we are told by politicians, we clearly see that the incresed penetration of so called "renewable energy" has done nothing but increase our bills. It is not continuous energy and will need full backup for calm nights, which will be more expensive again. It is foreign made and owned. It is great for the Margaret River greens, NIMBY, but horrible for us Augusta residents. But sadly I have learned that this is just a box ticking excercise, to show community engagement, and will go ahead despite all our local objections. And just like the Beenup mine, which was totally opposed by all Augusta residents, and went ahead anyway, and created a huge environmental disaster, and had to be shut down because it was not economic. I firmly believe that this proposal will be just the same, with no government handouts to make it financially viable, it will do nothing but destroy our beautiful unspoiled environment.
520	Support	Carbon emissions must be reduced urgently. Wind and solar power are the best way to achieve this. The need to act now means that NIMBY ism is inappropriate and harmful. I have read the information available and I unequivocally support the Scott River proposal

521	Support	Anthropogenic climate change is a far bigger threat to the planet, our local environment, and humanity in general than any RE development. Political timidity is allowing the denialists' misinformation campaigns to undermine sensible processes for positive action on development of renewable energy. We do not have time to waste. There is a cost and there are risks with any project. Manag them and get on with it.
522	Support	I would like to see Augusta Margaret River powered by %100 renewable energy, as we are blessed with the wind and sun for this to be possible. As an ecologist myself, having read the feasability assessments, I believe the design is very environmentally conscientious, with impacts minimised, particularly with regards to threatened species and ecological communities. I think wind farms aesthetically beautiful, so no affect tourist and are something we should be proud of as a community. I hope this project can pave the way for more wind farms and renewable energy projects in our community.
523	Object	The proposal is considered not to have any regard to an inability to appropriately control the Acid Sulphate Soils and particularly noting both the failed BHP Beenup Mine and Cable Sands Jangarup Mine. The proposed site exhibits the same soil profiles that both BHP and Cable Sand could not control. Hydrology and the affect on the Blackwood River is a serious issue. The site is located within an area of endangered fauna and flora. The site is located within close proximity to residents of both Molloy Island and Scott River. The noise from turbines has an adverse effect on health and the quality of life. The visual affect from the Augusta township is totally unacceptable. and is proven to cause annoyance, stress or sleep disturbance. The affect of wind turbines is not just direct but also indirect What are the future plans of Synergy to further extend the wind turbines The "drop in sessions" by Synergy were arranged mid week when most people are working. Why was there not a representative present during the weekends to ensure all residents of Augusta had the opportunity to express their concerns. This proposal is poorly conceived and executed and should not proceed. It will be a burden for both current and future generations. Who will remediate the site when it becomes contaminated. Who will remove the turbines when they are obsolete. They are not warranted in such a pristine environment.
524	Object	Totally object to this proposal - there is nothing green about wind farms whilst they might sound like a good idea. These are an eye sore to the environment not the mention environmental destruction required to facilitate these structures + they are for the most part not recyclable, their ultrasonic noise interferes with wildlife - birds / marine & no doubt mammals. For the power they generate vs cost & longevity there's no justification. If we want clean energy in the 21 century for our future generations we should be focusing on the safe nuclear energy that has a far greater energy production capability/longevity & negative impact on our environment.
525	Support	While WTG might not provide the best vista there is no question that we need to create electricity generation. We don't want coal or gas. Solar has the same arguments against as WTG + effects of extraction of rare earth used in construction of panels. WTG seems like the most feasible option.
526	Object	This project has the potential to be an environmental disaster. We know you are aware of the acid sulphate soils in the area and the 25 years it has taken to rehabilitate the Beenup mine area. And now you want to destroy the countryside, the land, the rivers, for an unreliable, expensive, intermittent power supply that is anything but green and renewable. This net zero, so called renewable energy,

		journey that our government is on will be a blight on the landscapes of Australia for generations to come. Failing wind turbines, smashed solar panels, tonnes of concrete and steel buried in the ground, leaching chemicals and minerals into the ground, destroying arable land, not just in Scott River, but all over Australia. It is lunacy of the highest order. And I object, object and object to the whole concept. I live on Molloy Island, a peaceful, quiet, pleasant way of life and a caring community. You say the sound won't affect us, well maybe not, I would hope not. But the fear is for the waters surrounding us, the Scott River, the Blackwood River, which could easily be contaminated and cause irreparable damage to the ecology of the district. I'm no expert, I'm not a scientist. But I have seen a man who has spent 25 years involved in the rehabilitation of the Beenup mine, end in tears because of his fears for the damage this project could cause.
527	Object	As an Augusta resident, I have attended the community briefings provided by Synergy and have found that the information provided to this point has been vague on detail, and short on supporting data. I understand the proposal is in early design phase, but dsespite numerous requests the Synergy team have been unable or unwilling to provide any information on pile design and potential impacts to Acid Sulphate Soils, other than a couple of simple sketches. Whilst I understand the attraction of the site in terms of utilization of the old transmission line and associated transport infrastructure, Synergy have not provided any information on the process for engagement of a commercial operator for the wind farm if approved, and they have refused to provide information on how they will ensure the operator holds liability for the decommissioning and site remediation at end of commercial viability, to ensure that the Shire residents, particularly us in the areas affected by this development, are not left with a huge decommissioning bill or eyesore on our un-spoilt southern coastline. I believe that the size and number of turbines present a visual pollutant for Augusta residents, and will detrimentally affect tourism in our town. This proposal is vastly different from the original concept discussed when the Shire was developing concepts for a community-supported wind farm. I strongly hope the Shire supports a much smaller development, with turbine heights and blade sizing reduced to minimize impact on wildlife and visual amenity. Whilst I am supportive of a staged transition to renewable energy supply within the Shire, I would ask that the Shire reject the current DA proposal, in favor a smaller development more in line with community requests and sentiment.
528	Support	It is a good use of a piece of land that is unsuitable even for a mine. The level of scare mongering and misinformation by the naysayers is absurd. The community should embrace the chance to help in providing green energy with a resource that seems plentiful, namely wind. I am embarrassed by the level of "NIMBYISM" in a supposedly green area.
529	Object	I write to lodge a formal submission on Synergy Renewable Energy Developments Pty Ltd's (SynergyRED) Development Application (DAP pathway) for the proposed Scott River Wind Farm. My wife and I are currently considering both commercial and residential developments in the town centre and on Turner Street and this major windfarm development would have a significant impact on the amenity and value of these developments to the point where we are re-considering our significant investments given the substantial costs involved in completing our projects. In particular, we are looking to invest in creating an arts studio and cultural centre which we believe will become an important cultural hub and drawcard to the town which is currently lacking in this regard.

		Our objection is based on the scale and nature of the proposal, the lack of sufficient detail in the Development Application to allow proper assessment, and the significant long-term impacts the development would have on the environment, including groundwater and impact of acid sulfate soils, visual amenity, rural character, community wellbeing and future land use in the Scott River and Augusta region. The Development Application seeks approval of a largely conceptual proposal. Key elements—including the number, location, height and specification of turbines, construction methodology, foundation design, dewatering volumes and environmental management measures—have not been finalised. As a result, the application does not provide a reliable basis for assessing worst-case impacts or for imposing effective and enforceable conditions on a development that would operate for several decades. The proposal poses serious environmental risks. Large-scale excavation, trenching and turbine foundations will require piling and dewatering, with the potential to alter groundwater flow paths and water table levels. The Scott River area is known to be sensitive, with shallow groundwater and acid sulfate soils. Disturbance of these soils through excavation or groundwater drawdown can generate sulfuric acid and mobilise heavy metals, causing long-term damage to soils, waterways, vegetation and agricultural water supplies. The application lacks a site-specific acid sulfate soil investigation, a detailed hydrogeological assessment, and a robust dewatering and management plan with monitoring, trigger levels and emergency responses. The scale of earthworks is substantial, including approximately 30 km of onsite roads, 30 km of cable trenching, and turbine foundations involving thousands of tonnes of excavation per turbine, potentially exceeding 7 metres in depth. Despite this, no clear method is identified for managing dewatering volumes or mitigating cumulative impacts across the site. Visual impact is a major concern. The proposed turbines would exceed the height of Perth's tallest buildings and introduce multiple skyscraper-scale structures into a rural landscape. This would fundamentally alter the character of the area, dominate views from surrounding properties and roads, and cause long-term loss of amenity. Structures of this magnitude do not "blend in" to a natural rural landscape. They fundamentally industrialise it. The photomontages provided are limited and do not adequately convey the true scale, worst-case or cumulative visual impacts. Approval of this development would also effectively sterilise surrounding land, constraining future rural, residential and tourism uses for decades. The proposal does not demonstrate compliance with the intent of the Shire's Town Planning Scheme, which requires wind turbines to be designed and sited so as not to detract from visual amenity. Even the developer acknowledges that the turbines will have significant visual impacts. Noise, shadow flicker and general disturbance have not been adequately assessed, particularly given the absence of final turbine specifications. The application does not provide confidence that impacts on nearby residents will be acceptable or enforceably managed. Community consultation has been inadequate. Many affected landowners report no direct engagement, and the application does not clearly document community feedback or demonstrate how concerns have been addressed. The first direct correspondence I received from the Shire about the proposal in its current form was a one-page letter sent less than a month ago. Why has the community consultation period for such a major infrastructure proposal in such an environmentally sensitive area been so short?? Finally, the application fails to demonstrate clear economic or environmental benefit to offset these impacts. Claims of up to 200,000

		tonnes per annum of CO_2 savings are unsubstantiated, with no explanation of how or where such reductions would occur. The proposal is silent on impacts to tourism and land values as well as any planning or response plans for potential flow of acidic water into the Scott River and ultimately into the Blackwood river mouth at Augusta. What significant benefits and assurances will Augusta get for the environmental risks and loss of amenity. Will this windfarm grow in the future and what other alternative sites in the Shire have been seriously considered? Will the development alleviate the constant power outages in the Augusta? For these reasons and queries, I respectfully request that the Shire of Augusta Margaret River recommend that RDAP refuse the application, or at minimum return it for major further information and re-advertising before any Responsible Authority Report (RAR) is finalised. Please confirm receipt of this objection and please feel free to contact me to further discuss.
530	Support	Thank you for inviting us to comment on this planning application. Based on the information provided, we fully support the creation of a wind farm.
531	Object	Fire danger, surface water flow, loss of black cockatoos, noise, loss of property value
532	Support	All for this develoment, what a wonderful way to generate clean energy. Sad to see so much misinformation out there. Sweden's windfarms account for over 20% or the overall energy quota. And they are really quite magestic things.
533	Object	Have your say: My objection to the proposed wind farm is based upon the visual impact industrialising the image of Augusta and destroying the pristine wilderness and natural beauty outlook that makes the town so appealing. I was born in Augusta and raised on a family farming property on the Blackwood River fronting the Hardy Inlet only a few kms from the town. The Blackwood and Scott Rivers are a huge part of what makes this area so special and the proposed wind farm with massive towers some 250 metres tall in a locality with proven high acid sulphate soils provides an unacceptable risk to the environment in so many ways. This is in addition to being so highly visible from most of Augusta and surrounding areas along the Blackwood and Scott River. I am willing to be involved in further discussions and public forums which I consider most necessary on an issue so important.
534	Object	I write on behalf of Grevillea Blackwood Pty Ltd t/as the Augusta Hotel whose new owner has been engaged in developing a strategic vision for the property in order to create a high-quality tourism establishment that leverages Augusta's unique natural beauty and coastal appeal.

		It has come to our attention that a large-scale wind farm is proposed for the Scott River/ East Augusta area, involving turbines up to 250 metres in height. While we recognise the importance of renewable energy and support Western Australia's sustainability goals, we have serious concerns regarding the potential impact of this project on the area's tourism economy and community character. Our key objections and concerns are as follows: Visual and Landscape Impact The proposed turbines, among the tallest globally, will significantly alter the iconic coastal vistas that attract visitors to Augusta. This visual intrusion is incompatible with the premium tourism experience we and other stakeholders aim to deliver. Tourism and Economic Consequences Augusta's economy relies heavily on tourism. Any development that diminishes the area's natural appeal risks undermining local businesses, employment, and long-term economic growth. Community and Investor Confidence This project is causing significant concern for the local community and for us as an investor in the region given the many millions of dollars envisaged for the Augusta Hotel development and construction. We respectfully request that the decision-making process fully considers these concerns and that the adverse visual, economic, and environmental impacts determine that the Wind Farm project is in fact proposed in the wrong location. At present our commitment to Augusta remains strong, and we hope to continue developing projects that enhance the region's appeal. To achieve this, it is important that future developments complement Augusta's unique character and support its long-term tourism potential. We would welcome the opportunity to participate in further consultations and provide detailed input on this matter.
535	Object	
536	Object	Submitted on behalf of thirty-six (36) directly impacted landowners within 5 km of the proposed turbine array (all landowners copied into the email submitting this submission) 18 December 2025 1. Introduction and Position We, the thirty-six (36) undersigned landowners (set out the foot of this submission), write to formally object to the Scott River Wind Farm development application in its current form. Our properties lie within the immediate impact zone of the proposed 20 turbine, 250 metre high industrial facility, and we would bear the greatest cumulative impacts across noise, amplitude modulation (AM) including excess amplitude modulation (EAM), visual intrusion, environmental risk, agricultural disruption, and long-term amenity loss. Our objection is based on the individual impacts and risks we as adjacent landowners will be exposed to; and further, the absence of cumulative spatial conflict modelling, procedural

		fairness, and baseline technical assessments that are essential for determining whether the Scott River landscape is capable of absorbing a development of this scale. The application, as submitted, does not meet the standards of due diligence, transparency, community engagement, environmental protection, social licence, or evidence-based assessment that the Shire should require before considering approval. 2. Key Grounds for Objection 2.1 Inadequate Engagement and Procedural Fairness Despite the scale of the proposal, and the proximity and severity of impacts to our properties, Synergy has not engaged with us directly. No site-specific assessments have been provided to us, and no individual consultation has occurred. This is not a minor oversight. It represents a procedural-fairness failure: · directly impacted residents were not given the opportunity to understand or respond to site-specific risks · no individual noise, AM, visual, hydrological, or agricultural impact assessments were provided · the proponent relied on generalized information sessions rather than meaningful engagement This approach is inconsistent with the principle of informed consent, falls below contemporary expectations for large-scale renewable-energy development, and undermines community trust.2 Engagement must be consistent across all potentially aU'ected landowners; selective or confidential approaches undermine procedural fairness and community trust. Given the Shire's own Engagement Report shows strong concern about transparency and consultation quality, the absence of direct engagement with the most aU'ected landowners is a critical deficiency. 2.2 Absence of Cumulative Spatial Conflict Modelling The application does not include the modelling required to determine whether the Scott River landscape can absorb the combined impacts of: · noise and AM and EAM propagation · visual dominance from 250-metre turbines (physical and lighting) · hydrological and groundwater disturbance · biodiversity fragmentation · fire-risk constraints and aerial-firefighting limitations · agricultural operational impacts

		· construction traU̓ic and heavy-haul logistics These impacts do not occur in isolation. They overlap spatially and interact in ways that can only be understood through cumulative spatial conflict modelling — a standard requirement in many jurisdictions for developments of this scale. Without this modelling, neither the Shire nor the community can meaningfully assess: · landscape suitability · cumulative risk · compatibility with agricultural land use · environmental resilience · long-term community impact The absence of this modelling is a fundamental flaw in the application. 2.3 Incomplete and Inadequate Noise and AM and EAM Assessment The application relies on standard acoustic modelling that does not address: · amplitude modulation (AM) including excess amplitude modulation (EAM) · low-frequency noise · infrasound · downwind propagation under prevailing SE winds3 · stable night-time atmospheric conditions · cumulative eU̓ects of 20 turbines operating simultaneously AM and EAM are internationally recognized as the most intrusive and complaint-generating characteristic of wind farms. Given the turbine size and downwind orientation of our properties, AM risk is inherently elevated. The application provides: · no independent AM or EAM analysis · no mitigation plan · no curtailment triggers · no commitment to independent monitoring This is not adequate for a development of this scale. 2.4 Landscape, Visual, and Environmental Impacts Visual The proposed turbine height (the highest in Australian and one metre higher than the tallest skyscraper in Perth) and density would fundamentally alter the rural landscape character of Scott River, Courtenay, Nillup, Alexandra Bridge, Warner Glen and surrounding areas.

		Night time landscape The district also contains some of the darkest night-sky conditions in the South-West, an environmental and cultural asset that would be significantly degraded by aviation and operational lighting associated with the proposal. The application does not adequately address: • cumulative visual impacts (including physical and night-time lighting/skyglow) • sequential views along key roads and recreation areas • impacts on iconic landscapes and tourism values • impacts on the region's exceptional dark-sky environment, despite the WA Government's Position Statement: Dark Sky and Astrotourism requiring dark-sky considerations to be applied at all stages of the planning process. The attached "Lower Blackwood Dark Sky Assessment Report" authored by Dyna JeU'ery sets out the case for the Lower Blackwood to be internationally recognised as a world class Dark Sky Reserve, noting that the estimated Bortle Class 1–2 conditions place the Lower Blackwood in the same darkness category as some of the most celebrated Dark Sky reserves in the world. Environmental risks Environmental risks are insuU'iciently assessed in the application. The Scott River district forms part of a nationally recognized biodiversity hotspot, containing species and ecological4 communities that are already highly pressured and vulnerable to further disturbance. The proposal does not provide the level of technical evidence required for a development of this scale. Specifically: • the region contains extensive high-risk acid sulphate soils (ASS), including areas with historical failures and multiple precedent environmental incidents in the South-West arising from ASS disturbance. • it is as matter of public record that Australia's largest company, BHP with all its resources and expertise, was not able to manage acid sulphate risks at Scott River. After spending ~$300M to develop the Beenup Mineral Sands mine in Scott River, BHP had to permanently shut the mine after only 2 years of operation in 1999. The land hosting the mine remains, after more than 20 years, classified as "remediated for restricted use" under the Contaminated Sites Act 2003. We note that based on the Synergy's Proposed Wind Farm layout, as attached to the Shire's letter to landowners dated 19 November

		2025 for Planning Application P225771, that the proposed Wind Farm is immediately adjacent the failed mine site and two regulated contaminated sites, and that two of 250 metre high wind turbines are to be located 300 to 400 metres from the failed mine site and one of the contaminated sites while a third turbine is to be located ~800 metres from the second contaminated site. Attached for reference are: 1. “Acid Sulfate Soils and the Scott River Wind Farm Report” authored by Dyna JeU’ery providing a scientific literature review and assessment of Environmental Risk, Precedent, and Project Feasibility. 2. extracts of DWER’s Contaminated Sites Act 2003 for 886 Scott River Road, Scott River (site ID 25934) and for 4254 Scott River Rd, Scott River (site ID 25933), setting out the nature and extent of contamination, the restrictions on use and the reasons for classification. • groundwater systems are shallow, highly permeable, and hydraulically connected across the district • the site includes tributaries and drainage lines feeding into the Scott and Blackwood Rivers, and the risk of acid and sulphate concentrations entering these rivers as a result of construction activities of 20 turbines of more than 250 metres in height, noting the substantial foundations that will be required for these turbines • the area supports vulnerable flora, fauna, and ecological communities that are already under significant pressure from fragmentation, hydrological change, and cumulative land use impacts • biodiversity corridors including ground-based and aerial movement pathways would be further fragmented by turbine pads and structures, access roads, and cabling, with no avoidance or mitigation hierarchy demonstrated5 • no assessment is provided for lighting impacts, skyglow, dust-related sky degradation, or impacts on nocturnal fauna, despite these being required considerations under the State's Dark Sky policy Given the sensitivity of the Scott River and Blackwood River catchments, the vulnerability of local species, the region's exceptional dark-sky values, and the history of ASS-related failures in the district and broader South-West, independent hydrogeological, ecological, lighting/sky-quality, and ASS assessments should be mandatory prerequisites for any consideration of approval. These assessments are not included in the application.

		2.5 Agricultural Impacts and Land-Use Compatibility The Scott River, Courtenay, Nillup, Alexandra Bridge and Warner Glen districts are a productive agricultural region. The application does not demonstrate that the proposed development is compatible with: · livestock wellbeing and management · aerial spraying · organic certification · biosecurity requirements · current and future farm and business planning, family or retirement dwellings Industrial-scale turbines introduce permanent constraints on agricultural operations, and cause documented behavioural avoidance, stress responses, and disruption to grazing and movement patterns in livestock. These impacts are not adequately assessed or mitigated. Further, the proposal would impose new constraints on our ability to build dwellings, tourism ventures, agricultural infrastructure, or family and retirement homes on our own land. These reverse-amenity impacts arise solely from the introduction of an industrial-scale facility adjacent to long-established rural properties and would materially limit our future development potential despite our prior tenure. 2.6 Lack of Benefit-Sharing or Compensation for Non-Host Neighbours The application oU'ers no neighbour benefit-sharing scheme or compensation for non-host landowners, despite the fact that we would bear the majority of the impacts. In comparable jurisdictions, neighbour benefit-sharing is standard practice for large-scale wind developments, recognizing that non-host landowners experience significant amenity, landscape, and operational impacts. The absence of such a framework creates a clear inequity between host landowners, who receive financial compensation, and neighbouring residents, who receive none. Benefit-sharing is a recognized component of social licence and a key mechanism for reducing conflict and ensuring that the burdens and benefits of development are more evenly distributed. Any such framework must be transparent and must not include confidentiality clauses that restrict community understanding or participation.6 2.7 InsuU'icient Safeguards for Long-Term and Post-Operation Risks The application does not include: · a secured financial guarantee or bond or rehabilitation fund · independent auditing of decommissioning costs

		· full foundation removal requirements · commitments to restore agricultural productivity or any aUected environmental or ecological aspect · transparent operational monitoring or enforceable monitoring controls Given the long-term risks associated with industrial infrastructure, these omissions are significant. 3. Conclusion We do not oppose renewable energy. We oppose a major industrial-scale proposal that would fundamentally alter the rural, ecological, agricultural, and social character of Scott River, Courtenay, Nillup, Alexandra Bridge, Warner Glen and surrounds; that lacks the cumulative impact modelling, procedural fairness, and evidence-based safeguards required for transparent and defensible decision making; and that would impose significant, long-term, and irreversible burdens on a small group of private landowners without their meaningful and informed consent or any form of equitable compensation. The Scott River Wind Farm, as currently submitted, does not meet contemporary standards of due diligence, social license, environmental protection, agricultural compatibility, or community fairness. It fails to demonstrate that the landscape is capable of absorbing a development of this scale, risks that may emerge and it fails to protect the legitimate expectations and rights of existing landowners. It also fails to address the region's exceptional dark-sky values or meet the requirements of the WA Government's Dark Sky and Astrotourism Position Statement, and it provides no credible assessment of severe ASS risks despite well-documented precedent failures in the South-West arising from ASS disturbance. 4. Request for Decision: For all the reasons set out in this submission, we respectfully request that the Shire: Refuse the application Signed, the thirty-six aUected landowners located within 5 km of the proposed turbine array
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Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
Department of Planning, Lands and Heritage (DPLH)	The following comments and attached photos are provided on the visual impact of the proposed Scott River wind farm and the proponent's Landscape and Visual Impact Assessment (LVIA). The comments are made with reference to the WAPC *"Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design"* and the Department of Planning, Lands and Heritage GIS "InQuiry", as well as knowledge of the area. The viewshed mapping indicates that the turbines may be extensively visible. However, it is likely that roadside trees would obscure views from two of the three major roads to Augusta (Bussell Highway and Caves Road), and views from narrow, treelined secondary roads oriented generally towards the site eg Challis Road, and Fisher Road, which is used to access the settlement on Molloy Island. Analysis using Google Streetview images indicates that the greatest visibility is likely to be from: • private residences in Augusta which have northeasterly views, comprising o elevated sites o sites along the shore of the Blackwood River, Hardy Inlet, or ocean; • public recreation sites on the western banks of the Blackwood River (eg the river end of Howe Road), Hardy Inlet (eg end of Ellis Road) or open ocean (eg Flinders Bay); • from western portions of Hardy Inlet; • from the open ocean. It also appears that there will also be significant visibility from Augusta's main intersection at Blackwood Avenue and Ellis Street, other locations along Blackwood Avenue, and from Scott River Road and Governor Broome Road, which are at the project site and are used to access East Augusta and more distant coastal areas eg for recreational purposes. **<u>Assessment report - method and conclusions</u>** The method used for the assessment is generally suitable, with two exceptions as below. • several important viewpoints have been overlooked in analysis: 1. Travelling east along Scott River Road leaving East Augusta, in locations where the vegetation is naturally low (see attached Photo 1); 2. Main street intersection, Ellis Street moving downhill into the intersection with Blackwood Avenue (Photo 2 – two examples); 3. Main town foreshore opposite East Augusta (Photo 3); 4. Albany Terrace, close to the opening between Hardy Inlet and the ocean (Photo 4).

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	• reference to the three primary visual management objectives as being 'protection', 'best practice', and 'engagement', but the third objective advised in the WAPC's manual is 'enhancement', not 'engagement'. It is beneficial to identify potential engagement opportunities, but this should occur elsewhere in the report and 'enhancement' should be addressed. This objective would justify introducing roadside tree planting to Scott River Road and Governor Broome Road, within the project site, as it would reduce turbine visibility from the closest viewpoints, and would enhance environmental values in the landscape. The conclusions reached in relation to the analysed viewpoints are supported. It is noted that, of the 12 viewpoints analysed, the significance of the visual impacts was determined to be 'high' for four points, 'moderate-high' for five points, 'moderate' for two points, and 'negligible' for one point (which mapping showed was not within the viewshed in any case). Overall, the impact on the key selected viewpoints within and around the town of Augusta could correctly be described as moderate at the very least, but frequently high. **Further analysis advised** The significance of the project's potential visual impacts on the tourist town of Augusta warrants further work by consultants: 1. Provision of photomontages for the additional viewpoints listed above, possibly using a simpler method to produce wireframe images but with vegetation overlaid; 2. Provision of a project site plan showing individually numbered turbines, with numbers also shown on the existing and new photomontages, to enable further assessment of the siting of individual turbines with a view to relocating some of the turbines elsewhere within the project site. **Mitigation measures** Two measures to mitigate visual impacts are recommended: 1. Relocate approximately three of the outlying turbines at each of the north and south ends of the layout, using numbered photomontages to identify the particular turbines which have the greatest impact; 2. Plant local trees to form a screen along the Scott River Road and Governor Broome Road boundaries of the project site (see Photos 5-7). **Conclusions**

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	The proponent concludes that a grid layout would be preferable to the proposed irregular layout, on the basis that this is more appropriate for the open, agricultural setting. This is consistent with Scottish wind farm guidance which recommends a regular layout for wide open and level landscapes with regular agricultural fields. It is noted that there is a significant proportion of woodland vegetation so the landscape is not fully 'open', and the overall landscape setting is gently undulating, not level, partly due to clumps of trees set amongst areas of lower dune and wetland vegetation. From distant viewpoints such as Augusta and the coastline south of town, the horizon-line is not level, but hillocky, with variations in colour and texture of remnant vegetation. Although the turbines are located in an agricultural setting, from the significant viewpoints the wind farm appears to be located within a broadly natural wider landscape. Therefore, the currently proposed irregular layout is considered to be the most suitable, and should therefore be retained. As mentioned above, it is recommended that some turbines are relocated, with the specific altered layout dependent on further analysis of the existing photomontages once turbine numbers are added to the images, and the consideration of further images of views from important locations that were not initially assessed. Examples derived from Google Streetview images and the photomontages in the LVIA are: • In Viewpoint 4, which is on the western shore of the Blackwood River just upstream from Molly Island, if the northern two or three turbines were relocated further south, it appears that no turbines would be visible, and potentially other viewpoints in the vicinity of Molloy Island, assuming that intervening vegetation remains. • In views from the western shore of Hardy Inlet, near the inlet mouth, several turbines are apparent at the focal point of easterly views, adjacent to the steep southerly face of the dune at the mouth of Swan Lake. Relocation of those turbines would retain the natural character of this important view. • In viewpoints along the ocean coastline, relocation of southern turbines would decrease the perception that turbines are very close to the coast. In views from town, the wind farm would be less prominent if turbines were in a more compact, clustered layout rather than locating them in an open, roughly linear pattern extending further north and south over a larger area. The **Social Values Assessment Report** provided by the proponent does not adequately address the community's perception of landscape character and views as required by the *WAPC Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design*. For example, study participants were not asked about the importance of views of the landscape. The list of values that participants were asked about did not include "scenic views" or similar. The closest category was "preserving what is unique about this area'' and "being able to see the clouds, horizon and sky", neither of which adequately interrogates opinions about views of this landscape. Only a small proportion of participants (15%) were residents of Augusta and as such would be directly impacted by views of the wind farm. Overall, the social values report likely results in under-estimating the likely social impacts of the proposed wind

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	farm. Public submissions on the wind farm proposal could be reviewed to gain a more comprehensive overview of community perceptions. **Additional Viewpoints for Photomontages Saved in Separate Attachment.**
Department of Water and Environmental Regulation (DWER)	This proposal has been referred to the Environmental Protection Authority (EPA). On 8 December 2025, the EPA determined to not assess the proposal under Part IV of the *Environmental Protection Act 1986*. The EPA's public record and summary of reasons include public advice to other decision-making authorities to ensure that their statutory decision-making processes achieve and assure environmental outcomes consistent with the EPA's environmental factor objectives. Further information about the EPA process and what stage this application is at can be found at Wind Farm in Scott River | EPA Western Australia. The Department has identified that the proposal has the potential for impact on environment and/or water resource values and/or management. Key issues and recommendations are provided below, and these matters should be addressed: 1. Issue: Water licensing Advice: The following advice notes are recommended to be applied: Advice Note: The proposal is in the Lower Blackwood Surface Water Area proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore a Bed and Bank permit will be required for any interference with the bed and bank of any watercourses. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. Advice Note: The proposal is in the Lower Blackwood Surface Water Area and Beenup and Rosa Beenup Groundwater subareas proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore any take of surface water from a watercourse or groundwater will require a licence to take water. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. 2. Issue: Water supply Advice: The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, the proposal water balance and Water Sourcing Strategy is to be prepared to the satisfaction of the Local Government. 3. Issue: Surface water management Advice: The following condition is recommended to be applied:

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	Condition: Prior to any ground disturbing activities, a post-development flood model is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation. Condition: Prior to any ground disturbing activities, a Stormwater Management Plan shall be prepared to the satisfaction of the Local Government. 4. Issue: Industry Regulation Advice: The following advice notes are recommended to be applied: Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed crushing and screening of material taken from borrow pits operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if it has the capability to meet or exceed the specified production or design capacity of category 12 or 70 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed concrete batching plant operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if the concrete produced is used at another premises or if the proposed concrete batching plant has the capability to meet or exceed the specified production or design capacity of category 77 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: The concrete batching plant will need to demonstrate compliance with the *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998* irrespective of whether the premises meets the threshold to become a Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987* or not.

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	5. Issue: Onsite domestic wastewater management Advice: The following condition is recommended to be applied: Condition: Prior to the installation of onsite domestic wastewater systems, a site and soil evaluation report is to be prepared that takes account of the principles of the *Government Sewerage Policy (WAPC 2019)*. 6. Issue: Construction Environmental Management Plan Advice: The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, a Construction Environmental Management Plan is to be prepared to the satisfaction of the Local Government. 7. Issue: Native Vegetation Advice: The following advice notes are recommended to be applied: Based on the information provided the proposed clearing may not be exempt and a clearing permit may need to be obtained under the Environmental Protection Act 1986. For more information, please contact the Department of Water and Environmental Regulation's Native Vegetation Regulation staff on 08 6364 7098 or admin.nvp@dwer.wa.gov.au. 8. Issue: Potential contamination and acid sulfate soils Advice: The following condition and advice note are recommended to be applied: Condition: Prior to any ground disturbing activities, an Acid Sulfate Soils and Dewatering Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation. Advice Note: For condition [INSERT VALUE] the following document provides guidance on the assessment and management of contaminated sites in Western Australia (WA) within the legislative framework provided by: the *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006*; and the revised national site assessment framework provided in the *National Environment Protection (Assessment of Site Contamination) Measure 1999*: Guideline: Assessment and management of contaminated sites (www.wa.gov.au). Further information on Contaminated Sites can be obtained by email (contaminated.sites@dwer.wa.gov.au) or by telephone on 1300 762 982.

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9. Issue: Noise
   Advice: Please see the attached Technical Review Report prepared by the Department's Environmental Noise Branch.

10. Issue: Terrestrial fauna
    Advice: The following condition is recommended to be applied:

    Condition: Prior to operating any turbine, a Bird and Bat Adaptive Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation and other relevant stakeholders.

More detail pertaining to the above issues are provided in the table below.

Item No.	Reviewer comment/advice
1	**Issue:** Water licensing **Advice:** The following advice notes are recommended to be applied: Advice Note: The proposal is in the Lower Blackwood Surface Water Area proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore a Bed and Bank permit will be required for any interference with the bed and bank of any watercourses. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. Advice Note: The proposal is in the Lower Blackwood Surface Water Area and Beenup and Rosa Beenup Groundwater subareas proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore any take of surface water from a watercourse or groundwater will require a licence to take water. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. **Discussion:**

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			The proposal includes the take for groundwater for dewatering and proposed works across creek lines for transmission lines and access roads. It has not yet been determined where the water supply will be sourced, which may be drawn from groundwater. The subject property is in the Lower Blackwood Surface Water Area as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any taking or diversion of surface water in this proclaimed area (whether by direct pumping, construction of a dam, or excavation) can be subject to licensing. Any interference of the watercourse (such as the construction of a dam or crossing, or excavation of the watercourse) may require a *permit to interfere with the bed or banks* from the department. Exemptions from regulation can be sought from the department related to the presence of any springs at the head of a watercourse rising on the property. The proponent is advised to contact the department to determine licensing and permit requirements or whether any exemptions apply. As of Dec 2025 there was water available in the Lower Blackwood Estuarine Reach surface water sub area under the *Whicher surface water allocation plan (DoW 2009)* which relates to the subject land. The subject property is in the Beenup and Rosa Beenup Groundwater subareas as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any groundwater abstraction in this proclaimed area is subject to licensing by the department, other than supply from the shallow watertable (superficial aquifer) for domestic and non-intensive stock watering purposes. Note: *Domestic use* generally refers to the take of water to service ordinary use associated with a household and for firefighting purposes*. Intensive stock watering* relates to the watering of stock that are generally confined to an area smaller than that required for grazing under normal conditions. Under these latter circumstances, stock is usually fed by hand or mechanical means. As of Dec 20205 there was: • water available in the Perth-Superficial Scott aquifer of the Beenup ground water sub area; • no water available in the Perth-Lesueur Sandstone South aquifer of the Rosa Beenup ground water sub area;	

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			• water available in the Perth-Leederville aquifer of the Beenup ground water sub area; under the *South West groundwater areas allocation plan (DoW 2009)* which relates to the subject land. Available water is allocated on a first-in first-served basis and as such, there is no guarantee that water will be available at the time of development. The availability of water resources can be viewed at the department's public water register is available at https://maps.water.wa.gov.au/#/webmap/register.	
		2	**Issue:** Water supply **Advice:** The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, the proposal water balance and Water Sourcing Strategy is to be prepared to the satisfaction of the Local Government. **Discussion:** The water demand has not yet been determined, and Sect 3.4 of *Preliminary Construction Environmental Management Plan (synergyRED 2025)* states 'Permanent and temporary water tanks and/or storage dams will be installed to support construction and operational water requirements (Figure 3-1). Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction'. Furthermore, Sect 2.3.6 of *Development Application Report (Urbis 2025)* states that 'Once the water sourcing strategy has been finalised, engagement with Department of Water and Environmental Regulation (**DWER**), Water Corporation and the Shire AMR prior to the commencement of construction will be undertaken as required'. The Department supports the preparation of a water balance and Water Sourcing Strategy, and this should be conditioned.	
		3	**Issue:** Surface water management	

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			Advice: The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, a post-development flood model is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation. Condition: Prior to any ground disturbing activities, a Stormwater Management Plan shall be prepared to the satisfaction of the Local Government. **Discussion:** Sect 3.12 of *Development Application Report (Urbis 2025)* states 'Surface water – flood characterisation assessment and modelling to identify inundation areas to inform the future placement of infrastructure and mitigate impacts on surface flow post-construction'. Preliminary pre-development flood modelling has been undertaken and presented in the *Hydrological & Hydrogeological Assessment (Stantec 2025)*, which has provided plans with the 1% AEP peak flood depths and peak flood velocity. Noting the scale of the subject site, Key Model Parameters presented in Section 5.4.1, and application of the 1% AEP climate change high emissions scenario Representative Concentration Pathway 8.5 the model is considered fit for purpose by the Department. It is recommended that this work is used to help inform the overall surface water plan for the development site. A post development flood model will assist in informing infrastructure locations, road crossing designs to comply with Shire requirements, road drainage designs mitigate erosion and sediment mobilisation, and all electrical installations are suitably located and insulated to increase resilience to major flooding. The post development flood model along with a Stormwater Management Plan is recommended to be conditioned.	
		4	**Issue:** Industry Regulation **Advice:** The following advice notes are recommended to be applied:	

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			Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed crushing and screening of material taken from borrow pits operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if it has the capability to meet or exceed the specified production or design capacity of category 12 or 70 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed concrete batching plant operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if the concrete produced is used at another premises or if the proposed concrete batching plant has the capability to meet or exceed the specified production or design capacity of category 77 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: The concrete batching plant will need to demonstrate compliance with the *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998* irrespective of whether the premises meets the threshold to become a Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987* or not. **Discussion:** Sect 2.3.1 of *Development Application Report (Urbis 2025)* refers to both the 'Installation and operation of concrete batching plants' and 'Extraction of borrow material (may include crushing and screening by mobile plant)'.	

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However, Table 3-1 of *Section 38 Referral Supporting Document (Ecologial 2025)* details that 'A Works Approval and Operating License/Registration for crushing and screening will be applied for', but there is no reference to any regulatory considerations for the concrete batching plant.

Insufficient information was provided to enable DWER to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). Based on the information provided the proposed crushing and screening and concrete batching plant operations may cause these premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act (*EP Act), if it has the capability to meet or exceed the specified production or design capacity* of the relevant category under Schedule 1 of the EP Regulations. e.g.

12	Screening, etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	50000 tonnes or more per year
70	Screening, etc. of material: premises on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	More than 5000 but less than 50000 tonnes per year
77	Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places other than those premises.	100 tonnes or more per year

The EP Act makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to cause an emission or alter the nature or volume of waste, noise or odour from the Prescribed Premises, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises.

The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if

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			they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. It is noted that category 77 Prescribed Premises are premises where cement products or concrete are manufactured for use at other premises. If cement products or concrete produced at a premises are used solely at that premises, it is not considered a category 77 Prescribed Premises under Schedule 1 of the *Environmental Protection Regulations 1987*. The application will need to demonstrate compliance with the *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998* irrespective of whether the premises is Prescribed or not. * Production capacity and design capacity definitions: • The **production capacity** is the rate at which a product is produced as relevant to the description of the prescribed premises category; and • **design capacity** is the maximum capacity for which the facility or equipment is designed to receive, handle, process, contain or emit, as relevant to the description of the prescribed premises category. In view of the uncertainty regarding regulation under Part V of the EP Act advice has been provided on environmental risks and mitigation strategies, based on the available information. If the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process.	
		5	**Issue:** Onsite domestic wastewater management **Advice:** The following condition is recommended to be applied: Condition: Prior to the installation of onsite domestic wastewater systems, a site and soil evaluation report is to be prepared that takes account of the principles of the *Government Sewerage Policy (WAPC 2019)*. **Discussion:**	

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			It is noted that Sect 2.2.9 of *Development Application Report (Urbis 2025)* identifies that no construction camp or temporary onsite accommodation is anticipated to be required, with workers proposed to be accommodated in local accommodation in surrounding towns and localities. Onsite facilities are however proposed to be provided and for domestic wastewater Sect 2.2.11 of *Development Application Report (Urbis 2025)* suggest this may be in the form of mobile self-contained or inground septic systems. The site is in a sewerage sensitive area as defined in the *Government Sewerage Policy (WAPC 2019)* (GSP). Therefore, if inground systems are proposed, it is recommended that the principles of the GSP are applied in the development of a site and soil evaluation report to support the 'Application to Construct or Install an Apparatus for the Treatment of Sewage' required under the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. This requirement is recommended to be conditioned.	
		6	**Issue:** Construction Environmental Management Plan **Advice:** The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, a Construction Environmental Management Plan is to be prepared to the satisfaction of the Local Government. **Discussion:** The *Preliminary Construction Environmental Management Plan (synergyRED 2025)* is noted, and the terrestrial environmental quality and inland waters objective-based management actions are supported. The document does not however provide details of any contingency measures. For example, in the event of a spill what action will occur and what actions will be taken if any significant erosion and/or sediment mobilisation occurs. It is recommended that the report be conditioned and should be updated to include emergency and contingency response actions.	
		7	**Issue:** Native Vegetation	

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Advice: The following advice notes are recommended to be applied:

Based on the information provided the proposed clearing may not be exempt and a clearing permit may need to be obtained under the *Environmental Protection Act 1986*. For more information, please contact the Department of Water and Environmental Regulation's Native Vegetation Regulation staff on 08 6364 7098 or admin.nvp@dwer.wa.gov.au.

Discussion:

It is noted that the clear of native vegetation has been reduced as much as practical. Some clearing will however be required and Table 3-1 of *Section 38 Referral Supporting Document (Ecologial 2025)*: states that 'A native vegetation clearing permit will be applied for'.

Under section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless:

- it is undertaken under the authority of a clearing permit
- it is done after the person has received notice under Section 51DA(5) that a clearing permit is not required
- the clearing is subject to an exemption

Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Clearing Regulations).

Based on the information provided, should development approval be issued, clearing to construct a building or structure is likely to be exempt from the requirement for a clearing permit under Regulation 5, Item 1 of the Clearing Regulations, if the vegetation to be cleared is not riparian. Riparian vegetation is defined as the distinctive vegetation associated with a wetland or watercourse. If any riparian vegetation is required to be cleared for the proposed development, a clearing permit is required.

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			Clearing to construct vehicular tracks is likely to be exempt from the requirement for a clearing permit under Regulation 5, Item 12 of the Clearing Regulations. Noting that: • Construction of vehicle tracks within riparian vegetation is generally not allowed, but where there is no reasonable alternative route, and the track is necessary for the commercial activities of the property, it may pass through riparian vegetation. • There must be at least 100 metres between the track and any other cleared land that can be used for the purpose intended for that track. This may include other cleared areas. Note that these exemptions will not apply prior to development approval being issued. Please also note that that clearing for a building / structure and vehicular tracks, combined with other exempt clearing activities on the property, must not exceed five hectares in a financial year. If further clarification is required, please contact the Department's Native Vegetation Regulation section by email (admin.nvp@dwer.wa.gov.au) or by telephone (6364 7098).	
		8	**Issue:** Potential contamination and acid sulfate soils **Advice:** The following condition and advice note are recommended to be applied: Condition: Prior to any ground disturbing activities, an Acid Sulfate Soils and Dewatering Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation. Advice Note: For condition [INSERT VALUE] the following document provides guidance on the assessment and management of contaminated sites in Western Australia (WA) within the legislative framework provided by: the *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006*; and the revised national site assessment framework provided in the *National Environment Protection (Assessment of Site Contamination) Measure 1999*: Guideline: Assessment and management of contaminated sites (www.wa.gov.au). Further information on Contaminated Sites can be obtained by email (contaminated.sites@dwer.wa.gov.au) or by telephone on 1300 762 982. **Discussion:** Contamination	

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			• The location of the proposed windfarm is adjacent east and north-east of the site of the former Beenup Mineral Sands Mine. The former Beenup mine site (Lot 4254 on Plan 208478 and Lot 200 on Plan 36387) was classified under the Contaminated Sites Act 2003 (CS Act) on 26 June 2013 as remediated for restricted use, and a memorial (number M345894ML) was placed on the certificates of title. The site was classified because site investigations during mine closure confirmed that groundwater and surface water at the site contain elevated levels of metals and sulfate, some exceeding environmental and health guidelines. The observed impacts to surface water and groundwater have resulted from historical mining activities, including disturbance and poor management of ASS and deposition of mineral processing waste. • As the regional groundwater flow is south to south-west, generally towards the Scott River, legacy contamination at the former Beenup mine site is not expected to impact the location of the proposed wind farm. However, those historical impacts highlight the fact that soil and groundwater conditions in the area present a high risk of acidification, and potential ASS will require management during construction activities. • CS has reviewed the document "Proposed Wind Farm in Scott River, Preliminary Geotechnical and Baseline Contamination Report (Stantec, 1 July 2024)", and considers that it provides an appropriate assessment of baseline contamination conditions at the site. <u>Acid Sulfate Soils</u> • The proposed wind farm is located in an area that is mapped as having a high to moderate risk of ASS occurring within • CS has reviewed the document "*Proposed Wind Farm in Scott River, Preliminary Acid Sulfate Soils and Dewatering Management Plan* (PTG Consulting, 10 September 2025)", and considers that it provides an adequate preliminary assessment of ASS risks associated with construction of the proposed wind farm. CS considers that risks associated with disturbance of ASS are able to be appropriately managed should the proposed development of the wind farm proceed. • The report notes that dewatering drawdown has been modelled to a maximum depth of approximately 2 metres for turbine construction and 3 metres for construction of	

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			meteorological towers. The report presents options for management of ASS risk during dewatering and excavation which appear appropriate and generally consistent with the guidance provided in DWER's ASS guidelines and national guidelines for the management of ASS. • As the ASS Dewatering Management Plan is preliminary only, CS expects that further, more detailed investigations will be required once all aspects of the proposal design are finalised, at which stage the proposed options for dewatering management can be reviewed and refined.	
		9	**Issue:** Noise **Advice:** Please see the attached Technical Review Report prepared by the Department's Environmental Noise Branch.	
		10	**Issue:** Terrestrial fauna **Advice:** The following condition is recommended to be applied: Condition: Prior to operating any turbine, a Bird and Bat Adaptive Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation and other relevant stakeholders. **Discussion:** As detailed in the EPA Chairman's Determination it was considered that the impacts of the proposal, including on birds and bats, were not so significant that assessment by the EPA under Part IV of the *Environmental Protection Act 1986* (EP Act) was required and determined to not assess the proposal. While the EPA determined not to assess the proposal, it was identified that the construction and operation of the proposal has the potential to impact birds and bats from collision/strike and barotrauma. The EPA's decision was made on the basis of other decision-making processes being able to manage the potential impacts to birds and bats, and the proponent implementing the proposal in accordance with the Preliminary Bird and Bat Adaptive Management Plan (Eco Logical 2025, dated 24 November 2025).	

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	Other decision-making processes the EPA identified included: • authorisation under s40 of the *Biodiversity Conservation Act 2016* (BC Act) to take or disturb threatened fauna • Part V Division 2 of the EP Act to regulate impacts associated with loss of fauna habitat • referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for assessment of potential impacts to species of Matters of National Significance (MNES) The EPA identified that these decision-making processes can consider threatened and migratory fauna species but cannot consider risks to fauna species that are not specially protected. Noting that one conservation significant bird (Priority 3) and one bat species (Priority 4) were recorded during site surveys. The EPA made specific reference to the ability to include a condition requiring preparation of a Bird and Bat Adaptive Management Plan provides assurance that impacts to birds and bats are monitored and managed appropriately, including species that are not considered under other decision-making processes. The EPA has committed that requests to review and provide advice on the adequacy of any Bird and Bat Adaptive Management Plan submitted to the Shire can be made to the Department's Green Energy team via greenenergy.exec@dwer.wa.gov.au. Where the Department has a statutory role, planning applications should be considered prior to the Department issuing any relevant permits, licenses, and/or approvals. If the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process. In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.
Water Corporation	We offer the following comments regarding this proposal.

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	Reticulated water and sewerage are not available to the subject land. The Water Corporation has no objection to the proposed wind farm development. It has been noted in the report water will be trucked to the site to service potable and non-potable water requirements. Onsite effluent disposal managed by a septic system and removed by a certified contractor, or an in-ground septic system will be installed. The information provided above is subject to review and may change. If the proposal has not proceeded within the next 12 months, please contact us to confirm that this information is still valid. Please provide the above comments to the landowner, developer and/or their representative.
Department of Primary Industries and Regional Development (DPIRD)	The Department of Primary Industries and Regional Development (DPIRD) and the South West Development Commission has reviewed the development application by Synergy Renewable Energy Developments Pty Ltd (SynergyRED), a wholly owned subsidiary of Synergy, to build a wind farm. The project will be located 15km north-east of Augusta on the Scott River plain, an agricultural district predominantly hosting beef grazing, dairy farming and blue gum plantations. The project includes the construction and operation of: • up to 20 wind turbines over 3,597 ha with a production capacity of up to 100MW • associated infrastructure, including a 4.3km 132kV transmission line, a new 132kV electrical sub-station, a permanent site office, up to 2 met masts, up to 2 communications towers and associated water tanks and roads. The development is not large by the standards of other wind farms being proposed in the state. The following comments relevant to regional development were received from DPIRD's Strategic Programs team and Local Content Adviser Network • DPIRD notes the wind farm proposal presents a positive economic development opportunity for the region, with the proponent making efforts to ensure the host communities share in project benefits. • Provided the environmental mitigations can be addressed, the project provides for some renewable energy to feed into the SWIS from the south of the state, which will help power supply locally as well as provide feed in via the nearby Beenup 132 KVA line that runs to Manjimup. The project may not significantly increase the range of jobs on offer to the local community in the longer term. • The proponent has not factored in an accommodation strategy and 'likely' accommodation model. Even as a staged project, occasions when up to 150 staff are employed at once are expected to strain the local housing

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	market. An accommodation strategy should be provided that includes all sources of housing demand generated by the project and addresses both the temporary and longer-term workforce accommodation requirements. • DPIRD's Local Content Adviser Network (LCAN) considers the Scott River project to present a strong opportunity for achievable local content outcomes. There is significant potential for local participation in the civil and enabling works, as well as onsite support services, including fabrication and electrical. • There are several capable businesses across Busselton, Margaret River, and the wider South West region that could contribute to the delivery of this project. • The LCAN sees this project as an excellent opportunity to both utilise and further build local capability in wind farm construction. The following recommendations to SynergyRED have been provided by DPIRD's Strategic Programs team and Local Content Adviser Network: • carefully analyse how its accommodation needs will be met given concerns about the availability of local housing. • note Recommendation 2 of the social impact report in addressing concerns in the Scott River locality and being flexible and open to suggestions for improved local benefits. • apply more focus on developing neighbour programs, local content and training opportunities for employees and businesses that are not adequately defined at this stage. • Contact DPIRD's Local Adviser Network (local.content@dpird.wa.gov.au) to find out how they might best engage local regional businesses to supply the project. The following comments relevant to regional development were received from the South West Development Commission (SWDC). • *LGA Draft Policy:* The Shire of Augusta Margaret River has released a Draft Local Planning Policy – Large-Scale Renewable Energy Facilities for comment. It is strongly recommended that SynergyRED review this draft policy and work with the Shire to see how they can respond and accommodate any necessary changes in the project proposal as the policy is progressed and formalised. It is noted that several of the provisions in the draft Local Planning Policy are already addressed in SynergyRED's proposal. • *Aviation impact assessment:* The conducted aviation impact assessment only considered certified aerodromes within 30 nautical miles and non-certified aerodromes within 5 nautical miles of the project site. However, there are two airstrips within the Shire of Augusta Margaret River, one located in Augusta and one in Margaret River, which have received Regional Airports Development Scheme funding from the State and which support the Royal Flying Doctor Service, small general aviation and charters and potential aerial support for Department of Fire and Emergency Services, WA Police and Department of Biodiversity, Conservation and Attractions. The aviation impact assessment did not receive responses from several key aviation stakeholders including the Royal

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	Flying Doctor Service. It is strongly recommended that further consultation occur with the aerodrome manager/s and key users of airstrips in the region to ensure that these smaller operations can continue safely during and following construction. • *Community contribution:* SynergyRED should be commended for proposing adoption of the *Draft Guideline on Community Benefits for Renewable Energy Projects in Western Australia* with respect to a community benefit fund. Further proposed structure of this fund is in the Shire's draft policy linked above. Opportunities to support local employment, training and accommodation should continue to be explored. Ancillary improvements to telecommunications or power for (at a minimum) landholders within the development envelope should also be considered. • *Local economic impact:* It is understood from the proposal that agricultural uses within the project envelope will be able to continue during and following construction. This is an excellent outcome for the landholders and for the broader regional economy. Every opportunity to mitigate impact to these operations should be taken. This includes engagement with landholders with regards to seasonal traffic variations (for example, around harvest) and peak construction, which may require traffic planning or traffic management on some internal roads. • *Stakeholder engagement:* There is clearly mixed sentiment towards the development of a wind farm in this location, particularly from residents in the immediate vicinity. Ongoing stakeholder engagement is required to continue to provide information to the community about the wind farm, the technology, the impact and the opportunities it provides. While the proposal details how to manage the water table, acid sulphate soils and construction to the level of detail it can at this stage, the assessments on noise and shadow flicker are not well articulated for community members. SynergyRED could consider development of additional fact sheets or infographics outlining what the practical impact is likely to be, and/or engage an independent assessment to counter existing misinformation. It is also unclear if the Shire of Nannup has been engaged, which – while not the directly responsible local government – does run very close to the project envelope. There will also be a requirement to continue to work with neighbours to mitigate or compensate for impacts to their plans for their properties. • *Viewing platform:* While little planning has been conducted at this stage with regards to the viewing platform, it is recommended that if there is the opportunity to do so, that SynergyRED engage with Karri Karrak Aboriginal Corporation in designing and developing the signage, to also articulate relevant Aboriginal culture and heritage in the project area/region. • *Construction workforce:* The proposal suggests that the construction workforce be accommodated in local accommodation in surrounding towns and localities. Adequate forward planning is required for this due to limited availability of accommodation in the South West, some of which is already utilised by other projects in the region. The following comments relevant to agricultural resource management were received from DPIRD's Agricultural Resource Management and Assessment (ARMA) branch.

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	• DPIRD has reviewed the Preliminary Construction and Environmental Management Plan (CEMP) and supports use of the CEMP to outline measures to manage biosecurity and water erosion risks during construction. DPIRD provides the following considerations for finalising the CEMP. o It is essential to outline biosecurity management measures to reduce the risk of introducing or disturbing pathogens and weed species within the vegetation across the development envelope. Managing biosecurity risks during construction, ongoing operations, and eventual decommissioning of the wind farm will help minimise impacts on landholders, adjoining farms, and transport routes. o DPIRD is aware of wind farms where soils/landscapes considered at low risk of water erosion under agricultural use, have suffered serious erosion under other uses. The movement of very large and heavy machinery, combined with access roads, pads for turbines and other features can concentrate water flow resulting in erosion. The management measures will need to address any potential surface water or groundwater impacts associated with the development. • DPIRD requests a copy of the final CEMP document, when it becomes available, and the opportunity to advise whether the biosecurity and soil degradation risks associated with this project are being managed. • The Soil and Land Conservation team have advised that within the project area there are several Agreements to Reserve native vegetation in perpetuity. Should SynergyRED and their contactors require to undertake activities within these areas, or to obtain more information on these agreements, they should contact the Commissioner of Soil and Land Conservation, by email at commsoil@dpird.wa.gov.au, prior to commencing any activities.
Department of Biodiversity, Conservation and Attractions (DBCA)	The following comments are provided pursuant to DBCA's responsibilities under the *Conservation and Land Management Act 1984* (CALM Act) and *Biodiversity Conservation Act 2016* (BC Act). **DBCA-managed lands** The proposal area surrounds and partially intersects with an unnamed Nature Reserve (R 42377 / Lot 4924) accessed from Dennis Road, as well as Crown freehold Lot 101, currently held by the Department of Planning, Lands and Heritage but actively managed since 2016 by DBCA and accessed via Scott River Road. It is intended that Lot 101 will ultimately be transferred to the conservation estate to be managed as a nature reserve by DBCA under the CALM Act. The project area also adjoins Crown freehold Lot 1 Governor Broome Road to the southeast, acquired by DBCA through an environmental offset process. To the northeast of the project area, adjoining Dennis Road/Pagett Road, is the Pagett and Chester Nature Reserves and South Blackwood State Forest. To the south and west of the project area, along the Blackwood and Scott Rivers, is the Scott National Park. The proposed development should not result in impositions being placed upon the management of the adjoining and nearby DBCA-managed lands. There should be no direct or indirect impacts, including vehicle, pedestrian and/or stock

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	access, fire management, dewatering/groundwater impacts, surface water run-off, erosion, pollution, pests, Phytophthora dieback or weed spread from the proposed development to the adjacent DBCA-managed land. The submitted Development Application Report (Urbis, October 2025) provides indicative locations for the 20 proposed Wind Turbine Generators (WTGs) and associated infrastructure such as wind monitoring and communication towers, electrical substation, site buildings, transmission line, dams, temporary concrete batching plant, storage and stockpile areas. The proposal states that the maximum tip height for the WTGs is 250m, with a hub height of 164m and a minimum tip height of 40m. For this proposal, the rotor swept area (RSA), -the physical area swept by the blades during operation - is between 23,000m2 and 26,000m2 and has the potential to impact on fauna movements across the landscape. *Advice* • Adequate boundary fencing and gates should be installed to restrict vehicle or stock access to the adjoining DBCA-managed reserves. • Recommend a minimum 100m setback from the boundary of the adjoining nature reserves to any of the proposed buildings, structures and earthworks, to mitigate potential impacts on DBCA-managed lands. A greater setback distance to WTGs or supporting development may be identified, based on finalisation of the development plans following a further design and procurement process, as noted in the Development Application Report (Urbis October 2025). • The proposed gravel-capped access road alignments cross the access ways to Lot 101 and R42377. Further discussions with DBCA will be required in relation to current and future access to the lands and appropriate roading materials to minimise Phytophthora disease spread. **Visual Amenity** The methodology, process and outcomes as presented in Attachment 4 - Referral Supporting Documents (RSD), Ecological Australia 2025 and the main assessment documented in Proposed Wind Farm - Scott River Landscape and Visual Impact Assessment by GHD 2025 are generally supported given: • The methodology aligns with industry standards using established methodologies and approved documents, including the WAPC *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting, and design*. • Suitable Landscape Character Units (LCU) were developed highlighting the variety of landscape types that surround the project. These were then extended to describe the public's acceptance of visual change to the landscape quality of those LCUs. • The Zones of Visual Influence (ZVI) capture where the wind farm infrastructure will be seen across the landscape. Views specific to DBCA managed lands are largely absent, including the Cape to Cape Track, recreation sites and activity on and along the Blackwood River / Scott River and Hardy Inlet, and the Cape Leeuwin Lighthouse (from the

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	ground and the top viewing deck). Assessing more receptors could help to identify small scale or local mitigation measures.
	
	The majority of the assessment focuses on the WTGs as these are the largest elements in the landscape - this includes the mapping of ZVIs. Other infrastructure worthy of the same detailed assessment as the WTGs include the access and maintenance roads, transmission line, meteorological masts and the substation, given they are of significant scale or length in the landscape and will be seen in a different context to the towers.
	
	Individual ZVIs for the other infrastructure will determine where these elements will be seen from the landscape and sensitive visual receptors. These ZVIs could inform mitigation measures that could reduce the individual visual impact of these items and therefore reduce the collective total visual impact for the project as a whole.
	
	The report notes that there will be an impact to the quality of the visual landscape from this proposal. Because of this acknowledgment, and the degree of the impact, the proposed mitigation measures appear limited. More advanced assessment of mitigation measures, based on a more detailed assessment of sensitive visual receptors, infrastructure assessment and associated ZVI may provide more protection of landscape quality and the viewer's sensitivity to the proposal.
	
	Advice
	• The viewing deck at the Cape Leeuwin Lighthouse sits ~40m above ground, and the base of the lighthouse is ~ 20m above sea level. As this is a significant tourism site it would warrant an assessment.
	• The Visual Impact Assessment identifies that this proposal will be highly visible in the surrounding landscape and that there is limited scope in most instances to reduce this visual impact.
	• The proposed mitigation measures are limited and reflect the high impact of the proposal from scattered receptor sites but do not consider local or small-scale mitigation measures or interventions to protect visual quality from the entire landscape.
	• Potential mitigation measures to address landscape-wide and locally identified impacts could include:
	  • Road edge vegetation screening along surrounding travel route corridors of all types managing and screening views along the length of these corridors.
	  • Localised screening surrounding the ancillary infrastructure.
	  • Broadscale landscape planting within the project area.
	
	Flora
	DBCA provides the following comments on Attachment 4 (RSD) - Appendix I Detailed Flora and Vegetation Survey undertaken by Phoenix Environmental Services in February 2025 (the Flora Survey).

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	Vegetation complex information has not been assessed correctly. For the southwest Regional Forest Agreement Area, the Mattiske and Havel (1998) mapping should be used. Threatened flora, *Conospermum quadripetalum* (CR), has been recorded in previous surveys from 2019, including in close proximity to proposed WTGs in the northwestern vegetation and in the road reserve as recently as 2022. The Flora Survey did not record this species, although it was noted that its habitat was not thoroughly searched. *C. quadripetalum* is wetland dependant and may be impacted by dewatering. 71 individual specimens of the threatened *Verticordia plumosa* var. *vassensis* (EN) have been recorded on Governor-Broome Road, some of which appear to be in proximity to the proposed track that crosses the road. *V. plumosa var. vassensis* is often found in seasonally inundated areas and may be impacted by alterations to hydrology / drawdown. Survey sites BEE030 and BEE061 have incorrectly identified a known population of threatened flora *Banksia nivea* subsp. *uliginosa* (EN) as the common subspecies *Banksia nivea* subsp. *nivea*. The common subspecies has not been recorded on the Scott Coastal Plain. Survey sites BEE114, BEE115R also recorded *Banksia nivea* subsp. *nivea*. The Flora Survey did not locate any plants of the threatened *Darwinia ferricola* (EN). DBCA records indicate there are nine populations within the area surveyed. Records of *Leucopogon alternifolius* (P3) have likely been confused with the Priority 3 species *Leucopogon wheelerae*, which is endemic to the Scott Coastal Plain and only known between Walpole to Albany. It is possible that some of these BC Act listed threatened species may no longer persist on site, however a soil stored seed bank is still likely to be present and plants may germinate at this location in future. At present, there are several tracks within the footprint that occur very close to known threatened plant occurrences (e.g. *Darwinea fericola*, *Verticordia plumosa* var. *vassensis)*. Attachment 1 provides a list of DBCA identified regionally significant species from the Flora Survey records. The flora survey does not provide a table of locations or precisely identify the spatial location of conservation listed or significant flora. Attachment 4 (RSD) – Appendix D Preliminary Oversize and/or Over Mass (OSOM) Route Study (Ares Group April 2025) indicates that some native vegetation clearing along the transport route from Bunbury Port to the site may be

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	required, and potentially around Site Entrance A. Vegetation to be cleared in association with the transport route was not assessed in the Flora Survey. *Advice* • It is recommended that the proponent obtain detailed flora survey records from DBCA via a data request. • Pre-clearance surveys of the northwestern vegetation for *Conospermum quadripetalum* should be conducted to determine whether it is present and in proximity to the clearing. • Pre-clearance surveys of the northwestern vegetation for *Verticordia plumosa* var. *vassensis* should be conducted to determine whether it is present and in proximity to the clearing. • Records of *Banksia nivea* subsp. *nivea* need to be reviewed to determine if it is the threatened sub species *B. nivea* subsp. *Uliginosa*. • Where possible, a 50 metre buffer be applied to all confirmed threatened plant records (even if the plant no longer persists on site). If this is not feasible, a BC Act section 40 authorisation will be required for the take of plants, soil stored seed and inadvertent take of threatened species of plants, which may be subject to conditions to mitigate and offset any potential impacts. • Given the project area is predominately cleared agricultural land (72.4%) it is recommended that any WTGs, associated development such as BESSs, concrete batching plant, extraction pits and supporting infrastructure such as access tracks, transmission lines target existing cleared areas. • It is noted that several of the proposed access tracks currently bisect drainage lines. Clearing of drainage lines should be avoided where possible. • Transmission line fire mitigation measures such as vegetation pruning and grass spraying should not result in any clearing or modification to the remnant vegetation in the DBCAmanaged nature reserve (R42377) to achieve transmission line fire protection objectives. • Planning access for construction traffic off Scott River Road and Governor Broome Road should consider presence and avoid any impacts on threatened and conservation significant flora within these road reserves. **Threatened Ecological Communities** The ironstone soils, which are the foundation of the Scott River Ironstone Threatened Ecological Community (TEC), are highly restricted in distribution on the Scott River Plain. The Scott River Ironstone TEC is listed as Critically Endangered under the BC Act and Endangered under the federal *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Currently there are 24 occurrences from the Scott River area recorded on DBCA's TEC database. The occurrences total 377 hectares over an extent of occurrence of approximately 150 km2. The loss of any occurrence of this TEC is considered significant.

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	The Scott River Ironstone Association Interim Recovery Plan 2015–2020 (DPAW, 2015) (IRP) for the TEC refers to the underlying geology's physical properties as being important for local moisture retention and to sustain the TEC vegetation. The TEC relies on relatively shallow groundwater depth in summer and autumn (1-2 metres below ground). Ponding occurs in low-lying areas during the winter because vertical drainage of rainfall and runoff is prevented by the relatively impervious ironstone layer and shallow groundwater level. Inundation usually persists for a period of three months during winter, although some occurrences may have little surface water. The vegetation community is tolerant of periodic inundation (usually for several months during winter). The IRP also states that "any groundwater use that has the potential to lower the summer minimum groundwater levels at the water table by more than 0.3 metre should be considered a potential threat" (p16). If groundwater levels are impacted or dewatering occurs, this could result in vegetation deaths within the community. Areas currently mapped as Scott Ironstone TEC that were considered to be in degraded condition were not included as occurrences of the TEC, as they do not meet the criteria of good or better to be listed under the relevant acts. These occurrences are still considered to be important, as with intervention (eg fencing, weed control and grazing management) they have the ability to recover sufficiently to be considered part of the TEC. These areas of vegetation should also be considered for potential impacts from clearing and groundwater drawdown. Some of the proposed WTG locations are very close to known occurrences of Scott Ironstone TEC and vegetation within conservation reserves (Lot 101, Lot 1 and R42377). For example, the proposed WTG on the east side of Lot 101 is immediately adjacent to native vegetation within Lot 101 as well as vegetation mapped as Scott River Ironstone TEC in the Flora Survey. Groundwater drawdown here has a high potential to impact native vegetation, including the Scott River Ironstone TEC. The information provided does not include sufficient detail to demonstrate that modification of the TEC is unlikely to occur. The proposed site office, concrete batching plant and laydown areas are in close proximity to Lot 101 and DBCA's access gate into Lot 101. *Advice* • It is recommended that footings that require minimal dewatering are used for any of the WTGs near the Scott River Ironstone vegetation. • Further discussion is required with DBCA to ensure there is no impact to vegetation in Lot 101 and DBCA's operations/access. • The access track construction should consider appropriate culvert installation to ensure surface hydrology flows are not altered, which may impact the Scott River Ironstone TEC.

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	• A minimum 100m setback is recommended from proposed buildings, structures and earthworks and the Scott River Ironstone TEC occurrences, to mitigate potential impacts on the TEC. • It is recommended a site-specific hydrological study is undertaken. If this information identifies potential impacts to TEC vegetation from the proposal, authorisation under section 45 of the BC Act will be required. If further advice is required in relation to requirements under the BC Act including whether authorisation is required to modify a TEC, email speciesandcommunities@dbca.wa.gov.au. • It is recommended that the Preliminary Acid Sulfate Soils and Dewatering Management Plan **(**Attachment 4 (RSD) - Appendix B – PTG Consulting September 2025) be updated in consultation with DBCA to include appropriate monitoring and mitigation measures relating to the Scott River Ironstone TEC and be conditioned on any development approval. • The proponent may also need to address any referral requirements under the EBPC Act. **Wetlands** The majority of the development area is mapped as palusplain in the Geomorphic Wetlands Augusta to Walpole dataset, with a cluster of sumplands and damplands around the middle of the development area, particularly within Lots 4152, 4263 and 4265. Any alterations in hydrology may impact the palusplain. There may also be indirect impacts to the sumplands that are in close proximity to development. **Fauna** DBCA notes potential impacts of the development on conservation significant values including breeding, roosting and foraging habitat of the threatened Carnaby's cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*), and the Priority species Western False Pipistrelle bat (*Falsistrellus mackenziei*), all of which were observed within the proposal area. Evidence from studies at other windfarms has shown that operational impacts affect particular species disproportionately, compared to habitat loss or stationary elevated structures (Willis et al. 2010). While research on Australian wind farms is limited, evidence to date suggests the species most affected by collision mortality fall into the following groups (MacMahon 2010): • Large sedentary raptors. • Fast high flying microchiropteran bats. • Fast high flying non-passerines. Representative species from all of these groups are known to occur within the locality of the Scott River proposal.

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	Studies reported in the literature reviewing the operational impacts at Australian wind farms using data from operational monitoring (i.e. carcass searches) at Australian wind farms found an average mortality of 0.71 birds and 0.55 bats per turbine per year, although these rates are imperfect given the limited datasets (Heinze et al, 2014). It is noted that some species such as the wedge-tailed eagle (*Aquila audax*) and white-striped freetailed bat (*Austronomus australis*) have an 'almost certain' risk of collision with the turbines and high mortality rates/carcass counts have been recorded at other wind farms in Australia. However, as these species are not conservation listed, the impact to these species has not been assessed. How black cockatoos use the landscape in the presence of wind turbines is not well known at present. It may change their foraging, roosting and breeding behaviour. Locating turbines and tracks away from trees and vegetation may minimise disruption to their normal behaviour patterns. Black cockatoos may fly a distance of around 20-30 km on average over open areas (e.g. agriculture areas). Black cockatoos utilise vegetation corridors, such as those formed by the adjacent remnant vegetation, to access known patches of foraging, roosting and breeding habitat. Often the birds will fly to the ground to drink on dusk before returning to their night roost in the forested areas. The RSA of the proposed WTGs is between 40-250m above the ground. The supporting Attachment 4 (RSD) - Appendix L Bird and Bat Risk Assessment – Level Two (Phoenix Environmental Sciences August 2025) indicates that certain conservation significant species such as Red-Tail and Carnaby's Black Cockatoos have been recorded flying to heights of 50m. Many of the WTGs appear to be placed close (or within) areas of remnant vegetation/Black Cockatoo habitat. There is evidence in other bird species that the impact of noise from the turbines may be detrimental to reproductive success. Studies also indicate that birds may exhibit avoidance behaviour near windfarms, with reports of displacement effects ranging from 75 to 800 metres from turbines (Strickland 2004, Winkelman 1994). Potential noise impacts to fauna are considered in Attachment 4 Referral Supporting Document (RSD) and is proposed to be managed through Attachment 4 (RSD) - Appendix N Preliminary Bird and Bat Adaptive Management Plan (both Ecological September 2025). The Preliminary Bird and Bat Adaptive Management Plan **(**Attachment 4 (RSD) - Appendix N – Ecological September 2025) (BBAMP) emphasises carcass monitoring but lacks detail on adaptive responses if collision triggers are exceeded. There are high-quality habitat areas and records for Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) in the southeast corner of the development area, which is in proximity to two proposed WTGs.

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	Advice
	• Where possible, a minimum 100m buffer between remnant vegetation and individual WTGs is recommended, to reduce bird strike and any potential impacts from the turbine noise. In particular, recommend the following specific WTGs be considered for relocation to reduce impacts for black cockatoos and WRP:
	  • WTG in the northeast of the Development Area adjacent to red-tailed black cockatoo records
	  • WTG cluster north of Governor Broome Road
	  • northwest WTG in dense vegetation, and
	  • southwest WTG just to the north of Governor Broome Road.
	• Recommend the proponent identify any water sources such as fire water points/soaks/troughs/bores etc. in the agricultural land and consider not placing turbines between the existing water points and the vegetation to ensure no disruption to flight paths and reduce the potential for bird strike.
	• Recommend the BBAMP **(**Attachment 4 (RSD) -Appendix N – Ecological September 2025) be updated in consultation with DBCA and be conditioned on any development approval.
	• Recommend the BBAMP be updated to include specific operational adjustments such as blade feathering, appropriate RSA for the proposed WTGs, painted blades, acoustic deterrents, and radar/camera-based smart curtailment of the turbine speed during periods of high species activity, in response to carcass reporting.
	• WRP and Black Cockatoo species are listed as threatened under the BC Act and EPBC Act. The proponent should be aware of their obligations and approval requirements under section 40 of the BC Act, which requires Ministerial authorisation to take or disturb threatened species. If further advice is required in relation to requirements under the BC Act including whether an authorised fauna spotter is required for activities such as vegetation clearing, email speciesandcommunities@dbca.wa.gov.au.
	
	Construction Environmental Management
	The submitted Attachment 4 (RSD) - Appendix H Preliminary Construction Environmental Management Plan (CEMP) Fig 3.1 identifies a temporary concrete batching plant being located approximately 300 metres southwest from Lot 101, which contains Scott River Ironstone TEC vegetation. There is potential for dust impacts on DBCA-managed lands and TEC vegetation from the prevailing wind direction.
	
	The proposed construction laydown area and communications tower appear to be located in close proximity to the access gate/track for Lot 101.
	
	The entirety of the Development Area and surroundings are identified as a Dieback Vulnerable Zone. In terms of specific occurrences of dieback, the intersection of Brockman Highway and Sues Road and the northern side of Brockman Highway was assessed as infested in 2001 and 2008. The vegetation to the south and east of the intersection of

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	Brockman Highway and Dennis Road was assessed as dieback infested in 2008 and 2009, respectively, potentially including the road verge vegetation. In addition, Lot 101 and R42377, were assessed as dieback infested in 2009/2010. Priority Protection Areas (PPA) are the highest Phytophthora dieback disease priority management areas within the State. The focus of PPAs is to reduce the risk of Phytophthora dieback spread. In the development area, there are two Priority Protection Areas – an uninfested high value hotspot in the southeast corner of Lot 1 and eastern portion of Lot 4154 and an infested high value hotspot in the southwest corner of the site, extending over around a quarter of Lot 4260. The section within the infested high value hotspot PPA along Scott River Road / Governor Broome Road is actively managed to reduce impacts. PPA on-ground management measures include fencing, road improvements, drainage control and phosphite treatments. Attachment 4 (RSD) - Appendix H Preliminary Construction Environmental Management Plan (SynergyRED September 2025) indicates that a Dieback Management Plan will be developed and will be informed by a Phytophthora dieback survey completed prior to construction. The Dieback Management Plan will need to include appropriate prevention and mitigation measures such as ensuring that vehicles and machinery are cleaned when arriving and leaving the development area, with information provided on how and where vehicles machinery and equipment will be cleaned of soil (e.g. wash down bays). DBCA is aware that Governor Broome Road can be subject to seasonal saturation causing road deterioration and summer dust. The current proposal will increase existing truck movements, and the adjoining TEC vegetation and flora species may be subject to increased Phytophthora dieback spread impacts, vehicles straying off-road to avoid road damage, and dust coverage. Existing fencing along Governor Broome Road, installed to protect TEC vegetation and threatened flora from cattle movement between sites at this location, has an increased damage risk from stock and vehicles during the construction period. *Advice* • Recommend further modelling be undertaken to identify and address potential dust impacts from the proposed temporary concrete batching plant on DBCA-managed lands and TEC occurrences. • The proposed construction laydown area and communication tower be relocated further to the south so that DBCA access to Lot 101 is not restricted. • Recommend that the proposed Dieback Management Plan be produced in consultation with DBCA and be a condition of any development approval, to be completed prior to the commencement of works. • Recommend water sources used for dust mitigation measures be clean or treated to minimise the risk of moving/spreading pathogens and impacting upon native vegetation. • Recommend the proponent consider suitable traffic management measures during construction to ensure fencing along Governor Broome Road is not damaged.

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	• Recommend that any mulch or topsoil stockpiles, or hydrocarbon/hazardous material stores, are not located upslope and/or within 100m of DBCA-managed lands and TEC occurrences. • Recommend all cleared vegetation be mulched and disposed offsite every day to minimise fauna utilising/moving into the cleared vegetation. If spoil is stockpiled and not mulched or disposed offsite within this timeframe, stockpiles should be checked for fauna before they are mulched or removed from the site. • CEMP Table 6.7 Terrestrial Fauna Management refers to incidents where loss or injury of native fauna occurs. Regional Wildlife Officers at DBCA's Southwest Region should be notified within 24 hours of any incident occurring. **Attachment 1** – DBCA identified regional significant flora species based on the Flora Survey records (assuming correct ID) • *Actinodium cunninghamii* - western range end. Disjunct western populations. • *Calothamnus lehmannii* - disjunct and rare on Scott Coastal Plain. • *Cyathochaeta equitans* - no known previous record on Scott Coastal Plain. • *Daviesia flexuosa* - western populations are disjunct from the eastern south coastal populations. • *Goodenia micrantha* - first known record on Scott Coastal Plain. • *Grevillea diversifolia* subsp. *subtersericata* - no known previous record on Scott Coastal Plain. Disjunct from usual distribution. Nearest record near Northcliffe. • *Hakea tuberculata* - disjunct western populations are endemic to the Scott Ironstone TEC. • *Isolepis congrua* - no known previous record on Scott Coastal Plain. Nearest record near Denmark. • *Isolepis hookeriana* - no known previous record on the Scott Coastal Plain. Nearest record near Bridgetown. • *Lepidosperma leptostachyum* - no known previous record on the Scott Coastal Plain • *Melaleuca densa* - western range end. Uncommon on Scott Coastal Plain. • *Myriophyllum salsugineum* - Poorly recorded. First record on the Scott Coastal Plain landform. • *Persoonia graminea* - western populations are disjunct from eastern populations. Uncommon. • *Scaevola striata* var. *striata* - western range end at Scott River. • *Sphaerolobium grandiflorum* - First record on the Scott Coastal Plain landform. Disjunct. Not recorded west of Walpole • *Sphaerolobium racemulosum* - western populations highly disjunct from populations east of Albany. • *Stylidium megacarpum* - southern range end. Poorly recorded on the Scott Coastal Plain landform. • *Synaphea obtusata* - no known previous record on the Scott Coastal Plain. Not previously recorded west of Manjimup.
Department of Health (DoH)	DoH position: No objection – with comments and/or recommended conditions and advice notes provided below.

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	1. Site servicing The DoH advises that the treatment and disposal of wastewater generated on site, either temporarily or permanently, is required to comply with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* and the Government Sewerage Policy 2019 requirements. A site-specific Site and Soil Evaluation (SSE) should be undertaken by a qualified consultant during the wettest seasonal time of the year (mid-July/August) as per AS/NZS 1547:2012, to ensure the land application area for each wastewater treatment system is appropriately sized and located. **2. Health and amenity** Mosquitoes The subject land is in a region that occasionally experiences problems with nuisance and disease carrying mosquitoes. These mosquitoes are known carriers of Ross River (RRV) and Barmah Forest (BFV) viruses. Human cases of RRV and BFV diseases have been reported in this region. Future development should avoid the creation of additional mosquito breeding habitats. The DoH recommends that the proponent ensures the proposed site works and infrastructure do not create additional mosquito breeding habitat as follows: • Changes to topography resulting from earthworks must prevent run-off from creating surface ponding as it may become mosquito breeding habitat. • Water tanks and other water-holding containers must be sealed or screened to prevent mosquito access and breeding. • On-site infrastructure and constructed water bodies must be located, designed and maintained so they do not create or contribute to mosquito breeding. Temporary concrete batching plant Concrete batching facilities may impact human health due to contaminant types such as lime, calcium hydroxide, alkalis, hydrocarbons, asbestos and metals (nickel, zinc). Concrete batching plants are also considered a potentially contaminating land use as described in the Department of Water and Environmental Regulation's *Assessment and management of contaminated sites* (DWER, Nov 2021). The DoH considers it appropriate that these matters are addressed through the development application, including considerations to protect public health and to avoid the creation of a new contaminated site. The DoH recommends that the applicant provide details of effective management of the proposed temporary concrete batching plant, including contingency measures and actions in the event of facility malfunctions or spills.

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	Noise The DoH is unable to provide noise-related comments as noise falls outside of the DoH's regulatory area. Please refer the request to the Department of Water and Environmental Regulation noise branch for advice concerning noise impacts and comment on the proposed wind farm application: Noise regulation | Western Australian Government. Contaminated sites There is a large area adjacent to the western boundary of the site comprising a series of linear ponds and wetlands known as the former Beenup Titanium Minerals Mine. The site was reported (DMO25933/25934) under the *Contaminated Sites Act 2003* based on the presence of groundwater contamination derived from deposits of mineral processing wastes and disturbance of acid sulfate soils, and elevated radiation derived from the titanium mineral processing waste deposited on site. The mine operations were rehabilitated to wetlands in 2004 and a radiation survey conducted at the time concluded that the site was suitable as a wetland reserve but not for any other sensitive land uses. The proponent may wish to discuss this with the Radiological Council of Western Australia. **Approvals** • An Application to Construct or Install an Apparatus for the Treatment of Sewage for each onsite wastewater treatment system, temporary or otherwise, will be required to be submitted to the Shire of Augusta Margaret River. • All drinking water provided on site must meet the health-related requirements of the *Australian Drinking Water Guidelines 2011*.
Department of Fire and Emergency Services (DFES)	I refer to your email dated 19 November 2025 regarding the submission of a Bushfire Management Plan (BMP) (Revision 1.0), prepared by Linfire and dated 27 March 2025, for the above proposed development. The BMP is accompanied by a Bushfire Risk Management Plan (BRMP) (Revision 0) from the proponent dated 27 March 2025 in relation to the proposal. This advice relates to the State Planning Policy 3.7 Bushfire (SPP 3.7) and supporting Planning for Bushfire Guidelines (Guidelines), as well as DFES' role and responsibilities as Hazard Management Agency (HMA) for Fire in Western Australia. **General Comment** • DFES acknowledges that the development site consists of multiple owners of land primarily used for agricultural purposes. The proposed development includes the installation of 20 wind turbines and associated infrastructure, including a substation and operations and maintenance building/office. • Specific requirements of SPP 3.7 and the Guidelines are to be further addressed in the BMP as outlined in the below assessment Tables 1 and 2.

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	• DFES notes that the current version of SPP 3.7 and the Guidelines no longer makes reference to 'high risk land use'. The decision maker has referred this proposal to DFES as a discretionary referral. DFES considers that SPP 3.7 and the Guidelines do not adequately address high risk land use such as renewable energy facilities. Given the temperature sensitive nature of the infrastructure, it is critical to ensure that the proposed design adequately responds to facility fire risks and bushfire risks in order to protect life, property and infrastructure. • Accordingly, DFES has also assessed the proposal against the CFA Design Guidelines and Model Requirements – Renewable Energy Facilities as amended (REF Guidelines) which is currently considered best practice for the development of renewable energy facilities. • Specific requirements of SPP 3.7 and the supporting Guidelines and the REF Guidelines are to be further addressed in the BMP and BRMP as outlined in the below assessment. The assessment comments relating to the REF Guidelines have been incorporated into the below overall assessment comments for the respective issue/element. **Recommendation: Compliance with acceptable solutions not demonstrated – modifications required** DFES advises that the BMP has not demonstrated that the proposed development complies with the Element 2: Siting and Design requirements of SPP 3.7 and the Guidelines. Further information should also be submitted to demonstrate compliance with the Victorian Country Fire Authority REF Guidelines, considered best practice for the development of renewable energy facilities. DFES recommends the BMP and BRMP be modified as per the Assessment advice provided in Tables 1-3 to ensure it is accurate and the bushfire risk management/mitigation measures are effective and can be implemented in perpetuity to manage/mitigate the bushfire risk to people, property and infrastructure to an acceptable level and appropriate to the land use and location. The required modifications are listed in the table(s) below. Should the modified BMP and BRMP affect the design of the proposal, the proposal should be amended to reflect these modifications. DFES recommends that due consideration be given to the below assessment of the extreme bushfire hazard level and unacceptable risk (see Tables 1 – 3).

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS

Table 1: Assessment – Policy Measure 7.1 ii. c. Compliant Preparation of a BAL Contour Map

Vegetation Classification or Exclusions	BMP Modification Required
Classified Plot 6 – not demonstrated Vegetation Plot 6 cannot be substantiated as Class B Woodland with the limited information and photographic evidence provided. Photograph IDs 6a-c do not represent Class B Woodland. The foliage cover appears to exceed 30% and most of the Plots are contiguous with Class A Forest. The BMP should detail specifically how the Class B Woodland classification was derived as opposed to Class A Forest. If unsubstantiated, the vegetation classification should be revised to consider the vegetation as per AS 3959, or the resultant BAL ratings may be inaccurate.	**BAL Rating cannot be validated.** Further evidence to support the vegetation classification of Plot 6 as Class B Woodland is required.

Table 2: Policy Measure 7.1 ii. e. Compliance with the Bushfire Protection Criteria 7: Development – Commercial and Industrial

Element	Assessment	Action
Siting and Design	**A2.1a – not demonstrated** The BAL ratings cannot be validated for the reason(s) outlined in Table 1. There are two turbines located in a high-risk environment within a timber plantation, the timeline for harvesting is unknown. Should the plantation land use continue it is suggested from a HMA perspective that these turbines be located to a lower risk environment on the site. Furthermore, although SPP 3.7 does not require commercial or industrial land uses achieve anything less than BAL-29 for habitable buildings, evidence is required that the proposal meets the separation distance requirements (whichever is greater) to ensure: a) that radiant heat from a nearby bushfire will not trigger a failure in the infrastructure (whatever the most susceptible component is); and b) that radiant heat emitted from a failure in infrastructure should be used to inform the minimum separation distance required (i.e. radiant heat level that the weakest component can withstand) and provided to demonstrate compliance. Sufficient evidence in the form of technical specifications and/or standards should be provided.	**BAL Rating cannot be validated.** Modification to the BMP is required to address the Assessment advice.

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Agency	SUMMARY OF COMMENTS

Vehicular Access	**A3.1 – demonstrated** The BMP has demonstrated compliance with the driveway and turning circle requirements of the Guidelines. **REF Guidelines** The REF Guidelines requires a larger turning circle or T-head to allow for the turning of fire appliance. It is recommended that consideration is given to these Guidelines, in consultation with the local brigades and units, to determine the minimum driveway compliance requirements.	**Compliance with vehicular access requirements of the REF Guidelines not demonstrated.** Modification to the BRMP is required to address the Assessment advice.
Water Supply	**A4.1 - demonstrated** The BMP has demonstrated compliance with Element 4: Water Supply of the Guidelines. **REF Guidelines** The REF Guidelines require a 45,000L water tank at each site entrance and there are four site entrances listed in the vehicle access compliance statement. However, only three water tanks for firefighting purposes are shown on Figures 8 and 9 and they are located throughout the site at various driveway intersections.	**Compliance with firefighting Water Supply requirements of the REF Guidelines not demonstrated.** Modification to the BRMP is required to address the Assessment advice.

Table 3: Policy Measure 7.1 iv. and Section 9.4.2 of the Guidelines: DFES Role as Hazard Management Agency (HMA)

DFES wishes to provide the below additional advice in its role and responsibilities of HMA for Fire in Western Australia.

Emergency Management Plan (EMP)		Action
Emergency Management Plan (EMP)	Given the high-risk land use at this location, it is considered appropriate that an 'Emergency Management Plan' be prepared. Consideration should be given to the Bushfire Emergency Plan (BEP) Manual (as published by the Western Australian Planning Commission), Section 7 of the REF Guidelines and the comments from DFES Aviation Services below. These contain details of information that should be included in a EMP and will ensure the appropriate content is detailed when finalising the EMP to the satisfaction of the decision maker.	**Comment only.**

Attachment 7 – Schedule of Referral Responses

<table>
<tr><th>Agency</th><th>SUMMARY OF COMMENTS</th></tr>
<tr><td></td><td>
<table>
<tr><th>Renewable Energy Facilities</th><th></th><th>Action</th></tr>
<tr><td>Consultation</td><td>In the event that an approval is granted, the DFES District Officer responsible for this region and the local fire and emergency services should be consulted during the development, construction, and leading up to the commissioning of the facility.

It is considered critical for the local fire and emergency services to understand the hazards present in the facility and the measures required to ensure the safety of firefighting personnel when working in or around different parts of the facility.

This may impact on how crews respond to a fire within the facility, which may in turn have ramification regarding the optimal number and location of water supplies.</td><td>Comment only.</td></tr>
<tr><th>DFES Other Technical Advice</th><th></th><th>Action</th></tr>
<tr><td>DFES Regional and Special Operations</td><td>DFES Land Use Planning have referred the Scott River wind farm proposal to both the lower south west regional and special operations branches. Due to operational priorities no comment has been received to date. Should any comment be provided within the near future it will be provided to the Shire.</td><td>Comment only.</td></tr>
<tr><td>DFES Aviation Services</td><td>Aviation Services provide the following comments:
• No wind turbines to be located within 300 metres of one another.
• Wind turbines will be provided with automatic shut-down and the ability to be completely disconnected from the power supply in the event of fire.
• All weather monitoring stations to be notified to the Civil Aviation Safety Authority.
• All guy-wires to be clearly marked.</td><td>Turbine locations to be provided to DFES Aviation Services.</td></tr>
<tr><td>DFES Land Use Planning</td><td>It is the responsibility of the proponent to ensure the proposal complies with relevant planning and building requirements. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, environmental health or any other approvals required by a relevant authority under written laws.</td><td>Comment only.</td></tr>
</table>
</td></tr>
<tr><td>Department of Energy and Economic Diversification (DEED)</td><td>Officers from the Energy Policy WA and PoweringWA groups have previously met with representatives from Synergy to discuss SynergyRED’s (the Applicant) proposal. The Department notes SynergyRED has a successful track record of developing renewable projects in the South West Interconnected System (SWIS), including joint venture projects like the Mumbida Wind Farm and the Warradarge Wind Farm.

Electricity Demand
The State Government has committed to the retirement of state-owned coal fired power stations by 2030, with the Collie Power Station due to retire in 2027 and the remaining Muja Power Station units in 2029. The Australian Energy Market Operator’s (AEMO) 2025 Wholesale Electricity Market (WEM) Electricity Statement of Opportunities highlights a need</td></tr>
</table>

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	for new generation capacity in the SWIS from 2027 onwards. This is due to the planned retirement of these facilities, plus growth in peak demand and overall electricity consumption. The Clean Energy Link – North transmission project, due for completion at the end of 2027, will enable the connection of new generation and storage projects between Three Springs and the Perth metropolitan area. This transmission infrastructure will support a range of energy sources, including wind and solar projects, with connections enabled from 2028 onwards. In advance of completion of this transmission program of works, and noting growing demand, the Department is supportive of renewable energy projects connecting to the existing Western Power network and making use of any available capacity. Additionally, whole-of-system modelling indicates that wind generation assets should be developed across the SWIS to access diverse wind profiles over the day and year to maximise the availability of renewable generation at any one time. Excess renewable power also fills the growing fleet of Battery Energy Storage System facilities across the SWIS, providing a lower cost and lower emissions energy source to 'firm' intermittent renewable energy generation. **Connection to the SWIS** Connection to Western Power's transmission network and confirmation of project financing are essential to the viability of the proposed wind farm in Scott River. The Department notes the applicant; • proposes to connect up to 100 megawatts of wind generation capacity to the Beenup to Manjimup 132 kilovolt transmission line via a 4.3 kilometre connection asset, and • has been engaging with Western Power regarding the connection of their project to the SWIS via fortnightly meetings since February 2025. The Department notes the progress being made towards a connection agreement and that ongoing work is required to connect the project to the SWIS, including approvals, confirmation of project financing and available network capacity, and construction of the connection asset. **Stakeholder Engagement and Community Benefits** The State Government expects renewable energy proponents to follow best practice when engaging with landowners, stakeholders and the communities in which they intend to operate. The Department notes SynergyRED has undertaken the first steps in obtaining social licence for their project through: • engagement across the community since 2024, including community drop-in sessions, monthly updates in the local newsletter, letter drops and targeted advertising; • performing a Social Values Assessment to inform the development of their project; and

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	• committing to provide $100,000 per annum towards a Community Benefits Fund, the allocation of which will be informed by the development of a Community Benefit Fund Implementation Plan in consultation with the Shire of Augusta Margaret River (the Shire) and the community. The Department notes the Applicant's proposed community benefits contribution is in line with the recommended amount outlined in the PoweringWA *Draft Guideline on Community Benefits for Renewable Energy Projects*. The Draft Guideline is subject to finalisation. As such, SynergyRED should continue to work with the Shire and local community to ensure funds may be allocated in a way that meets the long-term needs of the community and is consistent with the final Guideline once published. The Department does not have a formal role in approvals required to deliver the Project, and encourages SynergyRED to continue to engage relevant agencies, including Western Power and AEMO, to understand its complete approval pathways from development through to energisation. The Department also encourages the applicant to continue to undertake on-going engagement regarding the development, prioritising transparency and collaboration with the Shire and local community.
Western Power	I refer to the Development Assessment Panel development application - Shire of August Margaret River for SynergyRED Scott River Wind Farm. The applicant's report states that the "Feasibility assessment Area" (subject area) and the "latest draft development boundary…is subject to change as the feasibility assessment progresses". Western Power recommend that a Detailed Design and Construction Phase plan as agreed with Western Power be provided by the proponent/applicant. Noting the existing and potential Western Power assets relevant to the proposal, Western Power's internal customer connection team in respect to the proposed development advise that the customer/proponent has been progressing the development with Western Power. However, prior to commencement of works, the proponent shall ensure that the connection and stages, location, design, access and ongoing maintenance and operations of assets is supported and agreed with Western Power. Western Power recommends the following standard Advice Notes prior to development or subdivision on the subject site, pursuant to Section 167 of the Planning and Development Act 2005: Advice Notes *(i) The development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.*

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	(ii) No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power. *(iii) The applicant should formally progress the Western Power network connection and substation arrangements with Western Power.* *(iv) Arrangements being made to the specifications of Western Power for the provision of necessary electricity easements as and where required.*
Main Roads WA (MRWA)	I refer to your email of 19 November 2025 and advise that Main Roads has no objections in principle to the proposed development, subject to further engagement being undertaken with Main Roads regarding the intersection construction required to facilitate the movement of components from the Bunbury Port to site.
CASA	CASA has reviewed the Aviation Impact Assessment (AIA) prepared by Aviation Projects dated April 2025 for the Scott River (Beenup) Wind Farm project located in the Shire of Augusta Margaret River Local Government Area in Western Australia. CASA notes the following information contained in the AIA: • This wind farm development compromises 20 wind turbine generators (WTGs), which are up to 250 m Above Ground Level (AGL). • The wind farm is located outside of Busselton Airport's OLS. • The wind farm will affect the minimum sector altitude and GNSS arrival instrument procedures at Busselton aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes (Airservices Australia - 25 February 2025). • There are 2 uncertified aerodromes identified within 3 nm: o Unknown Aerodrome 1. The proposed wind farm would be considered potentially hazardous obstacles. When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial in understanding the potential extent of these impacts. o Boley Aerodrome. The proposed wind farm would be considered potentially hazardous obstacles. When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts. CASA notes from the Airservices Australia response that it concluded that … The proposed activity will penetrate the current Airservices-designed airspace procedures and/or impact CNS facilities or ATC operations at Busselton aerodrome. Busselton aerodrome (YBLN) is a certified aerodrome which must operate in accordance with the

Attachment 7 – Schedule of Referral Responses

Agency	SUMMARY OF COMMENTS
	requirements of Part 139 (Aerodromes) - Manual of Standards 2020. Therefore, until such time that the impacts at Busselton Aerodrome are resolved and published, CASA advises that the proposed Scott River (Beenup) Wind Farm as presented, would have an unacceptable effect on the safety of existing and future air transport operations at Busselton Aerodrome. Further, CASA agrees with the AIA that communication with the 2 uncertified aerodromes owners/operators is required regarding the potential impacts associated with the planned 250 m high WTGs. CASA's assessment was conducted in accordance with the National Airports Safeguarding Framework (Guideline D) as developed by the Department of Infrastructure, Transport, Regional Development, Communications and the Arts, and as developed to provide planning advice to State and Local Planning Authorities to aid in safeguarding Australian airports from incompatible development. Post the above being resolved and published, with regards to Visual Flight Rules (VFR) operations, pilots are permitted to fly as low as 500 ft AGL. The WTGs will reach up to a height of approximately 820 ft (or 250 m) AGL, and therefore the turbine blades will infringe navigable airspace by 320 ft. Therefore, CASA would recommend the proponent install obstacle lighting on the WTGs due to the height of these structures. To limit any potential visual impact on the community, CASA would also recommend consideration of a radar-activated type system of steady red low intensity (200 cd) aviation hazard lighting or contacting obstacle lighting suppliers and discussing whether a cowling system, much like a typical "lampshade", could be incorporated into the lighting system that could result in little or no downward light spill without impacting aviation safety. Any wind monitoring masts associated with the development should be marked as per Section 8.110 of CASA's Part 139 (Aerodromes) - Manual of Standards (MOS139) with the inclusion of aviation hazard markers. The coordinates and estimated survey heights of each WTG and wind monitoring mast must be reported to the Airservices Australia Vertical Obstacle Database (VOD) email address, once Development Approval is granted to ensure that the location of the wind farm can be mapped for the information of pilots. Changes to maps can take in excess of six months, therefore one month prior to works commencing, Airservices should be contacted via the VOD email address so that a NOTAM (Notice to Airmen) can be published by Airservices advising pilots that the construction of tall structures in the area is imminent. On the completion of works, the VOD should be advised of the surveyed height and location of each WTG and wind monitoring mast so that the wind farm details can be accurately recorded in the database.

Attachment 8

On 19 September 2025, the Shire received a petition containing **1,377** signatures requesting the following:

Petition

Save Scott River from Wind Turbines

To the Planning Minister of Western Australia and the Shire President of Augusta Margaret River This petition is to show our objection to the proposed wind farm in Scott River, Western Australia for the following reasons:

(1) The Scott River district is known for its high ecological value and its protected under the Environment Protection and Biodiversity Conservation Act 1999 (Scott River Ironstone Association – Endangered Category) there is a high risk to endangered flora and fauna from wind turbine construction and operation. There are 26 fauna species listed as threatened, priority or under protection that occur with the Scott River catchment. (2) Industrial wind turbines will increase fire risk to the local community, with no aerial and limited ground support around the site. (3) There is a very high risk of Acid Sulphate Soils being created during and after the construction of the enormous wind turbines and what this will present to the sensitive waterways of the Scott and Blackwood River, neighbouring farmland and Flinders Bay. (4) Neighbouring landowners have valid health concerns living under 250m high wind turbines and will be exposed to the noise, disturbance and shadow flicker.

We ask you to consider the rare and endangered wildlife, nearby residents and our unique and sensitive environment when considering industrialised development at the Scott River and our strong objection to the proposed wind farm in such an unsuitable location.

1 SHIRE REQUEST FOR FURTHER INFORMATION (RFI) ISSUED ON 23/01/2026

No.	KEY THEME	RFI ITEM	RESPONSE
1.	Micro-siting	<u>Context</u> The Shire is aware that the applicant has provided a concept plan to have maximum flexibility in the next stage of the project, with other companies predicted to carry out construction and operation. However, the lack of certainty on the locations of the WTGs (Wind Turbine Generators) limits a full and thorough assessment of the proposal. The Shire first and foremost asks that the locations of the WTGs be presented with greater certainty at this stage to enable more detailed and specific evaluation of impacts and mitigation measures. In particular, visual impact, environmental disturbance and ASS risk all require a greater level of precision than that put forward by the application. The Shire recognizes the need for some flexibility in delivery and notes the industry based standard embodied within the State Draft Renewable Energy Code providing for micro-siting within a 100m radius of a particular location. <u>Request</u> Provision of site plan showing actual proposed locations of wind turbines with individually numbered turbines. The Shire is open to a development envelope with a radius of 100m.	The Scott River site presents a complex combination of environmental, technical and planning constraints that must be balanced when determining appropriate Wind Turbine Generator (**WTG**) placement. As a result, SynergyRED does not consider the application of a standard radial approach to micro-siting to be appropriate for this Proposal. The State Government Draft Renewable Energy Planning Code ('Draft Code') currently proposes a 100 m micro-siting radius, which is also reflected in the Shire of Augusta-Margaret River's ('the Shire') Draft LPP23: Renewable Energy Facilities ('**Draft LPP23**'). Draft LPP23 is yet to be adopted by the Shire of Augusta-Margaret River ('the Shire'). SynergyRED, however, understands that DPLH is considering increasing the micro-siting radius, based on industry feedback during the public consultation process for the Draft Code. To support both the Shire and community's need for certainty and transparency, and the Proposal's technical requirements, SynergyRED proposes a refined, site responsive and constraint informed micro-siting approach for the Shire and Development Assessment Panels' (**DAP**) consideration, as set out in **Appendix A**: Proposed Wind Turbine Envelope:. SynergyRED proposes a methodology that positions <u>all WTG within a defined 'constraint-free area' **and** within a 500 m radius of their currently proposed locations</u>, offering a technically robust alternative to the Draft Code and Draft LPP23. From a visual impact perspective, applying a 500 m micro-siting radius provides limited flexibility to relocate WTGs, given the constraint-free area on the plan in **Appendix A**. Using this approach, the 'horizontal spread' of the total wind farm will not be able to increase from most key viewpoints (the south west around Augusta). That is, the most northern turbine and southern turbine cannot move any further away from the centre of the site which therefore limits any increase to visual impact. Hence, any future turbine relocation is not expected to materially increase visual impacts from those identified in the updated visual assessment, completed to address DPLH's comments (see Section 2.1 - DPLH Agency Response). A condition of Development Approval reflecting the above rationale is proposed for Shire and DAP consideration and is set out **Appendix A**. The proposed condition is based on the State Development Assessment Unit's (**SDAU**) decision on the Narrogin Wind Farm (September 2025), adapted to accommodate the above approach for the Wind Farm in Scott River Proposal.

2.	Landscape/ Visual Impact	Outline how the proposal has responded to community concerns around landscape impacts.	See **Section 2.1** - Response to DPLH Agency Submission.
		Show numbers on the existing and new photomontages to enable further assessment of the siting of individual turbines with a view to relocating some of the turbines elsewhere within the project site.	See **Section 2.1** – Response to DPLH Agency Submission.
		Provision of photomontages for the additional viewpoints listed below possibly using a simpler method to produce wireframe images but with vegetation overlaid: i. Travelling east along Scott River Road leaving East Augusta, in locations where the vegetation is naturally low (see attached Photo 1). ii. Main street intersection, Ellis Street moving downhill into the intersection with Blackwood Avenue (Photo 2 – two examples). iii. Main town foreshore opposite East Augusta (Photo 3). iv. Albany Terrace, close to the opening between Hardy Inlet and the ocean (Photo 4). v. Key recreation sites of DBCA managed land.	See **Section 2.1** – Response to DPLH Agency Submission.
		Inclusion of other structures in the assessment including meteorological masts, transmission lines, substation and other associated structures and mitigation methods for these.	See **Section 2.1** – Response to DPLH Agency Submission.
		Mitigation measures to address landscape-wide and locally identified impacts could include. i. Road edge vegetation screening along surrounding travel route corridors of all types managing and screening views along the length of these corridors. ii. Localised screening surrounding the ancillary infrastructure. iii. Broadscale landscape planting within the Proposal area.	See **Section 2.1** – Response to DPLH Agency Submission.
		4. Inclusion in VIA of how structures other than wind turbines may have visual impact and how these will be mitigated (if necessary).	See **Section 2.1** – Response to DPLH Agency Submission.
		5. Outline of any mitigation measures for localised visual impact such as vegetation screening.	See **Section 2.1** – Response to DPLH Agency Submission.
3.	Social Impact (associated with Visual Impact)	The social values assessment provided with the application does not adequately measure community concerns around landscape impacts. The high level of submissions in the public consultation demonstrates the high social value attributed to the Augusta/Scott River landscape and provides some opportunity for the proponent to address community perspectives on this matter. Landscape impact, including the perception of impact, remains a substantive issue and the social values assessment provided with the proposal does not address this issue sufficiently. As noted in the DPLH response, submissions received detailing landscape impact concerns provide a sound basis for an updated social impact assessment and for refinement of the proposal to mitigate impacts.	See **Section 2.1** – Response to DPLH Agency Submission.

4.	Acid Sulfate Soils and groundwater management (including native vegetation and dewatering)	Details of what research is required to inform an ASS and groundwater management plan and what would trigger an alternative construction design to address presence of ASS and impacts of dewatering on GDEs. Confirmation of the actual location of the WTGs will enable the Shire to be able to assess impacts on native vegetation, TEC's and fauna. DBCA have provided detailed advice as to setbacks that would be required from groundwater dependent ecosystems (GDE's) and other native vegetation which should be reflected in the siting of the WTGs. While an ASS and groundwater management plan is predicted to be forthcoming were the application to be approved, there is a lack of certainty around what would trigger the alternative methods of construction and whether this would be achievable at the proposed locations. That is, how will risk be determined and the optional foundation responses and management measures be enacted?	As noted in Section 6.5 of Attachment 4 - RSD (Eco Logical Australia 2025), SynergyRED commits to undertake a detailed geotechnical and Acid Sulfate Soils (**ASS**) investigation prior to construction. This will include additional soil sampling and analysis to at least 1 m below the base of any proposed excavations to ascertain the extent of Potential Acid Sulfate Soils (**PASS**), in accordance with Department of Water and Environmental Regulation (**DWER**) Guideline on the Identification and investigation of acid sulfate soils and acidic landscapes (2015a). This will define the nature and extent of ASS and the amount of existing and potential acidity it contains in order to determine appropriate management measures. Additional baseline water monitoring will also be undertaken prior to construction to contribute to the baseline dataset for the site and inform the establishment of appropriate water quality targets and thresholds within the detailed Acid Sulfate Soils Dewatering Management Plan (**ASSDMP**). As detailed in Section 2.2.2 of the Development Application, two (2) primary WTG foundation options (above ground/partial above ground) will be utilised to minimise the depth of excavation limiting impacts to groundwater (and reducing the volume of ASS disturbed). A typical below ground foundation will only be used where it is confirmed, prior to construction, through detailed site investigation and revised modelling, that no dewatering will be required (i.e. where groundwater level is below depth of excavation ~5m). As detailed in Section 10.5.2 of Attachment 4 - RSD (Eco Logical Australia 2025) the specific foundation option chosen for each turbine/mast/tower location will be determined based on detailed site investigation and revised modelling to ensure that any proposed dewatering or excavation would not result in significant impact to soil, surface water or groundwater quality as a result of PASS exposure. An above ground foundation may be required where revised modelling indicates that a partial-above ground foundation proposed at a particular location would not comply with the defined dewatering limits (as defined in Section 7.6.1 of Attachment 4 - RSD (Eco Logical Australia 2025)). Micro-siting of WTGs is discussed in response to Shire RFI Key Theme 1 and consideration of DWER recommended buffers provided in Section 2.2. The micro-siting approach ensures WTGs are located 100 m from native vegetation, including Groundwater Dependent Ecosystems (**GDE**) (i.e. Threatened Ecological Communities (**TEC** and wetlands), as measured from their centre point. This buffer combined with the temporary and spatially constrained nature of the proposed dewatering, and implementation of the ASSDMP including application of the defined groundwater drawdown limits will ensure that drawdown of groundwater does not significantly impact GDE within or surrounding the Development Envelope. Impacts to GDE are discussed further in response to public submissions of objection – **Key Theme (3**Submissions raised concern for threatened and endangered species including the white-bellied frog, snake-neck turtle, short-neck tortoise, ringtail possum, black swans and Baudin's and Carnaby's black cockatoos.**).**Submissions raised concern for threatened and endangered species including the white-bellied frog, snake-neck turtle, short-neck tortoise, ringtail possum, black swans and Baudin's and Carnaby's black cockatoos.

5.		Please also provide details as to any dewatering that may be required for cables going to the substation and the location of these.	Cabling between the wind turbines and the substation that connects the Proposal with the 132 kV transmission line is expected to be underground and follow existing and proposed internal access roads where possible to minimise disturbance. High Voltage (**HV**) cables are typically buried at depths of about 900-1200 mm, with the trenches being typically 450 mm wide subject to design. Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable, to reduce the likely requirement to dewater. The dewatering management for cables (if required) is included in the (ASSDMP). included as Appendix B in the Development Application.
6.	Noise Impact	Inclusion in Noise Impact Assessment for noise controls relating to the 'modulation' Characteristic. DWER's environmental noise branch considers the 'modulation' characteristic, as defined in regulation 9, is the most likely to be present in the noise received. Therefore, at this stage of the project the proponent should also investigate noise controls that can be put in place before (e.g. serrated edges) and/or during operation (e.g. curtailment strategies) to reduce noise levels to compliance should modulation be detected at receivers outside the Project development envelope once the wind farm is operational.	See **Section 2.2** – Response to DWER Agency Submission and updated Noise Impact Assessment in **Appendix D**: Updated Noise Impact Assessment
7.	Community Benefit Fund	Update on details of the proposed community benefit fund and any other details regarding local economic benefits such as local procurement, training etc, Please provide further information regarding the proposal for community benefits, including how it is proposed the funding will be governed and function.	SynergyRED has committed to establishing a $100,000 per annum Community Benefit Fund ('the Fund') for the proposed wind farm. The Fund will be adjusted in line with the Consumer Price Index (**CPI**) for future years. SynergyRED will align the implementation of the Fund with the Department of Energy and Economic Diversification (**DEED**)'s "*Community Benefits Guideline for Large-scale Renewable Energy Projects in the South West Interconnected System*" (**Community Benefits Guideline**), released on 4 March 2026. An Advice Note is proposed in relation to the Fund, consistent with the SDAU's Narrogin decision.
8.	Aviation Impact Assessment	Update the aviation impact assessment to include Augusta and Margaret River airstrips. Consideration of the Augusta and Margaret River Airstrips which are regularly used were not taken into account in the Aviation Impact Assessment. As per advice from DPIRD, consultation with relevant stakeholders should occur to investigate any impacts.	See Section 2.4 – Response to Department of Primary Industry and Regional Development (**DPIRD**) Agency Submission (Aviation Impact Assessment).
9.	Bushfire Management	Confirmation that the turbines within a plantation have adequate separation distance for bushfire. Advice from DFES noted the location of two turbines within a timber plantation. A query was raised as to whether proposal meets the separation distance requirements (whichever is greater) to ensure: a) that radiant heat from a nearby bushfire will not trigger a failure in the infrastructure (whatever the most susceptible component is); and	See Section 2.7 – Response to Department of Fire and Emergency Services (**DFES**) Agency Submission.

		b) that radiant heat emitted from a failure in infrastructure should be used to inform the minimum separation distance required (i.e. radiant heat level that the weakest component can withstand). Please confirm that the separation distance is adequate in regard to the above. Note, DFES have raised other issues that should be resolved through an updated BMP.	
10.	DCCEEW Referral	An update on the status of the referral to DCCEEW	The Proposal has received a 'not a controlled action if taken in a particular manner' (**NCA-PM**) referral decision from the Department of Climate Change, Energy, the Environment and Water (**DCCEEW**). This decision means that the Proposal is not likely to have a significant impact on Federally protected flora, fauna or ecological communities, and so does not require assessment by DCCEEW, provided that it is developed in accordance with the 'particular manner' specified in the decision. The 'particular manner' includes a new commitment to ensure the minimum blade ground clearance is 59 metres above ground level (increased from 40 metres above ground level at time of referral), to avoid significant impacts to black cockatoos and migratory birds. For more information on the decision and the required actions, refer to DCCEEW's website: EPBC Act Public Portal.
11.	Response to Submissions Raised	**1.** The conceptual nature of the design & lack of project certainty **2.** Impacts on biodiversity **3.** Impacts on hydrology, groundwater & dependent ecosystems **4.** Acid sulfate soils & irreversible environmental risk **5.** Impacts on visual impact & landscape character **6.** Noise, shadow flicker and EMI and associated health & residential amenity impacts **7.** Planning and other approval processes & community consultation **8.** Impacts on agricultural land & rural productivity **9.** Impacts on property values, investment & rural lifestyle **10.** Impacts on tourism & local economy **11.** How the project will contribute to community benefits & energy equity **12.** Traffic, roads & roadside vegetation **13.** Extreme weather, fire & safety **14.** Decommissioning & rehabilitation risks	**Refer to Public Submissions summary (in Section 3)** *Note: Responses to several additional matters raised in the submissions (as identified in SynergyRED's review) have also been included in the Section 3 response.*

2 AGENCY SUBMISSIONS

2.1 Department of Planning, Lands and Heritage (DPLH)

SUMMARY OF SUBMISSION	RESPONSE
The following comments and attached photos are provided on the visual impact of the proposed Scott River wind farm and the proponent's Landscape and Visual Impact Assessment (LVIA). The comments are made with reference to the WAPC "*Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design" and the Department of Planning, Lands and Heritage GIS "InQuiry",* as well as knowledge of the area. The viewshed mapping indicates that the turbines may be extensively visible. However, it is likely that roadside trees would obscure views from two of the three major roads to Augusta (Bussell Highway and Caves Road), and views from narrow, treelined secondary roads oriented generally towards the site e.g. Challis Road, and Fisher Road, which is used to access the settlement on Molloy Island.	Noted and confirm the above comment. As outlined in the Proposal LVIA (2025) section 3 Methodology, the ZTV only considers the landform and does not include land cover factors such as the presence of buildings and trees. It therefore represents the maximum case scenario of potential visual impacts.
Analysis using Google Streetview images indicates that the greatest visibility is likely to be from: • private residences in Augusta which have northeasterly views, comprising ▪ elevated sites ▪ sites along the shore of the Blackwood River, Hardy Inlet, or ocean; • public recreation sites on the western banks of the Blackwood River (e.g. the river end of Howe Road), Hardy Inlet (e.g. end of Ellis Road) or open ocean (e.g. Flinders Bay); • from western portions of Hardy Inlet; • from the open ocean. It also appears that there will also be significant visibility from Augusta's main intersection at Blackwood Avenue and Ellis Street, other locations along Blackwood Avenue, and from Scott River Road and Governor Broome Road, which are at the project site and are used to access East Augusta and more distant coastal areas e.g. for recreational purposes.	Noted. See **Appendix B**: Addendum to the LVIA to address agency comments **Section 4.2** The locations identified by DPLH as having the greatest potential for visibility align with the landscape and visual impact assessment, which incorporates representative viewpoints from residential, coastal, inlet, recreational, and road-based receptors, ensuring the visual exposure and sensitivity from these areas are appropriately addressed.
Assessment report - method and conclusions The method used for the assessment is generally suitable, with two exceptions as below. • Several important viewpoints have been overlooked in analysis: **1.** Travelling east along Scott River Road leaving East Augusta, in locations where the vegetation is naturally low (see attached Photo 1); **2.** Main street intersection, Ellis Street moving downhill into the intersection with Blackwood Avenue (Photo 2 – two examples); **3.** Main town foreshore opposite East Augusta (Photo 3); **4.** Albany Terrace, close to the opening between Hardy Inlet and the ocean (Photo 4). • reference to the three primary visual management objectives as being 'protection', 'best practice', and 'engagement', but the third objective advised in the WAPC's manual is 'enhancement', not 'engagement'. It is beneficial to identify potential engagement opportunities, but this should occur elsewhere in the report and 'enhancement' should be addressed. This objective would justify introducing roadside tree planting to Scott River Road and Governor Broome Road, within the project site, as it would reduce turbine visibility from the closest viewpoints, and would enhance environmental values in the landscape. The conclusions reached in relation to the analysed viewpoints are supported. It is noted that, of the 12 viewpoints analysed, the significance of the visual impacts was determined to be 'high' for four points, moderate-high' for five points, 'moderate' for two points, and 'negligible' for one point (which mapping showed was not within the viewshed in any case). Overall, the impact on the key selected viewpoints within and around the town of Augusta could correctly be described as moderate at the very least, but frequently high.	See **Appendix B: Section 4.3** All locations identified by DPLH as having the greatest potential for visibility have been field-verified and assessed through new viewpoint commentary, updated photomontages and ZTV analysis, with results cross-referenced to existing LVIA viewpoints to confirm that visibility from Augusta, Hardy Inlet, coastal areas and key road corridors is appropriately and comprehensively addressed.

SUMMARY OF SUBMISSION	RESPONSE
Further analysis advised The significance of the project's potential visual impacts on the tourist town of Augusta warrants further work by consultants: **1.** Provision of photomontages for the additional viewpoints listed above, possibly using a simpler method to produce wireframe images but with vegetation overlaid; **2.** Provision of a project site plan showing individually numbered turbines, with numbers also shown on the existing and new photomontages, to enable further assessment of the siting of individual turbines with a view to relocating some of the turbines elsewhere within the project site.	See **Appendix B: Section 4.4** Additional fieldwork has been undertaken to assist in addressing this comment. All specific locations outlined were visited, including sites within Augusta. Photomontages have been prepared for all four locations. An amended layout has also been explored in relation to views from In addition, a photomontage overlay has been prepared from the Viewpoint 01 Augusta Hotel comparing the proposed 250 m tip height turbines with 235 m tip height turbines illustrating that lower wind turbines may not result in a substantial reduction in visual impacts from this viewpoint location.
Mitigation measures Two measures to mitigate visual impacts are recommended: **1.** Relocate approximately three of the outlying turbines at each of the north and south ends of the layout, using numbered photomontages to identify the particular turbines which have the greatest impact; **2.** Plant local trees to form a screen along the Scott River Road and Governor Broome Road boundaries of the project site (see Photos 5-7).	A revised turbine layout has been developed using 3D modelling to relocate five turbines at the northern, southern and eastern extents of the array, reducing visual clustering and improving visual balance across key viewpoints, with updated photomontages and ZTV mapping provided in **Appendix B**: Addendum to the LVIA to address agency comments **Section 4.4** to illustrate these changes. Additional illustrative material from both LVIA and newly requested viewpoints confirms the visual influence of relocated turbines and demonstrates the resulting reduction in visual prominence along key public viewing corridors, including Scott River Road, the Augusta town centre and the coastal foreshore.
Conclusions The proponent concludes that a grid layout would be preferable to the proposed irregular layout, on the basis that this is more appropriate for the open, agricultural setting. This is consistent with Scottish wind farm guidance which recommends a regular layout for wide open and level landscapes with regular agricultural fields. It is noted that there is a significant proportion of woodland vegetation so the landscape is not fully 'open', and the overall landscape setting is gently undulating, not level, partly due to clumps of trees set amongst areas of lower dune and wetland vegetation. From distant viewpoints such as Augusta and the coastline south of town, the horizon-line is not level, but hillocky, with variations in colour and texture of remnant vegetation. Although the turbines are located in an agricultural setting, from the significant viewpoints the wind farm appears to be located within a broadly natural wider landscape. Therefore, the currently proposed irregular layout is considered to be the most suitable and should therefore be retained. As mentioned above, it is recommended that some turbines are relocated, with the specific altered layout dependent on further analysis of the existing photomontages once turbine numbers are added to the images, and the consideration of further images of views from important locations that were not initially assessed. Examples derived from Google Streetview images and the photomontages in the LVIA are: **1.** In Viewpoint 4, which is on the western shore of the Blackwood River just upstream from Molly Island, if the northern two or three turbines were relocated further south, it appears that no turbines would be visible, and potentially other viewpoints in the vicinity of Molloy Island, assuming that intervening vegetation remains. **2.** In views from the western shore of Hardy Inlet, near the inlet mouth, several turbines are apparent at the focal point of easterly views, adjacent to the steep southerly face of the dune at the mouth of Swan Lake. Relocation of those turbines would retain the natural character of this important view. **3.** In viewpoints along the ocean coastline, relocation of southern turbines would decrease the perception that turbines are very close to the coast. In views from town, the wind farm would be less prominent if turbines were in a more compact, clustered layout rather than locating them in an open, roughly linear pattern extending further north and south over a larger area.	The Department's comments and recommendations regarding turbine layout are noted. Relocating the turbines identified by DPLH is not feasible due to wind resource loss, landowner constraints, geotechnical limitations, environmental and planning constraints, and the limited visual benefit demonstrated in detailed testing. Instead, an alternative refined layout was developed, relocating five turbines (T3, T5, T6, T10, T20) to meaningfully reduce visual prominence and improve skyline cohesion, supported by updated photomontages and ZTV analysis (Appendix C). • Relocating northern turbines further south is not viable due to reduced wind resource, impacts on committed landowners, less favourable geotechnical conditions and limited visual improvement. • Compact clustering of southern turbines was tested; only WTG 20 demonstrated meaningful benefit, with WTG 18 and WTG 19 showing negligible change in visual effect. • A refined layout relocating five turbines (T3, T5, T6, T10, T20) was implemented to reduce clustering, smooth the skyline and lessen edge prominence in key views from Augusta, Albany Terrace, Town Beach and Scott River Road. • Updated photomontages and revised ZTVs confirm that the alternative layout improves visual cohesion across the viewpoints identified by DPLH. **See Appendix B: Section 4.6 and Appendix C**: DPLH Community SVA and LVIA **Section 2.**

SUMMARY OF SUBMISSION	RESPONSE
The **Social Values Assessment Report** provided by the proponent does not adequately address the community's perception of landscape character and views as required by the WAPC Visual landscape Planning in Western Australia – a manual for evaluation, assessment, siting, and design. For example, study participants were not asked about the importance of views of the landscape. The list of values that participants were asked about did not include "scenic views" or similar. The closest category was "preserving what is unique about this area'' and "being able to see the clouds, horizon and sky", neither of which adequately interrogates opinions about views of this landscape. Only a small proportion of participants (15%) were residents of Augusta and as such would be directly impacted by views of the wind farm. Overall, the social values report likely results in under-estimating the likely social impacts of the proposed wind farm. Public submissions on the wind farm proposal could be reviewed to gain a more comprehensive overview of community perceptions. **Additional Viewpoints for Photomontages Saved in Separate Attachment.**	Additional work has been undertaken to address DPLH's concern that the Social Values Assessment did not adequately examine community perceptions of landscape character and scenic views. This includes supplementary analysis of public submissions, expanded consideration of landscape-related community values, and integration of updated photomontages, alternative layout testing and mitigation measures. See **Appendix C: Section 2.**

2.2 Department of Water and Environmental Regulation (DWER)

SUMMARY OF SUBMISSION	RESPONSE
This proposal has been referred to the Environmental Protection Authority (EPA). On 8 December 2025, the EPA determined to not assess the proposal under Part IV of the *Environmental Protection Act 1986*. The EPA's public record and summary of reasons include public advice to other decision-making authorities to ensure that their statutory decision-making processes achieve and assure environmental outcomes consistent with the EPA's environmental factor objectives. Further information about the EPA process and what stage this application is at can be found at Wind Farm in Scott River | EPA Western Australia. The Department has identified that the proposal has the potential for impact on environment and/or water resource values and/or management. Key issues and recommendations are provided below, and these matters should be addressed:	Noted.
1. Issue: Water licensing **Advice:** The following advice notes are recommended to be applied: Advice Note: The proposal is in the Lower Blackwood Surface Water Area proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore a Bed and Bank permit will be required for any interference with the bed and bank of any watercourses. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. Advice Note: The proposal is in the Lower Blackwood Surface Water Area and Beenup and Rosa Beenup Groundwater subareas proclaimed under the *Rights in Water and Irrigation Act 1914*, therefore any take of surface water from a watercourse or groundwater will require a licence to take water. For more information, please contact the Department of Water and Environmental Regulation's Water Licensing staff on 08 9781 0188 or busselton.admin@dwer.wa.gov.au. **Discussion:** The proposal includes the take for groundwater for dewatering and proposed works across creek lines for transmission lines and access roads. It has not yet been determined where the water supply will be sourced, which may be drawn from groundwater. The subject property is in the Lower Blackwood Surface Water Area as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any taking or diversion of surface water in this proclaimed area (whether by direct pumping, construction of a dam, or excavation) can be subject to licensing. Any interference of the watercourse (such as the construction of a dam or crossing, or excavation of the watercourse) may require a *permit to interfere with the bed or banks* from the department. Exemptions from regulation can be sought from the department related to the presence of any springs at the head of a watercourse rising on the property.	SynergyRED commits to applying for any necessary licences under the *Rights in Water and Irrigation Act 1914* (**RIWI Act**), as these relate to: • temporary dewatering (i.e. removal of groundwater) during the construction phase of the Proposal to support excavation and installation of below ground infrastructure; and • any interference with the bed and banks of a watercourse. SynergyRED accepts the advice notes as proposed.

SUMMARY OF SUBMISSION	RESPONSE
The proponent is advised to contact the department to determine licensing and permit requirements or whether any exemptions apply. As of Dec 2025, there was water available in the Lower Blackwood Estuarine Reach surface water sub area under the *Whicher surface water allocation plan (DoW 2009)* which relates to the subject land. The subject property is in the Beenup and Rosa Beenup Groundwater subareas as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any groundwater abstraction in this proclaimed area is subject to licensing by the department, other than supply from the shallow watertable (superficial aquifer) for domestic and non-intensive stock watering purposes. Note: *Domestic use* generally refers to the take of water to service ordinary use associated with a household and for firefighting purposes. *Intensive stock watering* relates to the watering of stock that are generally confined to an area smaller than that required for grazing under normal conditions. Under these latter circumstances, stock is usually fed by hand or mechanical means. As of Dec 20205 there was: • water available in the Perth-Superficial Scott aquifer of the Beenup ground water sub area; • no water available in the Perth-Lesueur Sandstone South aquifer of the Rosa Beenup ground water sub area; • water available in the Perth-Leederville aquifer of the Beenup ground water sub area; under the *South West groundwater areas allocation plan (DoW_2009)* which relates to the subject land. Available water is allocated on a first-in first-served basis and as such, there is no guarantee that water will be available at the time of development. The availability of water resources can be viewed at the department's public water register is available at https://maps.water.wa.gov.au/#/webmap/register.	
2. Issue: Water supply **Advice:** The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, the proposal water balance and Water Sourcing Strategy is to be prepared to the satisfaction of the Local Government. **Discussion:** The water demand has not yet been determined, and Sect 3.4 of *Preliminary Construction Environmental Management Plan (SynergyRED 2025)* states 'Permanent and temporary water tanks and/or storage dams will be installed to support construction and operational water requirements (Figure 3-1). Water will be sourced elsewhere, purchased and ported in. There is a possibility that any dewater collected during construction, if treated appropriately to a suitable quality, may also be able to be used during construction'. Furthermore, Sect 2.3.6 of *Development Application Report (Urbis 2025)* states that '*Once the water sourcing strategy has been finalised, engagement with Department of Water and Environmental Regulation (**DWER**), Water Corporation and the Shire AMR prior to the commencement of construction will be undertaken as required'.* The Department supports the preparation of a water balance and Water Sourcing Strategy, and this should be conditioned.	SynergyRED accepts the condition as proposed.
3. Issue: Surface water management **Advice:** The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, a post-development flood model is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation.	SynergyRED accepts the conditions as proposed.

SUMMARY OF SUBMISSION	RESPONSE
Condition: Prior to any ground disturbing activities, a Stormwater Management Plan shall be prepared to the satisfaction of the Local Government. **Discussion:** Sect 3.12 of *Development Application Report (Urbis 2025)* states 'Surface water – flood characterisation assessment and modelling to identify inundation areas to inform the future placement of infrastructure and mitigate impacts on surface flow post-construction'. Preliminary pre-development flood modelling has been undertaken and presented in the *Hydrological & Hydrogeological Assessment (Stantec 2025)*, which has provided plans with the 1% AEP peak flood depths and peak flood velocity. Noting the scale of the subject site, Key Model Parameters presented in Section 5.4.1, and application of the 1% AEP climate change high emissions scenario Representative Concentration Pathway 8.5 the model is considered fit for purpose by the Department. It is recommended that this work is used to help inform the overall surface water plan for the development site. A post development flood model will assist in informing infrastructure locations, road crossing designs to comply with Shire requirements, road drainage designs mitigate erosion and sediment mobilisation, and all electrical installations are suitably located and insulated to increase resilience to major flooding. The post development flood model along with a Stormwater Management Plan is recommended to be conditioned.	
4. Issue: Industry Regulation **Advice:** The following advice notes are recommended to be applied: Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed crushing and screening of material taken from borrow pits operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if it has the capability to meet or exceed the specified production or design capacity of category 12 or 70 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: Insufficient information was provided to enable Department of Water and Environmental Regulation to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987*. Based on the information provided the proposed concrete batching plant operations may cause the premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act 1986*, if the concrete produced is used at another premises or if the proposed concrete batching plant has the capability to meet or exceed the specified production or design capacity of category 77 under Schedule 1 of the *Environmental Protection Regulations 1987*. The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000. Advice Note: The concrete batching plant will need to demonstrate compliance with the *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998* irrespective of whether the premises meets the threshold to become a Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987* or not. **Discussion:** Sect 2.3.1 of *Development Application Report (Urbis 2025)* refers to both the 'Installation and operation of concrete batching plants' and 'Extraction of borrow material (may include crushing and screening by mobile plant)'.	SynergyRED commits to applying for any necessary Works Approval or Licence/Registration under Part V of the *Environmental Protection Regulations*. A concrete batching plant will be required during construction of the Proposal and may comprise a temporary/mobile crushing and screening plant. A Works Approval and Operating Licence/ Registration may be required if the proposed temporary/mobile crushing and screening plant and/or concrete batching plant triggers the prescribed activities outlined within Schedule 1 of these Regulations. This requirement will be confirmed following detailed design, geotechnical investigations and contract award. SynergyRED accepts the advice notes as proposed.

SUMMARY OF SUBMISSION	RESPONSE
However, Table 3-1 of *Section 38 Referral Supporting Document (Eco Logical 2025)* details that 'A Works Approval and Operating License/Registration for crushing and screening will be applied for', but there is no reference to any regulatory considerations for the concrete batching plant. Insufficient information was provided to enable DWER to determine whether the proposal will be categorised as Prescribed Premises as per Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). Based on the information provided the proposed crushing and screening and concrete batching plant operations may cause these premises to become Prescribed Premises as per for the purposes of Part V Division 3 of the *Environmental Protection Act (*EP Act), if it has the capability to meet or exceed the specified production or design capacity* of the relevant category under Schedule 1 of the EP Regulations. e.g.	

12	Screening, etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	50000 tonnes or more per year
70	Screening, etc. of material: premises on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated	More than 5000 but less than 50000 tonnes per year
77	Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places other than those premises.	100 tonnes or more per year

The EP Act makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to cause an emission or alter the nature or volume of waste, noise or odour from the Prescribed Premises, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises.

The Applicant is therefore advised to refer to the information and Industry Regulation Guide to Licensing available at http://www.der.wa.gov.au/our-work/licences-and-works-approvals and / or if they have queries relating to works approvals and licences to contact DWER at info@dwer.wa.gov.au or 6364 7000.

It is noted that category 77 Prescribed Premises are premises where cement products or concrete are manufactured for use at other premises. If cement products or concrete produced at a premises are used solely at that premises, it is not considered a category 77 Prescribed Premises under Schedule 1 of the *Environmental Protection Regulations 1987*.

The application will need to demonstrate compliance with the *Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998* irrespective of whether the premises is Prescribed or not.

* Production capacity and design capacity definitions:

- The **production capacity** is the rate at which a product is produced as relevant to the description of the prescribed premises category; and
- **design capacity** is the maximum capacity for which the facility or equipment is designed to receive, handle, process, contain or emit, as relevant to the description of the prescribed premises category.

In view of the uncertainty regarding regulation under Part V of the EP Act advice has been provided on environmental risks and mitigation strategies, based on the available information. If the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process.

5. Issue: Onsite domestic wastewater management **Advice:** The following condition is recommended to be applied: Condition: Prior to the installation of onsite domestic wastewater systems, a site and soil evaluation report is to be prepared that takes account of the principles of the *Government Sewerage Policy (WAPC 2019)*. **Discussion:** It is noted that Sect 2.2.9 of *Development Application Report (Urbis 2025)* identifies that no construction camp or temporary onsite accommodation is anticipated to be required, with workers proposed to be accommodated in local accommodation in surrounding towns and localities. Onsite facilities are however proposed to be provided and for domestic wastewater Sect 2.2.11 of *Development Application Report (Urbis 2025)* suggest this may be in the form of mobile self-contained or inground septic systems. The site is in a sewerage sensitive area as defined in the *Government Sewerage Policy (WAPC 2019)* (GSP). Therefore, if inground systems are proposed, it is recommended that the principles of the GSP are applied in the development of a site and soil evaluation report to support the 'Application to Construct or Install an Apparatus for the Treatment of Sewage' required under the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. This requirement is recommended to be conditioned.	SynergyRED accepts the proposed condition, noting this will be relevant only if an inground septic system is utilised.
6. Issue: Construction Environmental Management Plan **Advice:** The following condition is recommended to be applied: Condition: Prior to any ground disturbing activities, a Construction Environmental Management Plan is to be prepared to the satisfaction of the Local Government. **Discussion:** The *Preliminary Construction Environmental Management Plan (SynergyRED 2025)* is noted, and the terrestrial environmental quality and inland waters objective-based management actions are supported. The document does not however provide details of any contingency measures. For example, in the event of a spill what action will occur and what actions will be taken if any significant erosion and/or sediment mobilisation occurs. It is recommended that the report be conditioned and should be updated to include emergency and contingency response actions.	SynergyRED proposes the following amended condition: • Prior to any ground disturbing activities, a Construction Environmental Management Plan (**CEMP**) shall be submitted to the Local Government for approval. Once approved, the Construction Environmental Management Plan shall be implemented at all times during the construction phase of the Proposal to the satisfaction of the Local Government upon advice from relevant agencies.
7. Issue: Native Vegetation **Advice:** The following advice notes are recommended to be applied: Based on the information provided the proposed clearing may not be exempt and a clearing permit may need to be obtained under the Environmental Protection Act 1986. For more information, please contact the Department of Water and Environmental Regulation's Native Vegetation Regulation staff on 08 6364 7098 or admin.nvp@dwer.wa.gov.au. **Discussion:** It is noted that the clear of native vegetation has been reduced as much as practical. Some clearing will however be required and Table 3-1 of *Section 38 Referral Supporting Document (Eco Logical 2025)*: states that 'A native vegetation clearing permit will be applied for'.	SynergyRED is aware that the proposed native vegetation clearing may not be exempt under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and intends to submit a Native Vegetation Clearing Permit **(NVCP)** application prior to construction. SynergyRED accepts the advice note as proposed.

Under section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless: • it is undertaken under the authority of a clearing permit • it is done after the person has received notice under Section 51DA (5) that a clearing permit is not required • the clearing is subject to an exemption Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Clearing Regulations). Based on the information provided, should development approval be issued, clearing to construct a building or structure is likely to be exempt from the requirement for a clearing permit under Regulation 5, Item 1 of the Clearing Regulations, if the vegetation to be cleared is not riparian. Riparian vegetation is defined as the distinctive vegetation associated with a wetland or watercourse. If any riparian vegetation is required to be cleared for the proposed development, a clearing permit is required. Clearing to construct vehicular tracks is likely to be exempt from the requirement for a clearing permit under Regulation 5, Item 12 of the Clearing Regulations. Noting that: • Construction of vehicle tracks within riparian vegetation is generally not allowed, but where there is no reasonable alternative route, and the track is necessary for the commercial activities of the property, it may pass through riparian vegetation. • There must be at least 100 metres between the track and any other cleared land that can be used for the purpose intended for that track. This may include other cleared areas. Note that these exemptions will not apply prior to development approval being issued. Please also note that that clearing for a building / structure and vehicular tracks, combined with other exempt clearing activities on the property, must not exceed five hectares in a financial year. If further clarification is required, please contact the Department's Native Vegetation Regulation section by email (admin.nvp@dwer.wa.gov.au) or by telephone (6364 7098).	
8. Issue: Potential contamination and acid sulfate soils **Advice:** The following condition and advice note are recommended to be applied: Condition: Prior to any ground disturbing activities, an Acid Sulfate Soils and Dewatering Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation. Advice Note: For condition [INSERT VALUE] the following document provides guidance on the assessment and management of contaminated sites in Western Australia (WA) within the legislative framework provided by: the *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006*; and the revised national site assessment framework provided in the *National Environment Protection (Assessment of Site Contamination) Measure 1999*: Guideline: Assessment and management of contaminated sites (www.wa.gov.au). Further information on Contaminated Sites can be obtained by email (contaminated.sites@dwer.wa.gov.au) or by telephone on 1300 762 982. **Discussion:** Contamination • The location of the proposed windfarm is adjacent east and north-east of the site of the former Beenup Mineral Sands Mine. The former Beenup mine site (Lot 4254 on Plan 208478 and Lot 200 on Plan 36387) was classified under the Contaminated Sites Act 2003 (CS Act) on 26 June 2013 as remediated for restricted use, and a memorial (number M345894ML) was placed on the certificates of title. The site was classified because site investigations during mine closure confirmed that groundwater and surface water at the site contain elevated levels of metals and sulfate, some exceeding environmental and health guidelines. The observed impacts to surface water and groundwater have resulted from historical mining activities, including disturbance and poor management of ASS and deposition of mineral processing waste.	SynergyRED accepts the condition and advice note as proposed.

• As the regional groundwater flow is south to south-west, generally towards the Scott River, legacy contamination at the former Beenup mine site is not expected to impact the location of the proposed wind farm. However, those historical impacts highlight the fact that soil and groundwater conditions in the area present a high risk of acidification, and potential ASS will require management during construction activities. • CS has reviewed the document "Proposed Wind Farm in Scott River, Preliminary Geotechnical and Baseline Contamination Report (Stantec, 1 July 2024)", and considers that it provides an appropriate assessment of baseline contamination conditions at the site. <u>Acid Sulfate Soils</u> • The proposed wind farm is located in an area that is mapped as having a high to moderate risk of ASS occurring within • CS has reviewed the document "*Proposed Wind Farm in Scott River, Preliminary Acid Sulfate Soils and Dewatering Management Plan* (PTG Consulting, 10 September 2025)", and considers that it provides an adequate preliminary assessment of ASS risks associated with construction of the proposed wind farm. CS considers that risks associated with disturbance of ASS are able to be appropriately managed should the proposed development of the wind farm proceed. • The report notes that dewatering drawdown has been modelled to a maximum depth of approximately 2 metres for turbine construction and 3 metres for construction of meteorological towers. The report presents options for management of ASS risk during dewatering and excavation which appear appropriate and generally consistent with the guidance provided in DWER's ASS guidelines and national guidelines for the management of ASS. • As the ASS Dewatering Management Plan is preliminary only, CS expects that further, more detailed investigations will be required once all aspects of the proposal design are finalised, at which stage the proposed options for dewatering management can be reviewed and refined.	
9. Issue: Noise **Advice:** Please see the attached Technical Review Report prepared by the Department's Environmental Noise Branch - **Appendix D**: Updated Noise .	Noted. SynergyRED is aware that the Proposal's noise emissions must comply with the *Environmental Protection (Noise Regulations) 1997* (*as amended)* (**Noise Regulations**) and has demonstrated that the Proposal will comply based on a maximum case scenario. The Noise Report has been amended to include discussion on modulation mitigation options both pre-construction and during operations to ensure compliance will be achieved. The Amended Noise Report is attached in **Appendix D** DWER also noted that the Noise Regulations apply to new dwellings. SynergyRED is aware that some proposed dwellings were approved by the Shire in the vicinity of the Proposal after the noise assessment included in the Development Application was completed. SynergyRED is committed to: – Ensuring that the final WTG layout will be compliant with the Noise Regulations. – Providing updated noise modelling prior to construction to demonstrate the final WTG model and layout will achieve compliance with the Noise Regulations. SynergyRED proposes the following conditions to address noise: • Prior to any ground disturbing activities, an updated Noise Impact Assessment from a qualified acoustic consultant is to be provided confirming the development can comply with the relevant provisions of the *Environmental Protection (Noise) Regulations 1997* (as amended), to the

	satisfaction of the Local Government upon advice from the Department of Water and Environmental Regulation. • Prior to operations commencing, an Operational Noise Management and Monitoring Plan is to be approved and implemented to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation.
10. Issue: Terrestrial fauna **Advice:** The following condition is recommended to be applied: Condition: Prior to operating any turbine, a Bird and Bat Adaptive Management Plan is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation and other relevant stakeholders. **Discussion:** As detailed in the EPA Chairman's Determination it was considered that the impacts of the proposal, including on birds and bats, were not so significant that assessment by the EPA under Part IV of the *Environmental Protection Act 1986* (EP Act) was required and determined to not assess the proposal. While the EPA determined not to assess the proposal, it was identified that the construction and operation of the proposal has the potential to impact birds and bats from collision/strike and barotrauma. The EPA's decision was made on the basis of other decision-making processes being able to manage the potential impacts to birds and bats, and the proponent implementing the proposal in accordance with the Preliminary Bird and Bat Adaptive Management Plan (Eco Logical 2025, dated 24 November 2025). Other decision-making processes the EPA identified included: • authorisation under s40 of the *Biodiversity Conservation Act 2016* (BC Act) to take or disturb threatened fauna • Part V Division 2 of the EP Act to regulate impacts associated with loss of fauna habitat • referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for assessment of potential impacts to species of Matters of National Significance (MNES) The EPA identified that these decision-making processes can consider threatened and migratory fauna species but cannot consider risks to fauna species that are not specially protected. Noting that one conservation significant bird (Priority 3) and one bat species (Priority 4) were recorded during site surveys. The EPA made specific reference to the ability to include a condition requiring preparation of a Bird and Bat Adaptive Management Plan provides assurance that impacts to birds and bats are monitored and managed appropriately, including species that are not considered under other decision-making processes. The EPA has committed that requests to review and provide advice on the adequacy of any Bird and Bat Adaptive Management Plan submitted to the Shire can be made to the Department's Green Energy team via greenenergy.exec@dwer.wa.gov.au. Where the Department has a statutory role, planning applications should be considered prior to the Department issuing any relevant permits, licenses, and/or approvals. If the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process. In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.	SynergyRED proposes the following alternative condition wording, noting the preliminary Bird and Bat Adaptive Management Plan (**BBAMP**) provides for monitoring commencing prior to operations: • Prior to commissioning of WTG, a Bird and Bat Adaptive Management Plan is to be approved and implemented to the satisfaction of the Local Government, on advice from relevant environmental agencies.

2.3 Water Corporation

SUMMARY OF SUBMISSION	RESPONSE
We offer the following comments regarding this proposal. Reticulated water and sewerage are not available to the subject land. The Water Corporation has no objection to the proposed wind farm development. It has been noted in the report water will be trucked to the site to service potable and non-potable water requirements. Onsite effluent disposal managed by a septic system and removed by a certified contractor, or an in-ground septic system will be installed. The information provided above is subject to review and may change. If the proposal has not proceeded within the next 12 months, please contact us to confirm that this information is still valid. Please provide the above comments to the landowner, developer and/or their representative.	SynergyRED proposes the following condition regarding effluent disposal to address Water Corporation and DWER requirements: • Prior to the installation of any inground domestic wastewater systems, a site and soil evaluation report is to be prepared that takes account of the principles of the *Government Sewerage Policy (WAPC 2019)*. SynergyRED also proposes the following advice note: • Potable water supply and effluent disposal facilities / infrastructure shall be designed, installed and maintained for the life of the development in accordance with the Local Government's requirements, upon advice of the Department of Health.

2.4 Department of Primary Industries and Regional Development (DPIRD)

SUMMARY OF SUBMISSION	RESPONSE
The Department of Primary Industries and Regional Development (DPIRD) and the South West Development Commission has reviewed the development application by Synergy Renewable Energy Developments Pty Ltd (SynergyRED), a wholly owned subsidiary of Synergy, to build a wind farm. The project will be located 15km north-east of Augusta on the Scott River plain, an agricultural district predominantly hosting beef grazing, dairy farming and blue gum plantations. The project includes the construction and operation of: • up to 20 wind turbines over 3,597 ha with a production capacity of up to 100MW • associated infrastructure, including a 4.3km 132kV transmission line, a new 132kV electrical sub-station, a permanent site office, up to 2 met masts, up to 2 communications towers and associated water tanks and roads. The development is not large by the standards of other wind farms being proposed in the state. The following comments relevant to regional development were received from DPIRD's Strategic Programs team and Local Content Adviser Network(SWDC).	Noted.
Strategic Programs team and Local Content Adviser Network	
DPIRD notes the wind farm proposal presents a positive economic development opportunity for the region, with the proponent making efforts to ensure the host communities share in project benefits.	Noted. SynergyRED has committed to establishing a Fund consistent with the State's Community Benefits Guideline, which will benefit the local community.
Provided the environmental mitigations can be addressed, the project provides for some renewable energy to feed into the SWIS from the south of the state, which will help power supply locally as well as provide feed in via the nearby Beenup 132 KVA line that runs to Manjimup. The project may not significantly increase the range of jobs on offer to the local community in the longer term.	Noted. The Proposal has been subject to substantial environmental investigations and reporting and found to be acceptable from an environmental perspective at State and Federal level, subject to a range of Management Plans being prepared. The Proposal is expected to provide for up to 150 employees during the peak Construction Phase and up to five (5) employees (operational staff) following construction and commissioning.
The proponent has not factored in an accommodation strategy and 'likely' accommodation model. Even as a staged project, occasions when up to 150 staff are employed at once are expected to strain the local housing market. An accommodation strategy should be provided that includes all sources of housing demand generated by the project and addresses both the temporary and longer-term workforce accommodation requirements.	Noted SynergyRED proposes the following condition: • Prior to construction commencing, an Accommodation Strategy shall be developed in consultation with the Local Government and implemented to the satisfaction of the Local Government.
DPIRD's Local Content Adviser Network (LCAN) considers the Scott River project to present a strong opportunity for achievable local content outcomes. There is significant potential for local participation in the civil and enabling works, as well as onsite support services, including fabrication and electrical.	Noted
There are several capable businesses across Busselton, Margaret River, and the wider South West region that could contribute to the delivery of this project.	SynergyRED encourages participation of West Australian and Regional businesses in its supply chains. This includes application of the WA Industry Participation Strategy and State Government Aboriginal procurement policy. As part of ongoing community engagement activities, local businesses have been encouraged to register their interest in the Proposal. This information will help identify suitable local suppliers and connect them with project work opportunities. As the Proposal progresses and procurement pathways are finalised, SynergyRED will further develop its Local Content approach, including identifying appropriate work packages for local companies and promoting opportunities through established procurement and industry engagement channels.

SUMMARY OF SUBMISSION	RESPONSE
The LCAN sees this project as an excellent opportunity to both utilise and further build local capability in wind farm construction.	Noted
The following recommendations to SynergyRED have been provided by DPIRD's Strategic Programs team and Local Content Adviser Network: 1. Carefully analyse how its accommodation needs will be met given concerns about the availability of local housing. 2. Note Recommendation 2 of the social impact report in addressing concerns in the Scott River locality and being flexible and open to suggestions for improved local benefits. 3. Apply more focus on developing neighbour programs, local content and training opportunities for employees and businesses that are not adequately defined at this stage. 4. Contact DPIRD's Local Adviser Network (local.content@dpird.wa.gov.au) to find out how they might best engage local regional businesses to supply the project.	1. SynergyRED proposes the following condition • Prior to construction commencing, an Accommodation Strategy will be developed in consultation with the Local Government and implemented to the satisfaction of the Local Government. 2. See Shire RFI Key Theme 7 – Community Benefit Fund 3. Noted 4. Noted
South West Development Commission (SWDC).	
LGA Draft Policy: The Shire of Augusta Margaret River has released a Draft Local Planning Policy – Large-Scale Renewable Energy Facilities for comment. It is strongly recommended that SynergyRED review this draft policy and work with the Shire to see how they can respond and accommodate any necessary changes in the project proposal as the policy is progressed and formalised. It is noted that several of the provisions in the draft Local Planning Policy are already addressed in SynergyRED's proposal.	SynergyRED has reviewed and provided a submission to the Shire in relation to Draft LPP23. It has also met with the Shire to discuss Draft LPP23 in the context of this Proposal, given Draft LPP23 was advertised after SynergyRED prepared its Proposal, with advertising of the Development Application and Draft LPP23 occurring concurrently. The Proposal has been prepared in the context of extensive and robust technical investigations and industry best practice and is considered to be generally compliant with the Policy direction of Draft LPP23. SynergyRED is also reviewing the Draft Code and considers the Proposal to be largely consistent with its Policy direction. A detailed submission to the Draft Code is being prepared by SynergyRED and will be submitted during the public comment period.
Aviation impact assessment: The conducted aviation impact assessment only considered certified aerodromes within 30 nautical miles and non-certified aerodromes within 5 nautical miles of the project site. However, there are two airstrips within the Shire of Augusta Margaret River, one located in Augusta and one in Margaret River, which have received Regional Airports Development Scheme funding from the State and which support the Royal Flying Doctor Service, small general aviation and charters and potential aerial support for Department of Fire and Emergency Services, WA Police and Department of Biodiversity, Conservation and Attractions. The aviation impact assessment did not receive responses from several key aviation stakeholders including the Royal Flying Doctor Service. It is strongly recommended that further consultation occur with the aerodrome manager/s and key users of airstrips in the region to ensure that these smaller operations can continue safely during and following construction.	SynergyRED is committed to ensuring that aviation operations can continue safely during construction, and once the Proposal is operational. The Aviation Impact Assessment (**AIA**) assessed aerodromes in accordance with Civil Aviation Safety Authority (**CASA**) and National Airports Safeguarding Framework (**NASF**) guidance, and consultation with agencies including the Royal Flying Doctor Service (**RFDS**) and emergency services. The Augusta Airstrip at Lot 315 Hillview Road, Augusta, is located approximately 16 km from the nearest WTG, and further from the Augusta Aerodrome which was already assessed in the AIA. The Margaret River Airstrip on Nozzle Road is approximately 32 km from the Proposal. The AIA will be updated to include commentary on both airstrips; however, no impacts to their operations are anticipated. Further engagement with key aviation stakeholders, including aerodrome managers and major airstrip users is ongoing, and any additional constraints or requirements identified will be incorporated into the revised assessment.
Community contribution*:* SynergyRED should be commended for proposing adoption of the *Draft Guideline on Community Benefits for Renewable Energy Projects in Western Australia* with respect to a community benefit fund. Further proposed structure of this fund is in the Shire's draft policy linked above. Opportunities to support local employment, training and accommodation should continue to be explored. Ancillary improvements to telecommunications or power for (at a minimum) landholders within the development envelope should also be considered.	As addressed in responses to Key Theme 7 to the Shire Request For Further Information (RFI) ISSUED ON 23/01/2026I, SynergyRED has committed to provide a contribution to the local community through a fund consistent with the State Government's Community Benefits Guideline. SynergyRED will work with the Shire and community to distribute funds to community projects.

The following comments relevant to agricultural resource management were received from DPIRD's Agricultural Resource Management and Assessment (ARMA) branch. ***Local economic impact**:* It is understood from the proposal that agricultural uses within the project envelope will be able to continue during and following construction. This is an excellent outcome for the landholders and for the broader regional economy. Every opportunity to mitigate impact to these operations should be taken. This includes engagement with landholders with regards to seasonal traffic variations (for example, around harvest) and peak construction, which may require traffic planning or traffic management on some internal roads.	Agricultural activities will be able to continue in parallel with the proposed Wind Farm activity. SynergyRED will engage with landowners during the construction phase to minimise impacts at peak times including harvest. Prior to construction commencing on-site, a Traffic and Transport Management Plan shall be submitted to the Shire for approval.
***Stakeholder engagement**:* There is clearly mixed sentiment towards the development of a wind farm in this location, particularly from residents in the immediate vicinity. Ongoing stakeholder engagement is required to continue to provide information to the community about the wind farm, the technology, the impact and the opportunities it provides. While the proposal details how to manage the water table, acid sulphate soils and construction to the level of detail it can at this stage, the assessments on noise and shadow flicker are not well articulated for community members. SynergyRED could consider development of additional fact sheets or infographics outlining what the practical impact is likely to be, and/or engage an independent assessment to counter existing misinformation. It is also unclear if the Shire of Nannup has been engaged, which – while not the directly responsible local government – does run very close to the project envelope. There will also be a requirement to continue to work with neighbours to mitigate or compensate for impacts to their plans for their properties.	SynergyRED has undertaken and facilitated comprehensive community engagement throughout the feasibility assessment and will continue to provide information to the community regarding the Proposal and the approvals process. SynergyRED has developed and published infographics related to noise and ASS, , as these topics were of particular interest to the community. The noise infographic explains the anticipated, maximum case noise levels at significant locations in the area and compares the noise level to other real-world examples. This was presented in the Community Drop-in Sessions and published in the Community Information Book - Part One. The ASS infographic depicts options of WTG foundations, which will mitigate risks related to exposure of ASS. Assessments indicate that expected shadow flicker durations will be within guidelines and should not cause nuisance. If the Proposal is approved and final WTG positioning confirmed, SynergyRED will work with neighbours to reduce any impacts related to shadow flicker. Some neighbours have indicated they have no interest in entering a neighbour agreement with SynergyRED, for a variety of reasons. Neighbour agreements provide the means of delivering financial benefits to impacted neighbours. Neighbour agreement negotiations and neighbour engagement with the intent of mitigating impact will continue where relevant and where neighbours are receptive to such engagement.
***Viewing platform**:* While little planning has been conducted at this stage with regards to the viewing platform, it is recommended that if there is the opportunity to do so, that SynergyRED engage with Karri Karrak Aboriginal Corporation in designing and developing the signage, to also articulate relevant Aboriginal culture and heritage in the project area/region.	Noted. SynergyRED intends to engage with Karri Karrak Aboriginal Corporation (**KKAC**) in the design process for signage at the tourist viewing platform, to explore opportunities to incorporate local Aboriginal culture and heritage.
***Construction workforce**:* The proposal suggests that the construction workforce be accommodated in local accommodation in surrounding towns and localities. Adequate forward planning is required for this due to limited availability of accommodation in the South West, some of which is already utilised by other projects in the region.	SynergyRED acknowledges the concern regarding potential workforce pressures on the local housing market. As the Proposal is in a preliminary development stage and no construction contractors have been appointed, detailed workforce forecasts are not yet available. Current workforce estimates are based on comparable renewable energy projects of similar scale. Peak workforce numbers are expected only during the civil construction phase (2–6 months) and are not anticipated to continue throughout the broader 18–24 month construction period. SynergyRED proposes the following Advice note in this regard: • As part of the sourcing process, SynergyRED will refine the accommodation requirements to select an accommodation option that aims to balance the needs of the Proposal and community.

	A condition of Development Approval is supported as follows: • Prior to construction commencing, an Accommodation Strategy will be developed in consultation with the Local Government. The Accommodation Strategy shall be implemented to the satisfaction of the Local Government.
Agricultural Resource Management and Assessment (ARMA)	
DPIRD has reviewed the Preliminary Construction and Environmental Management Plan (CEMP) and supports use of the CEMP to outline measures to manage biosecurity and water erosion risks during construction. DPIRD provides the following considerations for finalising the CEMP. • It is essential to outline biosecurity management measures to reduce the risk of introducing or disturbing pathogens and weed species within the vegetation across the development envelope. Managing biosecurity risks during construction, ongoing operations, and eventual decommissioning of the wind farm will help minimise impacts on landholders, adjoining farms, and transport routes. • DPIRD is aware of wind farms where soils/landscapes considered at low risk of water erosion under agricultural use, have suffered serious erosion under other uses. The movement of very large and heavy machinery, combined with access roads, pads for turbines and other features can concentrate water flow resulting in erosion. The management measures will need to address any potential surface water or groundwater impacts associated with the development.	The finalised CEMP will outline measures to manage erosion and biosecurity.
DPIRD requests a copy of the final CEMP document, when it becomes available, and the opportunity to advise whether the biosecurity and soil degradation risks associated with this project are being managed.	SynergyRED will provide DPIRD with a copy of the CEMP once finalised.
The Soil and Land Conservation team have advised that within the project area there are several Agreements to Reserve native vegetation in perpetuity. Should SynergyRED and their contactors require to undertake activities within these areas, or to obtain more information on these agreements, they should contact the Commissioner of Soil and Land Conservation, by email at commsoil@dpird.wa.gov.au, prior to commencing any activities.	Noted.

2.5 Department of Biodiversity, Conservation and Attractions (DBCA)

SUMMARY OF SUBMISSION	RESPONSE
The following comments are provided pursuant to DBCA's responsibilities under the *Conservation and Land Management Act 1984* (CALM Act) and *Biodiversity Conservation Act 2016* (BC Act).	
DBCA-Managed Lands	
a. The proposal area surrounds and partially intersects with an unnamed Nature Reserve (R 42377 / Lot 4924) accessed from Dennis Road, as well as Crown freehold Lot 101, currently held by the Department of Planning, Lands and Heritage but actively managed since 2016 by DBCA and accessed via Scott River Road. It is intended that Lot 101 will ultimately be transferred to the conservation estate to be managed as a nature reserve by DBCA under the CALM Act.	SynergyRED is aware of the Department of Biodiversity Conservation and Attractions (**DBCA**) manages land within and neighbouring the Development Envelope and has considered these in the preparation of the Development Application. SynergyRED has undertaken preliminary consultation with both the Department of Planning Lands and Heritage (**DPLH**) and DBCA regarding the Proposal's partial intersection with R 42377 & Lot 101 and will seek the appropriate approvals for access to reserves following receipt of primary approvals, and detailed design.
b. The project area also adjoins Crown freehold Lot 1 Governor Broome Road to the southeast, acquired by DBCA through an environmental offset process. To the northeast of the project area, adjoining Dennis Road/Pagett Road, is the Pagett and Chester Nature Reserves and South Blackwood State Forest. To the south and west of the project area, along the Blackwood and Scott Rivers, is the Scott National Park.	
c. The proposed development should not result in impositions being placed upon the management of the adjoining and nearby DBCA-managed lands. There should be no direct or indirect impacts, including vehicle, pedestrian and/or stock access, fire management, dewatering/groundwater impacts, surface water run-off, erosion, pollution, pests, Phytophthora dieback or weed spread from the proposed development to the adjacent DBCA-managed land.	The Proposal will be developed to limit impact on DBCA's land management activities, most likely to occur during construction of any portion of the footprint that intersects/traverses these properties (e.g., access tracks and transmission line). These direct impacts will be limited to areas of cleared land within these landholdings and will be discussed with DBCA when seeking the above approvals.
d. The submitted Development Application Report (Urbis, October 2025) provides indicative locations for the 20 proposed Wind Turbine Generators (WTGs) and associated infrastructure such as wind monitoring and communication towers, electrical substation, site buildings, transmission line, dams, temporary concrete batching plant, storage and stockpile areas. The proposal states that the maximum tip height for the WTGs is 250m, with a hub height of 164m and a minimum tip height of 40m. For this proposal, the rotor swept area (RSA), -the physical area swept by the blades during operation - is between 23,000m2 and 26,000m2 and has the potential to impact on fauna movements across the landscape.	As noted, the Proposal's layout has been designed to avoid the placement of WTG in proximity (within 100 m from the centre point of the WTG) to remnant native vegetation within R 42377 and Lot 101, and as a result no groundwater drawdown is currently anticipated. (Stantec 2025; Attachment 4- Appendix A). Note during assessment of the Proposal's referral under the EPBC Act, the minimum blade ground clearance was increased from 40 metres above ground level to 59 metres above ground level to avoid significant impacts to black cockatoos and migratory birds. The BBAMP (Attachment 4 – Appendix N) will be updated to reflect this change. Other indirect impacts will be managed through the implementation of Management Plans, including a CEMP (Attachment 4 -Appendix H), detailed ASSDMP (Attachment 4-Appendix B), and **Appendix E**: Bushfire Risk Management Plan (BRMP) - and Dieback Management Plan (**DMP**) where required (to be informed by Phytophthora dieback survey prior to construction). The ASSDMP will be updated to include the following drawdown limit: Drawdown will not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDEs and the location of native vegetation within R 42377 and Lot 101.
Advice:	
1. Adequate boundary fencing and gates should be installed to restrict vehicle or stock access to the adjoining DBCA-managed reserves.	Noted. SynergyRED understands that the vegetated values within both R 42377 and Lot 101 are currently fenced to protect them from surrounding agricultural activities including grazing. Following receipt of primary approvals and detailed design, and when seeking the above approvals, SynergyRED will discuss with DBCA any potential impacts to

SUMMARY OF SUBMISSION	RESPONSE
	existing fencing associated with the Proposal along with proposed mitigation (e.g. installation of gates) to ensure vehicle and stock access to reserve values continue to be restricted.
2. Recommend a minimum 100m setback from the boundary of the adjoining nature reserves to any of the proposed buildings, structures and earthworks, to mitigate potential impacts on DBCA-managed lands. A greater setback distance to WTGs or supporting development may be identified, based on finalisation of the development plans following a further design and procurement process, as noted in the Development Application Report (Urbis October 2025).	Noted. The current indicative disturbance footprint has no direct impact on the adjoining nature reserves, and largely falls outside a 100m buffer applied to the protected values within adjoining reserves[1], excepting: • A number of existing access tracks proposed for upgrade/use – selected to minimise disturbance/clearing of native vegetation and associated impacts on landowner. • A portion of the overhead transmission line, associated access track and Western Power laydown area which have been positioned to avoid direct impacts on reserves and minimise impacts on landowner farming practices. In response to DBCA's comments, SynergyRED is committed to locating: • All WTGs 100 m from R 42377, Lot 101 and Lot 1. • The proposed substation, operation and maintenance area and all temporary construction areas (e.g. laydown areas, construction site offices, concrete batching plant, topsoil/vegetation stockpiles, ASS/dewatering management infrastructure) at least 100 m from the protected values within R 42377 & Lot 101[1] to mitigate potential impacts on DBCA-managed lands. • The proposed transmission line and associated access track to ensure that there is no direct impact on R 42377 & Lot 101, with consideration for ongoing asset management and protection. These commitments will be reflected in the CEMP (Attachment 4 -Appendix H).
3. The proposed gravel-capped access road alignments cross the access ways to Lot 101 and R42377. Further discussions with DBCA will be required in relation to current and future access to the lands and appropriate roading materials to minimise Phytophthora disease spread.	Noted. SynergyRED will consult with DBCA and seek the appropriate approvals for access to reserves following receipt of primary approvals and detailed design.
Visual Amenity The majority of the assessment focuses on the WTGs as these are the largest elements in the landscape - this includes the mapping of ZVIs. Other infrastructure worthy of the same detailed assessment as the WTGs include the access and maintenance roads, transmission line, meteorological masts and the substation, given they are of significant scale or length in the landscape and will be seen in a different context to the towers. Individual ZVIs for the other infrastructure will determine where these elements will be seen from the landscape and sensitive visual receptors. These ZVIs could inform mitigation measures that could reduce the individual visual impact of these items and therefore reduce the collective total visual impact for the project as a whole. The report notes that there will be an impact to the quality of the visual landscape from this proposal. Because of this acknowledgment, and the degree of the impact, the proposed mitigation measures appear limited. More advanced assessment of mitigation measures, based on a more detailed assessment of sensitive visual receptors, infrastructure assessment and associated ZVI may provide more protection of landscape quality and the viewer's sensitivity to the proposal.	Noted. See responses to advice below.

[1] Note: The 100m buffer has not been applied to the mostly cleared portions of R 42377 & Lot 101 that support access to the protected values.

SUMMARY OF SUBMISSION	RESPONSE
Advice:	
1. The methodology, process and outcomes as presented in Attachment 4 - Referral Supporting Documents (RSD), Eco Logical Australia 2025 and the main assessment documented in Proposed Wind Farm - Scott River Landscape and Visual Impact Assessment by GHD 2025 are generally supported given: • The methodology aligns with industry standards using established methodologies and approved documents, including the WAPC Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting, and design. • Suitable Landscape Character Units (LCU) were developed highlighting the variety of landscape types that surround the project. These were then extended to describe the public's acceptance of visual change to the landscape quality of those LCUs. • The Zones of Visual Influence (ZVI) capture where the wind farm infrastructure will be seen across the landscape.	Noted and confirm comment.
2. Views specific to DBCA managed lands are largely absent, including the Cape to Cape Track, recreation sites and activity on and along the Blackwood River / Scott River and Hardy Inlet, and the Cape Leeuwin Lighthouse (from the ground and the top viewing deck). Assessing more receptors could help to identify small scale or local mitigation measures.	Updated hub- and tip-height ZTV mapping now includes the Cape to Cape Track, Leeuwin Lighthouse, key waterways and Scott River National Park confirming that the Cape to Cape Track and the Lighthouse fall outside the visible area, while other recreational areas such as Scott River National Park, Hardy Inlet, Blackwood River and Scott River lie within it, noting that ZTV outputs do not account for vegetation, buildings or distance effects. In addition, photomontages in the Proposal LVIA (2025) demonstrate that views from both the top and bottom of Cape Leeuwin Lighthouse are obscured by intervening landform, confirming no visibility of the Proposal from these locations. See **Appendix B: Section 3.2**
3. The viewing deck at the Cape Leeuwin Lighthouse sits ~40m above ground, and the base of the lighthouse is ~ 20m above sea level. As this is a significant tourism site it would warrant an assessment	
The Visual Impact Assessment identifies that this proposal will be highly visible in the surrounding landscape and that there is limited scope in most instances to reduce this visual impact. The proposed mitigation measures are limited and reflect the high impact of the proposal from scattered receptor sites but do not consider local or small-scale mitigation measures or interventions to protect visual quality from the entire landscape. Potential mitigation measures to address landscape-wide and locally identified impacts could include: • Road edge vegetation screening along surrounding travel route corridors of all types managing and screening views along the length of these corridors. • Localised screening surrounding the ancillary infrastructure. • Broadscale landscape planting within the project area.	Noted. See **Appendix B: Section 3.5 and Appendix C: Section 2.** SynergyRED is committed to offering targeted visual screening, vegetation strategies, or similar low-impact mitigation measures to adjacent landowners should these prove effective and appropriate in consultation with affected parties.
Flora **Discussion** DBCA provides the following comments on Attachment 4 (RSD) - Appendix I Detailed Flora and Vegetation Survey undertaken by Phoenix Environmental Services in February 2025 (the Flora Survey). a. Vegetation complex information has not been assessed correctly. For the southwest Regional Forest Agreement Area, the Mattiske and Havel (1998) mapping should be used. b. Threatened flora, *Conospermum quadripetalum* (CR), has been recorded in previous surveys from 2019, including in close proximity to proposed WTGs in the northwestern vegetation and in the road reserve as recently as 2022. The Flora Survey did not record this species, although it was noted that its habitat was not thoroughly searched. *C. quadripetalum* is wetland dependant and may be impacted by dewatering.	a) Phoenix Environmental Sciences has confirmed that vegetation has been assessed in accordance with relevant guidance material - *EPA Technical Guidance (2016)* and the *Environmental Factor Guideline* (2022). Neither of these Guidelines stipulate a requirement for Mattiske and Havel (1998) mapping to be used. b) Noted. As detailed in Attachment 4 (Referral Supporting Document (**RSD**) - Section 8.6.6 and Section 9.6.11, given the temporary and spatially constrained nature of the proposed dewatering, and the implementation of the detailed ASSDMP, drawdown of groundwater is not expected to significantly impact groundwater dependent vegetation within or surrounding the Development Envelope. Furthermore, through the implementation of mitigation measures within the CEMP and design, the Proposal is not expected to result in significant impacts to surface hydrological regimes to cause significant vegetation impact.

SUMMARY OF SUBMISSION	RESPONSE
c. 71 individual specimens of the threatened *Verticordia plumosa* var. *vassensis* (EN) have been recorded on Governor-Broome Road, some of which appear to be in proximity to the proposed track that crosses the road. *V. plumosa var. vassensis* is often found in seasonally inundated areas and may be impacted by alterations to hydrology / drawdown. d. Survey sites BEE030 and BEE061 have incorrectly identified a known population of threatened flora *Banksia nivea* subsp. *uliginosa* (EN) as the common subspecies *Banksia nivea* subsp. *nivea*. The common subspecies has not been recorded on the Scott Coastal Plain. Survey sites BEE114, BEE115R also recorded *Banksia nivea* subsp. *nivea*. e. The Flora Survey did not locate any plants of the threatened *Darwinia ferricola* (EN). DBCA records indicate there are nine populations within the area surveyed. f. Records of *Leucopogon alternifolius* (P3) have likely been confused with the Priority 3 species *Leucopogon wheelerae*, which is endemic to the Scott Coastal Plain and only known between Walpole to Albany. g. It is possible that some of these BC Act listed threatened species may no longer persist on site, however a soil stored seed bank is still likely to be present and plants may germinate at this location in future. h. At present, there are several tracks within the footprint that occur very close to known threatened plant occurrences (e.g. *Darwinea fericola*, *Verticordia plumosa* var. *vassensis)*. i. Attachment 1 [inserted below] provides a list of DBCA identified regionally significant species (assuming correct ID) from the Flora Survey records. • *Actinodium cunninghamii* - western range end. Disjunct western populations. • *Calothamnus lehmannii* - disjunct and rare on Scott Coastal Plain. • *Cyathochaeta equitans* - no known previous record on Scott Coastal Plain. • *Daviesia flexuosa* - western populations are disjunct from the eastern south coastal populations. • *Goodenia micrantha* - first known record on Scott Coastal Plain. • *Grevillea diversifolia* subsp. *subtersericata* - no known previous record on Scott Coastal Plain. Disjunct from usual distribution. Nearest record near Northcliffe. • *Hakea tuberculata* - disjunct western populations are endemic to the Scott Ironstone TEC. • *Isolepis congrua* - no known previous record on Scott Coastal Plain. Nearest record near Denmark. • *Isolepis hookeriana* - no known previous record on the Scott Coastal Plain. Nearest record near Bridgetown. • *Lepidosperma leptostachyum* - no known previous record on the Scott Coastal Plain • *Melaleuca densa* - western range end. Uncommon on Scott Coastal Plain. • *Myriophyllum salsugineum* - Poorly recorded. First record on the Scott Coastal Plain landform. • *Persoonia graminea* - western populations are disjunct from eastern populations. Uncommon. • *Scaevola striata* var. *striata* - western range end at Scott River. • *Sphaerolobium grandiflorum* - First record on the Scott Coastal Plain landform. Disjunct. Not recorded west of Walpole • *Sphaerolobium racemulosum* - western populations highly disjunct from populations east of Albany. • *Stylidium megacarpum* - southern range end. Poorly recorded on the Scott Coastal Plain landform. • *Synaphea obtusata* - no known previous record on the Scott Coastal Plain. Not previously recorded west of Manjimup. j. The flora survey does not provide a table of locations or precisely identify the spatial location of conservation listed or significant flora. k. Attachment 4 (RSD) – Appendix D Preliminary Oversize and/or Over Mass (OSOM) Route Study (Ares Group April 2025) indicates that some native vegetation clearing along the transport route from Bunbury Port to the site may be required, and potentially around Site Entrance A. Vegetation to be cleared in association with the transport route was not assessed in the Flora Survey. **Advice:**	c) No dewatering is expected for access track construction. See response to item (b) above. d) Noted – See response to related advice (2) below. e) Section 5.1.2 of Appendix I of Attachment 4 (RSD) details desktop records for this species. Most of these locations were visited and could not be located (i.e. appeared to be cleared), with the exception of three (3) records which weren't visited and confirmed, given they were located outside of expected areas of disturbance. As detailed in Attachment 4 (RSD) - Section 8.3.3.1, unconfirmed desktop records have been treated as present, and will be avoided in line with the Proposal's commitments for Threatened flora. f) Phoenix Environmental Sciences has confirmed that *Leucopogon alternifolius* records are likely *Leucopogon wheelerae*. Note, as both species are P3, misidentification will not result in any change to predicted impacts to this species or require change to mitigation (i.e. SynergyRED has already committed to avoid clearing of P3 species, including any contiguous native vegetation within 20m, as detailed in Attachment 4 (RSD) - Section 8.7. g) Noted – See response to related advice (5) below. h) As detailed in Attachment 4 (RSD) - Section 8.5 and 9.7, the Proposal has also committed to avoid clearing of conservation significant flora (including contiguous native vegetation within 50 m of known Threatened and P1 species and within 20 m of P2, P3 and P4 species). i) Noted. SynergyRED will review these species and avoid these where possible. j) Noted. This information can be exported from the spatial data and provided to DBCA during the relevant Section 40/45 Authorisation process under the BC Act. k) Noted – See response to related advice (9) below.

1. It is recommended that the proponent obtain detailed flora survey records from DBCA via a data request.	Search of DBCA Threatened and Priority Flora Database was conducted as part of the Detailed Flora and Vegetation Survey (See Attachment 4 (RSD) - Appendix I – Section 4.1).
2. Pre-clearance surveys of the northwestern vegetation for *Conospermum quadripetalum* should be conducted to determine whether it is present and in proximity to the clearing.	An additional targeted flora survey has now been conducted over the Eco Logical gap survey area in the north-west. No Threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) or the *Biodiversity Conservation Act 2016* (**BC Act)**, or Priority species listed by DBCA were recorded within this area (ELA, 2025). A copy of this report can be made available to DBCA during relevant Section 40/45 Authorisation processes under the BC Act.
3. Pre-clearance surveys of the northwestern vegetation for *Verticordia plumosa* var. *vassensis* should be conducted to determine whether it is present and in proximity to the clearing.	See response to item (2) above.
4. Records of *Banksia nivea* subsp. *nivea* need to be reviewed to determine if it is the threatened sub species *B. nivea* subsp. *Uliginosa*.	Phoenix Environmental Sciences has advised that *Banksia nivea* subsp. *nivea* and Banksia *nivea* subsp. *uliginosa* could be considered cryptic to each other and are difficult to split due to overlap in most taxonomic characters, and that on the basis of range, subsp. nivea is possible at this location (i.e. would only represent a slight range extension). Recognising the higher conservation status of Banksia *nivea* subsp. *uliginosa* (T), all *Banksia nivea* subsp. *nivea* records will be treated as Banksia *nivea* subsp. *uliginosa* (i.e. will be avoided, including avoiding clearing of any contiguous native vegetation within 50 m, as detailed in Attachment 4 - Section 8.7) until specimens are independently identified at the WA Herbarium and confirmed otherwise.
5. Where possible, a 50 metre buffer be applied to all confirmed threatened plant records (even if the plant no longer persists on site). If this is not feasible, a BC Act section 40 authorisation will be required for the take of plants, soil stored seed and inadvertent take of threatened species of plants, which may be subject to conditions to mitigate and offset any potential impacts.	The CEMP (RSD - Appendix H – Attachment 4) commits to no clearing of contiguous native vegetation within the Clearing Exclusion Area Buffer (50 m) for Threatened species, including recorded and unconfirmed desktop records. SynergyRED will consult with DBCA during relevant Section 40/45 Authorisation processes under the BC Act regarding impacts to recorded and desktop Threatened flora records, including those considered to no longer be present.
6. Given the project area is predominately cleared agricultural land (72.4%) it is recommended that any WTGs, associated development such as BESSs, concrete batching plant, extraction pits and supporting infrastructure such as access tracks, transmission lines target existing cleared areas.	As detailed in Attachment 4 (RSD) – Section 8.5, Section 8.6.1 and Section 8.7, the Indicative Disturbance Footprint has been designed to utilise existing cleared areas and tracks as much as practicable to reduce clearing of native vegetation. The Proposal will result in the clearing of no more than 1 ha of native vegetation, including a maximum of 0.02 ha of vegetation in Very Good or better condition.
7. It is noted that several of the proposed access tracks currently bisect drainage lines. Clearing of drainage lines should be avoided where possible.	While the Indicative Disturbance Footprint does bisect a number of drainage lines, no clearing of native vegetation is anticipated at these locations. SynergyRED will avoid clearing of native vegetation growing in association with drainage lines wherever possible or otherwise obtain the relevant approvals (e.g., NVCP under Part V of the EP Act and Bed and Banks Permit under the RIWI Act).
8. Transmission line fire mitigation measures such as vegetation pruning and grass spraying should not result in any clearing or modification to the remnant vegetation in the DBCA managed nature reserve (R42377) to achieve transmission line fire protection objectives.	Noted. The transmission line will be located to ensure that the construction and ongoing maintenance of this infrastructure (i.e., Western Power clearance and regrowth zones) will not result in any impact to remnant vegetation within R42377.
9. Planning access for construction traffic off Scott River Road and Governor Broome Road should consider presence and avoid any impacts on threatened and conservation significant flora within these road reserves.	While the Preliminary Over Size Over Mass (**OSOM**) identified a number of site entrances that might require native vegetation clearing, the Proposal has selected

	those site entrances that do not require native vegetation clearing, with one exception ('Area 1') as assessed in Attachment 4 (RSD) – Section 8.6.1. Clearing of this entrance is not anticipated to have any impact on conservation significant flora.
Threatened Ecological Communities **Discussion** a. The ironstone soils, which are the foundation of the Scott River Ironstone Threatened Eco Logical Community (TEC), are highly restricted in distribution on the Scott River Plain. The Scott River Ironstone TEC is listed as Critically Endangered under the BC Act and Endangered under the federal *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Currently there are 24 occurrences from the Scott River area recorded on DBCA's TEC database. The occurrences total 377 hectares over an extent of occurrence of approximately 150 km2. The loss of any occurrence of this TEC is considered significant. b. The Scott River Ironstone Association Interim Recovery Plan 2015–2020 (DPAW, 2015) (IRP) for the TEC refers to the underlying geology's physical properties as being important for local moisture retention and to sustain the TEC vegetation. The TEC relies on relatively shallow groundwater depth in summer and autumn (1-2 metres below ground). c. Ponding occurs in low-lying areas during the winter because vertical drainage of rainfall and runoff is prevented by the relatively impervious ironstone layer and shallow groundwater level. Inundation usually persists for a period of three months during winter, although some occurrences may have little surface water. The vegetation community is tolerant of periodic inundation (usually for several months during winter). d. The IRP also states that "any groundwater use that has the potential to lower the summer minimum groundwater levels at the water table by more than 0.3 metre should be considered a potential threat" (p16). If groundwater levels are impacted or dewatering occurs, this could result in vegetation deaths within the community. e. Areas currently mapped as Scott Ironstone TEC that were considered to be in degraded condition were not included as occurrences of the TEC, as they do not meet the criteria of good or better to be listed under the relevant acts. These occurrences are still considered to be important, as with intervention (e.g. fencing, weed control and grazing management) they have the ability to recover sufficiently to be considered part of the TEC. These areas of vegetation should also be considered for potential impacts from clearing and groundwater drawdown. f. Some of the proposed WTG locations are very close to known occurrences of Scott Ironstone TEC and vegetation within conservation reserves (Lot 101, Lot 1 and R42377). For example, the proposed WTG on the east side of Lot 101 is immediately adjacent to native vegetation within Lot 101 as well as vegetation mapped as Scott River Ironstone TEC in the Flora Survey. Groundwater drawdown here has a high potential to impact native vegetation, including the Scott River Ironstone TEC. The information provided does not include sufficient detail to demonstrate that modification of the TEC is unlikely to occur. g. The proposed site office, concrete batching plant and laydown areas are in close proximity to Lot 101 and DBCA's access gate into Lot 101. **Advice:**	Noted. See response to DBCA comments in advice responses below.
1. It is recommended that footings that require minimal dewatering are used for any of the WTGs near the Scott River Ironstone vegetation.	As detailed in Attachment 4 (RSD) – Section 2.2.1.1, two (2) primary WTG foundation options (above ground/partial above ground) will be utilised to minimise the volume of ASS disturbed, and dewatering volume and depth. Typical below ground foundation will only be used where it is confirmed, prior to construction, through detailed site investigation and revised modelling, so that no dewatering will be required.
2. Further discussion is required with DBCA to ensure there is no impact to vegetation in Lot 101 and DBCA's operations/access.	Noted.

	SynergyRED will consult with DBCA to seek the appropriate approvals for access to reserves following receipt of primary approvals and detailed design and during relevant Section 40/45 Authorisation processes under the BC Act.
3. The access track construction should consider appropriate culvert installation to ensure surface hydrology flows are not altered, which may impact the Scott River Ironstone TEC.	SynergyRED has accepted DWER proposed conditions relating to stormwater management, see Section 2.2 issue 3.. The SMP will give consideration to locations of TEC and ensure that drainage controls (e.g. drains and culverts) will be appropriately located, designed, constructed and maintained to maintain surface water flow regimes and minimise erosion.
4. A minimum 100m setback is recommended from proposed buildings, structures and earthworks and the Scott River Ironstone TEC occurrences, to mitigate potential impacts on the TEC.	The Approved Conservation Advice for Scott River Ironstone Association (DSEWPaC 2013) recommends the application of a minimum 50 m buffer for the Scott River Ironstone TEC, *'However, the width of the buffer required may be greater depending on the type of threat, the local hydrology and other factors'*. The Proposal layout has been designed to avoid the placement of WTG in proximity (minimum of 100 m from the centre point of the WTG) to remnant native vegetation, including the TEC. In response to DBCA advice, SynergyRED commits to locating: • WTGs a minimum of 100 m from TEC (as measured from the centre point of the WTG) and inclusive of a 50m buffer between associated ground disturbance (i.e., WTG and hardstand) and the TEC. • Infrastructure which may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, and refuelling locations) 100 m from TEC. • The concrete batching plant 500 m from TEC. • All temporary construction areas (e.g. laydown areas, construction site offices, concrete batching plant, topsoil/vegetation stockpiles, ASS/dewatering management infrastructure) 100 m from TEC. SynergyRED, however, cannot commit to locating roads and cabling 50 m from TEC, noting that it is seeking to utilise existing tracks/access roads as much as practicable (many of which are already in proximity to TEC), as cabling often follows roads. SynergyRED has proposed to clear 0.01 ha within 50 m buffer of TEC to facilitate transport of WTG components south of Governor Broome Road as detailed in Section 8.6.1 of the RSD (Attachment 4). Any infrastructure and potential impacts within 50 m of TEC will be discussed with DBCA during relevant Section 40/45 Authorisation processes under the BC Act.
5. It is recommended a site-specific hydrological study is undertaken. If this information identifies potential impacts to TEC vegetation from the proposal, authorisation under section 45 of the BC Act will be required. If further advice is required in relation to requirements under the BC Act including whether authorisation is required to modify a TEC, email speciesandcommunities@dbca.wa.gov.au.	A Surface Water and Hydrogeological Assessment (Appendix A to Attachment 4 (RSD)) was undertaken to investigate the hydrological and hydrogeological regimes within the Development Envelope and to assess potential impacts. SynergyRED has committed to managing dewatering so that drawdown does not exceed 0.1 m beyond 100 m from any dewatering location or natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at groundwater dependent ecosystems, including TEC. SynergyRED is committed to undertaking further detailed site investigations and modelling to support selection of WTG foundations and the development of the ASSDMP.

6. It is recommended that the Preliminary Acid Sulfate Soils and Dewatering Management Plan (Attachment 4 (RSD) - Appendix B – PTG Consulting September 2025) be updated in consultation with DBCA to include appropriate monitoring and mitigation measures relating to the Scott River Ironstone TEC and be conditioned on any development approval.	SynergyRED will consult DBCA on the ASSDMP as appropriate when seeking approvals for access to reserves, following receipt of primary approvals and detailed design, and during relevant Section 40/45 Authorisation processes under the BC Act. SynergyRED proposes a condition as follows: • Prior to any ground disturbing activities, an Acid Sulfate Soils and Dewatering Management Plan (ASSDMP) is to be prepared to the satisfaction of the Local Government, on advice from the Department of Water and Environmental Regulation (DWER).
7. The proponent may also need to address any referral requirements under the EBPC Act.	The Proposal was referred to DCCEEW on the 28 November 2025. On the 27 February 2026 the DCCEEW made the Referral Decision - Not controlled action if taken in a particular manner. More information on the decision is available via its website: EPBC Act Public Portal.
Wetlands The majority of the development area is mapped as palusplain in the Geomorphic Wetlands Augusta to Walpole dataset, with a cluster of sumplands and damplands around the middle of the development area, particularly within Lots 4152, 4263 and 4265. Any alterations in hydrology may impact the palusplain. There may also be indirect impacts to the sumplands that are in close proximity to development.	Impacts to wetlands were considered in Section 9.6.1 and Section 9.6.11 of Attachment 4 (RSD).
Fauna **Discussion** a. DBCA notes potential impacts of the development on conservation significant values including breeding, roosting and foraging habitat of the threatened Carnaby's cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*), and the Priority species Western False Pipistrelle bat (*Falsistrellus mackenziei*), all of which were observed within the proposal area. b. Evidence from studies at other windfarms has shown that operational impacts affect particular species disproportionately, compared to habitat loss or stationary elevated structures (Willis et al. 2010). While research on Australian wind farms is limited, evidence to date suggests the species most affected by collision mortality fall into the following groups (MacMahon 2010): • Large sedentary raptors. • Fast high flying microchiropteran bats. • Fast high flying non-passerines. Representative species from all of these groups are known to occur within the locality of the Scott River proposal. c. Studies reported in the literature reviewing the operational impacts at Australian wind farms using data from operational monitoring (i.e. carcass searches) at Australian wind farms found an average mortality of 0.71 birds and 0.55 bats per turbine per year, although these rates are imperfect given the limited datasets (Heinze et al, 2014). d. It is noted that some species such as the wedge-tailed eagle (*Aquila audax*) and white-striped freetailed bat (*Austronomus australis*) have an 'almost certain' risk of collision with the turbines and high mortality rates/carcass counts have been recorded at other wind farms in Australia. However, as these species are not conservation listed, the impact to these species has not been assessed.	Noted – See response to related advice and clarification on discussion item (e) and (g) below: (e) The Forest Red-tailed Black Cockatoo was the only conservation listed species recorded flying at heights above 40m, specifically two records within a flight range of 25-50m. As detailed in the BBAMP (Appendix N of Attachment 4 (RSD), these two records have been conservatively assumed to be within the RSA for the risk assessment; however, it is acknowledged that these records are likely to be below 40 m based on known behaviour and flight height records of this species collected for other wind farm projects. (g) The Proposal layout has been designed to avoid the placement of WTG in proximity (minimum of 100 m from the centre point of the WTG) to remnant native vegetation/habitat. The dense vegetation surrounding WTGs BP_01 and BP_02 in the north west of the Development Envelope is Bluegum plantation, scheduled for removal prior to the implementation of the Proposal.

e. How black cockatoos use the landscape in the presence of wind turbines is not well known at present. It may change their foraging, roosting and breeding behaviour. Locating turbines and tracks away from trees and vegetation may minimise disruption to their normal behaviour patterns. Black cockatoos may fly a distance of around 20-30 km on average over open areas (e.g. agriculture areas). Black cockatoos utilise vegetation corridors, such as those formed by the adjacent remnant vegetation, to access known patches of foraging, roosting and breeding habitat. Often the birds will fly to the ground to drink on dusk before returning to their night roost in the forested areas. f. The RSA of the proposed WTGs is between 40-250m above the ground. The supporting Attachment 4 (RSD) - Appendix L Bird and Bat Risk Assessment – Level Two (Phoenix Environmental Sciences August 2025) indicates that certain conservation significant species such as Red-Tail and Carnaby's Black Cockatoos have been recorded flying to heights of 50m. g. Many of the WTGs appear to be placed close (or within) areas of remnant vegetation/Black Cockatoo habitat. h. There is evidence in other bird species that the impact of noise from the turbines may be detrimental to reproductive success. Studies also indicate that birds may exhibit avoidance behaviour near windfarms, with reports of displacement effects ranging from 75 to 800 metres from turbines (Strickland 2004, Winkelman 1994). Potential noise impacts to fauna are considered in Attachment 4 Referral Supporting Document (RSD) and is proposed to be managed through Attachment 4 (RSD) - Appendix N Preliminary Bird and Bat Adaptive Management Plan (both Eco Logical September 2025). i. The Preliminary Bird and Bat Adaptive Management Plan **(**Attachment 4 (RSD) - Appendix N – Eco Logical September 2025) (BBAMP) emphasises carcass monitoring but lacks detail on adaptive responses if collision triggers are exceeded. j. There are high-quality habitat areas and records for Western Ringtail Possum (*Pseudocheirus occidentalis*) (WRP) in the southeast corner of the development area, which is in proximity to two proposed WTGs. **Advice**	

1. Where possible, a minimum 100m buffer between remnant vegetation and individual WTGs is recommended, to reduce bird strike and any potential impacts from the turbine noise. In particular, recommend the following specific WTGs be considered for relocation to reduce impacts for black cockatoos and WRP: a. WTG in the northeast of the Development Area adjacent to red-tailed black cockatoo records [BP_04] b. WTG cluster north of Governor Broome Road [BP_13, BP_15, BP_16] c. northwest WTG in dense vegetation [BP_01 and BP_02], and d. southwest WTG just to the north of Governor Broome Road [BP_17].	The Proposal layout has been designed to avoid the placement of WTG in proximity (minimum of 100 m from the centre point of the WTG) to remnant native vegetation/habitat, and so the current indicative layout is in accordance with this advice. The final location of the WTGs will be subject to detailed design and site investigations and will ensure this buffer is maintained by siting WTGs within the 'Wind Turbine Envelope ''as detailed in the **Shire** (**RFI) - Item 1** and further discussed in **Appendix A** Substantial disturbance to fauna movement patterns and behaviour from WTG movement, light, noise and/or vibration is not anticipated, and will be minimised through the implementation of the CEMP (Appendix H – Attachment 4 (RSD) and BBAMP (Appendix N – Attachment 4 (RSD). Note: • WTGs BP_5 and BP_6 in the north east of the Development Envelope have been relocated in support of mitigating visual impacts and are now located further away from Forest Red-tailed Black Cockatoo records. See Appendix C: DPLH Community SVA and LVIA- Figure 1 • WTG BP_10 and BP_20 have also been relocated in support of mitigating visual impacts and are now located further away from Carnaby's Cockatoo records, and in the case of BP_10 further away from DBCA managed land. • The dense vegetation surrounding WTGs BP_01 and BP_02 in the northwest of the Development Envelope is Bluegum plantation, scheduled for removal prior to the implementation of the Proposal. As noted previously, the Proposal has received a NCA-PM referral decision from DCCEEW. The 'particular manner' includes a new commitment to ensure the minimum blade ground clearance is 59 metres above ground level (increased from 40 metres above ground level at time of referral), to avoid significant impacts to black cockatoos and migratory birds. For more information on the decision and the required actions, refer : EPBC Act Public Portal.
2. Recommend the proponent identify any water sources such as fire water points/soaks/troughs/bores etc. in the agricultural land and consider not placing turbines between the existing water points and the vegetation to ensure no disruption to flight paths and reduce the potential for bird strike.	Noted. The BBAMP (Appendix N – Attachment 4 (RSD) includes the following preventative management and mitigation measure: Where possible and agreed to by landholders, sources of water (e.g. cattle troughs) will be restricted to/relocated more than two (2) times the blade length from operational WTG to reduce the risk of birds being attracted to the area. The implementation of this mitigation measure will require close coordination with landholders through discussion and notification of water sources and the annual BBAMP implementation program.
3. Recommend the BBAMP **(**Attachment 4 (RSD) - Appendix N – Eco Logical September 2025) be updated in consultation with DBCA and be conditioned on any development approval.	SynergyRED proposes a condition as follows: • Prior to WTG commissioning, a Bird and Bat Adaptive Management Plan (BBAMP) is to be approved and implemented, to the satisfaction of the Local Government, upon advice from DWER and DBCA.
4. Recommend the BBAMP be updated to include specific operational adjustments such as blade feathering, appropriate RSA for the proposed WTGs, painted blades, acoustic deterrents, and radar/camera-based smart curtailment of the turbine speed during periods of high species activity, in response to carcass reporting.	Following submission of the Development Application, the BBAMP has been updated in response to a RFI from the Environmental Protection Authority (**EPA**) during its assessment of the referral under the *Environmental Protection Act 1986* (**EP Act**). The latest version can be found on the DCCEEW website. The response was updated to include threshold criteria and contingency actions, including use deterrents (e.g. noise,

	visual) or WTG curtailment. The selection of the most appropriate contingency action will be selected in consultation with relevant agencies. As identified in Item (3) above, a condition is accepted in this regard.
5. WRP and Black Cockatoo species are listed as threatened under the BC Act and EPBC Act. The proponent should be aware of their obligations and approval requirements under section 40 of the BC Act, which requires Ministerial authorisation to take or disturb threatened species. If further advice is required in relation to requirements under the BC Act including whether an authorised fauna spotter is required for activities such as vegetation clearing, email speciesandcommunities@dbca.wa.gov.au.	Noted. SynergyRED is aware of the requirements under s 40 of the BC Act and will apply for a Section 40 authorisation, where required.
Construction Environmental Management **Discussion** a. The submitted Attachment 4 (RSD) - Appendix H Preliminary Construction Environmental Management Plan (CEMP) Fig 3.1 identifies a temporary concrete batching plant being located approximately 300 metres southwest from Lot 101, which contains Scott River Ironstone TEC vegetation. There is potential for dust impacts on DBCA-managed lands and TEC vegetation from the prevailing wind direction. b. The proposed construction laydown area and communications tower appear to be located in close proximity to the access gate/track for Lot 101. c. The entirety of the Development Area and surroundings are identified as a Dieback Vulnerable Zone. In terms of specific occurrences of dieback, the intersection of Brockman Highway and Sues Road and the northern side of Brockman Highway was assessed as infested in 2001 and 2008. The vegetation to the south and east of the intersection of Brockman Highway and Dennis Road was assessed as dieback infested in 2008 and 2009, respectively, potentially including the road verge vegetation. In addition, Lot 101 and R42377, were assessed as dieback infested in 2009/2010. d. Priority Protection Areas (**PPA**) are the highest Phytophthora dieback disease priority management areas within the State. The focus of PPAs is to reduce the risk of Phytophthora dieback spread. In the development area, there are two Priority Protection Areas – an uninfested high value hotspot in the southeast corner of Lot 1 and eastern portion of Lot 4154 and an infested high value hotspot in the southwest corner of the site, extending over around a quarter of Lot 4260. The section within the infested high value hotspot PPA along Scott River Road / Governor Broome Road is actively managed to reduce impacts. PPA on-ground management measures include fencing, road improvements, drainage control and phosphite treatments. e. Attachment 4 (RSD) - Appendix H Preliminary Construction Environmental Management Plan (SynergyRED September 2025) indicates that a Dieback Management Plan will be developed and will be informed by a Phytophthora dieback survey completed prior to construction. The Dieback Management Plan will need to include appropriate prevention and mitigation measures such as ensuring that vehicles and machinery are cleaned when arriving and leaving the development area, with information provided on how and where vehicles machinery and equipment will be cleaned of soil (e.g. wash down bays). f. DBCA is aware that Governor Broome Road can be subject to seasonal saturation causing road deterioration and summer dust. The current proposal will increase existing truck movements, and the adjoining TEC vegetation and flora species may be subject to increased Phytophthora dieback spread impacts, vehicles straying off-road to avoid road damage, and dust coverage. Existing fencing along Governor Broome Road, installed to protect TEC vegetation and threatened flora from cattle movement between sites at this location, has an increased damage risk from stock and vehicles during the construction period. **Advice**	Noted. See response to related advice below.

1. Recommend further modelling be undertaken to identify and address potential dust impacts from the proposed temporary concrete batching plant on DBCA-managed lands and TEC occurrences.	The current location of the concrete batching plant is over 200m from the nearest DBCA managed land. Dust emissions from the concrete batching plant are expected to be minimal, localised and temporary. SynergyRED commits to relocating the concrete batching plant at least 500 m from DBCA managed land, TEC and wetland habitat during detailed design.
2. The proposed construction laydown area and communication tower be relocated further to the south so that DBCA access to Lot 101 is not restricted.	SynergyRED notes that whilst it might appear, based on the scale of the map, that the proposed communication tower and construction laydown area intersect Lot 101, this infrastructure will be located outside of this property. Only a small portion of the overhead transmission line and an access track intersect Lot 101. SynergyRED has undertaken preliminary consultation with both DPLH and DBCA regarding the Proposal's partial intersection with R 42377 & Lot 101 and will seek the appropriate approvals for access to reserves following receipt of primary approvals and detailed design. The Proposal will be developed to limit imposition on DBCA's land management activities.
3. Recommend that the proposed Dieback Management Plan (**DMP**) be produced in consultation with DBCA and be a condition of any development approval, to be completed prior to the commencement of works.	SynergyRED will consult DBCA on the DMP as appropriate when seeking approvals for access to reserves following receipt of primary approvals and detailed design, and during relevant Section 40/45 Authorisation processes under the BC Act. SynergyRED proposes a condition as follows: • Prior to any ground disturbing activities, a Dieback Management Plan must be prepared to the satisfaction of the Local Government, on advice from the Department of Biodiversity, Conservation and Attractions (DBCA).
4. Recommend water sources used for dust mitigation measures be clean or treated to minimise the risk of moving/spreading pathogens and impacting upon native vegetation.	Noted. SynergyRED will consult DBCA on the DMP as appropriate when seeking approvals for access to reserves following receipt of primary approvals and detailed design, and during relevant Section 40/45 Authorisation processes under the BC Act.
5. Recommend the proponent consider suitable traffic management measures during construction to ensure fencing along Governor Broome Road is not damaged. 6. Recommend that any mulch or topsoil stockpiles, or hydrocarbon/hazardous material stores, are not located upslope and/or within 100m of DBCA-managed lands and TEC occurrences. 7. Recommend all cleared vegetation be mulched and disposed offsite every day to minimise fauna utilising/moving into the cleared vegetation. If spoil is stockpiled and not mulched or disposed offsite within this timeframe, stockpiles should be checked for fauna before they are mulched or removed from the site. 8. CEMP Table 6.7 Terrestrial Fauna Management refers to incidents where loss or injury of native fauna occurs. Regional Wildlife Officers at DBCA's Southwest Region should be notified within 24 hours of any incident occurring.	Noted. The CEMP and/or DMP will be updated to consider and address the following: 1. Protection of fencing around DBCA managed land. 2. Management of mulch/topsoil stockpiles 3. Hydrocarbon storage. 4. Notification of DBCA Southwest Regions Regional Wildlife Officers in the event of loss or injury of native fauna Note: Infrastructure which may be a source of contamination (e.g. substation and switchyard, operations and maintenance building and workshop, and refuelling locations) will be located at least 100 m from wetland habitat, TEC and DBCA managed land. SynergyRED is committed to relocating the concrete batching plant at least 500 m from DBCA managed land, TEC and wetland habitat during detailed design.

2.6 Department of Health (DoH)

SUMMARY OF SUBMISSION	RESPONSE
DoH position: No objection – with comments and/or recommended conditions and advice notes provided below. **1. Site servicing** The DoH advises that the treatment and disposal of wastewater generated on site, either temporarily or permanently, is required to comply with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* and the Government Sewerage Policy 2019 requirements. A site-specific Site and Soil Evaluation (SSE) should be undertaken by a qualified consultant during the wettest seasonal time of the year (mid-July/August) as per AS/NZS 1547:2012, to ensure the land application area for each wastewater treatment system is appropriately sized and located.	SynergyRED acknowledges that reticulated water and sewerage are not available at the site, and that water will be trucked to the site to service potable and non-potable water requirements. SynergyRED proposes the following conditions: • Prior to the installation of any inground domestic wastewater systems, a site and soil evaluation report is to be prepared that takes account of the principles of the Government Sewerage Policy (WAPC 2019). • The Proponent is to ensure suitable potable water supply and effluent disposal facilities / infrastructure are designed, installed and maintained for the life of the development in accordance with the Local Government's requirements, upon advice of the Department of Health as necessary.
2. Health and amenity	
Mosquitoes The subject land is in a region that occasionally experiences problems with nuisance and disease carrying mosquitoes. These mosquitoes are known carriers of Ross River (RRV) and Barmah Forest (BFV) viruses. Human cases of RRV and BFV diseases have been reported in this region. Future development should avoid the creation of additional mosquito breeding habitats. The DoH recommends that the proponent ensures the proposed site works and infrastructure do not create additional mosquito breeding habitat as follows: • Changes to topography resulting from earthworks must prevent run-off from creating surface ponding as it may become mosquito breeding habitat. • Water tanks and other water-holding containers must be sealed or screened to prevent mosquito access and breeding. On-site infrastructure and constructed water bodies must be located, designed and maintained so they do not create or contribute to mosquito breeding.	Management of mosquito risk will be addressed in the CEMP.
Approvals An Application to Construct or Install an Apparatus for the Treatment of Sewage for each onsite wastewater treatment system, temporary or otherwise, will be required to be submitted to the Shire of Augusta Margaret River. All drinking water provided on site must meet the health-related requirements of the *Australian Drinking Water Guidelines 2011*.	SynergyRED accepts the advice notes as proposed.
Temporary concrete batching plant Concrete batching facilities may impact human health due to contaminant types such as lime, calcium hydroxide, alkalis, hydrocarbons, asbestos and metals (nickel, zinc). Concrete batching plants are also considered a potentially contaminating land use as described in the Department of Water and Environmental Regulation's *Assessment and management of contaminated sites* (DWER, Nov 2021). The DoH considers it appropriate that these matters are addressed through the development application, including considerations to protect public health and to avoid the creation of a new contaminated site. The DoH recommends that the applicant provide details of effective management of the proposed temporary concrete batching plant, including contingency measures and actions in the event of facility malfunctions or spills.	The temporary concrete batching plant will be operated in accordance with standard guidelines and licensing.
Noise	

SUMMARY OF SUBMISSION	RESPONSE
The DoH is unable to provide noise-related comments as noise falls outside of the DoH's regulatory area. Please refer the request to the Department of Water and Environmental Regulation noise branch for advice concerning noise impacts and comment on the proposed wind farm application: Noise regulation | Western Australian Government.	See Department of Water and Environmental Regulation (DWER) Section 2.2 Response
Contaminated sites There is a large area adjacent to the western boundary of the site comprising a series of linear ponds and wetlands known as the former Beenup Titanium Minerals Mine. The site was reported (DMO25933/25934) under the *Contaminated Sites Act 2003* based on the presence of groundwater contamination derived from deposits of mineral processing wastes and disturbance of acid sulfate soils, and elevated radiation derived from the titanium mineral processing waste deposited on site. The mine operations were rehabilitated to wetlands in 2004 and a radiation survey conducted at the time concluded that the site was suitable as a wetland reserve but not for any other sensitive land uses. The proponent may wish to discuss this with the Radiological Council of Western Australia.	Noted.

2.7 Department of Fire and Emergency Services (DFES)

SUMMARY OF SUBMISSION	RESPONSE
I refer to your email dated 19 November 2025 regarding the submission of a Bushfire Management Plan (BMP) (Revision 1.0), prepared by Linfire and dated 27 March 2025, for the above proposed development. The BMP is accompanied by a Bushfire Risk Management Plan (BRMP) (Revision 0) from the proponent dated 27 March 2025 in relation to the proposal. This advice relates to the State Planning Policy 3.7 Bushfire (SPP 3.7) and supporting Planning for Bushfire Guidelines (Guidelines), as well as DFES' role and responsibilities as Hazard Management Agency (HMA) for Fire in Western Australia.	Noted.
General Comments	
DFES acknowledges that the development site consists of multiple owners of land primarily used for agricultural purposes. The proposed development includes the installation of 20 wind turbines and associated infrastructure, including a substation and operations and maintenance building/office.	Noted.
Specific requirements of SPP 3.7 and the Guidelines are to be further addressed in the BMP as outlined in the below assessment Tables 1 and 2.	Noted, refer comments below. Other than addition of correct Class B Woodland photos to the **Appendix E**: Bushfire Risk Management Plan (BRMP), no other amendments to the BRMP and **Appendix F**: Bushfire Management Plan (BMP) are considered necessary.
DFES notes that the current version of SPP 3.7 and the Guidelines no longer makes reference to 'high risk land use'. The decision maker has referred this proposal to DFES as a discretionary referral. DFES considers that SPP 3.7 and the Guidelines do not adequately address high risk land use such as renewable energy facilities. Given the temperature sensitive nature of the infrastructure, it is critical to ensure that the proposed design adequately responds to facility fire risks and bushfire.	Noted and agreed regarding application of SPP 3.7 and the WA Guidelines, removal of 'high-risk land use', and lack of guidance for renewable energy facilities. The statement regarding 'temperature sensitive infrastructure' appears out of place and suggest it may be related to BESS infrastructure which is not included in this Proposal. Notwithstanding, SynergyRED does concur that the proposal needs to respond to facility fire and bushfire risks to protect life, property and infrastructure, despite the lack of a statutory trigger to do so and noting the Draft Code and Draft LPP23 recommend preparation of a BMP. In this regard, the Draft Code identifies a proposed performance outcome of BAL-29 for WTG in bushfire prone areas. The BMP and BRMP commit to non-vegetated zones (**NVZ**) and Asset Protection Zones (**APZ**) to achieve BAL-29 or lower at the WTG tower casing.
Accordingly, DFES has also assessed the proposal against the CFA Design Guidelines and Model Requirements – Renewable Energy Facilities as amended (REF Guidelines) which is currently considered best practice for the development of renewable energy facilities.	SynergyRED has voluntarily adopted the Country Fire Authority (**CFA**) Guidelines in the bushfire risk assessment and management of the Proposal (see Section 1.3 in BMP and Section 1.3 in BRMP). Some CFA Guideline requirements have been rationalised for a Western Australian (**WA**) context, such as technical specifications for private driveways, firewater tanks, where consistency with standard WA expectations were considered appropriate, rather than introducing Victorian specifications. These rationalisations were explained in meetings with the Department of Fire and Emergency Services (**DFES**) Land Use Planning Branch, Built Environment Branch and the Lower South West Regional Office in 2024 with no concerns raised.
Specific requirements of SPP 3.7 and the supporting Guidelines and the REF Guidelines are to be further addressed in the BMP and BRMP as outlined in the below assessment. The assessment comments relating to the REF Guidelines have been incorporated into the below overall assessment comments for the respective	Noted and addressed in detail below.

issue/element.	
Recommendation: Compliance with acceptable solutions not demonstrated – modifications required	
DFES advises that the BMP has not demonstrated that the proposed development complies with the Element 2: Siting and Design requirements of SPP 3.7 and the Guidelines.	There is no non-compliance with Element 2 (from SPP 3.7 and WA Guidelines), as this only applies to the proposed habitable building. The DFES comment relates to the WTG, which are not subject to Element 2. Further comment on WTG siting is addressed in detail below and in the BMP and BRMP.
Further information should also be submitted to demonstrate compliance with the Victorian Country Fire Authority REF Guidelines, considered best practice for the development of renewable energy facilities.	Table 2 (Section 4.0) of the BRMP addresses the CFA guidelines and how the proposal complies. Notwithstanding this, the CFA Guidelines are voluntary only in WA, but have been used as guidance to demonstrate appropriate management of bushfire risk to and from the renewable energy infrastructure in the absence of formal guidance in WA.
DFES recommends the BMP and BRMP be modified as per the Assessment advice provided in Tables 1-3 to ensure it is accurate and the bushfire risk management/mitigation measures are effective and can be implemented in perpetuity to manage/mitigate the bushfire risk to people, property and infrastructure to an acceptable level and appropriate to the land use and location. The required modifications are listed in the table(s) below. Should the modified BMP and BRMP affect the design of the proposal, the proposal should be amended to reflect these modifications.	See sections below for response.
DFES recommends that due consideration be given to the below assessment of the extreme bushfire hazard level and unacceptable risk (see Tables 1 – 3) [copied below].	See sections below for response.

Table 1: Policy Measure 7.1 ii. c. Compliant Preparation of a BAL Contour Map	
Vegetation Classification or Exclusions - Classified Plot 6 – not demonstrated • Vegetation Plot 6 cannot be substantiated as Class B Woodland with the limited information and photographic evidence provided. Photograph IDs 6a-c do not represent Class B Woodland. The foliage cover appears to exceed 30% and most of the Plots are contiguous with Class A Forest. • The BMP should detail specifically how the Class B Woodland classification was derived as opposed to Class A Forest. • If unsubstantiated, the vegetation classification should be revised to consider the vegetation as per AS 3959, or the resultant BAL ratings may be inaccurate. • Evidence is required to support the vegetation classification of Plots 19-20 and the exclusion of Plot 21. • No photographic evidence has been provided for these plot areas. • The BMP should detail specifically how the relevant classification and exclusion are derived. • It is noted that these areas are unlikely to affect the BAL rating due to the separation distance, however for accuracy the BAL assessment should reflect conditions on site. <u>Action</u> BAL Rating cannot be validated. Further evidence to support the vegetation classification of Plot 6 as Class B Woodland is required.	An updated BRMP has been provided with correct photos in BRMP. • The BMP (for habitable buildings) doesn't detail Class B woodland, it is only in the BRMP (for renewables) • Acknowledge the photos are incorrect and are replications of forest vegetation • The following photos (in BRMP) are correct for the woodland vegetation • Woodland vegetation classification occurred where there was little to no understorey fuel loads • This does not impact actual bushfire measures as woodland is treated same as forest for WTG  Plate 1: Correct Woodland Photos
Table 2: Policy Measure 7.1 ii. e. Compliance with the Bushfire Protection Criteria 7: Development – Commercial and Industrial	
<u>Siting and Design - A2.1a – not demonstrated</u> The BAL ratings cannot be validated for the reason(s) outlined in Table 1. There are two turbines located in a high-risk environment within a timber plantation, the timeline for harvesting is unknown. Should the plantation land use continue it is suggested from a HMA perspective that these turbines be located to a lower risk environment on the site.	No amendment to BMP required. The correct Class B Woodland classification has been included and turbine siting must balance multiple constraints, including circumstances where High-Risk locations are unavoidable and wider APZs are required in accordance with CFA Guidelines, the Draft Code.

Furthermore, although SPP 3.7 does not require commercial or industrial land uses achieve anything less than BAL-29 for habitable buildings, evidence is required that the proposal meets the separation distance requirements (whichever is greater) to ensure: a) that radiant heat from a nearby bushfire will not trigger a failure in the infrastructure (whatever the most susceptible component is); and b) that radiant heat emitted from a failure in infrastructure should be used to inform the minimum separation distance required (i.e. radiant heat level that the weakest component can withstand) and provided to demonstrate compliance. Sufficient evidence in the form of technical specifications and/or standards should be provided. Action BAL Rating cannot be validated. Modification to the BMP is required to address the Assessment advice.	An APZ extending to the turbine blade envelope will be implemented as documented in the BMP (Section 5.1.2) and BRMP (Section 3.1.1) for High-Risk turbines. Furthermore, turbines within existing timber plantations have been conservatively rated, with the expectation that plantation clearing will reduce the risk. As discussed in Table 2 and Section 3.1.1 of the BRMP, compliance with recommended BAL outcomes is achieved through the NVZ/APZ , which demonstrate BAL-29 or lower (and in some cases BAL-19 or BAL-12.5), supported by non-combustible turbine tower construction. This meets or exceeds the Draft Code. It is noted that WTGs are not habitable buildings, so the requirements of SPP3.7 do not apply. As detailed in Table 2 and Section 3 of the BRMP, comprehensive turbine-fire prevention and response measures are incorporated, including operational status monitoring, fault detection, fire detection and alarm systems, automatic nacelle suppression, establishment of NVZ/APZ, and onsite emergency response capability to reduce the likelihood of uncontrolled turbine fire. See **Appendix E and F** for updated BMP and BRMP.
<u>Vehicular Access</u> – A3.1 – demonstrated The BMP has demonstrated compliance with the driveway and turning circle requirements of the Guidelines. REF Guidelines The REF Guidelines requires a larger turning circle or T-head to allow for the turning of fire appliance. It is recommended that consideration is given to these Guidelines, in consultation with the local brigades and units, to determine the minimum driveway compliance requirements. **Action** Compliance with vehicular access requirements of the REF Guidelines not demonstrated. Modification to the BRMP is required to address the Assessment advice.	No amendment to BMP or BRMP is required to address this comment. • While the CFA Guidelines have been used to provide design guidance for the WTG (noting no other detailed design guidance currently exists), it is noted that this has been rationalised for a WA context (see Sections 1.3 of BMP and 1.3 of BRMP) • In the case of vehicular access, rather than adopt Victorian technical specifications, SynergyRED has retained the WA private driveway specifications, other than a longer separation distance between passing bays (from 200 m to 600 m). This is detailed in Section 3.1.2 and Table 2 of the BRMP, and Section 5.2.2 of the BMP • This approach to use WA private driveway standards is considered to be more appropriate to ensure continuity with the expectations in WA, rather than introduce Victorian standards which might not be applicable to WA • This approach was raised with DFES in meetings in 2024 and no concerns were raised.
<u>Water Supply</u> A4.1 - demonstrated The BMP has demonstrated compliance with Element 4: Water Supply of the Guidelines. REF Guidelines The REF Guidelines require a 45,000L water tank at each site entrance and there are four site entrances listed in the vehicle access compliance statement. However, only three water tanks for firefighting purposes are shown on Figures 8 and 9 and they are located throughout the site at various driveway intersections. Action Compliance with firefighting Water Supply requirements of the REF Guidelines not demonstrated. Modification to the BRMP is required to address the Assessment advice	An updated BRMP and BMP have been provided in **Appendix E** and **Appendix F** respectively to address additional water tank requirements. • The water tanks were located away from entrances based on recommendations made by the Community Emergency Services Manager (**CESM**) regarding water theft in the area – see Table 2 in BRMP. • The BRMP and BMP have been updated to include 4 x 45kL water tanks (180kL total WTG firewater) with the additional tank proposed south of Governor Broome road as depicted below (see yellow tank symbol).

	 Plate 2: Additional 45kL firewater tank (incorporated into amended BMP and BRMP) • Also mentioned in Section 5.3.2 of BMP (and in BRMP) is that final locations are flexible to relocation (or amalgamation) based on consultation with DFES, CESM, local brigades.
Table 3: Policy Measure 7.1 iv. and Section 9.4.2 of the Guidelines: DFES Role as Hazard Management Agency (HMA) DFES wishes to provide the below additional advice in its role and responsibilities of HMA for Fire in Western Australia	
Emergency Management Plan (EMP) Given the high-risk land use at this location, it is considered appropriate that an 'Emergency Management Plan' be prepared. Consideration should be given to the Bushfire Emergency Plan (BEP) Manual (as published by the Western Australian Planning Commission), Section 7 of the REF Guidelines and the comments from DFES Aviation Services below. These contain details of information that should be included in a EMP and will ensure the appropriate content is detailed when finalising the EMP to the satisfaction of the decision maker. Action Comment Only	No amendment to BMP or BRMP is required to address this comment. • While the proposed development is not a 'vulnerable' land use as defined by SPP 3.7, and there is no statutory requirement to produce a Bushfire Emergency Plan (BEP), it is agreed that there does need to be bushfire emergency management procedures in place for a bushfire emergency. • Significant bushfire emergency management guidance has been provided in the BMP as follows: ▪ Development of an Emergency Information Book and Signage – see Section 5.6 ▪ Strong liaison with DFES – see Section 5.7 ▪ Incorporation of bushfire emergency management measures into the overarching Emergency Management Plan for the facility (i.e. for all hazards) – see Section 5.8 and Appendix 7. It is expected that development of an Emergency Response Plan and an updated Bushfire Management Plan prior to operations will be conditions of Development Approval, with the following proposed conditions - • Prior to operations commencing, an Emergency Response Plan shall be developed in consultation with the Local Government. The Emergency Response Plan shall be implemented at all times during the operational phase to the satisfaction of the Local Government. • Prior to operations commencing, an updated Bushfire Management Plan shall be submitted to the Local Government for approval. Once approved, the Bushfire Management Plan shall be implemented at all times during the operational phase, to the satisfaction of the Local Government upon advice from the Department of Fire and Emergency Services.

Consultation
 	
In the event that an approval is granted, the DFES District Officer responsible for this region and the local fire and emergency services should be consulted during the development, construction, and leading up to the commissioning of the facility.
It is considered critical for the local fire and emergency services to understand the hazards present in the facility and the measures required to ensure the safety of firefighting personnel when working in or around different parts of the facility.
This may impact on how crews respond to a fire within the facility, which may in turn have ramification regarding the optimal number and location of water supplies.
 	
Action
Comment Only
	• It is agreed that a strong connection should exist between the wind farm operator and local fire and emergency services
	• Consultation was undertaken with DFES, CESM and volunteer fire brigades prior to submission of the Development Application and development of the BMP and BRMP.
	• The BMP details the following liaison with DFES that is expected as part of the project, including
	  ○ Prior to commissioning – see Sections 5.4 and 5.7
	  ○ As part of Emergency Information Book development – see Section 5.6
	  ○ Ongoing during operation – see Sections 5.5 and 5.7.

DFES Other Technical Advice	
DFES Regional and Special Operations DFES Land Use Planning have referred the Scott River wind farm proposal to both the Lower South West regional and special operations branches. Due to operational priorities no comment has been received to date. Should any comment be provided within the near future it will be provided to the Shire. **Action** Comment Only	Comment noted. SynergyRED met with a representative of the DFES Lower South West Regional Office in November 2024 to discuss the Proposal.

DFES Aviation Services
 	
Aviation Services provide the following comments:
• No wind turbines to be located within 300 metres of one another.
• Wind turbines will be provided with automatic shut-down and the ability to be completely disconnected from the power supply in the event of fire.
• All weather monitoring stations to be notified to the Civil Aviation Safety Authority.
• All guy-wires to be clearly marked.
 	
Action
Turbine locations to be provided to DFES Aviation Services.
	No amendment to BMP or BRMP is required to address this comment.
	
	• The requirements raised by DFES Aviation Services are addressed as follows in the BMP:
	  ○ WTG spacing –Section 5.1.2
	  ○ Auto shut-down and disconnection from power –Section 5.4.1.3
	  ○ Weather monitoring stations –Section 5.4.1.4
	  ○ Guy wires –Section 5.4.1.4
	• SynergyRED will provide the final WTG locations to DFES prior to construction, in addition to Airservices Australia. SynergyRED has no objections to this being included as an advice note in the Development Approval and proposes the following –
	• Once WTG locations and parameters have been finalised and at least one (1) month before construction commencing, the Proponent will submit the details of all WTGs to Airservices Australia via the Vertical Obstacle Data Form and to DFES.
	• On the completion of works, the Vertical Obstacle Data Form should be resubmitted to Airservices Australia and DFES with the surveyed height and location of each installed WTG and wind monitoring mast.

DFES Land Use Planning It is the responsibility of the proponent to ensure the proposal complies with relevant planning and building requirements. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, environmental health or any other approvals required by a relevant authority under written laws. **Action** Comment Only	Noted.

2.8 Department of Energy and Economic Diversification (DEED)

SUMMARY OF SUBMISSION	RESPONSE
Officers from the Energy Policy WA and PoweringWA groups have previously met with representatives from Synergy to discuss SynergyRED's (the Applicant) proposal. The Department notes SynergyRED has a successful track record of developing renewable projects in the South West Interconnected System (SWIS), including joint venture projects like the Mumbida Wind Farm and the Warradarge Wind Farm. **Electricity Demand** The State Government has committed to the retirement of state-owned coal fired power stations by 2030, with the Collie Power Station due to retire in 2027 and the remaining Muja Power Station units in 2029. The Australian Energy Market Operator's (AEMO) 2025 *Wholesale Electricity Market (WEM) Electricity Statement of Opportunities* highlights a need for new generation capacity in the SWIS from 2027 onwards. This is due to the planned retirement of these facilities, plus growth in peak demand and overall electricity consumption. The Clean Energy Link – North transmission project, due for completion at the end of 2027, will enable the connection of new generation and storage projects between Three Springs and the Perth metropolitan area. This transmission infrastructure will support a range of energy sources, including wind and solar projects, with connections enabled from 2028 onwards. In advance of completion of this transmission program of works, and noting growing demand, the Department is supportive of renewable energy projects connecting to the existing Western Power network and making use of any available capacity. Additionally, whole-of-system modelling indicates that wind generation assets should be developed across the SWIS to access diverse wind profiles over the day and year to maximise the availability of renewable generation at any one time. Excess renewable power also fills the growing fleet of Battery Energy Storage System facilities across the SWIS, providing a lower cost and lower emissions energy source to 'firm' intermittent renewable energy generation. **Connection to the SWIS** Connection to Western Power's transmission network and confirmation of project financing are essential to the viability of the proposed wind farm in Scott River. The Department notes the applicant; proposes to connect up to 100 megawatts of wind generation capacity to the Beenup to Manjimup 132 kilovolt transmission line via a 4.3 kilometre connection asset, and has been engaging with Western Power regarding the connection of their project to the SWIS via fortnightly meetings since February 2025. The Department notes the progress being made towards a connection agreement and that ongoing work is required to connect the project to the SWIS, including approvals, confirmation of project financing and available network capacity, and construction of the connection asset. **Stakeholder Engagement and Community Benefits** The State Government expects renewable energy proponents to follow best practice when engaging with landowners, stakeholders and the communities in which they intend to operate. The Department notes SynergyRED has undertaken the first steps in obtaining social licence for their project through: engagement across the community since 2024, including community drop-in sessions, monthly updates in the local newsletter, letter drops and targeted advertising; performing a Social Values Assessment to inform the development of their project; and committing to provide $100,000 per annum towards a Community Benefits Fund, the allocation of which will be informed by the development of a Community Benefit Fund Implementation Plan in consultation with the Shire of Augusta Margaret River (the Shire) and the community. The Department notes the Applicant's proposed community benefits contribution is in line with the recommended amount outlined in the PoweringWA *Draft Guideline on Community Benefits for Renewable Energy Projects*. The Draft Guideline is subject to finalisation. As such, SynergyRED should continue to work	Noted and agreed.

SUMMARY OF SUBMISSION	RESPONSE
with the Shire and local community to ensure funds may be allocated in a way that meets the long-term needs of the community and is consistent with the final Guideline once published. The Department does not have a formal role in approvals required to deliver the Project, and encourages SynergyRED to continue to engage relevant agencies, including Western Power and AEMO, to understand its complete approval pathways from development through to energisation. The Department also encourages the applicant to continue to undertake on-going engagement regarding the development, prioritising transparency and collaboration with the Shire and local community.	

2.9 Western Power

SUMMARY OF SUBMISSION	RESPONSE
I refer to the Development Assessment Panel development application - Shire of August Margaret River for SynergyRED Scott River Wind Farm. The applicant's report states that the *"Feasibility assessment Area"* (subject area) and the *"latest draft development boundary…is subject to change as the feasibility assessment progresses"*. Western Power recommend that a Detailed Design and Construction Phase plan as agreed with Western Power be provided by the proponent/applicant.	Noted and agreed. Western Power will receive the requested documentation as part of the Western Power network connection process that SynergyRED is currently progressing. It is unnecessary and inappropriate to duplicate Western Power's existing approvals as part of the Development Approval process.
Noting the existing and potential Western Power assets relevant to the proposal, Western Power's internal customer connection team in respect to the proposed development advise that the customer/proponent has been progressing the development with Western Power. However, prior to commencement of works, the proponent shall ensure that the connection and stages, location, design, access and ongoing maintenance and operations of assets is supported and agreed with Western Power.	Noted. This matter is adequately covered by the existing Western Power network connection process.
Western Power recommends the following standard Advice Notes prior to development or subdivision on the subject site, pursuant to Section 167 of the *Planning and Development Act 2005*: *Advice Notes* (i) The development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. (ii) No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power. (iii) The applicant should formally progress the Western Power network connection and substation arrangements with Western Power. (iv) Arrangements being made to the specifications of Western Power for the provision of necessary electricity easements as and where required.	SynergyRED has no objection to Advice Notes (i), (ii) or (iv). In relation to Advice Note (iii),SynergyRED is already in discussion with Western Power regarding the connection and substation arrangements.

2.10 Main Roads WA (MRWA)

SUMMARY OF SUBMISSION	RESPONSE
I refer to your email of 19 November 2025 and advise that Main Roads has no objections in principle to the proposed development, subject to further engagement being undertaken with Main Roads regarding the intersection construction required to facilitate the movement of components from the Bunbury Port to site.	Noted and agreed.

2.11 CASA

SUMMARY OF SUBMISSION	RESPONSE
CASA has reviewed the Aviation Impact Assessment (AIA) prepared by Aviation Projects dated April 2025 for the Scott River (Beenup) Wind Farm project located in the Shire of Augusta Margaret River Local Government Area in Western Australia. CASA notes the following information contained in the AIA: • This wind farm development compromises 20 wind turbine generators (WTGs), which are up to 250 m Above Ground Level (AGL). • The wind farm is located outside of Busselton Airport's OLS.	Noted.
• The wind farm will affect the minimum sector altitude and GNSS arrival instrument procedures at Busselton aerodrome. Please consult with the aerodrome and aviation operators to ensure that they accept the proposed changes. We need confirmation from the aerodrome operator before we will make any changes (Airservices Australia - 25 February 2025).	Noted and agreed. SynergyRED will consult with Busselton aerodrome and aviation operators regarding the proposed changes to airspace procedures and advise Airservices Australia.
• There are 2 uncertified aerodromes identified within 3 nm: o Unknown Aerodrome 1. The proposed wind farm would be considered potentially hazardous obstacles. When the wind blows from the north, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial in understanding the potential extent of these impacts. o Boley Aerodrome. The proposed wind farm would be considered potentially hazardous obstacles. When the wind blows from east, downstream wake turbulence from the closer WTGs will extend into the aerodrome's right side of the circuit area. Further consultation with the owner/operator of this aerodrome would be beneficial to understand the potential extent of these impacts.	Noted and agreed. SynergyRED will continue to consult with the owners / operators of these uncertified aerodromes; and commits to updating the AIA once the exact WTG locations are confirmed to incorporate any additional constraints or requirements identified through the consultation.
CASA notes from the Airservices Australia response that it concluded that … *The proposed activity will penetrate the current Airservices-designed airspace procedures and/or impact CNS facilities or ATC operations at Busselton aerodrome*. Busselton aerodrome (YBLN) is a certified aerodrome which must operate in accordance with the requirements of *Part 139 (Aerodromes) - Manual of Standards 2020*. Therefore, until such time that the impacts at Busselton Aerodrome are resolved and published, CASA advises that the proposed Scott River (Beenup) Wind Farm as presented, would have an unacceptable effect on the safety of existing and future air transport operations at Busselton Aerodrome. Further, CASA agrees with the AIA that communication with the 2 uncertified aerodromes owners/operators is required regarding the potential impacts associated with the planned 250 m high WTGs.	SynergyRED is aware of the issue raised by CASA and has already initiated a redesign quote from Airservices' Instrument Flight Procedures Design Team to address the impacts on Busselton aerodrome. The impacts are manageable and will be fully resolved prior to construction commencing, once the final coordinates and height of each WTG have been confirmed. Separately, see response above regarding ongoing consultation with the owners/operators of the two uncertified aerodromes.
CASA's assessment was conducted in accordance with the *National Airports Safeguarding Framework (Guideline D)* as developed by the Department of Infrastructure, Transport, Regional Development,	Noted.

SUMMARY OF SUBMISSION	RESPONSE
Communications and the Arts, and as developed to provide planning advice to State and Local Planning Authorities to aid in safeguarding Australian airports from incompatible development.	
Post the above being resolved and published, with regards to Visual Flight Rules (VFR) operations, pilots are permitted to fly as low as 500 ft AGL. The WTGs will reach up to a height of approximately 820 ft (or 250 m) AGL, and therefore the turbine blades will infringe navigable airspace by 320 ft. Therefore, CASA would recommend the proponent install obstacle lighting on the WTGs due to the height of these structures. To limit any potential visual impact on the community, CASA would also recommend consideration of a radar-activated type system of steady red low intensity (200 cd) aviation hazard lighting or contacting obstacle lighting suppliers and discussing whether a cowling system, much like a typical "lampshade", could be incorporated into the lighting system that could result in little or no downward light spill without impacting aviation safety.	As the Proposal site is located outside the horizontal extent of Obstacle Limitation Surfaces **(OLS)** of any certified aerodrome, CASA may recommend, but not mandate, obstacle lighting on tall structures. The NASF (Guideline D) states that "*During the day, large wind turbines are sufficiently conspicuous due to their shape and size, provided the colour of the turbine is of a contrasting colour to the background*." On this basis, and consistent with the recommendation in the AIA prepared by Aviation Projects, daytime lighting of the WTG is not required. As recommended in the Guideline, an obstacle lighting risk assessment has been included in the AIA and concludes that lighting of the WTG at night is also not required to maintain an acceptable level of safety to aircraft. Furthermore, SynergyRED notes that: • The WTG will be reported to Airservices Australia via the Vertical Obstacle Database and will be depicted on aeronautical maps and charts. • Aircraft flying at night are required to maintain a minimum height of 1000 feet above the tallest recorded obstacle. • Lighting of WTG at night is likely to have significant visual amenity impacts (including loss of dark sky) and may lead to community complaints (e.g. from light pollution). Draft LPP23 notes that 'lighting on wind turbines where it results in visual impact is generally not supported'. Further, the Draft Code recognises the adverse impacts of obstacle lighting on 'views and landscapes', dark skies and astrotourism, and requires proponents to avoid or mitigate these. • Night lighting may also have environmental impacts as it could attract insects and in turn bats and nocturnal animals, resulting in significant cumulative impacts to these species. • Radar-activated lighting is not a proven technology. SynergyRED is aware of only one wind farm proposal in Australia where this system was used but malfunctioned (due to numerous false activations and 'auto flashing' events) and was ultimately turned off in response to community complaints.
Any wind monitoring masts associated with the development should be marked as per Section 8.110 of CASA's *Part 139 (Aerodromes) - Manual of Standards (MOS139)* with the inclusion of aviation hazard markers.	The requirements for obstacle marking in Section 8.110 of CASA's Part 139 (Aerodromes) – Manual of Standards does not apply to the proposed met masts as they are not located within the OLS of any certified aerodrome or above an aircraft movement area. SynergyRED proposes marking of the wind monitoring masts in accordance with the principles in the NASF (Guideline D) and the supporting AIA. That is, three marker balls being placed on the outside guy wires near the top of the mast, guy wires being run through orange PVC piping up to at least 2.5m Above Ground Level (**AGL**) and paint markings (in alternating contrasting bands of colour) being applied to at least the top third of the mast.
The coordinates and estimated survey heights of each WTG and wind monitoring mast must be reported to the Airservices Australia Vertical Obstacle Database (VOD) email address, once Development Approval is granted to ensure that the location of the wind farm can be mapped for the information of pilots. Changes to maps can take in excess of six months, therefore one month prior to works commencing, Airservices should be contacted via the VOD email address so that a NOTAM (Notice to Airmen) can be published by Airservices advising pilots that the construction of tall structures in the area is imminent. On the completion of works, the VOD should be advised of the surveyed height and location of each WTG and wind monitoring mast so that the wind farm details can be accurately recorded in the database.	Noted and agreed. SynergyRED will notify Airservices' Vertical Obstacle Database Team (VOD) once the final coordinates and height of each WTG have been confirmed. Airservices requires this notification at least two (2) weeks before construction commences, however SynergyRED agrees to notify the VOD team one month prior to construction commencing to reflect CASA's comments. Consistent with CASA's advice, SynergyRED will advise Airservices' VOD team of the actual surveyed height and location of each WTG and wind monitoring mast on completion of construction.

3 PUBLIC SUBMISSIONS SUMMARY

3.1 Submissions of Support (152 submissions)

No.	KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
1	**Renewable energy & climate change mitigation**	Supporters emphasised the urgent need to transition to renewable energy sources to reduce greenhouse gas emissions and address climate change.	Noted and agreed.
		Submissions noted that wind energy is a proven, low-emissions technology that contributes to long-term environmental sustainability.	
2	**Alignment with State and national policy**	Supporters stated that the Proposal aligns with State and national renewable energy policies, emissions reduction targets and broader government commitments to decarbonisation and energy transition.	Noted and agreed.
3	**Energy security & reliability**	Supporters highlighted the role of the wind farm in diversifying energy supply, improving grid resilience and contributing to reliable electricity generation, particularly as ageing fossil fuel infrastructure is retired and noting growing population and energy demand.	Noted and agreed.
4	**Economic benefits & employment**	Supporters referenced economic benefits associated with the Proposal, including job creation during construction, opportunities for local contractors and longer-term operational employment, as well as potential tourism opportunities.	Noted and agreed.
5	**Public benefit & infrastructure investment**	Supporters considered the wind farm to be essential public infrastructure that would deliver long-term benefits beyond the local area, including investment in Regional infrastructure and contribution to broader community needs.	Noted and agreed.
6	**Manageable impacts with mitigation**	Supporters noted that the layout has clearly been designed with the local environment in mind and acknowledged that the Proposal may result in environmental or amenity impacts, however considered these to be acceptable or capable of being appropriately managed through design refinement, setback distances and planning conditions.	Noted and agreed.
7	**Responsible land use & co-existence**	Supporters noted that wind farms can coexist with agricultural land uses, allowing diversification and continued farming activities while generating renewable energy.	Noted and agreed.
		Supporters noted that the Proposal in addressing climate changes supports the long-term sustainability of farming.	Noted and agreed.
8	**Intergenerational equity & future benefits**	Supporters referred to the responsibility to support infrastructure that benefits future generations, noting that failure to invest in renewable energy would result in greater long-term environmental and economic costs.	Noted and agreed.
9	**Location**	Supporters considered the wind farm to be in the right location for energy production and distribution, noting: the wind conditions, ability to utilise existing road and distribution infrastructure, largely disturbed land with minimal clearing requirements, sparsely populated.	Noted and agreed.
		Supporters noted the proposed site as a better alternative to the previously approved Milyeannup Wind Farm, with less environmental impact and better proximity to existing distribution infrastructure.	Noted and agreed.
10	**Improved bushfire response**	Supporters acknowledged the benefit of improved water supply proposed as part of the Proposal in local bushfire response.	Noted and agreed.
11	**Comprehensive nature of investigations and engagement**	Supporters acknowledged the comprehensive level of community engagement and technical work undertaken to understand and address potential impacts and concerns relating to the Proposal.	Noted and agreed.
12	**Visual Impact**	Supporters noted and accepted potential visual impacts from their property in their support of the Proposal. Others noted their visual enjoyment of wind farms or considered the visual impact to be negligible.	Noted and agreed.
13	**Power reliability & electricity prices**	Submissions encourage inclusion of battery storage to support reliability of the local power network.	Discussed in Theme 1
		Statement was made that the Proposal would improve wholesale electricity price.	Discussed in Theme 1

3.2 Submissions of Objection (369 submissions)

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
1. The conceptual design of the design & lack of project certainty	The proposal is highly conceptual, with no confirmed turbine model, turbine height, final layout or infrastructure siting, limiting the ability to assess impacts accurately.	The Development Application explains that final WTG models and exact locations will be confirmed during detailed design and procurement. To ensure a robust assessment, the application has been based on a 'maximum case' scenario, representing the highest potential level of impact. All technical studies have been completed using this conservative approach, meaning the final design will deliver impacts that are equal to or less than those assessed in the Development Application.
	Uncertainty remains regarding construction and dewatering methods, foundation depths, access roads, trenching and water management, preventing informed assessment of environmental and amenity impacts.	A significant level of technical investigations has informed the Proposal's position on these matters to date and formed the basis of the environmental referrals (with no formal assessments under State and Federal frameworks being required as a result). These matters will be addressed through the detailed design phase, and in the preparation of the CEMP and detailed ASSDMP.
	Submissions objected to reliance on future studies, management plans and approvals, arguing that impacts should be assessed at application stage rather than deferred.	To the extent possible at the Development Application stage, technical investigations and preliminary Management Plans have been prepared. Once further detail is available through the detailed design and procurement phases, the CEMP, ASSDMP and its supporting technical information will be progressed and finalised for approval by relevant Agencies.
	Minimal separation distances from dwellings and property boundaries.	WTG setbacks will be 1.1 times blade tip height from dwellings and property boundaries
	Lack of certainty as to whether the Proposal will improve local power supply (reliability/consistency of supply).	The reliability and consistency of power supply in any Town depends on many factors, including the condition of transmission and distribution lines, transformers, and other parts of the distribution network. These assets are owned, managed, and maintained by Western Power, which is responsible for ensuring the reliability of electricity supply to homes and businesses. Renewable energy generated by the Proposal would be exported to the existing Western Power 132kV transmission line near Beenup substation. From here it would flow to Augusta, Scott River, Molloy Island, Alexandra Bridge, East Augusta, Karridale, Hamelin Bay, Forest Grove and the rest of the energy system.
	Concern Proposal will result in increased electricity prices.	Electricity pricing is influenced by a wide range of whole-of-system factors, rather than the cost of any single generation technology. A study by CSIRO showed that energy systems with a high proportion of renewable energy consistently deliver lower overall costs compared to systems reliant on fossil fuels. Electricity prices reflect multiple inputs, including the cost of fossil fuels such as gas and coal; the increasing operational and maintenance costs associated with ageing coal and gas assets; and the cost of new generation infrastructure, including renewables, as well as associated transmission and systems strength upgrades. CSIRO's GenCost analysis confirms that renewable technologies such as wind and solar remain the lowest cost forms of new electricity generation in Australia.
	Questions regarding the economic and environmental foundation and impacts of Renewables Facilities and achieving Net Zero, including the sustainability of the Wind Farm proposal given its short lifespan.	The transition to renewable energy in Western Australia is driven by established State Government policy, including the retirement of State-owned coal generation and the need for new, low-cost renewable generation to support the South West Interconnected System **(SWIS)**. Modern wind farms typically operate for 25–30 years. This Proposal aligns with the State's Net Zero objectives while remaining compatible with ongoing agricultural land use.
	Concern and objection to the scale and/or location of the Proposal i.e. That the proposal is too close to Augusta and Kudarup and too visible from the Towns; that the proposal is out of character with its setting and the perception in many submissions that the location is 'wilderness, unspoilt	The scale and location of the Proposal have been determined through detailed environmental, technical and land-use investigations. The site is predominantly cleared agricultural land with very limited remnant vegetation, which significantly reduces the need for clearing and avoids high value environmental areas. The overall scale of the Proposal is shaped by existing transmission

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
	pristine coastline, peaceful, natural beauty' that will be adversely impacted by the Proposal.	capacity, the strong and consistent wind resource in this part of the South West, and the State's need for new renewable generation. SynergyRED acknowledges community concerns about visibility; however, visual impact is one of many factors considered alongside biodiversity, hydrology, bushfire safety, cultural heritage, and the need to avoid conservation areas. These considerations have directly influenced the layout of WTG, ensuring WTG are placed to minimise environmental and amenity impacts while still enabling a Proposal that supports Western Australia's decarbonisation and energy-transition objectives. Further work is ongoing to investigate relocating some WTGs to minimise visual impact.
	Has alternative technology been considered, i.e., design Vortex Wind Generator, safer for birdlife and are less visually intrusive. Has solar and battery been considered as an alternative.	Alternative technologies have been considered. Vortex-type wind generators are not commercially proven or scalable for utility-scale energy generation and are not suitable for a Proposal of this size. While solar was considered, the solar resource at the site is less favourable than the wind resource and large-scale solar would require extensive land coverage, displacing productive agricultural use, unlike WTG, which allows farming to continue. A battery is not included in the Proposal as there is no network requirement for storage at this location, and the Proposal has been designed to efficiently utilise the existing 132kV transmission line without additional infrastructure such as batteries. This Proposal offers a wind farm site requiring minimal native vegetation clearing. Its location benefits from strong, consistent wind resources, good road access, sparse nearby housing, and proximity to an existing underutilised substation and transmission line, reducing environmental disturbance. The design has been intentionally concentrated within degraded and previously cleared areas, limiting native vegetation clearing to no more than 1 ha.
	Proposal relies on significant government subsidies, as well as being "gifted" a parcel of Crown reserve.	The Proposal does not rely on government subsidies. The viability of the wind farm Proposal is based on its technical and commercial merits, which are being assessed through the current feasibility phase. SynergyRED has not been gifted Crown reserve, and any use of Crown land would be subject to the appropriate statutory land tenure processes following primary approvals.
	Proposal ownership.	If the Proposal is approved, it is likely to be privately funded.
	Concern regarding future expansion.	There are no plans to expand the wind farm beyond the current Proposal. The maximum capacity of up to 100 MW and up to 20 WTG represents the full feasible development potential of the site based on wind resource, land availability, environmental constraints and existing transmission capacity. No further stages or increases in WTG numbers are proposed.
2. Impacts on Biodiversity	a) Submissions raised concern that there is insufficient baseline data, seasonal surveys, groundwater modelling and analysis to confidently define worst case risks/impacts, including to Scott River Ironstone Community and wetlands.	As detailed in the RSD, comprehensive baseline environmental studies, seasonal surveys and groundwater modelling have been undertaken in accordance with relevant policy and guidance to inform a robust assessment of the potential impacts from the Proposal, including potential impacts to the Scott River Ironstone Community and wetlands. The Proposal was referred to both the EPA and DCCEEW in 2025 to determine whether it required formal environmental impact assessment under the *Environmental Protection Act 1986* (EP Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The referral determinations were as follows: • EPA has determined to not assess the Proposal. This outcome was decided by the EPA because the proposed environmental effects of the proposal are not so significant or unmitigated as to warrant formal assessment under Part IV of the EP Act. Further detail on the decision is available on its website: Wind Farm in Scott River | EPA Western Australia. • DCCEEW made the referral decision - Not controlled action if taken in a particular manner. This decision means that the Proposal is not likely to have a significant impact on Federally protected flora, fauna or Ecological communities and so does not require assessment by DCCEEW, provided that the Proposal is developed in accordance with the 'particular manner' specified in the decision.

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
		The 'particular manner' includes a new commitment to ensure the minimum blade ground clearance is 59 metres AGL (increased from 40 metres AGL above ground level at the time of referral and submission of the Development Application), to avoid significant impacts to black cockatoos and migratory birds. Further information on the decision and the required actions is available on its website: EPBC Act Public Portal. If the Development Application is approved, detailed site investigations and further modelling will be undertaken to confirm the WTG foundation option/s to be used and to update the ASSDMP prior to construction.
	b) Submissions raised concern for threatened and endangered species including the white-bellied frog, snake-neck turtle, short-neck tortoise, ringtail possum, black swans and Baudin's and Carnaby's black cockatoos.	As detailed in the RSD, multiple surveys have been undertaken to inform potential impacts to terrestrial fauna. These surveys have been undertaken in accordance with relevant policy and guidance. . Based on the results of these surveys the Proposal has been designed to avoid impacts to terrestrial fauna where possible. A detailed assessment of the potential impacts to terrestrial fauna is provided in Section 9.6 of the RSD.. Potential impacts to conservation significant fauna including the White-bellied Frog, Western Ringtail Possum and black cockatoos, have been assessed within the RSD, and will be further minimised through the implementation of the mitigation measures outlined within the CEMP, DMP, BBAMP, BMP and BRMP and ASSDMP. The management and mitigation of impacts to conservation significant fauna, detailed in the RSD is expected to ensure other non-Threatened species observed during surveys (i.e. Snake-necked Turtle and Black Swan) are also not significantly affected by the Proposal.. For example, SynergyRED's commitment to avoid clearing of all wetland habitats. The Proposal also recently committed to minimum blade ground clearance of 59 metres above ground level (increased from 40 metres above ground level in the Development Application), to avoid significant impacts to black cockatoos and migratory birds, during DCCEEW assessment of the Proposal 's EPBC Act Referral. The Short-necked Turtle (or Western Swamp Tortoise) is only known to occur in the vicinity of Perth's Swan Valley, with unsubstantiated sightings as far south as Donnybrook and will not be affected by the Proposal.
	c) Submissions argued the proposal fails to demonstrate avoidance of protected communities and does not adequately address habitat loss, fragmentation and cumulative impacts.	The Indicative Disturbance Footprint has been designed to utilise existing cleared areas and tracks as much as practicable to reduce clearing of native vegetation/habitat. Specifically, the Proposal will avoid clearing of: • All Scott River Ironstone TEC • All wetland habitats • All potential and suitable breeding trees for black cockatoos • All High quality Western Ringtail Possum habitat Furthermore, the Proposal will clear no more than 1 ha of habitat represented by native vegetation, including the following specific habitat values: • 0.02 ha of native vegetation in Very Good or better condition • 0.5 ha of native Moderate to Low quality Western Ringtail Habitat, including a maximum of 0.03 ha of native Moderate quality Western Ringtail Possum habitat • 1 ha of native black cockatoo foraging habitat, including maximum of 0.5 ha of Moderate to High quality foraging habitat • 0.01 ha of contiguous native vegetation within 50 m of Scott River Ironstone TEC Potential impacts associated with habitat loss, fragmentation and cumulative impact have been addressed in the RSD.
	d) Submissions expressed concern that construction and turbine related noise, low-frequency sound, vibration and potential electromagnetic fields may adversely affect wildlife behaviour and	Potential disturbance to fauna from WTG movements, noise, light and vibration are described and assessed in the RSD. Overall, the Proposal is not anticipated to substantially alter the movement or behaviour of fauna species. Any potential impacts can be appropriately managed through implementation of the CEMP and BBAMP. The Proposal is not expected to impact marine wildlife, as it is an onshore wind farm located over 5 km from the coast.

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
	movements, including marine animals, resulting in effective habitat loss and affecting species diversity.	Both the EPA and the DCCEEW determined that the Proposal is not likely to have a significant impact on the environment and so does not require formal assessment.
	e) Submissions expressed concern regarding the impact of installing transmission lines through forest and bushland and related noise impacts.	The proposed new 132kV transmission line that will be constructed within the development envelope to connect to the existing transmission line will not be constructed in bushland or forest areas. Clearing of native vegetation will be restricted to small areas to facilitate ingress of WTG components, minor upgrades to the existing Beenup to Manjimup 132 kV transmission line, and where an alternative layout was not possible due to the avoidance of other significant values (e.g., potential nesting trees for black cockatoos, conservation significant flora, conservation covenant areas and higher quality habitat). Less than 0.16 ha of native vegetation clearing is required in support of proposed transmission line upgrade and connection. These areas were selected to avoid potential nesting trees for black cockatoos and to avoid impacts to adjacent conservation covenant areas.
	f) Submissions raised concern about collision risk to birds and bats, particularly raptors, migratory species, coastal birds and swans.	As addressed previously, the Proposal recently committed to minimum blade ground clearance of 59 metres above ground level (increased from 40 metres above ground level in the Development Application), to avoid significant impacts to black cockatoos and migratory birds, during DCCEEW assessment of the Proposal 's EPBC Act Referral. This revised commitment will reduce the risk of WTG strike and/or barotrauma from 'Negligible to Moderate' to 'Negligible to Low' for all bird and bat species. The implementation of the adaptive management approach as detailed in the preliminary BBAMP will ensure the Proposal does not have a significant impact on any bird and bat species. Following SynergyRED's submission of the Development Application, the BBAMP has been updated in response to the request for further information from the EPA during its assessment of the Proposal's referral under the EP Act. The latest version of the BBAMP was updated to include threshold criteria (i.e., limit of acceptable impact) and contingency actions (i.e. response actions to both early impact triggers and threshold criteria being exceeded) for both conservation significant species and non-listed species.
	g) Concern regarding potential impacts to conservation estate.	SynergyRED is aware of the DBCA managed land within and neighbouring the Development Envelope and has undertaken preliminary consultation with both DPLH and DBCA regarding the Proposal's partial intersection with R 42377 & Lot 101. It will seek the appropriate approvals for access to reserves following receipt of primary approvals and detailed design. The Proposal will be developed to limit impact on DBCA's land management activities, with any direct impacts limited to the areas of cleared land within these land holdings. The current Indicative Disturbance Footprint has no direct impact and largely falls outside a 100 m buffer applied to the protected values within adjoining reserves. Furthermore, to mitigate potential impacts on DBCA managed land, SynergyRED is committed to locating: • All WTGs at least 100 m from R 42377, Lot 101 and Lot 1 (measured from the WTG centrepoint) • The concrete batching plant at least 500 m from R 42377, Lot 101 and Lot 1 • The substation, operation and maintenance area and all other temporary construction areas (e.g., laydown areas, construction site offices, topsoil/vegetation stockpiles, ASS/dewatering management infrastructure) at least 100 m from the protected values within R 42377 & Lot 101 • The transmission line and associated access track so that there is no direct impact on R 42377 & Lot 101, with consideration for ongoing asset management and protection zones. As the Proposal has been designed to avoid the placement of WTG in proximity to remnant native vegetation, no groundwater drawdown is currently predicted on protected values within R 42377 & Lot 101. The ASSDMP will be updated to specify drawdown to not exceed natural seasonal variation (i.e. will remain above natural seasonal low in watertable) at GDE's and the location of native vegetation within R 42377 and Lot 101. Other indirect impacts will be managed through the implementation of management plans, including a CEMP, detailed ASSDMP , BMP, and DMP where required.

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
	h) Referral under EPBC Act is necessary not optional.	The Proposal was referred under the EPBC Act to the DCCEEW which determined that the Proposal is not likely to have a significant impact on the environment and so does not require formal assessment.

	i) Submissions queried the use of sonic bat deterrents and radar/camera technology to mitigate collision risk.	The BBAMP takes an adaptive management approach to allow for flexibility in response to:
		• Detailed design
		• Monitoring findings and/or
		• As more relevant information becomes available and experience is gained through ongoing research and monitoring, specifically with regard to:
		  ○ Relevant bird and bat species and their populations
		  ○ Effectiveness of different mitigation strategies, including the use of noise deterrents and radar/camera technology, for these species.
		This is particularly important for Australian wind farms, as the majority of published research on the effectiveness of different mitigation strategies is from overseas, and/or species specific.
		Following the submission of the DA, the BBAMP has been updated in response to a request for further information from the EPA during its assessment of the Proposal 's referral under the EP Act. The latest version can be found on the DCCEEW website, and was updated to include threshold criteria (i.e., limit of acceptable impact) and contingency actions (i.e., response actions to both early impact triggers and threshold criteria being exceeded), including use deterrents (e.g. noise, visual) or WTG curtailment. Where adaptive mitigations strategies are required, these will be selected and implemented in consultation with relevant agencies.
		The preliminary BBAMP will be updated in consultation with the Shire and other government agencies prior to commissioning.

3 Impacts **on hydrology, groundwater & dependent ecosystems**	a) Large-scale excavation, piling and trenching may alter groundwater flow paths and water table levels in a hydrologically sensitive area.	Two (2) primary WTG foundation options (above ground/partial above ground) will be utilised to minimise the depth of excavation limiting impacts to groundwater (and reducing the volume of ASS disturbed). A typical below ground foundation will only be used where it is confirmed, prior to construction, through detailed site investigation and revised modelling, that no dewatering will be required. Transmission poles and tower foundations will be concrete caisson construction and so not require dewatering. Noting the maximum depth of the primary foundation options is 1.2 mbgl and that traditional below ground foundations will only be utilised where there is no potential for interception with groundwater, the Proposal is not expected to result in groundwater mounding or flow disruption beyond levels of natural seasonal variation.
	b) Submissions raised concern for impacts on wetlands, rivers, bores, dams and groundwater-dependent vegetation.	SynergyRED will ensure that dewatering is minimised, managed and monitored in accordance with a detailed ASSDMP, to ensure that drawdown does not present an unacceptable impact on the environment, including to TEC, wetlands and other groundwater users. Attachment 4 – RSD - Impacts to surface water and/or groundwater quality resulting from ASS disturbance and management, construction dewatering, erosion and sedimentation, mobilisation of nutrients, and/or the accidental loss or spill of hazardous materials are anticipated to be minor, localised and temporary and will be managed through the implementation of the ASSDMP and CEMP.
	c) The application lacks an independent hydrogeological assessment demonstrating baseline conditions, predicted impacts and cumulative effects.	A Surface Water and Hydrogeological Assessment (was undertaken by Stantec, a highly regarded consultancy engaged on the basis of its ability to provide suitably qualified and independent expertise to undertake the assessment. This assessment was supported by 12 months of site-specific baseline water monitoring along with review of other local and more regional water quality data provided by BHP, the DWER and other desktop sources. Baseline data continues to be collected by SynergyRED in support of preparing detailed ASSDMP.

No. KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
		This assessment also included flood characterisation and modelling, characterisation of hydrogeology, drawdown modelling and a preliminary risk assessment to provide an understanding of key hydrogeological and hydrological risks associated with the Proposal. .
	d) Potential for groundwater contamination from ASS disturbance.	The potential for acidification and/or toxicity of surface water and/or groundwater during construction due to the disturbance and/or inappropriate handling of PASS and inappropriate management of dewater is addressed in the RSD.. PASS material remains benign when in a natural, undisturbed and anoxic state. Construction of the Proposal, including excavation and dewatering, has the potential to expose PASS to oxygen, which may result in impacts to surface water or groundwater quality. Typical impacts include elevated sulfate, low pH, high acidity, elevated acidity, elevated metals (particularly Iron and Aluminium) and low alkalinity in groundwater. It is noted that some areas within the Proposal already observe some of these conditions. Potential for exposure of PASS, during excavation and dewatering has been minimised through the Proposals design and can be appropriately managed through the implementation of the detailed ASSDMP and associated approvals under the RIWI Act, including the treatment of soil and dewater in accordance with DWER guidelines (2015b). As a result, while the Proposal presents a risk of minor, short term and localised surface water and/or groundwater acidification, with the above mitigation the Proposal it is not expected to result in significant impacts to surface water or groundwater quality.
4 Acid sulfate soils & irreversible environmental risk	a) The Scott River area is known to contain acid sulfate soils that may be exposed through excavation and groundwater drawdown leading to long-term contamination of the environment within and beyond the Development Envelope, including into waterways.	SynergyRED is aware of the potential for indirect impact of ASS exposure within and beyond the Development Envelope. The geotechnical and baseline contamination assessment undertaken for the Proposal included a preliminary ASS investigation of the Development Envelope, including field screening and laboratory testing. The results indicate that PASS is present within all soil types of the Development Envelope except for shallow pale grey/white sands.. Consideration of related impacts and proposed mitigation are summarised in response to Key Theme 3 above, including the use of alternative foundation options to limit depth of excavation and dewatering.
	b) Concern regarding the depth of, and volume of soil excavation (up to 7m) and lack of clarity in how ASS and dewatering will be managed.	As detailed in response to Key Theme 3, potential for exposure of PASS has been minimised through the Proposals design (e.g., alternative shallower foundation options and use of concrete caisson construction for transmission poles/towers) and can be appropriately managed through the implementation of a detailed ASSDMP and associated approvals under the RIWI Act. SynergyRED has committed to the preparation and implementation of an ASSDMP in accordance with relevant guidance to manage the potential risks to the environment during construction of the Proposal. A Preliminary ASSDMP has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP to be developed following the completion of detailed site investigations and detailed design prior to construction of the Proposal. The ASSDMP will include the following key management measures: • Soils requiring management will be treated with aglime upon excavation and reinterred, reused on-site and or taken off site for disposal, with limestone pads constructed where needed to manage treated soil stockpiles. • All stockpiled material will be stored an adequate distance away from waterways and wetlands to minimise the potential for leachate/runoff entering waterbodies. • ASS material that cannot be reused (i.e. geotechnically unsuitable and cannot be used as non-structural fill) will be disposed of offsite at a licensed facility. • In areas requiring soil management and treatment, soils at the base of excavations will be covered with a thin layer of aglime as a precautionary measure to provide buffering capacity against minor releases of acidity. • Treated soil will be assessed to validate the adequacy of the lime treatment. Where soils do not meet the validation criteria, soils will be retreated and retested until the criteria are met. Application of drawdown limits (as discussed in response to Key theme 3(a).

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	c) Submissions objected to the absence of a site-specific acid sulfate soil investigation and a detailed and enforceable dewatering, monitoring and emergency response plans.	Publicly available datasets and a Preliminary Geotechnical and Baseline Contamination Assessment which included a preliminary ASS investigation have been utilised to inform an understanding of the soil landscape, composition and geology within the Development Envelope.. The Proposals impact assessment was also supported by 12 months of site-specific baseline water monitoring along with review of other local and more regional water quality data. SynergyRED has committed to the preparation and implementation of an ASSDMP in accordance with relevant guidance to manage the potential risks to the environment during construction of the Proposal. A Preliminary ASSDMP has been prepared which details the proposed management framework, controls and monitoring measures to be included in the detailed ASSDMP to be developed following the completion of detailed site investigations and detailed design prior to construction of the Proposal.
	d) Limited lime resources.	As discussed in response to Key Theme 3 and 4, the Proposal involves the use of alternative WTG foundation designs that minimise excavation depth, thereby reducing the volume of excavated soils and associated dewatering, which in turn limits the amount of PASS requiring treatment. Civil construction, specifically activities that require excavation, will be scheduled to occur during the dry season, where practicable, to reduce the likely requirement to dewater. Final lime requirements will be determined during detailed design. These quantities will be defined in the detailed ASSDMP prepared prior to construction.
	e) Concern relating to the failed Beenup Mine experience	Acid sulfate soils only present a potential risk when they are disturbed during activities such as excavation. For wind farms, this disturbance occurs only briefly during the construction phase. Open-pit mines involve ongoing excavation, making the risk of disturbing acid sulfate soils much more persistent and significant. The potential for exposure of PASS from the Proposal has been minimised through the Proposal's design. Excavations for WTGs, met mast and communication tower foundations will be open for a period of approximately 33 days each. Furthermore, excavation and associated dewatering for the installation of transmission poles will be avoided by utilising concrete caisson construction methodology. By comparison dredge mining at Beenup mine was undertaken between 1997-1999 at depths of up to 50m. It's also worth noting that at the time the Beenup mine was operational ASS was not as well understood or governed, and there are now comprehensive guidelines, informed by over a decade of practical experience, that govern the identification and investigation of acid sulfate soils and acidic landscapes, as well as the treatment and management of soil and water in acid sulfate soil landscapes.
5 Impacts on visual impact & landscape character	a) Submissions argued that the proposal does not adequately address cumulative impacts, night-time aviation lighting, or the permanent loss of dark-sky and landscape values.	SynergyRED does not propose to install night-time obstacle lighting on the WTG. This is consistent with the risk assessment in the AIA which concludes that lighting of the WTG at night is not necessary to maintain an acceptable level aviation safety. SynergyRED's position reflects CASA guidance (noting that CASA may recommend but not mandate lighting in this instance), aviation safety requirements, community feedback (regarding amenity and environmental impacts), environmental considerations and provisions in Draft LPP23 dealing with protection of dark sky. At present, SynergyRED is not aware of any other wind farm proposals or significant development of similar scale in the region. In the absence of such proposals, no cumulative night-time lighting or cumulative dark-sky impacts can be reliably modelled. Also, the grid capacity and transmission infrastructure in the area is unlikely to support another project of comparable scale at this time. Should additional wind farm developments be brought forward in the region in future, these will be assessed by regulators in accordance with the applicable planning framework and statutory guidance at that time. Each project is required to undertake its own LVIA, including cumulative impact assessment where relevant, and is assessed on its individual merits.

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	b) Submissions suggested that the photomontages provided do not adequately convey the true scale, worst-case or cumulative visual impacts, and that additional photomontages are required to accurately assess the impact of the Proposal.	The LVIA follows best-practice methods, and additional work was completed at the request of DPLH to improve the visual assessment. This includes new photomontages, red-overlay images and detailed viewpoint assessments for Scott River Road, the Augusta town centre, Town Beach and Albany Terrace, along with individually numbered WTGs and updated ZTV mapping. These additions provide a clearer and more complete understanding of potential visual impacts.
	c) The proposal does not comply with the intent of the Shire's Draft Local Planning Policy which permits wind turbines only where they do not detract from visual amenity.	Whilst Draft LPP23 identifies the need for wind farms to address and minimise visual impact, and be located to avoid areas of visual significance, this is difficult to achieve given the nature of WTG, the subjective nature of visual impact, and as wind farms are typically located in areas of higher topography to maximise the wind resource. There are many factors which influence the location and height of WTG. Visual impact is just one of any number of considerations. A balanced approach to the environmental, technical and social impacts of wind farms is required in the consideration and determination of applications. Additional work is underway to investigate relocating several WTGs within the development envelope to reduce overall visual impact.
	d) Concerned about amenity impacts of aviation lighting on neighbour (and broader community) amenity and environmental impact.	SynergyRED does not propose to install night-time obstacle lighting on the WTG. This is consistent with the risk assessment in the AIA which concludes that lighting of the WTG at night is not necessary to maintain an acceptable level aviation safety. SynergyRED's position reflects CASA guidance (noting that CASA may recommend but not mandate lighting in this instance), aviation safety requirements, community feedback (regarding amenity and environmental impacts), environmental considerations and provisions in Draft LPP23 dealing with protection of dark sky.
6 Noise, shadow flicker and EMI and associated health & residential amenity impacts	a) Operational noise, low-frequency sound and infrasound were raised as concerns for nearby residents.	Infrasound is all around us and can be generated from natural sources (like the ocean) or manmade sources (like cars). A study commissioned by the National Health and Medical Research Council has confirmed that noise from wind farms does not harm human health, particularly for dwellings located 1500 m or more from WTGs. Synergy's Noise Impact Assessment was reviewed by DWER's Environmental Noise Branch and was deemed to be acceptable. The operational noise of the wind farm will be managed through a Noise Management Plan. The Proposal is committed to be compliant with the WA Noise Regulations.
	b) Submissions cited potential impacts on sleep, mental health, stress levels and overall wellbeing.	According to the National Health and Medical Research Centre there is no evidence that wind farms cause adverse health effects in humans. A report published by the Environmental Health Sciences Research Centre found no link between health outcomes and proximity to WTG.
	c) Shadow flicker, light spill and pulsation effects were identified as unacceptable intrusions in a rural living environment.	Construction and operational lighting will be managed through detailed design and included in the CEMP to ensure any potential impacts to nearby residents are managed. SynergyRED conducted an assessment to determine the potential for shadow flicker to occur as a result of the Proposal and identify mitigation options. All predicted actual shadow flicker durations are anticipated to be below the 10 hours per year as recommended by the *National Wind Farm Development Guidelines - Draft July 2010* (published by the Australian Environment Heritage and Protection Council). Aviation lighting is not proposed as part of this Proposal. See item 5 (d).
	d) Leaching of fluorochemicals, BPAs, microplastics and asbestos from blades.	WTG blades contain only trace, chemically bound BPA that does not produce measurable environmental emissions, and independent scientific reviews confirm coatings are non-toxic with no evidence of harmful BPA or microplastic release, noting that any particles are far smaller than everyday sources like tyres or paint; additionally, WTG blades are made from fiberglass and epoxy resin, not asbestos.

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	e) How will acceptable noise and shadow flicker impacts on nearby residents be monitored/enforced.	SynergyRED conducted an assessment to determine the potential for shadow flicker to occur as a result of the Proposal and identify mitigation options. All predicted actual shadow flicker durations are anticipated to be below the 10 hours per year as recommended by the *National Wind Farm Development Guidelines - Draft July 2010* (published by the Australian Environment Heritage and Protection Council). Suitable conditions are expected to be imposed at Development Approval stage such as the provision of an Operational Noise Management and Monitoring Plan will include the requirement for noise monitoring to be undertaken to ensure that noise levels are not greater than those predicted and detail the contingency measures to be implemented if exceedances are recorded.
	f) Concern regarding the noise modelling methodology and adequacy of baseline noise monitoring locations; along with need to monitor noise levels during the operational phase and mitigate noise if issues are found to occur.	The DWER Environmental Noise Branch has reviewed and provided technical advice on the NIA and confirmed that the noise modelling calculation method and assumptions are acceptable. Noise monitoring will be undertaken in accordance with conditions imposed on the Development Approval.
	g) Concern regarding the adequacy of baseline studies and the request that these studies should be updated to address neighbouring proposed and approved chalets.	Baseline noise studies were conducted in support of developing noise criteria in accordance with accordance with the South Australia Environment Protection Authority's (**SA EPA**) Wind Farms Environmental Noise Guidelines. The DWER subsequently advised that the Noise Regulations are statutory requirements in Western Australia and will be the standards used to assess compliance, and that the SA Guidelines may only be followed to the extent that they do not conflict with the requirements of the Noise Regulations. This prevents the 'adjustment' of assigned noise levels based on measured background noise levels. On this basis no further baseline noise studies are required or proposed for the Proposal. Noise compliance at recently approved dwellings will be ensured through implementation of conditions of Development Approval.
	h) Concern regarding impacts to telecommunications and request for baseline and post-construction signal-strength testing at nearby sensitive dwellings and mandatory rectification by Synergy for any degradation.	SynergyRED is committed to ensuring the Proposal does not disrupt existing services, and if any issues are identified during detailed design or construction, appropriate mitigation measures will be implemented in consultation with the relevant service providers.
7 Planning and other approval processes & community consultation	The proposal does not comply with the Shire's Draft LPP23: Large Scale Renewable Energy Facilities	The Shire's Draft LPP was released for advertising following preparation and lodgement of the Development Application (as was the release of the State Code). Notwithstanding, the proposal has been assessed against the Draft LPP and found to be generally consistent given it has been prepared in the context of extensive and robust technical investigations and industry best practise, informed by a range of Federal and State legislation, policy and other guidance. Compliance with Draft LPP23 is one of many considerations which will need to be given 'due regard' in the decision making process. It is also noted that a number of submissions were stated to relate to Draft LPP23 which the Shire advertised at the same time as the Development Application, and therefore these submissions did not relate to the Proposal.
	Consultation was described as inadequate in timing, accessibility and transparency.	The Development Application was advertised as a Complex Application in accordance with clause 64 of the *Planning and Development (Local Planning Schemes) Regulations 2015*, for a period of 28 days from 21 November to 19 December 2025. The Shire advertised the proposal on its website and at its office, and letters were sent to all landowners within a 15 km radius. The application was therefore advertised in accordance with the statutory requirements. SynergyRED's community engagement commenced in February 2024 when the community was advised of the proposed Wind Farm through letterbox drops, newspaper advertisements and social media posts. Since then, SynergyRED has been active in the community to share information, seek feedback and answer questions through a variety of methods. During the

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		feasibility assessment, SynergyRED has delivered 14 community drop-in sessions, opened a drop-in office in Augusta from February 2025, and held over 170 meetings with landowners, neighbours and community members. SynergyRED also sent letters to homes within five (5) kilometres of the Proposal site, inviting landowners to meet with a SynergyRED representative. Holiday homeowners were also contacted directly via the Stayz booking platform to share information about the Proposal and invite owners to meet with SynergyRED. An information display was established at the Augusta Library in October 2024 to ensure the community had ongoing access to information on the Proposal. In addition to these methods, community members are able to reach SynergyRED's Community Engagement Team by phone, email or through the Q&A function on its website.
	Submissions stated that community feedback was not meaningfully reflected in the Proposal design.	The following changes have been made to the Proposal as a result of the feasibility assessment findings and community feedback: • **Reduced Proposal scale**: The Proposal has been scaled down from a maximum of 30 WTG (150 MW) to a maximum of 20 WTG (100 MW), aligning with available transmission line capacity and reducing the visual impact, noise and overall footprint. • **Environmentally sensitive siting**: WTG locations have been adjusted to avoid areas containing TEC, and the Development Envelope has been revised to exclude environmentally sensitive areas. The minimum blade ground clearance has been increased from 25m to 40m and now to 59m to reduce risk of bird strike. • **Minimised vegetation clearing**: The preferred transport route was chosen to avoid the need for vegetation clearing, further reducing environmental disturbance. Total clearing within the wind farm will not exceed one hectare (1 ha). • **Acid sulfate soil and dewatering management**: Bespoke WTG foundation designs will be used to minimise disruption to shallow groundwater and soils containing acid sulfate materials. • **Tourist viewing platform**: A tourist viewing platform has been incorporated into the design to support increased tourism and provide future educational opportunities about renewable energy. SynergyRED intends to engage with KKKAC in the design process for signage at the tourist viewing platform, to explore opportunities to incorporate local Aboriginal culture and heritage.
	Lack of transparent and consistent communication undermining public confidence.	Refer to response to **Key Theme 7** above. The additional engagement undertaken by SynergyRED has occurred in addition to the statutory advertising period. SynergyRED has facilitated significant community engagement on the Proposal.
	Submissions raised concern about the lack of formal environmental assessment required by the EPA.	The Proposal has followed the correct statutory environmental assessment pathway, and the EPA has determined that a formal assessment under Part IV of the EP Act 1986 was not required. This decision reflected the EPA's review of the project characteristics, likely residual impacts, avoidance and minimisation measures, and the overall environmental risk profile. The Proposal was also referred to DCCEEW and received a "not a controlled action if taken in a particular manner" (NCA-PM) referral decision. This decision means that the proposed wind farm isn't likely to have a significant impact on Federally protected flora, fauna or Ecological communities and so does not require assessment by DCCEEW, provided that the wind farm is developed in accordance with the 'particular manner' specified in the decision. The 'particular manner' includes a new commitment to ensure the minimum blade ground clearance is 59 metres above ground level (increased from 40 metres above ground level at time of referral), to avoid significant impacts to black cockatoos and migratory birds.
	The DAP pathway limits meaningful local input.	The proposal has been subject to extensive community engagement over a number of years by SynergyRED, and the proposal was advertised in accordance with statutory requirements. The use of the Development Assessment Panel (**DAP**) pathway is a transparent, statutory, and valid standard approach to considering and determining Development Applications, with significant input from the local Shire. The DAP process allows for verbal and written deputations to be presented by submitters in addition to submissions being received during the statutory comment period, which are considered by the DAP prior to determination of the application.

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	The Proposal is not compliant with local planning policy or town planning scheme (including proposing non-compliant setbacks and height and introducing industrial uses to a rural area).	Section 4 of the Development Application demonstrates general compliance with the Planning Framework. Where matters of interpretation or discretion apply, such as in the case of LVIA, the report responds and provide appropriate justification. SynergyRED prepared and submitted its Development Application prior to the release of the Draft LPP. Upon review of the Draft LPP during the public advertising period, SynergyRED considers its application is generally compliant with the Policy's direction, as it had been prepared in the context of extensive technical investigations and industry best practice, informed by a range of Federal and State legislation and policy. A detailed submission has been provided to the Shire for its consideration in finalising its Policy. **Height** In relation to the height of the WTG, clause 5.13.3 of Local Planning Scheme No.21 (**LPS21**) specifies that maximum height limits specified under the Scheme do not apply to wind farms (including masts), provided the structure is sited and/or treated so as not to detract from the visual amenity of the locality. LVIA has been a significant focus of investigation and reporting in relation to this Proposal. Whilst it is acknowledged the proposal will have a visual impact, the number of WTG has been reduced to a maximum of 20 from an initial 30 WTG layout. and the WTG will be coloured white or light grey to minimise visual intrusion to the extent possible. **Setbacks** The Proposal generally complies with a range of setback requirements set out in LPS21, DBCA guidelines, the Shire's Draft LPP23 and Draft State Code, with only minor variations proposed. WTG will be setback a minimum of 100m from the edge of permanent streams and comply with or exceed LPS21 setbacks to boundaries. The Proposal is not able to achieve a 30m setback to intermittent watercourses required by the LPP. A 1500m setback from existing sensitive premises is proposed (in lieu of 1600m in the Draft LPP). A setback of 1.1 times blade tip height from non-host lots and road reserves, and existing and approved habitable buildings on host and non-host lots will be achieved. WTG will also be setback 100 m from road reserves (measured form their centrepoint) in line with DBCA advice (see Section 2.2, issue 2). **Land Use Permissibility** A number of submissions held the view that the use is Industrial. In response, it is confirmed that a wind farm is specifically defined in LPS1 and an 'A' (discretionary) use in the General Agricultural Zone. It is not defined as an Industrial land use.
	Concerns were raised regarding the involvement of the Augusta Margaret River Clean Community Energy (AMRCCE) and the integrity of the DAP process.	SynergyRED became aware of the wind farm proposal led by the Augusta-Margaret River Clean Community Energy (AMRCCE) in late 2022 while engaging with landowners in the area. SynergyRED commenced engagement with AMRCCE in late 2022 and Synergy entered into an agreement to assume ownership and responsibility for the AMRCCE development in early 2023. Since then, SynergyRED has led the development of the Proposal in line with Synergy's decarbonisation strategy. The use of the **DAP** pathway is a transparent, statutory, and valid standard approach to considering and determining Development Applications.
8 Impacts on agricultural land & rural productivity	The proposal may result in direct and indirect loss of productive agricultural land and disruption to farming operations.	In principle, wind farm projects do not compromise the ongoing use of land for agricultural purposes – the average impact of a wind farm footprint is approximately 1-2% of the land area. This is inclusive of using pre-existing access tracks, so the area lost to productive agriculture is typical less than 2%. This allows agricultural activities to continue, whilst providing landowners with an additional income stream. In turn, this allows for more financially sustainable farming given the seasonal, and often high-risk nature of agriculture, which is further exacerbated by climate change.

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		Often, the positioning of WTG involves broad consultation between the Proponent and landowners to ensure agricultural activities are considered – this is one of a wide range of considerations that are taken into account in the preparation of a Development Approval application and determining the final layout of WTG and other infrastructure.
	Concerns were raised regarding contamination risks and altered drainage affecting agricultural viability.	SynergyRED will manage contamination and drainage risks through detailed hydrogeological assessment and strict CEMP/ASSDMP controls, and because the wind farm occupies only a very small portion of largely cleared grazing land, and agricultural viability and farming operations will remain unchanged.
	Impacts on livestock, including animal welfare, behaviour and productivity due to noise, vibration, shadow flicker and infrasound exposure.	There is no evidence to support the view that wind farms have a negative impact on livestock. Livestock are known to use WTG towers for shade, shelter, and as a rubbing post. Meat and Livestock Australia updated wording on the Livestock Production Assurance (**LPA**) website, communicating "...it is safe for livestock to graze in a paddock which also contains solar panels, WTGs and turbines or other equipment."
9 Impacts on property values, investment & rural lifestyle	Submissions expressed concern about declining property values and reduced rental demand, and impact on investment by Proponents in the Augusta townsite as a result of the Wind Farm.	Independent evidence shows no consistent link between wind farms and reduced property values, and broader factors—such as access to services, amenities, land availability and revenue-generating potential typically play a much stronger role in influencing local property and investment outcomes. Property values are not a valid planning consideration in any case.
	Some submitters indicated they would reconsider their plans for investment in planned residential, commercial or cultural projects due to visual and amenity impacts.	Noted.
	Concern regarding increased insurance prices or insurance denial due to increased fire risk.	A BMP has been prepared to support the proposal. Whilst the whole site is declared a 'Bushfire Prone Area', a BAL assessment and associated **Appendix F**: Bushfire Management Plan (BMP) and **Appendix E**: Bushfire Risk Management Plan (BRMP) determined that the risk can be reduced through the implementation of APZ which are cleared and managed area around a house or building that reduces bushfire risk. The WTG will also be designed with fire detection and suppression systems to further reduce risk. As noted by the Australasian Fire and Emergency Services Authorities Council, the likelihood of WTG fires is considered to be low given appropriate protection measures are applied.
10 Impacts on tourism & local economy	Visual industrialisation was raised as a risk to visitor numbers and tourism-dependent businesses. Concern was raised that the proposal may undermine Augusta's reputation as a nature based tourism destination.	It is not expected that the proposal will result in adverse impact to visitor numbers and tourism dependent businesses. The Augusta area provides a range of tourism attractors which are not expected to be adversely affected by this proposal. As with the Albany Wind Farm which is a significant local tourist attraction, a viewing platform and suitable renewable energy interpretive information will be developed to further diversify the tourism experience for visitors.
	The Proposal will not result in significant employment numbers, or the employment of local people.	The construction phase alone could provide economic benefit into the region, supporting local contractors, suppliers, accommodation providers, and businesses. It could also generate up to 150 new job opportunities. Local employment will be encouraged.
11 How the project will contribute to community benefits & energy equity	Electricity generated would be exported to Perth with no improvement to local energy reliability despite ongoing outages.	Western Power is responsible for ensuring the reliability of electricity supply to homes and businesses. The reliability of power supply in any Town depends on many factors, including the condition of local poles and wires, transformers, and other parts of the distribution network. These assets are owned, managed, and maintained by Western Power. Renewable energy generated by the Proposal would be exported to the existing Western Power 132kV transmission line near Beenup substation. From here it would flow to Augusta, Scott River, Molloy Island, Alexandra Bridge, East Augusta, Karridale, Hamelin Bay, Forest Grove and the rest of the energy system.
	Submissions noted the absence of community ownership, benefit-sharing or cooperative models.	SynergyRED acknowledges that the Proposal does not incorporate community ownership, benefit-sharing or cooperative investment models. It does, however, include a $100,000 per-year Community Benefit Fund , a publicly accessible tourist

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		viewing platform, engagement with local businesses to maximise Regional participation during the procurement phase, and the creation of full-time operational roles for the operational life of the wind farm.
	Concern regarding how the Community Benefit Fund will be ensured.	SynergyRED has committed to providing a Community Benefit Fund of $100,000 per year, indexed to CPI, as part of the Development Application. Its commitment is expected to be applied as an Advice Note, consistent with other recent Wind Farm determinations. SynergyRED will align the implementation of the Fund with DEED's Community Benefits Guideline, which was released on 4 March 2026.
	Concern regarding how the Community Benefit Fund will be allocated.	SynergyRED will align the implementation of the Fund with DEED's Community Benefits Guideline.
	Concern that the Community Benefit Fund will not offset ongoing/permanent impacts experienced by nearby neighbours, and impact on the land.	SynergyRED acknowledges that the Community Benefit Fund is not designed to offset individual or property-specific impacts. Rather, it provides a stable, long-term mechanism for broader community benefit, while potential impacts on neighbouring landholders are addressed directly through technical assessments, regulatory compliance and enforceable management plans.
	Concern the Proposal will bring negatives to Augusta without any benefits	SynergyRED is committed to managing or mitigating any potential impacts associated with the Proposal in line with regulatory requirements. Beyond understanding if the Proposal is feasible, the feasibility assessment provided valuable information to tailor the Proposal's design to reduce impacts and enhance benefits. Whilst the WTG would be visible from Augusta, if the Proposal proceeds, there could be a number of benefits to Augusta. In addition to the Community Benefit Fund, the construction phase alone could provide economic benefit into the region, supporting local contractors, suppliers, accommodation providers, and businesses. It could also generate up to 150 new job opportunities. Beyond construction, the Proposal could position the Augusta Margaret River region as a frontrunner in Western Australia's energy transition, demonstrating leadership in adopting sustainable infrastructure. This is further supported by SynergyRED's development of a Tourist Viewing Platform to support increased tourism to the area. Augusta would also receive renewable energy generated by the Proposal, as electricity generated by the Proposal would flow to Augusta, as well as Scott River, Molloy Island, Alexandra Bridge, East Augusta, Karridale, Hamelin Bay, Forest Grove and the rest of the energy system.
12 Traffic, roads & roadside vegetation	Increased construction and operational traffic may require road upgrades, posing risk of clearing of native vegetation, erosion, sedimentation, and long-term environmental degradation. Movement of blades and other equipment may create safety concerns for tourist coaches which access roads in the area.	There is limited modification expected to current roads in the area to accommodate the Proposal. Any impact would be limited to the construction phase and not the operational phase where little to no traffic will be generated. Predominantly, existing roads and access tracks will be used. An OSOM Route Assessment concluded minor modifications to road design are required to accommodate vehicles transporting blades and other infrastructure. Any oversized movements, such as blades, would be approved by Main Roads WA (**MRWA**) Some minor vegetation clearing will be required for the main accesses on Scott River Road, which will be addressed through the CEMP. A Traffic Impact Assessment (**TIA**) was also undertaken and identified that vehicle movements during construction will have low to moderate impact and can be accommodated within the existing capacity of the road network.
	Particular concern was raised for mature karri trees along Scott River Road.	There will be no clearing of mature Karri trees along Scott River Road.
13 Extreme weather, fire & safety	Submissions raised safety concerns regarding whether turbine design adequately considers extreme wind forces in the area.	WTG used in Australia are required to meet strict international engineering and safety standards that account for extreme wind events. As part of the detailed design phase, the selected WTG model will undergo site-specific engineering assessments to ensure it is suitable for the conditions at Scott River. These standards are designed so WTG can operate safely across a wide range of weather conditions.

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	Submissions raised concern the Proposal inadequately addresses bushfire-related risks (e.g., restrictions on aerial firefighting which may impact a broader area).	A BMP and BRMP have been prepared to address bushfire-related risks. SynergyRED is committed to having fire detection and suppression systems as standard, and in the unlikely event of a WTG fire, WTG can be paused remotely to support aerial firefighting operations. SynergyRED has consulted with DFES and DBCA throughout the assessment process, and this consultation will continue through detailed design to ensure appropriate mitigation measures are in place. Aerial firefighting access will remain possible, with pilots determining safe operating conditions at the time.
14 Decommissioning & rehabilitation risks	Insufficient information was provided regarding decommissioning, rehabilitation and recycling of turbine components.	The Development Application provides an overview of the Decommissioning Strategy, which will be developed further following the Construction phase, and in accordance with the Appendix C Wind Farm in Scott River Preliminary Decommissioning Plan.
	Concerns were raised about long-term liability and responsibility for environmental remediation at the end of project life, and whether funds are available for removal of turbines and resolving site remediation and contamination removal.	The project owner holds full financial responsibility for all end-of-life works, ensuring WTG removal, site rehabilitation, and any required contamination remediation are fully funded and not transferred to landholders or external parties.
	Concern was raised regarding the limitations on future land use following decommissioning.	Following decommissioning, the land will be returned in a condition where it can continue to be used for agricultural purposes. It is not feasible to remove all infrastructure, including footings and subsurface components. Removal of sub-surface infrastructure is only required to ensure compatibility with the intended land use. In some cases, leaving subsurface infrastructure in place may be preferable, for example, to minimise excavation in areas with ASS, as is the case with the subject land. It can also be more sustainable to leave some infrastructure (e.g. buildings, access tracks and water tanks) in place where these can be used by the landowners. The preferences of landowners at the time of decommissioning will be considered. The overall objective is to minimise adverse impacts on the environment, which is not always consistent with excavating all subsurface infrastructure.

3.3 Other Submissions of Objection (369 submissions)

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1 Aboriginal heritage	Scott River area holds cultural significance for TO's. Inadequate consultation has occurred with traditional owners and risks to cultural sites.	SynergyRED has entered into a Noongar Standard Heritage Agreement (**NSHA**) with KKAC on behalf of South West Boojarah People. The NSHA outlines the processes for conducting Aboriginal heritage surveys and assessments. An Ethnographic and Archaeological Site Avoidance Heritage Survey has been conducted within areas of potential disturbance.
2. Cumulative impacts & precedent	The proposal may contribute to cumulative environmental, visual and social impacts when combined with existing or future developments.	SynergyRED is not aware of any other proposals for wind farms in the vicinity. Should other developments be proposed, these will be assessed by regulatory bodies in accordance with the current statutory and policy framework at that time, which is expected to consider cumulative impacts e.g. noise, road transport, visual impact etc.
	Objectors argued that cumulative construction impacts across the site have not been adequately assessed.	Cumulative construction impacts have been considered as part of the technical assessments submitted with the Development Application. Construction impacts such as noise, traffic, dust and ground disturbance will be managed through the CEMP. This will outline measures to minimise and coordinate activities across the site, ensuring impacts are appropriately managed and do not exceed acceptable levels.
	Submissions raised concern that approval may set a precedent for further large-scale energy infrastructure in the region.	Should other wind farm developments be proposed, these will be considered by the regulators in the context of the planning framework and other statutory and policy context at the time. Each application is considered on its respective merits.

3.4 Submissions of Indifference (7 submissions)

No.	KEY THEME	SUMMARY OF KEY ISSUES	RESPONSE
1	**Submissions appeared to support an opposed position**	No formal environmental assessment Concern Shire representatives are both pro renewable Concern regarding scale of Proposal Threats to wildlife Risks of ASS Increased risk of fire Impacts to visual amenity and tourism Lack of consistent and transparent communication Health impacts	Refer to technical information contained in Development Application and responses to matters raised in Agency and Community submissions.
2	**Submissions were supportive subject to conditions**	Supportive subject to no adverse wildlife impacts Supportive subject to size of Proposal being reduced, adequate bushfire management	Impacts to wildlife and management of bushfire risk have been addressed in the technical reports included in the Development Application and found to be acceptable. Following consideration of a level of assessment of the Proposal under State and Federal legislation, no formal assessment of the proposal has been required. The size of the Proposal is not able to be reduced due to technical and feasibility considerations.
3	**Position could not be determined on basis further information is required.**	Will the Proposal improve power reliability in Augusta How will it be ensured that the commitment to implement CBF is delivered Will layout be adjusted to avoid ASS and when will this be conducted Shadow flicker modelling – is this per WTG, near buildings or in general farm areas What is the recommended distance that houses be built to WTG, is this distance considered when putting turbines near boundary fences Noise from WTG, the feasibility study doesn’t mention the noise from the WTG and hence distance from houses.	Addressed in themes above

Appendices

Appendix A: Proposed Wind Turbine Envelope

Proposed Wind Farm in Scott River - Proposed Wind Turbine Envelope

Consideration

The Scott River site presents a complex combination of environmental, technical, and planning constraints that must be balanced when determining appropriate turbine placement. The Draft Renewable Energy Planning Code currently proposes a 100 m micro-siting radius. However, SynergyRED understands DPLH is likely to increase this based on industry feedback during the public consultation sessions. To support both the Shire's need for certainty and the Project's technical requirements, SynergyRED proposes a refined, and constraint informed micro-siting approach for consideration as set out below.

1. Planning Context

- Whilst the Draft Code proposes a wind turbine envelope with a radius of 100 m, SynergyRED understands that DPLH is considering increasing this distance in response to strong industry feedback during DPLH consultation sessions that 100 m is too restrictive.
- The Shire's Draft LPP 23 (which is yet to be adopted) includes a 100 m micro-siting provision which reflects the approach in the advertised Draft Code.
- As SynergyRED lodged its Development Application prior to the release of both the Draft Code and Draft LPP 23, it did not consider these in preparing its site layout.
- Recognising this, SynergyRED proposes the following alternative approach to that set out in Item 2 of the Shire's RFI dated 23 January 2026 that is technically robust and reflects the particularly complex nature of the subject site.

2. Proposed Approach

SynergyRED proposes that all turbines be located within the 'constraint free area' (shown by the hatched yellow on the plan[1] provided) **and** with the final location within a 500 m radius from the currently proposed turbine locations.

Application of this approach using the 500 m buffer results in a substantially smaller development envelope than that applied under the development approval application (approximately 286 ha, or 8% of the 3,597 ha Development Envelope.

We understand DPLH is currently considering increasing the current 100 m radial distance to 300 m in response to preliminary feedback on the Draft Code's micro-siting provisions.

Table 1 below outlines the various buffer distances considered and the corresponding available area for development under each scenario.

[1] Note this plan may need to be updated to reflect amended turbine layout in response to Shire RFI and revised LVIA.

Table 1: Buffer distances and developable area for micro-siting[2]

Development Envelopes	Total area (ha)	Constraint free land* available for micro-siting of turbines (ha)
Original Development Envelope	3,597	536.53
100 m radial buffer	62.8	35.0
200 m radial buffer	251.3	96.5
300 m radial buffer	565.5	160.5
500 m radial buffer	1488.9	285.7

** Constraint free land is depicted as the 'constraints-based wind turbine envelope' (yellow hashed polygon) on the provided plan.*

Why this approach is more robust

We believe this method provides a balanced and technically robust approach to flexibility for micro-siting, while ensuring all relevant constraints remain fully protected.

The 'constraints free area' (i.e. constraints-based wind turbine envelope' on the provided plan) has been deliberately designed to exclude all areas where turbine placement would be unsuitable for technical reasons (e.g. environmental constraints) and/or inappropriate or inconsistent with regulatory expectations and our Project commitments, including:

- Sensitive receptors - 1,500 m buffer.
- Existing transmission line - 240 m buffer (2 × 80 m blade length × 1.5).
- Roads - 242 m buffer (1.1 × 220 m tip height).
- Registered and lodged heritage sites - 80 m buffer (blade length).
- Landholder development exclusion areas (e.g., dairy operations, centre-pivot irrigation).
- External freehold boundaries - 240 m buffer (1.1 × 220 m tip height).
- DBCA-managed land (Reserve 42377, Lot 101) - 100 m buffer.
- Native vegetation - 100 m buffer, including all potential black cockatoo habitat trees, wetland areas, and covenant areas.

[2] Based on the proposed maximum 20 turbines

This approach provides a more technically robust basis for identifying micro-siting, and:

- Ensures turbines can only be placed in areas already demonstrated to be free from mapped environmental and land-use constraints.
- Provides sufficient flexibility but is still a tightly defined envelope for turbine placement.
- Offers greater transparency and certainty because it is grounded in measurable, defensible, site-specific constraints rather than arbitrary buffers which do not consider technical findings or other constraints such as boundary setbacks.
- Ensures no greater environmental or social impact than what has already been presented and assessed, when combined with Project commitments.

From a visual impact perspective, applying a 500 m micro-siting radius provides limited flexibility to relocate WTGs, given the constraint-free area on the plan in Figure 1 below. Using this approach, the 'horizontal spread' of the total wind farm will not be able to increase from most key viewpoints (the south west around Augusta). That is, the most northern turbine and southern turbine cannot move any further away from the center of the site which therefore limits any increase to visual impact. Hence, any future turbine relocation is not expected to materially increase visual impacts from those identified in the updated visual assessment, completed to address DPLH's comments (see Section 2.1 - DPLH Agency Response).

3. Summary of SynergyRED's position

SynergyRED proposes that all turbines be located within the 'constraint free area' AND within a 500 m radius from the current proposed turbine locations.

This proposed micro-siting approach represents a technically robust, low risk and defensible approach that:

- Provides clarity and certainty to the Shire.
- Maintains technical feasibility for the Project.
- Ensures no increased environmental or social impacts.
- Aligns with the evolving intent of the Draft Code and Draft LPP 23.
- Provides transparency to turbine location and transparency in decision making.
- Reflects feedback from both the Shire and DPLH consultation.

We believe this methodology offers the most balanced path forward for assessment, approval and future implementation.

4. Proposed Condition of Development Approval (Draft)

The following draft condition has been prepared for consideration by the Shire and DAP in the preparation of the Shire's RAR and determination of the application, respectively. The condition is based on the SDAU's decision on Narrogin Wind Farm (September 2025), and adapted to this Project, applying the rationale outlined above:

XX. Prior to the commencement of development, a Micrositing plan, drawn to scale and provided in a suitable format, shall be submitted for approval of the Shire of Augusta-Margaret River identifying the footprint at ground level within which each turbine must be located. The footprint for each turbine identified in the Micrositing plan:

a. *Must be no more than 500 m in any horizontal direction from the centre of the turbine at ground level as shown on the approved plans; and*
b. *Must be located within the Constraints Based Wind Turbine Envelope identified on approved Map No.XXX which forms part of this approval; and*
c. *Must not be within 1.1 times blade tip height from non-host lots, reserves located outside the Development Envelope, road reserves, and existing and approved habitable buildings on host lots and non-host lots.*

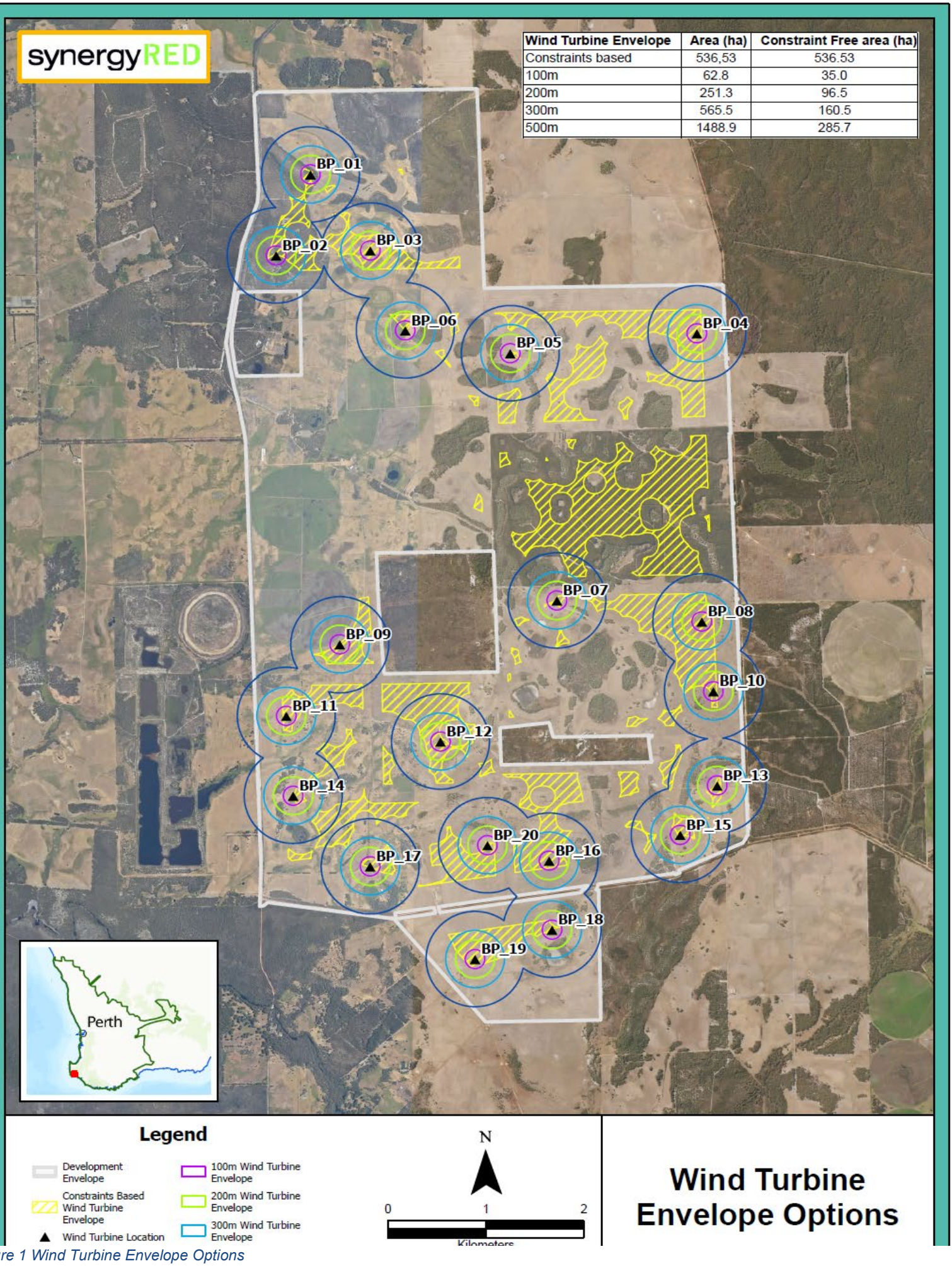

Figure 1 Wind Turbine Envelope Options

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PART C – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals

2. Meeting Closure